Student-led rehabilitation groups and clinics in entry-level health education: a scoping review.

WYNNE, D. and COOPER, K.

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Student-led rehabilitation groups and clinics in entry-level health education: a scoping review

Abstract<level 1 heading>

Objective: The purpose of this review was to identify, map, and describe the characteristics of student-led physical rehabilitation groups and clinics in entry-level health education.

Introduction: Student-led groups and clinics for physical rehabilitation are an emergent phenomenon in entry-level health professional education. Data gathered in this scoping review aimed to provide an understanding of the range and scope of student-led groups and clinics within a physical rehabilitation context and establish the evaluation undertaken to date from a student, service user, and stakeholder perspective. It also aimed to identify other important factors in the design, execution, and feasibility of the concept. Finally, it aimed to identify gaps in the literature that can be addressed by further research.

Inclusion criteria: This scoping review considered studies and sources that identify student-led methods for carrying out physical rehabilitation for service users in either an exercise group or clinic environment. Students and groups/clinics on entry-level qualifying courses were considered. The review considered primary and secondary research in any paradigm as well as text and opinion articles.

Methods: The JBI methodology for conducting scoping reviews was employed. The following databases were searched: MEDLINE, CINAHL, AMED, ERIC, Scopus, and SPORTDiscus. Searches were limited to January 1, 1998 to the day of the search (November 1, 2019). Non- English articles were excluded. To supplement the review, searches for gray literature were also undertaken. Data extraction was performed by two reviewers using a pre-determined data extraction form developed by the authors.

Results: The results of the review are presented in narrative form and supported by tables and figures. This review identified 523 sources of information of which 111 were screened at full-text stage and 48 sources were eligible to be included in the final scoping review. A wide range of student-led groups and clinics that provide physical rehabilitation exist globally. Drivers for the clinics and groups vary; key aims included providing a learning environment for student skill development, serving as clinical placements, and providing a social enterprise. Evaluations focused on student experience, service user experience, and cost-benefit analyses.

Conclusions: Student-led groups and clinics are at very different stages of development and use within entry-level curricula. The objectives and drivers for groups and clinics vary immensely worldwide, and therefore the evolution of groups and clinics has driven a wide and varied number of models globally.

Keywords: learning; outcomes; rehabilitation; student-led clinics; student-led groups

Introduction<level 1 heading>

Student-led groups and clinics are becoming more prevalent in entry-level health education worldwide.[1] Student-led groups and clinics are modes of student-led health interventions where students learn professional skills and competencies[2] and take primary responsibility for organizing and leading a health care service.[3] In these models, the students and health services are generally overseen by qualified health practitioners.[4]

Commonly used and established within the medical education curriculum,[3] student-led clinics are believed to originate in the United States[5] and involve students being responsible for leading many aspects of a clinical service.[2] This experience can be often be similar to that of a clinical placement, where students are supervised by a qualified practitioner[5]; however, the operations are led and directed by students who are responsible for aspects, such as clinical procedures, as well as administrative tasks, such as appointment bookings.[6] More widely, this model is beginning to be adopted as an integral part of the entry-level curricula of health professionals (HPs).[1] Rather than solely providing the traditional diagnostic and interventional procedures common to medical student-led clinics,[3] these initiatives can also provide physical rehabilitation and services to those with long-term health conditions by involving a wider group of student HPs.[5] Similar models of student-led groups for physical rehabilitation are used within the health and exercise field of kinesiology and sports therapy, with experiential learning a key driver for their implementation.[7] Health professionals, for the purposes of this review, can in the widest sense be considered to include nurses, pharmacists, the allied health professions, such as physiotherapists and occupational therapists, as well as exercise professionals, such as kinesiologists and sports therapists.

The terms “student-led groups” and “student-led clinics” are both commonly referred to as student-led groups and a variety of cohorts of students are included in this concept.[8] Student-run free clinics (SRFCs) are operations delivered by students that tend to focus on serving marginalized populations.[9] Another method of student-led health-service delivery is service learning, which is defined as an experiential learning opportunity that combines clear educational goals and service to the community.[10] Therefore, student-led groups and clinics are often defined as a type of service learning. For the purposes of this review, the term “student-led groups and clinics” will be used to encompass the above concepts (ie, student-led groups, student-led clinics, SRFCs, and service learning).

Internationally, the drivers for the adoption of student-led groups and clinics varies as does the tasks and activities undertaken by students.[11] Student-led groups and clinics are emerging around the world as a means of providing support to under-served populations.[11] The first documented student-led groups in the USA utilized the pro bono model, which was devised to provide a student-led clinical service to under-served populations at little or no cost.[11] Student-led groups and clinics are implemented in both university and interprofessional frameworks.[12] Some professional regulators have a requirement for university-professional, student-led groups and clinics to take place as an integral part of the

curriculum.[1] Interprofessional frameworks for the student-led group and clinic model are becoming more prevalent in entry-level HP education,[12] noted in particular for improving interprofessional collaboration skills and attitudes,[12-14] as well as a cost-effective means of fulfilling health-service delivery gaps.[3]

More recently, interest has grown with regard to using student-led groups or clinics as a potential substitution for clinical placement hours in some parts of the world, in the face of clinical placement capacity challenges.[15,16] Student-led groups and clinics have been noted to provide high-quality, low-cost health care services[17] as well as a feasible solution for student learning,[15,18] and are therefore proposed as a sustainable model for clinical education.[19] Student-led groups and clinics are a relatively new phenomenon in Europe[20]; however, anecdotally, it is accepted that student-led group and clinic learning have formed a part of entry-level health care education as a means of providing contextualized learning[21] alongside the well-established model of high fidelity simulation, which can further enhance clinical reasoning. High fidelity simulation is concerned with the imitation of real-world scenarios, often of patient encounters, to allow students to practice their skills, learning, and reasoning.[22] High fidelity simulation, whilst established with a well-founded place in the curriculum,[23] is recognized as a different learning experience and therefore not directly comparable[24] with student-led groups.

The objectives of student-led learning in the rehabilitation context are to target specific skills development and to experience real life health care with varied populations and conditions.[1] This is considered to not only provide benefit to students themselves but also to the service users involved in the rehabilitation process.[20]

Although medical and clinic-based student-led services, such as those run by medical, nursing, or pharmacy students, are prevalent within entry-level curricula internationally,[11] such clinics often follow the medical model and may only comprise diagnostic and single interventions for practices, such as imaging and prescription of medication.[3] It is recognized that students participating in student-led or service-led activities learn about the specific context in which the service is provided and the skills required for that service and practice.[18] To that end, as this scoping review is concerned with physical rehabilitation, the scope is limited to studies that can demonstrate elements of physical rehabilitation, either by inclusion of physical rehabilitation professionals and/or inclusion of exercise as an intervention as part of the group or clinic.

The concept of a student-led group or clinic is a teaching methodology[25] with a focus on developing students' learning and skills.[23] In addition, student-led groups and clinics are considered to be a supervised health service for service users[26] and a social enterprise[8]; therefore it is of interest to scope all of these aspects as part of the review. Student-led groups and clinics are considered to have mutual interest for both students and the service users involved, thereby providing benefit for all.[7] This scoping review aims to establish the literature base in these areas.

Data gathered in this scoping review will allow for an understanding of the range and scope of student-led groups and clinics within a physical rehabilitation context and establish the evaluation undertaken to date from a student, service user, and stakeholder perspective, as well as identification of any other important factors in the design, execution, and feasibility of the concept. It will also identify gaps in the literature that can be addressed by further research.

A preliminary search was undertaken in CINAHL, Cochrane Library (Systematic Reviews), Education Search Complete, ERIC, PEDro, PubMed, PROSPERO, Scopus, and the *JBI Database of Systematic Reviews and Implementation Reports* to establish whether systematic or scoping reviews published or in-progress on this topic already exist, and none were found. This scoping review, therefore, provides the first mapping of student-led physical rehabilitation groups and clinics in entry-level health care education.

The objective of this scoping review was to identify, map, and describe the characteristics of student-led physical rehabilitation groups and clinics in entry-level health education.

Review questions<level 1 heading>

- What types of student-led groups or clinics with a physical rehabilitation focus exist?
- What are the characteristics of these groups (such as but not limited to, structure of groups or clinics, how the groups or clinics are run, who runs the group or clinic, and types of service users involved)?
- How are student-led groups or clinics currently evaluated and what outcomes are used?
- Who is evaluated and how are these evaluations undertaken? Including consideration of participants and service users, as well as students running the groups and other relevant stakeholders.

Inclusion criteria<level 1 heading>

Participants<level 2 heading>

This review considered entry-level students involved in student-led groups and clinics in the fields of health professions and sport. This definition has been modified from the original published protocol[27] to more accurately reflect the scope and role of HP globally, which is relevant for this review. These are university or interprofessional groups, including HP entry-level students and/or sport students involved in student-led groups (eg, kinesiology, sports and exercise students, or sports therapy students). These aforementioned sports students, whilst not always considered under the traditional HP banner, have implemented physical rehabilitation in student-led groups and clinics within entry-level sports curricula for some

time.[7] It is considered there may be concepts of these long-established groups and clinics in sport that may be of direct relevance to this review. For the purposes of this review, entry-level health professional students as well as kinesiology, sports and exercise students, and sports therapy students are considered under the term of HP.

Concept<level 2 heading>

The concept was student-led physical rehabilitation groups. This review considered student-led groups with all types of service users and group participants that included a physical rehabilitation component. For example, this included those with both specific and multiple pathologies who received physical rehabilitation as an element of the group.

Any student-led group or clinic that included only diagnostic and/or medical interventions with no physical rehabilitation element were excluded from the review.

The particular aspects of this concept that were of interest were as follows.

i. Types and characteristics of student-led groups and clinics, which included types of student-led physical rehabilitation groups and clinics in existence; characteristics of student-led physical rehabilitation groups and clinics; purpose of the student-led physical rehabilitation groups and clinics; content and nature of the student-led physical rehabilitation groups and clinics, and where in the curriculum student-led rehabilitation groups and clinics take place.

ii. Evaluation of student-led groups and clinics, which included reported learning undertaken by students who experience student-led physical rehabilitation groups and/or clinics; reported student assessment practices used for students who experience student-led physical rehabilitation groups and clinics; reported measures used to capture student-led rehabilitation groups' and clinics' effectiveness and acceptability from group participants' perspectives; reported measures used to capture tutors and stakeholders perceptions/observations of students during student-led rehabilitation groups and clinics; and reported measures used to capture feasibility and sustainability of student-led rehabilitation.

Context<level 2 heading>

This scoping review considered literature in the field of HP or sport entry-level education in developed nations. Developed nations were defined as very high human development (58 countries) in the Human Development Index.[28] Groups and clinics run by students, with a focus on physical rehabilitation were considered for inclusion. Groups and clinics within a public or private health care setting, including community and hospital settings as well as third/voluntary sector and other organizations (eg, education [university] facilities) were considered for inclusion. Therefore, groups and clinics where students were both volunteering and/or there as a standard part of their curriculum or clinical education hours were eligible for inclusion. The students may or may not have been assessed as part of their

involvement in the group or clinic. Groups and clinics that undertook medical interventions or screenings alone were not included.

Types of sources<level 2 heading>

This scoping review considered primary and secondary research using quantitative, qualitative, and mixed methods study designs for inclusion. This is more explicit than stated in the protocol, which stated qualitative and quantitative studies. In addition, text and opinion papers were considered for inclusion in this scoping review. The review also considered documents developed by professional organizations and accrediting bodies who are responsible for the development and oversight of student-led groups and clinics in entry-level HP education.

Only articles published in English were included as this is the only language the reviewers understand, and the authors had time and resource constraints. Articles retrieved from MEDLINE, CINAHL, AMED, ERIC, SPORTDiscus (via EBSCO), and Scopus were included from January 1, 1998 until November 1, 2019 (the date of the search). Literature published from 1998 onwards was included as a previous literature review[7] did not find work in the area preceding that date.

Methods<level 1 heading>

This scoping review was conducted in accordance with the JBI methodology for scoping reviews[29] and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-analysis extension for Scoping Reviews (PRISMA-ScR).[30] This review was conducted in accordance with an a priori protocol.[27]

Search strategy<level 2 heading>

The search strategy aimed to locate both published and unpublished primary studies, reviews, and text and opinion papers in the field of student-led groups and clinics for physical rehabilitation. An initial limited search of MEDLINE, CINAHL, and ERIC was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles, and the index terms used to describe the articles were used to develop a full search strategy. The search strategy, including all identified keywords and index terms, was adapted for each included information source and a second search using all identified keywords and index terms was undertaken in the following databases: MEDLINE, CINAHL, AMED, ERIC, SPORTDiscus (all via EBSCO), and Scopus on November 1, 2019 (note a small amendment to the published protocol). The full search strategies are provided in Appendix I. The reference lists of articles selected for full-text review were screened for additional papers.

To supplement the review, sources of unpublished studies and gray literature searches included ProQuest Dissertations and Theses, Google Scholar, Open Access Theses and

Dissertations (OATD), and EBSCO Open Dissertations following a small amendment to the published protocol.

Study screening and selection<level 2 heading>

Following the search, all identified citations were collated and uploaded to RefWorks (ProQuest LLC, Ann Arbor, USA) and duplicates removed. Titles and abstracts were screened by two independent reviewers for assessment using the agreed inclusion and exclusion criteria for the review. Any disagreements were resolved via discussion. Full texts were obtained and screened by two independent reviewers, with disagreements resolved by discussion. As per guidance on scoping review methodology, there was no critical appraisal of methodological quality performed as part of this scoping review.[29]

Data extraction<level 2 heading>

Studies that met the inclusion criteria were reviewed in full and data extracted using the data extraction forms developed in a previous protocol.[27] The data extracted included specific details about the characteristics of the student-led group/clinic, aims and objectives of the group, content and design, as well as any evaluation of the group. This could include the students, service user participants, or any supervising staff (clinical or faculty). Two independent reviewers extracted data and any disagreements that arose between the reviewers were resolved through discussion. Authors of papers were contacted to request missing or additional data, where required.

Data presentation<level 2 heading>

Search results and article selections are summarized in a PRISMA flowchart.[31] The extracted data is presented in diagrammatic and tabular form in a manner that aligns with the objective of this scoping review. A narrative summary accompanies the tabulated and/or charted results and describes how the results relate to the review's objective and question/s.

Results<level 1 heading>

Study inclusion<level 2 heading>

The search yielded 615 records in total. This comprised 608 articles identified through database searching and an additional seven articles identified through other sources, namely gray literature searches. One source was identified via a hand search of the full-text reference lists. After duplicates were removed (n=92), 523 citations remained. The titles and abstracts of these were screened and 412 had irrelevant titles and/or abstracts and were excluded. The remaining 111 citations were considered for full-text review, and 63 were excluded at this stage as they did not meet the review inclusion criteria. Reasons for this included the group not being student-led (n=27), or there being no physical rehabilitation element to the group (n=34). Two articles had both of the aforementioned reasons for

exclusion. A full list of articles excluded at full-text screening stage with reasons is presented in Appendix II.

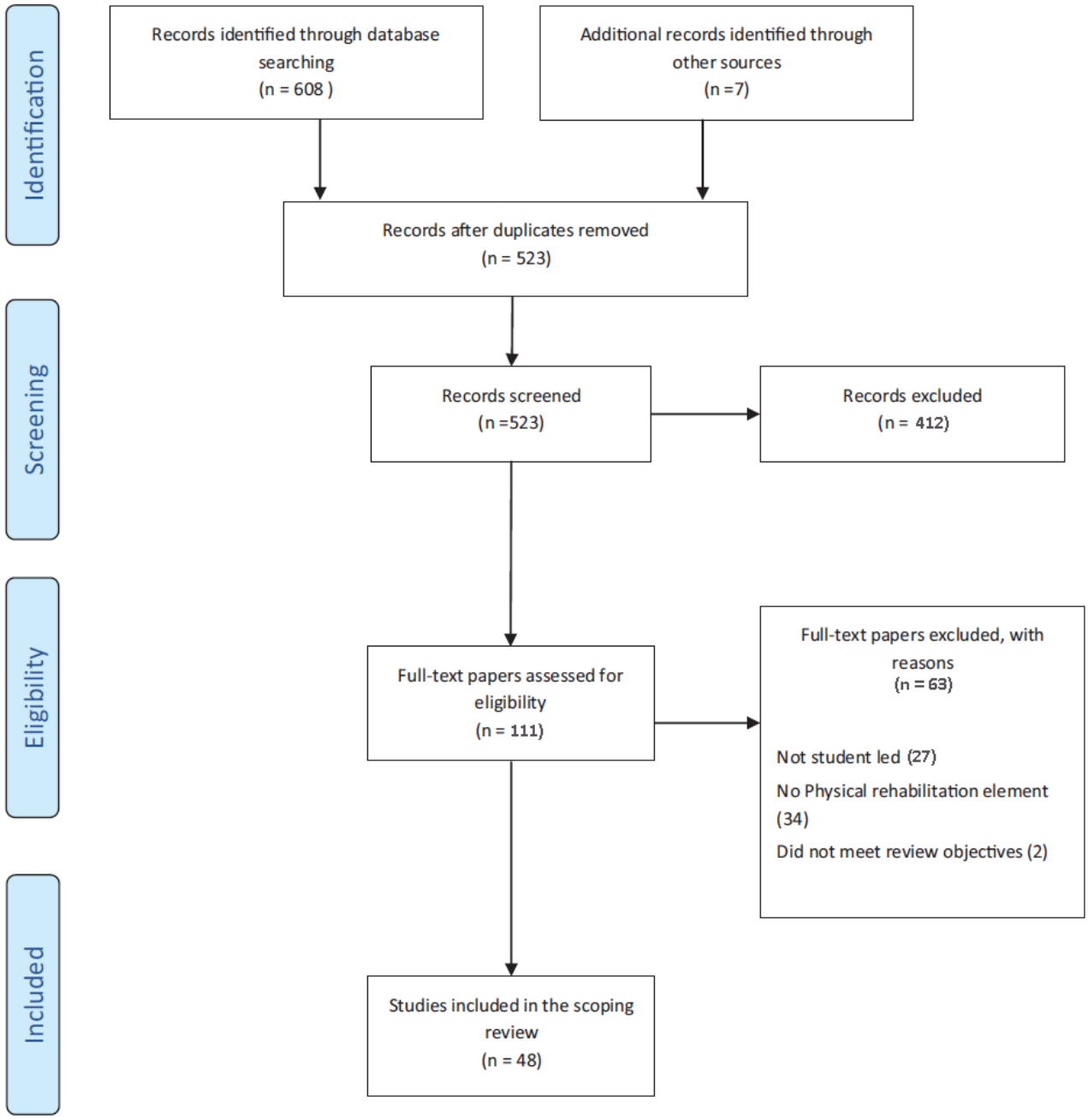

Figure 1: Search results and study selection and inclusion process[21]

Characteristics of included studies<level 2 heading>

Forty-eight citations were included in the final review. See Appendix III for a summary of all studies. These comprised 42 research studies (including descriptive studies, case reports, and qualitative and quantitative studies), two implementation reports, two help guides/project reports, and two webpages detailing student-led clinic outlines. The geographical location of sources varied. In total the sources came from six different countries with the majority (65%: 31 sources)[1,13,31-59] coming from the USA. Both help guides/project reports were sourced from the USA, as well as the majority of research studies (n=28). Australia had 19% (n=9)[5,8,16,26,60-64] of the sources, most of which were

research studies (n=7), as well as one project report and one webpage. The remaining countries were Canada (four research studies),[9,12,15,65] UK (one study and one webpage),[66,67] and Ireland[20] and Sweden[68] with one research study each. All studies had relatively small sample sizes, ranging from under 10 students to a maximum of 119, with the majority of studies including fewer than 50 participants.

Review findings<level 2 heading>

Types of student-led groups and clinics<level 3 heading>

A wide range of student-led groups and clinics that provide physical rehabilitation exist across the six countries from which they are reported. Of the 48 sources, 66% (n=32)[1,16,20,24,26,32,34-36,38-43,45-48,50,54,56-61,63,65-67,69] of these groups/clinics were led by university-professional groups, and 33% (n=16)[5,8,9,12,13,15,37,44,49,51-53,55,62,64,68] were interprofessional in nature. The university-professional, student-led groups were represented by 54% (n=26)[1,16,20,24,26,34-36,38-39,40,42,45,46,48,54,55,57-60,63,65-67,69] physiotherapy and 8% (n=4)[32,43,47,61] occupational therapy students. Exercise therapy/kinesiology denoted 4% (n=2)[15,50] of the total number of student-led groups identified by this review.

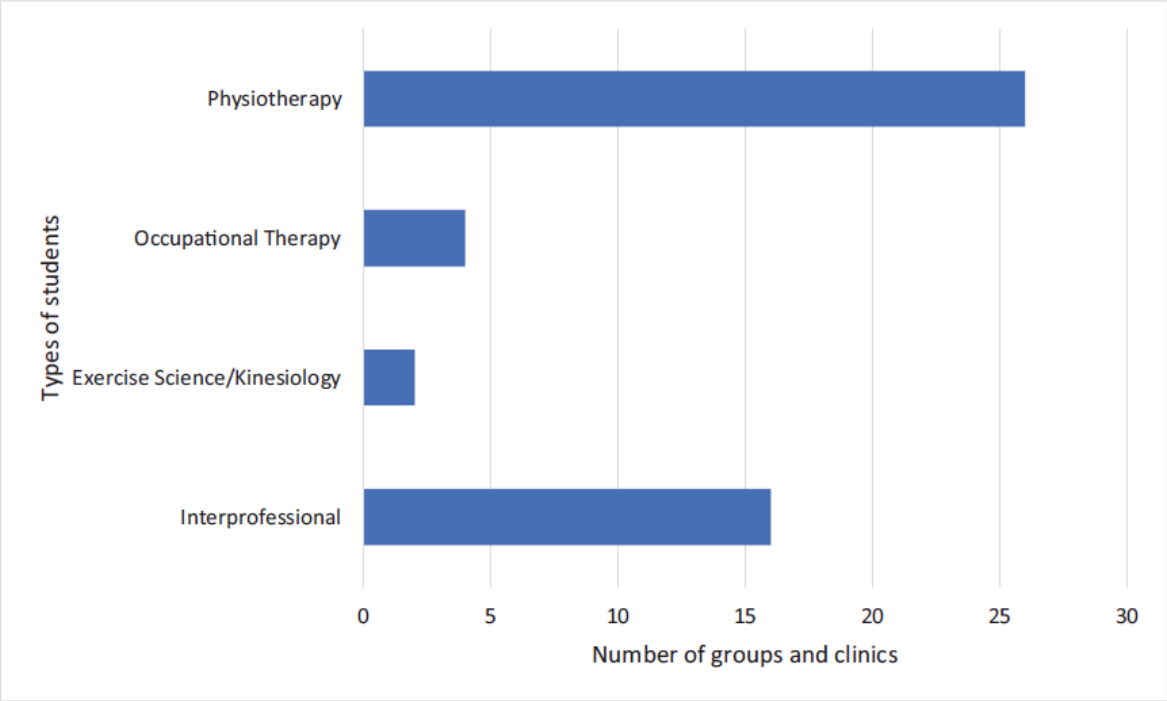

Figure 2: Types of students involved and number of student-led groups and clinics

Student-led groups and clinics have a wide variety of drivers. Key aims of the included sources ranged from providing a social enterprise and an altruistic approach to the provision of health care and rehabilitation to the under-served, to providing a basis for ongoing skills development through contact with service users. These aims were indicated across a wide variety of studies and sources, but the social enterprise and altruism objectives occurred most frequently in the USA. Provision of student-led groups and clinics as clinical placement hours is also a frequent driver for the model, and this was reported most frequently in Australia and Canada. Comments were made in some studies as to the sustainability of such

student-led models.[1,42,48,65] Sustainability was noted to be a greater challenge when student-led clinics were operated as part of a university department[68] requiring more staff resources, equipment, and access to the appropriate environment for client interactions.

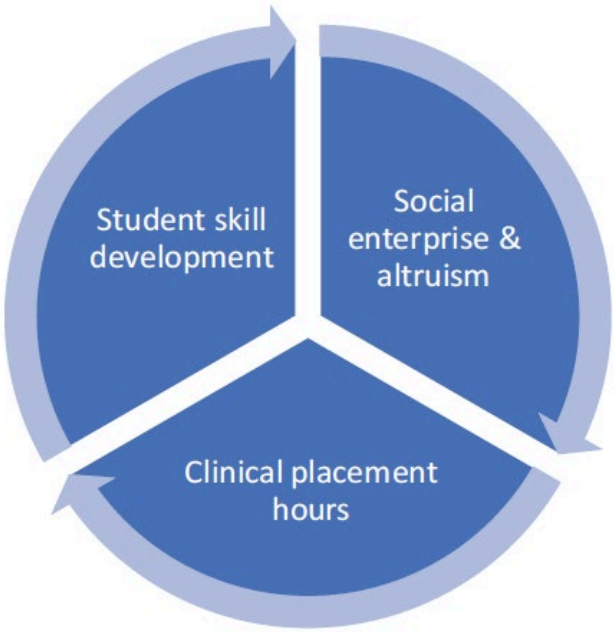

Figure 3: Aims of student-led groups and clinics

Characteristics of student-led groups and clinics<level 3 heading>

All groups and clinics in the review adopted a student-led model. Of these, 14 sources (29%)[24,32,35,37,41-45,47,50,56,61,66] featured student-led groups whereby service users undergo physical rehabilitation in a group exercise environment, either as in-patients, in community groups, or in residential homes. Thirty-one sources (65%)[1,5,8,9,12.13.15,20,26,34,36,38-40,46,48,49,51-55,59,60,62-65,67-69]ere student-led clinics where service users attended for individual physical rehabilitation as an out-patient.

Not all studies noted cost to service users as part of the student-led group or clinic, but for those that did, 20 sources (42%)[5,13,16,20,37-40,42,44-47,49,50,52,53,55,59,65] noted they were pro bono or free at the point of use and five sources (10%)[36,48,60,67,69] intimated a reduced fee or "dana" donation basis for clients attending. Two articles specifically reported on the financial sustainability and cost-benefit of the student-led clinic model.[16,54]

Types of clients attending and served by student-led groups and clinics varied. Where types of clients attending groups were reported, those who were under-served or uninsured were the most frequent recipients of physical rehabilitation (n=20, 42%), with the majority of those in the USA (n=15, 31%)[13,24,34,41-43,46,47,49,50,52-55], and the remainder in Canada (n=3, 6%)[9,12,15] and Australia (n=2, 4%)[16,64]. Those with neurological conditions were the next most frequent participants in groups, with 17% (n=8)[8,32,40,45,50,61,66,67] of those service users receiving rehabilitation in these settings in three countries: the USA, Australia, and the UK. Older people received physical rehabilitation at 13% (n=6) of student-led groups that were reported in the review; however, these were only reported in the USA. Members of the

general public were reported as having access to physical rehabilitation at 10% (n=5) of student-led groups across five countries, with one group in each: the USA,[36] Australia,[8] Canada,[12] Ireland,[20] and Sweden,[68] but not the UK. There was also one reported instance of community partners receiving physical rehabilitation in the USA (n=1, 2%).[35]

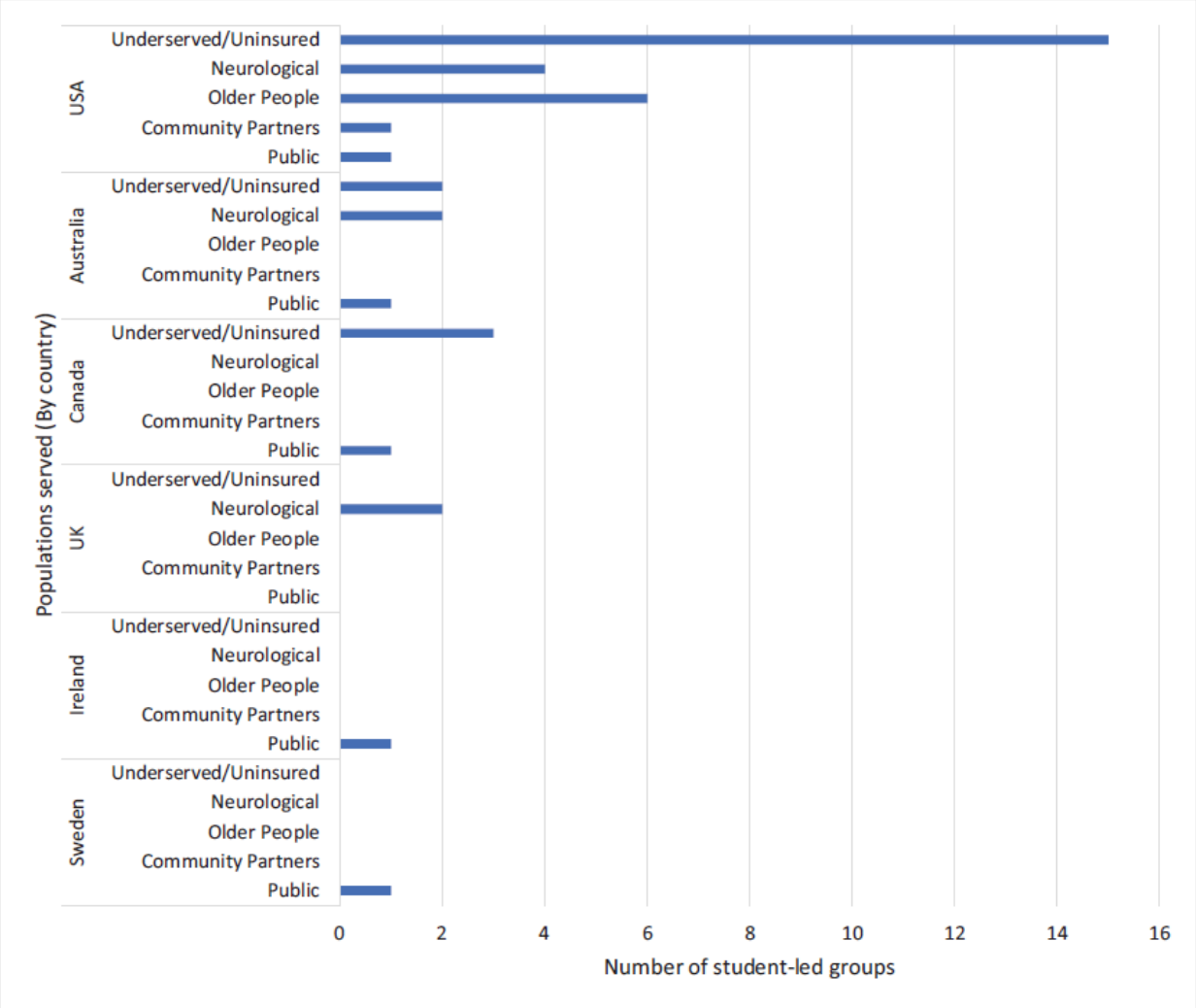

Figure 4: Populations served by student-led groups and clinics (by country)

The frequency and pattern of delivery of student-led groups and clinics varied, as well as their place in the curriculum. Eleven studies (23%)[8,24,32,42,44,45,47,50,56,61,65] had the student-led group or clinic as part of an academic module. Sixteen studies (33%)[13,34-36,38,40,43,46,48,49,51-55,66] reported running a student-led group or clinic as a learning activity outside the curriculum. Five studies (10%) had the student-led group or clinic as an integral and major part of the clinical placement experience; these studies ranged across three countries; Australia (n=2),[5,60] Canada (n=2),[12,15] and Ireland (n=1).[20] Of the 31 studies that described or evaluated student-led clinics, 32% (n=10)[13,35,38,45,50,51,57,59,60,65] reported that students' attendance at the clinic at the specified time in the curriculum was compulsory, and 26% (n=8)[5,40,46,48,49,52-54] reported that students could volunteer at the clinic. The remaining sources do not report this aspect. Where the commitment to clinic participation was reported as compulsory, this varied from a minimum of three hours to a range of

attendances over a period of weeks, and at times across three academic stages. Three studies reported a method of peer mentoring between student participants at the clinics.

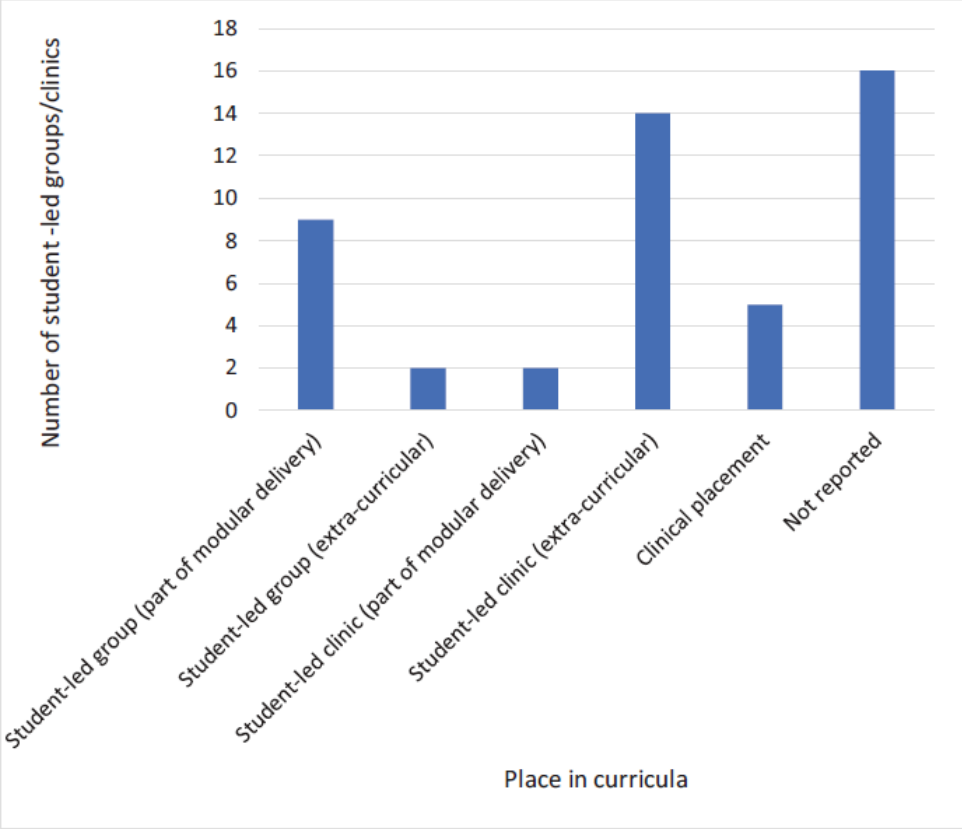

Figure 5: Place in curricula where student-led groups and clinics are delivered

Some of the included groups and clinics ran weekly and others at specified times in the year (eg, blocks of weeks or fortnightly). One study reported a student requirement to be involved in as many as 10 student-led group or clinic-based experiences over three semesters.[35]

Student roles in the groups varied. Students were responsible for a variety of roles and responsibilities and those reported mainly relate to service-user assessment and intervention. Design and delivery of treatment programs were the most frequently reported roles across the studies. Group and clinic organization were reported in a variety of manners. Where it was reported, students were, at times, noted to have specific leadership roles in the groups and clinics beyond assessment and delivery of treatment and intervention. Roles involved organization of service-user lists and organization of other students in the team, as well as administrative tasks (eg, writing reports). Seven studies (15%)[5,31,52,54,58,59,64] reported on the clinic or group infrastructure itself and the role of a student board, which oversees the running and development of such a group or clinic. Some student-led clinics in the USA had a specific student-led clinic committee structure responsible for overseeing the work of the clinic. These committees had variable membership but, in all cases, had student and faculty representation. This model of governance was not noted in any clinic or group outside the USA, perhaps indicating that

there was not a perceived need and/or the clinics or groups were not sufficiently developed to warrant such administration or leadership.

Evaluation of student-led groups and clinics<level 3 heading>

A variety of evaluations have been undertaken in the studies included in this review. The majority of studies, 67% (n=32)[1,8,12,13,15,16,20,24,32,34-41,45,47-54,56,57,61,65,67,68], have evaluated students as part of their investigation. Evaluations included exploring learning, attitudes to service users, perceptions of skills, motivations and barriers to participation, and understanding of other health care professionals' roles. Six studies (13%)[26,34,60,62,66,68] investigated service users and these evaluations ranged from satisfaction with student-led groups to pre- and post-physical rehabilitation outcomes. Four studies[16,46,65,68] evaluated student-led groups and clinics from a clinical supervisor/faculty perspective and these mainly focused on perceptions of the clinic and students, as well as feasibility of the student-led group or clinic model. As previously noted, cost-benefit evaluations were the central aims of two studies[16,69] in this scoping review focusing, in particular, on the financial sustainably of providing student-led free/reduced-cost physical rehabilitation to service users on a long-term basis.

Participants of research studies*	Focus of evaluation
Students (n = 32 studies)	Motivators and barriers to participation in student-led groups/clinics
	Perceptions of learning
	Clinical skills
	Confidence
	Professionalism
	Perceptions of service users/attitudes
	Understanding/perceptions of other healthcare professionals' roles
Service users (n = 6 studies)	Satisfaction with health care at student-led groups/clinics
	Pre- and post-physical rehabilitation outcomes
Clinical supervisors/faculty (n = 4 studies)	Perceptions of group/clinic
	Perceptions of students
	Feasibility of group/clinic
Cost benefit (n = 2 studies)	Economy sustainability of student-led group/clinic
	Cost per service user interaction

**Some studies were included in more than one participant/type of evaluation in this table.*

Table 1: Participants of research studies and focus of evaluation undertaken

Interviews and focus groups are the main reported measures that have been used to evaluate student-led groups and clinics. These have been most frequently utilized to explore perceptions of students, clinical supervisors, and service users alike. Some studies have

employed mixed methods approaches with the use of surveys and validated scales to establish pre- and post-group attitudes, skills and behaviors with groups of participants.

Discussion<level 1 heading>

This scoping review identified studies and sources that described and/or evaluated student-led physical rehabilitation for service users in either an exercise group or clinic environment in entry-level professional education curricula. Forty-eight sources were included, reporting a wide range of student-led groups and clinics in six countries. The majority of these groups were university-disciplinary and there were a range of drivers underpinning them.

The majority of studies in this review focused upon the student experience of student-led groups and clinics. Most of these studies were conducted on single sites and with one cohort. Although methodological quality is not commented upon, it is clear from the small studies conducted that this area of research is in its infancy. It is also clear that the objectives for student-led groups and clinics vary widely and this would appear to have a considerable influence on the structure, place in the curriculum, and types of service users that students interact with in these groups and clinics.

The geographical locations of the studies suggest that, although there are a number of student-led groups and clinics, the majority of these appear to be confined to the USA and Australia. Considering the studies more carefully, it is clear the drivers for student-led groups and clinics in these countries are different. Studies from the USA report utilizing student-led groups and clinics to facilitate altruism and social enterprise as encouraged by The Commission for American Physical Therapy Education (CAPTE) criteria for accreditation standards.[70] Australia has clearly linked the development of student-led groups and clinics to assist with clinical placement provision.[71] Where student-led groups and clinics are introduced earlier in curricula, there is a clear association with the objective to develop clinical skills through service-user interaction prior to more in-depth immersion in clinical practice. These also tend to evaluate the skills-based outcomes of such interventions. This also seems to be the case more frequently where students only have clinical placement experiences towards the end of their programs of study. Increasingly, the drivers for student-led groups and clinics and student-led service delivery models are becoming more prevalent across all health sectors with a clearly identified need to build capacity for students and service users alike.[72]

Where student-led groups and clinics are more established in curricula, there is often a leadership element to learning, where students may be responsible for not only clinical interactions, but also organizational aspects of service delivery and/or peer-assisted learning. This may also include some form of board-level role with an overarching responsibility for the running of the group or clinic. Whilst it is outside the scope of this review to comment on the quality of research outcomes in this area, early indications are that students favor these experiences.

The sustainability of the student-led groups was commented upon in some studies with varied outcomes. Various measures of sustainability were utilized, including staff resource and time, as well as cost-benefit analyses. There is a clear desire in some sectors to expand the provision of student-led groups in order to enhance the student experience[1] and bridge gaps in placement provision[60,72]; however, it is clear that the drivers for implementation and the type of model adopted may influence the overall sustainability of the model.

The varied models of health-service delivery are a key factor in the evaluation of student-led groups and clinics and it is clear that where public models of delivery exist, there are fewer reported models of student-led rehabilitation. However, it could conceivably be the case that these are part of entry-level curricula but are just not documented or investigated as such. There are calls from the education community that these models could form a sustainable method of building placement capacity in the future,[72] and therefore further evaluation of such models is warranted.

Limitations<level 2 heading>

This review's search may not have been exhaustive due to the date range settings selected and language restrictions. This may be especially the case for a practice that exists in global entry-level health education and curricula. Although the included studies were in English, there may have been studies published in Asian, African, or European languages that may have warranted inclusion. This is a recognized possible limiting factor of the review. As this was a scoping review, no rating of the quality of evidence was performed and therefore the outcomes of studies are not reported.

Conclusions<level 1 heading>

The aim of this review was to identify, map, and describe the characteristics of student-led physical rehabilitation groups and clinics in entry-level health care curricula across the globe. It is clear that these clinics and groups are at very different stages of development and use within the curricula in different countries and, whilst some areas, such as the USA, have very well-developed systems in place for such groups and clinics, other areas, such as the UK and Ireland, are in their infancy in developing this teaching and learning approach. Moreover, the objectives and drivers for groups and clinics vary immensely worldwide, from development of altruism to satisfying a clinical placement need, and therefore the evolution of models of groups and clinics have driven a wide and varied number of models globally.

Implications for research<level 2 heading>

Given the relative infancy of this area of practice and the literature in this field, it clear that further research needs to be undertaken. Much of the literature and research in existence is of a case study nature or "action research" focus, not unusual in educational research. However, to further understand the impact of student-led groups and clinics on students, faculty, and service users' experiences, it is important that further research is undertaken. This should include further evaluation of student experiences in relation to specific stages of

the curriculum. Exploration of faculty members' experiences should consider the training required and explore the facilitation of learning, as well as further establishing the sustainability of student-led groups from a resource and cost perspective. In addition, further use of validated measures would allow for a deeper understanding of whether student-led groups and clinics have any impact on development of skills and/or clinical reasoning practices. Due to the small sample sizes of the studies to date, it would be difficult to derive firm conclusions about the impact of student-led groups and clinics on students or service users. Further work is required to evaluate outcomes for service users as well as further exploration of perceived satisfaction. It would also be of value to explore barriers and motivators for service users to attend such initiatives. It is recognized that disaggregating aspects of curriculum design and practice can be challenging; however, there is a need to further understand the impact of student-led groups and clinics on entry-level education, and where and for whom they may be of most benefit.

Implications for practice<level 2 heading>

Student-led groups and clinics in physical rehabilitation, where established, appear to be firmly embedded in curricula and aspects such as governance, structure, and content, as well as sustainability. However, as student-led groups and clinics are in their infancy, these are all areas that require further evaluation. Evaluating student learning and establishing the optimal places in curricula are key areas for development. Where student-led groups and clinics are part of clinical placement experiences, these aspects appear already embedded. However, understanding supervision models and further evaluation of the interprofessional experience would be of benefit, as would evaluating peer-assisted learning models in a student-led environment.

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668 # Appendix I: Search strategy<level 1 heading>

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Database (and platform)*	Search strategy	Records retrieved
MEDLINE (EBSCO)	#1 MH "student run clinic OR "student led" OR "service learning" OR student group* OR student clinic* #2 MH "health occupations" OR health professions* OR (physiotherap# or physical therap#) OR (occupational therap' or ot) OR sports therap* #1 & #2 Limits applied: Dates: 01/01/1998-01/11/2019; English. Search mode: Boolean/Phrase.	171
CINAHL (EBSCO)	#1 MH "Service Learning") OR "student-led clinic" OR "student run clinic" #2 (MH "Health Occupations") OR physiotherap# or physical therap# or rehabilitation or exercise) OR occupational therap* OR sports therap* #1 & #2 Limits applied: Dates: 01/01/1998-01/11/2019; English. Search mode: Boolean/Phrase.	220
AMED (EBSCO)	#1 “student run” OR “Student-led” or “service learning” #2 “health professions” or health occupations OR [physiotherap# or physical therap#] OR [occupational therap’ or ot] OR Sports therap* #1 & #2 Limits applied: Dates: 01/01/1998-01/11/2019; English.	88
ERIC (EBSCO)	#1 “student led" OR "student run" OR "service learning" #2 health professional students* OR (physiotherapy or physical therapy or rehabilitation) OR (occupational therapy or occupational therapist or ot) OR Sport therapy OR "interprofessional" #1 & #2	41

	Limits applied: Dates: 01/01/1998-01/11/2019; English. Search mode: Boolean/Phrase.	
Scopus	#1 TITLE-ABS-KEY ("student led" * OR "student run" * OR "service learning" *) Limits applied: Dates: 01/01/1998- 01/11/2019; English.	39
SPORTDiscus (EBSCO)	#1 "student led" OR student run* OR service learning #2 health professionals* OR physiotherap* OR occupational therap* OR Sport therap* #1 & #2 Limits applied: Dates: 01/01/1998-01/11/2019; English.	49

**There were also 7 gray literature sources, which were retrieved from the following databases: Open Access Theses and Dissertations (OATD); EBSCO Open Dissertations; ProQuest Dissertations and Theses; and Google Scholar.*

673 # Appendix II: Studies ineligible following full-text review<level 1 heading>

Title	Reason for exclusion
Asand K, Zheng J, Chan-Golston A, Tam E, Bhetraratana M, Lan C, et al. Assessing quality of care through client satisfaction at an interprofessional student-run free clinic. J Interprof Care. 2018;32(2):203-10.	No physical rehabilitation element.
Atler K, Gavin WJ. Service-learning-based instruction enhances students' perceptions of their abilities to engage in evidence-based practice. Occup Ther Health Care. 2010b;24(1):23-38.	Not student-led.
Battle K, Deverix B, Durham D, Strydom E. Learning everyday: genesis rehab services' student program. OT Pract. 2008;13(10):10-14.	Not student-led.
Bird Y, Islam A, Moraros J. Community-based clinic volunteering: an evaluation of the direct and indirect effects on the experience of health science college students. BMC Med Educ. 2016;16: 21.	Not student-led.
Bresnahan JM. In the clinic. Tri-leadership: learning as a group within a group. OT Pract. 2010;15(20):17-19.	No physical rehabilitation element.
Bridges DR, Abel MS, Carlson J, Tomkowiak J. 2010. Service learning in interprofessional education: a case study. J Phys Ther Educ. 2010;24(1):44-50.	Not student-led.
Chevan J, Reinking M, Iversen MD. The early assurance program model for physical therapy education. J Phys Ther Educ Education. 2017;31(3):15-23.	Public health and not physical rehabilitation.
Chung C, Di Loreto L, Manga J, Wong J. Student-led interprofessional education revolution: developing the 'Diamond Approach'. J Interprof Care. 2009;23(6):630-2.	No student-led group.

Farlow JL, Goodwin C, Sevilla J. Interprofessional education through service-learning: lessons from a student-led free clinic. J Interprof Care. 2015;29(3):263-4.	Group not student-led.
Galantino ML. Multifaceted aspects of assessment in service learning: lessons learned. J Phys Ther Educ. 2006;20(3):49-54.	Diagnostic and not physical rehabilitation.
Greene D. Student perceptions of aging and disability as influenced by service learning. Phys Occup Ther Geriatr. 1998;15(3):39-55.	No physical rehabilitation element.
Gustafsson L, Brown T, McKinstry C, Caine A. Practice education: a snapshot from Australian university programmes. Austral Occup Ther J. 2017;64(2):159-69.	No ongoing physical intervention. Assessment only.
Haggarty D, Dalcin D. Student-run clinics in Canada: an innovative method of delivering interprofessional education. J Interprof Care.2014;28(6):570-2.	Public health and no physical rehabilitation element.
Hastings J, Zulman D, Walji S. UCLA mobile clinic project. J Health Care Poor Underserved. 2007;18(4):744-8.	No physical rehabilitation element.
Hayward LM, Meleis W, Mahanna J, Ventura SH. Interprofessional collaboration among physical therapy, speech-language pathology, and engineering faculty and students to address global pediatric rehabilitation needs: a case report. J Phys Ther Educ. 2016;30(4):24-34.	No physical rehabilitation element.
Heiselt AK, Tyson G. Rehabilitation counselling and service learning: exploring new partnerships. J Appl Rehabil Couns. 2011;42(3):26-31.	Does not address review objectives.
Hoppes S, Bender D, Degrace BW. Service learning is a perfect fit for occupational and physical therapy education. J Allied Health. 2014;34(1):47-50.	Counseling rather than review objectives.
Horowitz BP, Wong SD, Dechello K. Intergenerational service learning: to promote active aging, and occupational therapy gerontology practice. Geront Geriatri Educ. 2010;31(1):75-91.	Not student-led.

Housely C.L, Neill KK, White LS, Tedder AT, Castleberry AN. An evaluation of an interprofessional practice-based learning environment using student reflections. J Interprof Care. 2018;32(1):108-10.	Not student-led.
Hu T, Leung F. An evaluation of wait-times at an interprofessional student-run free clinic. J Interprof Care. 2016;30(4):532-5.	Medical intervention and no physical rehabilitation element.
Jackson L, Pickens N. Service learning in fall prevention at TWU-Dallas. OT Practice. 2013;18(16):16-17.	No physical rehabilitation element.
Kent F, Drysdale P, Martin N, Keating JL. The mixed-discipline aged-care student clinic: an authentic interprofessional learning initiative. J Allied Health. 2014;43(1):51-6.	Not student-led.
Kent F, Keating J. Patient outcomes from a student-led interprofessional clinic in primary care. J Interprof Care. 2013;27(4):336-8.	Assessment only. No physical rehabilitation.
Kent F, Keating J. Interprofessional education in primary health care for entry-level students--a systematic literature review. Nurse Educ Today. 2015;35(12):1221-31.	Assessment only. No physical rehabilitation.
Kent F, Lai F, Beovich B, Dodic M. Interprofessional student teams augmenting service provision in residential aged care. Australas J Ageing. 2016;35(3):204-9.	Systematic review. Does not answer review objectives.
Kent F, Martin N, Keating JL. Interprofessional student-led clinics: an innovative approach to the support of older people in the community. J Interprof Care. 2016;30(1):123-8.	No physical rehabilitation element.
Koski J, Smith Y. Non-traditional fieldwork: challenges and opportunities. OT Practice. 2012;17(1):8-18.	Screening and assessment only. No physical rehabilitation element.
Krause MW. Service learning in physiotherapy taken to a new level: experiences in South Africa. Phy Ther Rev. 2007;12(4):277-84.	Not student-led.
Krout JA, Bergman E, Bianconi P, Caldwell K, Dorsey J, Durnford S, et al. Intergenerational service learning with elders:	Not student-led.

multidisciplinary activities and outcomes. Geront Geriatr Educ. 2010;31(1):55-74.	
Lahav O, Daniely N, Yalon-Chamovitz S. Interpersonal social responsibility model of service learning: a longitudinal study. Scandinavian J Occup Ther. 2018;25(1):61-9.	Not student-led.
Lie D, Forest CP, Walsh A, Banzali Y, Lohenry K. What and how do students learn in an interprofessional student-run clinic? An educational framework for team-based care. Med Educ Online. 2016;21(1):31900.	No physical rehabilitation element.
Lloyd C, Williams PL, Machingura T. A process for developing a student-led programme in an acute mental health setting. N Z J Occup Ther. 2015;62(2):67-70.	No physical rehabilitation element.
Maloney SM, Griffith K. Occupational therapy students' development of therapeutic communication skills during a service-learning experience. Occup Ther in Ment Health. 2013;29(1):10-26.	Not clear any physical rehabilitation occurring. No description of this.
Mareck DG, Uden DL, Larson TA, Shepard MF, Reinhert RJ. Rural interprofessional service-learning: the Minnesota experience. Acad Med. 2004;79(7):672-6.	Not student-led. No physical rehabilitation element.
McMenamin R, McGrath M, D'Eath M. Impacts of service learning on Irish healthcare students, educators, and communities. Nurs Health Sci. 2010;12(4):499-506.	No physical rehabilitation.
Michaels MB. Service learning: advocating for reduction of falls risks in the elderly. J Phys Ther Educ. 2015;20(3):64-6.	Not student-led.
Moskowitz D, Glasco J, Johnson B, Wang G. Students in the community: an interprofessional student-run free clinic. J Interprof Care. 2006;20(3):254-59.	Not clear any physical rehabilitation occurring. No description of this.
Neill M, Hayward KS, Peterson T. Students' perceptions of the interprofessional team in practice through the application of servant leadership principles. J Interprof Care. 2007;21(4):425-32.	Assessment only and no physical rehabilitation element.
Nowakowski KA. A clinical service learning program promotes mastery of essential competencies in geriatric physical therapy. J Phys Ther Educ. 2014;28(2):46-53.	No physical rehabilitation.

Olivier M, Oostuthien L, Casleleijn D. Occupational therapy students' contribution towards enabling potential in a semi-rural community. Work. 2007;29(1):63-8.	Not clear any physical rehabilitation occurring. No description of this.
Ovans H, Lacey E, Bowes W,Winwood K. University of Worcester Occupational Therapy (OT) Student-led Clinic – Review of Student Learning...RCOT (Royal College of Occupational Therapist) Annual Conference 2017. Br J Occup Ther. 2017;80(8):115.	Student-led groups not a focus of this paper.
Palombaro KM, Lattanzi JB, Dole RL. Creating sustainable community engagement initiatives in a graduate physical therapy program. Metrop Univ. 2010;20(3):61-76.	Model unclear. No evidence of physical rehabilitation.
Reynolds PJ. How service learning experiences benefit physical therapy students professional development: a grounded theory study. J Phys Ther Educ. 2005;19(1):41-54.	Not student-led.
Roskell C. Developing patient centred care in health professionals: reflections on introducing service-learning into the curriculum. Int J Ther Rehab. 2012;19(8):448-56.	No physical rehabilitation element. Not student-led.
Rudd AB, Moore-Nadler M, Clanton C. Nurse-managed clinic paves the way for an interprofessional student-run free clinic. Alabama Nurs. 2016;43(3):8-9.	Not student-led.
Rudman SV. University-community partnerships for health. A model interdisciplinary service-learning project. J Phys Ther Educ.1999;28(2):109-12.	Not student-led.
Rukavina PB, Li, W, Shen B, Sun H. A service-learning based project to change implicit and explicit bias toward obese individuals in kinesiology pre-professionals. Obes Facts. 2010;3(2):117-26.	No physical rehabilitation element.
Scoggin A, Ruelas J, Wells S, Gonzales O, Hodge S, Delgado D, et al. Operation Lone Star. OT Pract. 2014;19(19):14-16.	No physical rehabilitation element.
Scott AH. Wellness works: community service health promotion groups led by occupational therapy students. Am J Occup Ther. 1999;53(6):566-74.	Not student-led.

Scott EA, Swartz MK. Interprofessional student experiences on the HAVEN free clinic leadership board. J Interprof Care. 2015;29(1):68-70.	Not student-led.
Smallfield S. Using service learning to teach office ergonomics. Educ Special Int Sect Q. 2011;21(1) 3-4.	No physical rehabilitation element.
Smith SN, Crocker AF. Experiential learning in physical therapy education. Adv Med Educ Pract. 2017;8:427-33.	No physical rehabilitation element.
Stemmons Mercer V, Zimmerman MY, Schrodt LA, Palmer WE, Samuels V. Interprofessional education in a rural community-based falls prevention project: the CHAMP experience. J Phys Ther Educ. 2014;28(2):35-45.	Not student-led.
Thomas KJ, Reigart EB, Trickey BA. An interdisciplinary service learning experience in geriatrics for occupational and physical therapy students. Geront Geriatr Educ. 1998;19(2):81-9.	No physical rehabilitation element.
Vanderweilen LM, Enurah AS, Osburn IF, Lacoe KN, Vanderbilt AA. The development of student-led interprofessional education and collaboration. J Interprof Care. 2013;27(5):422-3.	Not student-led.
Vansickle JL, Schaumleffell NA. Putting partnerships on paper: creating service engagement opportunities in kinesiology and recreation. JOPERD: J Phys Ed Recreat Dance. 2015;86(4):24-33.	Not student-led.
Village D. Service learning in geriatric physical therapist education. J Phys Ther Educ. 2001;15(2):42-5.	Not student-led.
Village D. Research report: comparison of the use of service learning, volunteer and pro bono activities in physical therapy curricula. J Phys Ther Educ. 2004;18(1):22-8.	No physical rehabilitation element.
Village D. Qualities of effective service learning. J Phys Ther Educ. 2006;20(3):8-17.	Not student-led. Does not meet review objectives.

Vroman K, Simmons CD, Knight J. Service learning can make occupation-based practice a reality: a single case study. Occup Ther Health Care. 2010;24(3):249-65.	Not student-led.
Wang T, Bhakta H. A new model for interprofessional collaboration at a student-run free clinic. J Interprof Care. 2013;27(4):339-40.	Assessment/screening only. No physical rehabilitation element.
Withey MB, Breault A. A home healthcare and school of pharmacy partnership to reduce falls. Home Healthc Nurse. 2013;31(6):295-302.	Pharmacy only. No physical rehabilitation element.
Yonkman J, Kossman M, Thomas K. Cultivating independence through service learning projects. OT Pract. 2016;21(2):8-11.	Not student-led.

Appendix III: Characteristics of included studies<level 1 heading>

Author (year) Country	Study design	Participants	Aims/objectives	Characteristics of group/clinic	Evaluation of group/clinic
Atler *et al.*[32] (2010) USA	Mixed methods	43 Year two OT students.	To what degree do students' perceptions of abilities in applying OT process change after SL? What are the most salient characteristics of experience reported by students?	OT students participated in SL with a neurological population. Integrated within module. Assigned in pairs to work with an individual with neurological impairment. Six visits over 16 weeks. Assessment and intervention plan designed and conducted by students.	Pre-survey to identify knowledge; post survey to evaluate knowledge Personal reflective essay. Analysis demonstrated a possible increase in student perceptions of knowledge, skills and confidence, to varying levels. Perceptual change only not actual change.
Beling[33] (2003) USA	Experimental SL and control group. Random assignment to groups.	40 PT students enrolled on geriatric rehabilitation course. Last semester of 3-year graduate PT program.	Null hypotheses: i. Graduate PT students' knowledge, misconceptions, and bias regarding aging will be unchanged following a service-learning experience in a geriatric rehabilitation course.	SL course of 32 hours of community service. Groups of 4 students completed a needs assessment and developed a program. Control group did in-class activities.	Standardized knowledge test about aging. Student evaluations of faculty.

			ii. Graduate students' faculty teaching evaluations will be unaffected by SL.		Significant increase in experimental groups pre- and post-scores. Students in the SL group did not evaluate the faculty favorably as saw the SL as much more work.
Black *et al.*[1] (2013) USA	Descriptive Interviews within 1 year of clinic launch.	18 inaugural members of Chester community PT clinical student board.	Describe the inaugural student board members' experiences in creating and launching the student-led, pro bono physical therapy clinic. To determine its usefulness and sustainability for meeting CAPTE and program missions.	Unclear	Qualitative content analysis of semi-structured interviews. Key themes related to being on the board: commitment; increased competence (clinical and administrative); leadership (communication and collaboration); and perspective.
Black *et al.*[34](2017) USA	Unclear	DPT students, clinic supervisors, service users.	Describe the implementation and assessment of grand rounds as a means of providing continuity of care and learning experience for students in a SLC.	Clinic open 4 nights per week. Students from across 3 years of DPT take turns serving clinic. Always supervised by a state-registered physical therapist. Students participate according to their level of experience;	Qualitative interviews of clinic supervisors, students' reflections and service users' satisfaction surveys. General feeling that grand rounds increased

			Prior to grand rounds, students noted being unprepared and clients noted they rarely saw the same student DPT twice.	more senior students provide mentorship. All students participate in documentation. Participation is organized in a rotation system according to when cohorts are in. 6-10 clients per evening are seen.	confidence and consistency.
Bostick *et al.*[15] (2014) Canada	Descriptive qualitative study	Convenience sampling n =13. Pharmacy, kinesiology and PT students.	Describe novel clinical learning experiences in an SLC from a student perspective. To try to ascertain the extent of different between SLCs and placement.	Established to address placement shortage by providing high-quality experience and address unmet physical rehabilitation needs within the community. Staffed by a 0.8 FTE PT and 0.2 physical therapy assistant. All students had administrative and housekeeping studies but primarily responsible for directing patient care. Student were encouraged to direct and monitor exercise programs.	Focus group discussion. Also, a survey determined difference between placement and SLC administered. 6 students participated in the focus group. Main themes; managing gap between classroom and real world; SLC was a means to do this. Students noted it was more responsibility than on placement. Instructors supervising did not carry own caseloads therefore could provide appropriate support.

				Pharmacy had communication role.	Facilitated ownership by students Safety in learning.
Brosky[35] (2006) USA	Survey	Survey of 75 PT students and 24 local community groups.	PT student perceptions and community partners' perceptions	A variety of student-led initiatives with a range of community partners. Students must complete 5-10 experiences across 3 semesters.	PT students and service users alike reported a positive experience, valuable partnerships, and benefit from the experience.
Buckley *et al.*[5] (2014) Australia	Descriptive study of initiation of REACH project	Medicine/PT/nursing and social work students.	Confirm feasibility of a 4 week IPL outreach clinic.	Service model of volunteers from each profession. 4 weeks long, 1-5pm daily. Student committee established to run and develop the clinic.	Discussed feasibility of the project: need to balance competing demands of IPL screening vs uni-professional roles. Issues with continuity of care between students. Generally positive experience from service users.
Cassidy and Yorke [40] (2019) USA	Mixed methods study	119 Year 1 and 2 student physical therapists.	Investigate motivators, barriers and facilitators to volunteering as a PT student at a student-run free clinic.	Clinic is run one day per week for 2 hours. Students are not mandated to volunteer; it is entirely optional. Services are provided mainly to clients with neurological conditions.	Top motivators were to practice treatment techniques and improve assessment skills. Top barrier was clinic hours and time constraints.

Crandell *et al.*[36] (2013) USA	Case report	8 DPT students.	Aim to understand development of professionalism via interviews, Core Values Self-Assessment form and analysis of student reflection.	SLC, which provides off-campus services to staff, students and members of community. Unclear whether students are assigned or volunteer and how many hours this is. 1st- and 2nd-year DPT students get this experience.	Suggests professionalism is developed more in the SLC than in other areas of the curriculum.
Flinn *et al.*[37] (2009) USA	Descriptive paper	OT and PT students.	Describe development of IPL SL course and evaluate impact on health professions students.	4 x 2-hour student-led sessions in the community with OT and PT students.	Outcomes noted that students' cognitive skills, ability to work with a diverse population, beliefs and opinions of SL, and appreciation of other disciplines were all enhanced by the class.
Forbes [60] (2020) Australia	Qualitative study	18 patients who attended 3 different university student-led PT clinics.	Exploration of service dissatisfaction with PT SLC.	Students attend a 1 x 5-week compulsory block at the SLC. Students are responsible for assessing, diagnosing, and managing patient care. Fee-paying system at approximate rate of 50% of standard services. Students have 1-hour consultations.	Continuity of care was raised as an issue in SLC. The additional time commitment to attend was a barrier for some patients. Some patients noted loss of autonomy when being treated by a student.

Forbes and Nolan[26] (2018) Australia	Cross-sectional qualitative study	20 patients who attended student-led PT clinics.	Explore patient satisfaction at student-led PT clinics.	Unknown.	Themes such as supervision style, communication, and quality of PT care all have a significant influence on patient perceptions. Some suggestions are made for the future provision of such a clinic to ensure a quality experience for patients.
Froberg *et al.*[68] (2018) Sweden	Mixed methods evaluation	SRC with medical, PT, nursing, OT, and psychology students.	To explore perceptions of the SRC by students, supervisors, and patients.	SRC provides care and rehabilitation for over 30,000 inhabitants of Stockholm county. IPL environment for learning. Length of placement varies from 1 week for medical students to 13weeks for psychology. All students are more than halfway through training.	Most student respondents were very satisfied with learning and supervision at the clinic and high patient satisfaction was reported. A significant amount of time was required by supervisors to run the clinic and ensure balance of supervision and autonomy for students.
George *et al.*[38] (2017) USA	Implementation report	Pro bono PT clinic.	Aim to describe the implementation of the PT clinic to allow transparency and accessibility for others to set up.	Clinic has leadership roles for PT students. Describes start-up costs. Compulsory for year 1 and 3 students; year 3 students peer mentor year 1 students.	Learning opportunities are highlighted: clinical competency, professional values, civic engagement, collaborative practice,

					peer mentorship, and leadership development.
Godoshian and Yorke[39](2019) USA	Survey	85 Qualified PTs who had participated in Student-run free clinics as students	Identify if participation in student-run free clinics correlates with high values of altruism, social responsibility, and cultural competency.	Various formats, as study was retrospective.	Significant correlation found between those attending SRC and altruism, however this was not linked to provision of pro bono services or to the under-served as a practising PT.
Gustaffsson *et al.*[8] (2016) Australia	Mixed methods study short report	SLC students; PT, OT, and speech pathology.	Evaluate IPL students' experiences of a SLC for those with neurological conditions.	5-week IPL student clinic for clients who had no other access to service. Clients attended once weekly for 5 weeks. IPL team assessment and treatment.	Increased understanding of student's awareness of each others' professions. Increased confidence of own role. Students had mixed opinions on when the optimal timing of the clinic would be in their clinical training.
Hamel[43] (2001) USA	Narrative report	PT and OT student-led sessions providing pro bono rehabilitation to elders.	To provide a narrative to consider SL as an option for learning and service delivery for those in need.	Does not describe.	Narrative account of the benefits to OT and PT students who were part of the service. Decision-making and empathy were two aspects that emerged.
Hu *et al.*[41] (2018)	Research report	Pharmacy, social work, PT, nursing, and medical	Evaluate learning experiences and skills	Free service for those who are under-insured	Understanding of different population

Canada		students running a SLC for under-served community.	developed among IPL health care students at a SLC for marginalized populations.	or on low incomes. Clinic runs every Saturday all-year-round and is staffed by students and supervisors from PT, social work, pharmacy, medicine, and nursing.	needs and IPL working. Provides a viable and sustainable means of providing a learning opportunity as well as service to the community.
Maritz[42] (2008) USA	Descriptive report	PT students led exercise group with frail elders, assisted by a DCP.	Aim to describe the development and implementation of the student-led group-based exercise model for frail elders.	Development of a seated exercise program for frail elders (by student PTs). Implementation of the program was 4 times weekly. Student leaders ran alternate days.	Reports on the positive sustainability of the program as it was designed and led by PT student but then handed over to DCPs.
Marken *et al.*[43] (2011) USA	Descriptive report	OT students in service-learning project with elders.	Develop and implement student-led rehabilitation sessions with elders.	Independent student-led sessions.	Does not specify.
Matthews *et al.*[44] (2012) USA	Research report	IPL, student-led collaboration with nursing, PT, and social work students and elders.	Does not specify.	Describes the 10-week intervention program, PT and nursing students are paired up and complete assessment and rehabilitation interventions.	Does not specify.
Ng and Hu[9] (2017) Canada	SRFC providers in Canada	SRFC providers in Canada.	Exploration of Canada IPL SRFCs.	No data.	Key differences from other countries (eg, US). Canada clinics offer more chronic disease

					management/rehabilitation and health maintenance.
Nicole *et al.*[16] (2015) Australia	Mixed methods evaluation	Student physiotherapists and clinical educators.	Explores perceived barriers and enablers to setting up SLS to increase placement capacity.	No details.	Barriers to SLS were: poor support or experience of clinical educator and perceived patient risk. Enablers included additional student responsibility, encouraging work readiness, and no set-up costs.
Nordon-Craft *et al.*[45] (2017) USA	Evaluation	80 1st-year DPT students.	Investigate SL of PT student attitudes and perceived clinical competence working with older adults.	Students delivered 5 supervised hours with older adults over 5 weeks. Compulsory SL activity.	Self-perceived improvement in clinical competence with elders post activity.
O'Connor[20] (2018) Ireland	Qualitative descriptive study	7 undergraduate PT students.	Exploration of challenges and facilitators of a community-based, student-led placement.	5 week student-led placement undertaken by 4 final-year PT students.	Students reported acquisition of professional skills, such as leadership and teamwork. Challenges of the model included the lack of a bespoke assessment process. Determined as a feasible model.

Ohio University[59] (2019) USA	Webpage	SL for PT students.	Pro bono, student-led PT service for under-insured.	All 1st- and 2nd-year DPT students must complete the minimum SL requirements, which include signing up for the SL group and meeting to establish group goals. In addition, a minimum of 15 hours direct patient contact per year are required at two clinics per week (afternoons 2pm to 4pm).	No outcomes reported.
Palombaro *et al.*[46] (2011) USA	Case report	DPT program students and staff.	Describe creation and implementation of student-led, pro bono physical therapy clinic.	Clinic is open 3 evenings a week. Clinic has a student board established. Volunteer students get recognition for the hours they have done.	The model of SLC is feasible and sustainable. It has all 8 steps to successful community engagement.
Passmore *et al.*[65] (2016) Canada	Qualitative study	7 PT students and 8 clinical supervisors who volunteered at an IPL clinic.	Explored perceived benefits of the PT student experience in an IPL clinic.	Once weekly drop-in clinic providing free health care. Includes PT, OT, pharmacy, social work, medicine, and nursing students. Students attend for 3 consecutive weeks and	Three themes identified; exposure to marginalized patient populations, learning through interprofessional interactions, and experience with different patient care approaches.

				then attend a 3-hour follow-up session.	
Patterson *et al.*[61] (2017) Australia	Qualitative study	15 OT students.	Aim to investigate student experiences and perceptions of student-led groups program model of education at a brain injury unit.	10-week duration in groups of 2 or 3 where students led the design and delivery of rehabilitation to clients within the unit. Some leadership tasks were also allocated.	Good balance of support and freedom for students and development of clinical skills. Some missed learning opportunities were identified due to more time spent with patients and less time observing.
Pearlman and Wallingford[47] (2003) USA	Evaluation	OT students.	Explore student and residents' outcomes related to the student-led wellness program for elders.	8 week intervention: each student led a different group daily as well as an individual session with residents daily.	Students noted improved observational skills, understanding of client needs, and enhanced interviewing skills.
Pennisula Health[62] (2012) Australia	Project report	IPL students: Dietetics, PT, OT, podiatry, social work, and speech therapy.	Report on creating and running an IPL SLC.	N/A	Feasible alternative for clinical placement. Patients reported that teams provided a useful service. For older patients, a student clinic should not run after hours.

Pro Bono Physical Therapy Services Project Committee[58] (2013) USA	Help guide	PT students and faculty.	Document to assist with creating and running a student-run, pro bono physical therapy clinic.	Step-by-step guide to setting up a clinic within the US.	No outcomes reported.
Rayson *et al.*[48] (2016) USA	Descriptive report	Chester Community PT clinic.	Description of growth and sustainability of a free-standing, PT student–led clinic.	Now open 4 nights per week; initially was 2. Students are all volunteers, but all students must complete a minimum of 3 nights per semester. Clinic is operated on a dana (donation) basis for clients.	Evolution of the model has allowed for sustained growth and expansion of the model. Student and clinic board is essential to this success.
Rogers *et al.*[549] (2017) USA	Narrative report	OT students from 3 state universities in Arizona state. Student-led clinics are interprofessional and include PT, OT, medicine, and nursing students.	Identify challenges and barriers for PT students participating in an IPL SLC.	Large clinic that is shared by 3 universities. 6 student-led committees are responsible for running and leading the clinic. Students volunteer at the clinic and are overseen by licensed professionals.	OTs are afforded the chance to adopt a generalist approach and also see patients early in their training. There have been limited OT preceptors so this has limited the number of students who can volunteer.
Roper and Santiago[50] (2014) USA	Qualitative study	14 kinesiology students.	Explore kinesiology students' perceptions of working in a student-led group with children with physical disabilities.	Student-led exercise class for those with physical disabilities. Each student led 6 consecutive weekly	Positive impact of the class on attitudes to those with disability. Improved communication skills.

				classes in a station model.	
Seif *et al.*[13] (2014) USA	Experimental pre/post-test study	Various students in an IPL clinic.	Examines benefits of a SRFC as a SL experience for pharmacy, medical, nursing, PT, and physical assistant students.	PT and OT therapy clinic on main campus. Patients are seen once weekly. All students are required to participate in the SLC at least 4 times per semester.	Improvement in interprofessional behavior and clinical reasoning.
Shrader *et al*.[51] (2010) USA	Evaluation	IPL clinic student participants (n=74). Students from Pharmacy, PT, physician assistant, and medicine.	Evaluate changes to student attitudes towards IPL health care professional roles and teamwork.	Clinic operates 3 evenings per week from 6pm to 10pm and accepts up to 10 patents per evening. All students enrolled were required to provide patient care 5 evenings per semester. Students worked in IPL health care teams.	Significant improvements were found in attitudes towards increased experience working in IPL teams and understanding roles and responsibilities of different health care roles.
Sick *et al.* [52] (2014) USA	Observational Cohort Study.	Medicine, nursing, PT, pharmacy, public health and social work students in a student-run free clinic.	To evaluate longitudinal impact of student-run free clinics on interprofessional attitudes and skills of students.	Students apply to become a clinic volunteer in first year of their education. If accepted, the student agrees to a 2 year commitment to be a student volunteer. Students can apply for a board leadership role in their 2nd year.	Students who were accepted to volunteer for the clinic experience a higher attitude and skills rating than those who do not indicating the educational model of the clinic offers some additional benefit.

				The walk-in clinic runs twice per week and students are supervised by volunteer clinicians.	
Sick *et al.*[53] (2017) USA	Observational cohort study	Medicine, nursing, PT, pharmacy, public health, and social work students in a SRFC.	To evaluate longitudinal impact of SRFCs on interprofessional attitudes and skills of students in working with those who are under-served.	Students apply to become a clinic volunteer in first year of their education. If accepted, the student agrees to a 2-year commitment to be a student volunteer. Students can apply for a board leadership role in their 2nd year. The walk-in clinic runs twice per week and students are supervised by volunteer clinicians.	Students who volunteered for the clinic experience more favorable attitudes towards the under-served than those who do not have the volunteering experience.
Stickler *et al.*[54] (2013) USA	Qualitative study	2nd- and 3rd-year DPT students.	Explore perceptions of PT students involved in the SLC.	Student-led PT services are provided once weekly at a local health care clinic for 3 hours. A licensed PT and student PT are paired to provide the service. The operations of the clinic are managed by student volunteers.	Students indicated the volunteering experience led them to an increased sense of care and compassion, altruism, social responsibility, and accountability, as well as increased clinical decision-making and creativity.

Stickler *et al.*[55] (2016) USA	Retrospective study	28 patient data records analyzed of those who attended a student-led PT clinic.	Evaluate pre- and post-treatment outcomes of patients to establish quality of care for those who are under-served or uninsured.	IPL clinic offering PT, OT, and primary care. PT is offered once a fortnight.	Significant improvements were noted in the health (physical and functional) outcomes. Mental health changes were not significant.
Stickler *et al.*[69] (2017) USA	Retrospective study	Patient data records analyzed between January 2013 and December 2014.	To establish cost of running a PT SRC for costs. To quantify equipment and cost per person. To estimate facility costs. To derive a cost of delivery per patient.	Volunteer clinic open one evening every 2 weeks. Average 25 nights per year. Students are mentored by a qualified PT. Average of 9 PT students are in the clinic each night. Each patient tis typically seen for 1-3 visits.	Clinic has an average cost per visit of approx. $7.
Sutherland Chronic care Student-led clinic[64] (2013) Australia	Report	IPL model of care: exercise physiology, dietetics, nursing, OT, PT, social work, and speech pathology.	Develop a model of care for SLC to create extra placements and target unmet health needs of the community.	Collaboration between two universities: inpatient student-led model as well as community student-led model; both IPL. 3rd- and 4th-year undergraduate students and final-year graduate entry students.	No outcomes reported.
University of Bradford[67] (2019)	Case study	Student-led neurological PT clinic.	Provide experiential learning environment for students. Secondary	4 students attend once weekly. One qualified physiotherapist oversees	Positive impact on student learning was reported. Service users

UK			aim is to provide intervention for those with neurological impairment looking for PT within a learning environment.	clinic. Students attend on a volunteer/optional basis. Steering group with student participants set up to progress the clinic. Service users pay a minimal amount to attend.	were satisfied with the clinic.
University of Canberra[63] (2019) Australia	Webpage	PT student–led clinic.	Low-cost treatment for patients with no insurance.	MSc and BSc Hons PT students.	No outcomes reported.
Willard and Crandell[56](2017) USA	Mixed methods study	Undergraduate exercise science students.	Investigate if inter-generational SL improves knowledge and attitudes to working with elders.	16-week student-led exercise program for older adults within the community. Students designed and led the weekly classes.	Some qualitative data to suggest attitudes towards older adults became more positive.
Wilson[57] (2006) USA	Descriptive study	DPT students providing pro bono therapy in a SLC.	Describes implementation of SL and highlights students and faculty learning.	PT students assume dual roles of student clinicians as well as managers. In each DPT year (1, 2, and 3) students complete a minimum of 4 volunteering hours at	Students report developing and learning leadership, communication, and teamwork.

				the clinic. In years 1 and 2 this is in peer teams, in year 3 it is individual.	
Worcester News[66] (2016) UK	News article.	PT students.	Student-led PT service for clients with neurological conditions.	Runs 3 times per week at university campus. Two are group sessions and one session is for 1:1.	No outcomes noted.

675 *DCP, direct care provider; DPT, doctorate of physiotherapy; IPL, interprofessional learning; OT, occupational therapy; PT, physiotherapy; SL, service learning;*
676 *SLC, student-led clinic; SRC, student-run clinic.*