Retrospective Review of Student Research Projects in a Canadian Master of Science in Physical Therapy Programme and the Perceived Impact on Advisors' Research Capacity, Education, Clinical Practice, Knowledge Translation, and Health Policy

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ABSTRACT

Purpose: This study's aim was to characterize the nature of students' research conducted for a Master of Science in Physical Therapy (MScPT) degree programme at a Canadian university and evaluate the lead advisors' perspectives of its impact on their research capacity, education, clinical practice, knowledge translation, and health policy. **Methods:** We conducted a quantitative, cross-sectional, retrospective review of research reports from 2003 to 2014 to characterize the MScPT students' research and a quantitative, cross-sectional e-survey of lead research advisors to evaluate the impact of this research. **Results:** Data were abstracted from reports of 201 research projects completed between 2003 and 2014. Projects were conducted primarily in university-affiliated hospitals (41.6%) or the university's physical therapy department (41.1%), and the majority (52.5%) had a clinical focus. Of the 95 lead advisors of 201 projects, 59 advisors (response rate 62.1%) of 119 projects completed the survey questionnaire. The respondents most frequently identified clinical practice (45.1%) and advisors' research capacity (31.4%) as areas positively affected by the students' research. **Conclusions:** The MScPT students' research projects facilitate the conduct of extensive research internally and across affiliated hospitals. This research appears to advance not only clinical practice but also the ability of lead advisors to undertake research.

Key Words: clinical protocols; evidence-based practice; research; students; education.

RÉSUMÉ

Objectif: caractériser la nature des recherches des étudiants réalisées dans le cadre d'un programme de maîtrise ès sciences en physiothérapie dans une université canadienne et évaluer le point de vue du superviseur quant aux conséquences sur la capacité de ses recherches, l'éducation, la pratique clinique, l'application du savoir et les politiques en matière de santé. **Méthodologie:** les auteurs ont réalisé une analyse quantitative, transversale et rétrospective des rapports de recherche entre 2003 et 2014 afin de caractériser les recherches des étudiants à la maîtrise en physiothérapie et ont effectué un sondage quantitatif et transversal en ligne auprès des superviseurs afin d'évaluer les conséquences de ces recherches. **Résultats:** les chercheurs ont extrait les données des rapports de 201 projets de recherche terminés entre 2003 et 2014. Ces projets avaient surtout été menés dans des hôpitaux universitaires (41,6 %) ou au département de physiothérapie de l'université (41,1 %), et la majorité (52,5 %) était d'ordre clinique. Sur les 95 superviseurs des 201 projets, 59 superviseurs (taux de réponse de 62,1 %) de 119 projets ont rempli le sondage. Selon les répondants, la pratique clinique (45,1 %) et la capacité de recherche des superviseurs (31,4 %) étaient les secteurs qui avaient le plus profité des recherches des étudiants. **Conclusions:** les projets de recherche des étudiants à la maîtrise en physiothérapie facilitent la tenue de recherches poussées à l'interne et entre hôpitaux affiliés. Ces recherches semblent non seulement faire progresser la pratique clinique, mais également la capacité des superviseurs à faire de la recherche.

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The Canadian Council of Physiotherapy University Programs¹ has recommended that entry-to-practice physiotherapy (PT) curricula foster the development of skills in literature searching and critical appraisal, data collection and analysis, and dissemination of evidence to inform best practices. These skills assist graduates in fulfilling the role of scholarly practitioner outlined in the *Essential Competency Profile for Physiotherapists in Canada*.² As scholarly practitioners, physiotherapists must be “committed to ongoing learning for the purpose of improving client outcomes through seeking, creating, applying, disseminating, and translating knowledge to physiotherapy practice.”^{2(p. 5)} Consequently, several university-level PT programmes in Canada have incorporated supervised research projects as a principal strategy for developing competency in the scholarly practitioner role.^{3–6} The experience of participating in one or more phases of conducting a research project gives students the opportunity to build the knowledge, skills, attitudes, and self-efficacy required to perform activities such as developing a research objective; locating, critically appraising, and synthesizing the research literature to justify the research; performing data collection and analysis; and summarizing and disseminating the findings.

Disseminating the findings of PT students’ research projects through presentations or publications targeted at relevant audiences is a form of knowledge translation (KT). KT is a collaborative, dynamic process in which evidence from research is synthesized and implemented by researchers, practitioners, educators, policy-makers, and the public with the goal of improving health practices and policies in the health care system.⁷ Health research findings can be used to inform public health policy, defined as the sets of laws, regulations, and guidelines that can affect the structure, conduct, and health of a society.⁸ For example, the Ontario Ministry of Health and Long-Term Care and Health Quality Ontario have developed clinical handbooks on quality-based procedures⁹ to inform organizational policies for managing people with conditions such as coronary artery disease, pneumonia, and stroke and to act as standards for governmental health care reimbursements.⁹ These procedural handbooks are based on systematic reviews of the literature that aim to synthesize and critically appraise the results of individual research projects.⁹

The University of Toronto (U of T) Master of Science in Physical Therapy (MScPT) degree programme implemented a student research project as part of the research curriculum in 2003.³ In collaboration with research advisors, a group of approximately five students conducts a research project during the second year that culminates in developing a poster presentation and writing a manuscript formatted according to submission guidelines for potential publication in a journal selected by the groups. Educators, clinicians, and research trainees can submit project proposals that are relevant to PT, and they serve

as lead advisors for the students through all stages of the research process. Although research has described the impact of participating in education designed to improve competency in evidence-based practice (EBP) on students’ knowledge, skills, and attitudes,^{10–12} little is known about the effect of being involved in a research project as a lead advisor. Furthermore, the scope and impact of research projects undertaken since 2003 have not previously been examined.

The primary objective of this study was to characterize the nature of the students’ research projects conducted as part of the U of T MScPT programme and examine the lead advisors’ perceptions of the impact of these projects on lead advisor research capacity, education, clinical practice, KT, and health policy. A secondary objective was to identify the facilitators of and barriers to participating as a lead advisor on the projects.

METHODS

Study design

We conducted a cross-sectional, retrospective review of research reports to characterize the MScPT students’ research at U of T and a cross-sectional e-survey of lead research advisors to examine the impact of this research. The U of T Research Ethics Board approved the study protocol.

Projects and participants

We included in our retrospective review those research projects, completed as part of the MScPT research curriculum between 2003 and 2014, that had a research protocol, final paper, or published journal article available for abstraction. The projects of students graduating in the most recent year (2015) were excluded because there may have been insufficient time for them to have an impact.¹³

We considered individuals who had served as lead advisors of the MScPT research projects completed between 2003 and 2014 at U of T and who had a valid email address as eligible to participate in the survey. A *lead advisor* was defined as an individual who had submitted at least one research project and had advised students through all stages of their projects, including developing and implementing the protocol and presenting their findings.

Data collection

For the retrospective review, we developed a 29-item tool using Microsoft Excel to extract data pertaining to research setting, study design, target population, data collection, and domain of PT education or practice for each project (see Appendix 1 online). A glossary of terms was also developed (see Appendix 1 online) because this is recommended to optimize the consistency of abstraction.^{14,15} *Qualitative studies* were defined as those that collected non-numerical data, and *quantitative studies*

were defined as those that collected numerical data or data converted to numbers. To pilot test the tool, three authors (SS, MG, NMS) independently abstracted data from 10 research projects and discussed responses until consensus was reached. After revising the tool, three authors (CL, RS, JA) were trained to use it by applying it to the same 10 projects. Researchers discussed the discrepancies among the responses until consensus was reached and final revisions were made. All projects were divided equally among five authors (SS, MG, CL, RS, JA) for abstraction.

For the survey, we developed a 43-item questionnaire administered using FluidSurveys (Fluidware, Ottawa, ON) with the following domains of impact: advisors' research capacity (7 items), education (7 items), clinical practice (5 items), KT (11 items), and health policy (4 items) (see Appendix 2 online). One item asked advisors to describe, in 100 words or less, an example illustrating the greatest impact of the MScPT research curriculum in one domain. We developed the following definitions:

Impact: the positive use of research project findings within each domain

Impact on education: the use of findings from an MScPT project to inform the design of educational programmes for physiotherapists or other professional groups

Impact on clinical practice: the use of project findings to improve specific practices, including assessment, treatment, and patient education

Impact on KT: completing specific activities, such as publishing in a peer-reviewed journal or presenting at a conference, which were designed to share research findings with various stakeholder groups

Impact on policy: the use of the findings to inform the development of specific health policies, such as clinical practice guidelines or regulatory policies.

We used two items to capture descriptive data relating to the advisors' work role and setting and six items to capture data related to the facilitators of and barriers to acting as a lead advisor in the U of T MScPT research curriculum. We piloted the survey with nine reviewers, who were selected to represent a range of lead advisors. We asked them to evaluate the face validity, content validity, and readability of the questionnaire, and we used their feedback to revise the questionnaire.

Sampling and recruitment

For the retrospective review, we attempted to abstract data from the final papers for all projects to optimize the consistency of data collection. Lead advisors were contacted to obtain final papers if they were missing. If they were unavailable, data were abstracted from research protocols and journal articles. The U of T Department of PT provided hard-copy (2003–2007) or electronic (2007–2014) versions of the available documents.

For the e-survey, we used a modified Dillman approach,¹⁶ consisting of a pre-notice email, an invitation email 1 week later, and three thank-you/reminder emails, sent at 1-week intervals over a 1-month period, to optimize the response rate. This was considered to be one round of the survey. Efforts were made to correct invalid email addresses, such as consulting with MScPT faculty and conducting an Internet search.

We asked advisors to confirm lead advisor status before completing the survey questionnaire. Individuals who did not identify themselves as a lead advisor were asked to provide contact information for the correct individual, who was then invited to participate. We asked advisors who had supervised multiple projects to answer questions about the impact of each project, up to a maximum of six projects in one round, to limit the burden on respondents and the risk that they would withdraw. Advisors who had led more than six projects were asked to complete additional 1-month rounds of the survey until the list of projects was finished. To increase the response rate, we personalized the email invitations and offered an incentive in the form of a draw for one of four \$25 gift cards.¹⁷

Data analysis

We used frequencies and percentages to summarize the data captured using categorical response scales. Project characteristics were presented by study design and by population type and source. For the survey, we omitted responses if a participant did not respond to at least 20% of questionnaire items pertaining to project impact. Two authors (CL, RS) independently reviewed and classified the descriptions of project impact into one of the domains of impact and then compared the responses for consistency. When interpreting the results related to KT, we considered presentation and publication rates of 0%–30% to be low; 31%–60%, moderate; and 61%–100%, high.¹³

RESULTS

Nature of MScPT students' research

A total of 201 research projects were completed between 2003 and 2014. Data were abstracted from final papers (97.0%), research protocols (2.0%), and peer-reviewed journal articles (1.0%). The percentages of projects involving quantitative, qualitative, and combined quantitative and qualitative methods were 66.7%, 26.4%, and 7.0%, respectively. Table 1 summarizes the study design and data collection methods used across the projects. The percentages of projects that targeted clinical populations, professional populations, and a combination of clinical and professional populations were 60.7%, 33.8%, and 5.5%, respectively. Some projects (32.9%) targeted multiple clinical populations.

Across the 201 projects, the primary workplace of the 98 lead advisors was the Department of PT at U of T

Table 1 Study Design and Data Collection Methods Used across MScPT Research Projects Completed 2003–2014

Study design and data collection method	No. (%) of projects*			
	Quantitative (out of 134*)	Qualitative (out of 53*)	Quantitative and qualitative (out of 14*)	All (201*)
Pilot studies	29 (21.6)	4 (7.5)	3 (21.4)	36 (17.9)
Number of study steps				
Single-step	125 (93.3)	49 (92.5)	2 (14.3)	176 (87.6)
Multi-step	9 (6.7)	4 (7.5)	12 (85.7)	25 (12.4)
Timing of data collection				
Prospective	85 (63.4)	49 (92.5)	10 (71.4)	144 (71.6)
Retrospective	42 (31.3)	3 (5.7)	0	45 (22.4)
Retrospective and prospective	7 (5.2)	1 (1.9)	4 (28.6)	12 (6.0)
Study design†	136	0	0	203
Cross-sectional	113 (83.1)	52 (98.1)	14 (100.0)	179 (88.2)
Experimental (quasi-, pilot RCT, RCT)	13 (9.6)	0	0	13 (6.4)
Observational (case control, cohort)	9 (6.6)	0	0	9 (4.4)
Longitudinal	1 (0.7)	1 (1.9)	0	2 (1.0)
Data collection tools‡	150	73	31	254
Survey questionnaire (web, mail, telephone, Skype)	62 (41.3)	0	13 (41.9)	75 (29.5)
Interview guide (face to face, telephone, Skype)	1 (0.7)	58 (79.5)	8 (25.8)	67 (26.4)
Standardized assessment tool (goniometry, functional outcome measure)	40 (26.5)	0	3 (9.7)	43 (16.9)
Data abstraction tool	42 (28.0)	0	0	42 (16.5)
Focus group guide (face to face, telephone, Skype)	0	11 (15.1)	6 (19.4)	17 (6.7)
Secondary analysis of existing data set	6 (4.0)	4 (5.5)	1 (3.2)	11 (4.3)

*Used as the denominator to compute column-specific percentages.

† Two (1.5%) quantitative projects used multiple study designs.

‡ Forty-two projects used multiple types of data collection tools; this explains why the total count for this section exceeds the number of projects indicated in the column header.

MScPT = Master of Science in Physical Therapy; RCT = randomized controlled trial.

(45.3%); hospitals fully affiliated with U of T (39.8%); community-affiliated hospitals and sites (6.0%); private clinics (1.0%); professional, health care, or community organizations (3.5%); or “other” or not specified (4.5%). Across the 201 projects, research was conducted in the Department of PT at U of T (41.1%), at hospitals fully affiliated with U of T (34.4%), at community- and member-affiliated hospitals (7.2%), in the community (e.g., homes of people with clinical conditions, professionals responding to surveys, community organizations; 6.2%), in health care organizations (1.4%), at private clinics (1.0%), or “other” (0.5%). Locations for 17 projects were unspecified (8.2%). Tables 2 and 3 summarize the characteristics and sources of the participants, respectively, in the 201 projects reviewed.

Table 4 presents the type of evaluation, research type, PT practice area, and primary aspect of PT education and practice targeted across all 201 projects.

Perceived impact of MScPT students' research

Of the 98 lead advisors on the projects completed in 2003–2014, 3 were removed because of missing contact information ($n = 2$) or technical error ($n = 1$). Of the 95 remaining advisors, 5 were not eligible (did not actually serve as a lead advisor) or a valid email address for the correct lead advisor could not be identified, 1 did not provide consent, and 59 advisors on 119 projects com-

pleted the questionnaire (response rate 62.1%). Of the 59 survey respondents, 57.6% led 1 project, 18.6% led 2 projects, 11.9% led 3–6 projects, and 11.9% led 7–13 projects.

Of the 59 survey respondents, 35.6% were core faculty members of the U of T Department of PT, and 55.9% held a status appointment with the department; 32.2% were clinicians or professional practice leaders; and 32.2% were researchers or scientists. Table 5 presents the characteristics of the survey respondents.

Table 6 provides results on the perceived impact of the projects on research advisor capacity based on data from 58 survey participants. Of the 58 respondents, 41.4% indicated that their participation in the research projects had assisted them “very much” in developing the ability to supervise graduate students. Table 7 presents data outlining the perceived impact of the projects on clinical education, clinical practice, KT, and health policy. Of the 59 participants, 51 (86.4%) provided a description of the greatest perceived impact of the MScPT students' research projects. Of the 51 descriptions, the areas of greatest impact were clinical practice (45.1%), advisor research capacity (31.4%), KT (11.8%), postgraduate and clinical education (5.9%), and health policy (5.9%). Appendix 3 online provides examples of descriptions in each domain of impact.

Table 2 Type and Characteristics of Participants in MScPT Research Projects Completed 2003–2014 ($n = 201$ Projects)

Population type and characteristic	No. %	
	Projects of each type	Projects with characteristic in each type*
Clinical population	176 (87.6)	
Age		
Geriatric (>65 years)		23 (13.1)
Adult (18–65 years)		121 (68.8)
Youth (13–17 years)		15 (8.5)
Children (<13 years)		17 (9.7)
Health status		
Neurological condition		53 (30.1)
Musculoskeletal condition		52 (29.5)
Cardiorespiratory condition		28 (15.9)
Systemic condition		20 (11.4)
Healthy†		20 (11.4)
Work-related injury		3 (1.7)
Family or support personnel	11 (5.5)	
Parent of child or youth		7 (63.6)
Non-parent family member		2 (18.2)
Caregiver or companion		2 (18.2)
Health care professionals and students	95 (47.3)	
Physical therapist		66 (69.5)
Medicine/nursing		
Other rehabilitation HCP (OT, SLP)		10 (10.5)
PT students		9 (9.5)
Non-PT HCP students		6 (6.3)
Other professionals	13 (6.5)	4 (4.2)
PT manager or employer		4 (30.8)
Other (chaplain, lifeguard, fitness trainer)		9 (69.2)

*Denominator for percentages in this column is the number of projects for each population type and source, as listed in the second column.

†Refers to studies that tested procedures designed for a clinical population in a healthy population (those without relevant health conditions or disabilities) as a preliminary step.

MScPT = Master of Science in Physical Therapy; HCP = health care professional; OT = occupational therapist; SLP = speech-language pathologist; PT = physical therapy.

Facilitators of and barriers to serving as lead advisor

Across 59 advisors, the three most frequently selected facilitators of serving as a lead advisor were the opportunity to develop new research ideas (15.3%), the motivation to increase research productivity (15.3%), and the opportunity to enhance students' research capacity or interest (14.7%). The three most frequently selected barriers were time commitment (32.1%), limitations on the size or complexity of projects (23.7%), and scheduling conflicts (18.6%).

DISCUSSION

The U of T MScPT students' research projects have supported research conducted primarily in the Department of PT and at hospitals affiliated with U of T, with the number of completed projects divided equally among

Table 3 Source and Location of Participants in MScPT Research Projects Completed 2003–2014 ($n = 201$ Projects)

Population source and location	No. %	
	Projects from each source	Projects located at each source*
Clinical population	152 (59.4)	
Hospital		100 (65.8)
U of T—PT department		10 (6.6)
Previous research		9 (5.9)
U of T—outside PT department		7 (4.6)
Other (community/health care organization, private clinic, Internet)		26 (17.1)
Professional population	104 (40.6)	
Professional organization (CPO, CPA)		26 (25.0)
Other PT department		19 (18.3)
Hospital		15 (14.4)
Internet		14 (13.5)
Other (community/health care organization, private clinic, Internet)		30 (28.8)

*Denominator for percentages in this column is the number of projects for each population type and source, as listed in the second column.

MScPT = Master of Science in Physical Therapy; U of T = University of Toronto; PT = physiotherapy; CPO = College of Physiotherapists of Ontario; CPA = Canadian Physiotherapy Association.

these locations. Various types of research are conducted in the curriculum, and the majority of projects have a clinical focus. The survey results suggest that participating as a lead advisor on students' research projects in the MScPT research curriculum enables the advisors to develop skills related to research capacity, particularly an increased ability to supervise graduate students and conduct a research project. Our findings also suggest that some MScPT research projects are advancing clinical practice, particularly in the areas of PT assessment, treatment, and education of patients, caregivers, or both. Finally, opportunities to further research productivity and capacity are perceived to facilitate lead advisor participation, and scheduling conflicts, time commitment, and limitations on project size and complexity represent barriers to participating as a lead advisor.

Impact on advisors' research capacity

To our knowledge, this is the first study to examine the impact of students' research conducted in a university-based health professional programme on the research capacity of lead advisors. Although the MScPT research projects enable the students to develop skills related to EBP, our results suggest that they also provide an opportunity for lead advisors in clinician, research, research trainee, and educator work roles to develop skills related to research capacity. Although the survey respondents

Table 4 Research Scope of MScPT Projects Completed 2003–2014 (*n* = 201 Projects)

Research scope	No. (%)
Type of evaluation	
Research project	160 (79.6)
Programme evaluation	41 (20.4)
Research type	
Clinical	105 (52.2)
Health services	64 (31.8)
Biomedical	16 (8.0)
Social, cultural, environmental, and population health	16 (8.0)
PT practice area*	
Mobility and musculoskeletal PT	58 (28.9)
Neurological PT	41 (20.4)
Research and education	27 (13.4)
Business practice management and leadership	22 (10.9)
Cardiorespiratory PT	18 (9.0)
Systemic disease	13 (6.5)
Global health	6 (3.0)
Occupational health and safety	6 (3.0)
Disability	5 (2.5)
Client-centred care	3 (1.5)
Pain	2 (1.0)
Primary aspect of PT education and/or practice	
Treatment	71 (35.3)
Assessment and treatment	52 (25.9)
Education and mentorship	46 (22.9)
Assessment	23 (11.4)
Assessment, treatment, and education	9 (4.5)

*Participants could select more than one practice area.

MScPT = Master of Science in Physical Therapy; PT = physical therapy.

perceived the highest level of impact to be on their ability to conduct a research study and supervise graduate students, one-quarter to one-third of them thought that there was a moderate-level impact on their ability to develop a research study, an ethics application, a manuscript, a poster, or an oral presentation.

These skills are fundamental to fulfilling scientist and scholarly practitioner roles.² Among PT clinicians, research participation has been associated with not only a positive attitude toward research¹⁸ but also the use of research literature in clinical decision making.¹⁹ Thus, participating in research—from the development of study objectives to the production and reporting of scientific evidence—may contribute to improving the value that physiotherapists place on scientific evidence and EBP. This is important because some clinicians do not value the scholar role²⁰ and think that the scientific literature is inaccessible and limited in its applicability to everyday clients.²¹

The in-depth descriptions of project impact given by the lead advisors suggest that the MScPT programme provides an opportunity for clinicians, who have had little or no previous research experience and who do not necessarily have time protected for research, to address clinical questions. The model for conducting

Table 5 Characteristics of Lead Advisor Survey Respondents (*n* = 59)

Characteristic	No. (%)
Highest degree obtained	
Bachelor's	5 (8.5)
Master's entry level to practice	6 (10.1)
Applied or research master's	23 (39.0)
Doctorate	24 (40.7)
Other, not specified	1 (1.7)
Appointment status with department of PT	
Core research faculty (tenured or tenure stream)	10 (17.0)
Core teaching faculty	11 (18.6)
Status-appointment faculty	33 (55.9)
Not affiliated	5 (8.5)
Primary work role	
Clinician/professional practice leader	19 (32.2)
Researcher/scientist	19 (32.2)
Educator	7 (11.9)
Post-doctoral fellow/PhD student	4 (6.8)
Other (health care or university administrator, freelance writer)	10 (16.9)
Time protected for research, %	
0	18 (30.5)
1–24	13 (22.0)
25–49	9 (15.3)
50–74	4 (6.8)
75–100	15 (25.4)
Primary workplace	
U of T	15 (25.4)
U of T-affiliated hospital	39 (66.1)
Other (private clinic, community organization, long-term care, other post-secondary institution, professional organization)	5 (8.5)

PT = physical therapy; U of T = University of Toronto.

MScPT student research at U of T may facilitate the involvement of clinicians as lead advisors. For example, clinicians are paired with a departmental research faculty member, who contributes methodological expertise as part of his or her teaching requirement. Departmental research faculty may also serve as lead advisors. Through lectures, workshops, and tutorials, MScPT research curriculum coordinators and teaching assistants support student researchers in developing a research protocol, submitting an application to obtain ethics approval, collecting and analyzing data, writing a manuscript formatted for submission to a preselected journal, and developing a poster to present at a conference.

U of T's Department of PT provides access to space, computers, and statistical software to support the completion of research activities. Lead advisors attend a few in-person sessions at the university, which minimizes

Table 6 Perceived Impact of Supervising MScPT Research on Lead Advisor's Ability to Perform Activities Reflecting Research Capacity ($n = 58$)

Area of impact	No (%) of advisors				
	Not at all	Slightly	Moderately	Very much	Extremely
Supervise graduate students	3 (5.2)	11 (19.0)	17 (29.3)	24 (41.4)	3 (5.2)
Develop a research study	3 (5.2)	15 (25.9)	20 (34.5)	19 (32.8)	1 (1.7)
Develop and submit an REB application	7 (12.1)	16 (27.6)	16 (27.6)	18 (31.0)	1 (1.7)
Conduct a research project	6 (10.3)	13 (22.4)	15 (25.9)	21 (36.2)	3 (5.2)
Write a manuscript	12 (20.7)	15 (25.9)	16 (27.6)	13 (22.4)	2 (3.4)
Develop a poster	14 (24.1)	15 (25.9)	17 (29.3)	10 (17.2)	2 (3.4)
Develop or deliver an oral presentation	21 (36.2)	11 (19.0)	14 (24.1)	10 (17.2)	2 (3.4)

Note: Percentages may not total 100 because of rounding.

MScPT = Master of Science in Physical Therapy; REB = research ethics board.

the time spent away from clinical practice. Furthermore, the affiliation of more than 90% of the survey respondents with the department, and the close proximity to the department of many university-affiliated hospitals, may be enabling factors. Subsequent research is necessary to determine the extent to which these factors may influence clinicians to serve as a lead advisor.

Impact on clinical research

The majority of the populations studied in the U of T MScPT students' research projects are clinical. This may be due to the nature of the research conducted by core faculty in the Department of PT and the involvement of hospital-based lead advisors. Examples provided by the respondents revealed that projects were used to directly inform PT clinical practice by educating staff and patients, validating clinical assessment tools, and informing aspects of PT treatment delivery. It is interesting that although 50% of registered physiotherapists in Ontario work in private practice settings,²² only 1% of the lead advisors of the 201 projects included in the retrospective review were based at private clinics. Further investigation is needed to determine whether this is due to a lack of awareness of the opportunity to submit a project or a lack of dedicated time or support to conduct research in a privately funded setting.

Impact on education, knowledge translation, and health policy

Our survey results suggest that although they were less frequently reported, the findings of the MScPT students' research projects informed the development of PT entry-level and continuing education and health policy. For example, one project contributed to the development of a clinical performance evaluation tool for entry-level PT students across Canada.²³ One lead advisor reported that her project findings had been quoted by the provincial PT regulatory body and professional association in a proposal aimed at expanding the PT scope of practice; this shows that the findings from an MScPT project can contribute to policy change.

The current body of literature has estimated that

there is a 17-year time lag for studies to be quoted in clinical guidelines;^{24,25} therefore, it is not surprising that few projects in the U of T MScPT curriculum, from its inception in 2003 to 2014, have reported any direct impacts on regulated health policy so far. Furthermore, the time allocated to research in the MScPT curriculum can limit projects to cross-sectional study designs with primarily descriptive analyses, which may make it more challenging to affect policy that requires more complex longitudinal study designs. Nevertheless, exploring ways in which MScPT research projects can contribute to evidence-informed policy warrants further consideration.

The dissemination and implementation of research to inform education design and health policy depends on various forms of KT. Our survey results suggest that the findings from just over half the projects were published in a peer-reviewed journal, presented at a national conference, or both. These dissemination rates exceed those observed in a previous evaluation of our MScPT programme, which showed that an estimated one-third of projects had led to a journal publication or conference presentation.¹³ One factor that likely increases the chance of publication in a peer-reviewed journal is the graded programme requirement that student groups draft a final report in the format of a manuscript for publication in a targeted journal. Other factors identified in the literature may also play a role: motivation from advisors, a positive relationship with advisors,^{26,27} self-selection of projects,²⁷ and the quality of the final paper.²⁸

The findings of our study may be useful for informing the development of models that facilitate the conduct of students' research in master's-level programmes in PT as well as other health professions. Although much of the clinical research conducted in U of T's MScPT programme takes place at hospitals affiliated with the university, some was conducted, although infrequently, in partnership with community organizations, health care organizations, and private clinics and in home care environments. Further research is needed to explain this result. For example, faculty members may conduct little research in these

Table 7 Impact of MScPT Projects on Clinical Education, Clinical Practice, Knowledge Translation, and Health Policy, as Perceived by Survey Respondents ($n = 119$ Projects)

Area of impact	No. (%)
Clinical education	
Entry-level education	
Physiotherapy programme	25 (21.0)
Other HCP programme (OT, SLP, medicine, nursing)	7 (5.9)
Inter-professional education	5 (4.2)
Continuing education	
Physiotherapy programme	25 (21.0)
Other HCP programme (OT, SLP, medicine, nursing)	9 (7.6)
Multiple health professionals	4 (3.4)*
Community education and training programmes	15 (12.8)†
Clinical practice	
Physiotherapy	
Treatment	43 (36.1)
Education provided to patients and caregivers	39 (32.8)
Assessment	32 (26.9)
Other aspect of service delivery (client-centred care, referral process)	43 (36.4)*
Other HCP service delivery	28 (23.7)*
Knowledge translation	
Published in a peer-reviewed journal	63 (52.9)
Presentations	
Organization/research setting	64 (54.7)†
National conference	60 (50.4)
Provincial conference	36 (30.5)*
Regional conference	35 (29.4)
International conference	27 (22.7)
Other communication	
Written summary to participants	39 (32.8)
Shared with research partners	26 (22.0)*
Educational resources	20 (17.1)†
News or social media	9 (7.6)
Health policy	
Government-mandated policy	3 (2.5)
Clinical practice regulations/guidelines	2 (1.7)
Health care policy	2 (1.7)
Regulatory policy	1 (0.9)†

*Data missing for 1 project.

†Data missing for 2 projects.

MScPT = Master of Science in Physical Therapy; HCP = health care professional; OT = occupational therapist; SLP = speech-language pathologist.

settings, or individuals in these settings may face particular challenges when they engage in research.

Our study had several limitations. First, our survey of lead advisors yielded a response rate of 62.1%, which

aligns with previous response rates of Web-based surveys among PT and community-based rehabilitation populations;^{23,24} however, the research impact may have been overestimated if the survey respondents, who were primarily core or status-appointment faculty, provided socially desirable responses because of a personal interest in the programme's success and if non-responders were less likely than responders to perceive an impact. Second, although the word *impact* can be considered to have a neutral meaning, the questionnaire items and instructions were worded to imply a positive impact. Third, questionnaire items were included to examine the impact of project findings on the education and clinical practice of health professional groups other than PT; however, these groups were not specified. Future research would be needed to explore the nature of these influences on specific professional groups.

In addition, clustering posed methodological issues because 38.9% of respondents were lead advisors on multiple research projects. Thus, a clinician who had acted as lead advisor on six clinical projects could be more likely to report that the greatest impact of the projects was on clinical practice. Finally, the direct impact of more recently completed projects may have been attenuated because of lack of time to disseminate or implement the findings.

CONCLUSIONS

The U of T MScPT research projects appear to enable lead advisors across a variety of work roles to develop skills in conducting research and supervising students. Furthermore, projects completed as part of this curriculum were perceived to have had a direct impact on clinical practice. Although having an impact on PT education and health policy was less common than having an impact on clinical PT practice, the moderate rate of dissemination of the research findings suggests that there is a potential for a larger impact on these domains in the future.

KEY MESSAGES

What is already known on this topic

Physiotherapy students have reported a positive impact of participating in research on their perceptions of their knowledge, skills, and attitudes toward evidence-based practice.

What this study adds

This is the first known study to investigate the impact of students' research projects in a Master of Science in Physical Therapy research curriculum at a Canadian university on advisors' research capacity, education, clinical practice, knowledge translation, and health policy. The lead advisors identified the positive impact of advising on such projects on building their own personal research

capacity. Our findings suggest that the projects had a direct impact primarily on clinical practice, but also on education and health policy.

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