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TITLE

Experiences of telehealth e-mentoring within postgraduate musculoskeletal physical therapy education in the United Kingdom and Canada: a protocol for parallel mixed methods studies and cross cultural comparison

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ABSTRACT

Introduction:

Mentored clinical practice is central to demonstrating achievement of International Educational Standards in advanced musculoskeletal physical therapy. Mentored clinical practice traditionally delivered face-to-face, offers a unique pedagogy to facilitate critical reflection, deeper learning and enhanced knowledge translation to optimise patient care. Yet access to mentors is often limited by geography or cost, supporting the potential value of telehealth e-mentoring. The aim of this study is to investigate the experiences and outcomes of multiple stakeholders (student-mentees, mentors and patients) engaged in musculoskeletal physical therapy telehealth e-mentoring across two Universities (United Kingdom, Canada).

Methods and analysis:

Using case study design, we will use sequential mixed methods involving qualitative and quantitative components based on existing evidence. To examine the influence of telehealth e-mentoring on health outcomes in patients with musculoskeletal complaints we will use patient reported outcomes for satisfaction, patient empowerment and change in musculoskeletal health. We will conduct semi structured interviews to explore the development of critical thinking, clinical reasoning, communication skills and confidence of students engaged in telehealth e-mentoring. To explore the mentor acceptability and appropriateness of telehealth e-mentoring we will conduct a focus group in each site. Finally, we will include a focus group of participants from each site to allow a cross cultural comparison of findings to inform international stakeholders. Quantitative data will be analysed using descriptive statistics (median and IQR) to describe changes in outcome data and qualitative data will be analysed following the Framework Method.

Ethics and dissemination:

This study has ethical approval (ERN_20-0695) granted by the University of Birmingham and will have approval at Western University prior to data collection. Findings will be published in a peer reviewed journal and disseminated to key stakeholders in musculoskeletal physical therapy education and practice.

Keywords

Telehealth; e-mentoring; postgraduate education; musculoskeletal physical therapy

ARTICLE SUMMARY

Strengths and Limitations of this Study

- This is the first study to explore the experiences of multiple stakeholders engaged in mentoring for postgraduate physical therapy using telehealth
- The mixed methods case study design enables detailed exploration of experiences and outcomes involving all stakeholders as participants
- Cross cultural comparison is enabled through use of multiple study site settings across countries/ continents
- Findings will be specific to physical therapy, the two Universities and their respective countries, thus limiting transferability to other allied health professions, settings and countries

INTRODUCTION

Mentored clinical practice (MCP) is central to demonstrating achievement of the International Federation of Orthopaedic Manipulative Physical Therapists (IFOMPT) International Educational Standards; [1] operationalised in the United Kingdom (UK) by the Musculoskeletal Association of Chartered Physiotherapists (MACP) and in Canada by the Canadian Association of Manipulative Physical Therapy (CAMPT). Using a framework of clinical reasoning, students as mentees, facilitated by a mentor, are able to integrate new skills and knowledge (procedural and propositional) acquired within a University setting into their assessment and management of patients with musculoskeletal (MSK) complaints in a practice setting. MCP offers a unique pedagogy to facilitate critical reflection, deeper learning and enhanced knowledge translation [2] to optimise patient care. Improvements in patient outcomes for those physical therapists who had completed fellowships with a component of MCP [3] and clinical trial data supporting its clinical effectiveness now exist. [4]

MCP is highly dependent on specialist input and suitably qualified MSK physical therapy mentors. Access to these mentors has become increasingly difficult in the UK with many of these highly trained mentors often working at an advanced practice level or in consultant practitioner roles; therefore being involved in managing or leading large physical therapy services with no capacity for mentorship. Additionally, in Canada the geography of the country makes access to mentors challenging and limits opportunities for mentees to access mentors based on location. This often results in professional isolation for physical therapists practising in rural areas.[2] Likewise, students report increasing difficulties when negotiating time away from work (costs, access, impact on service etc.) to complete the MCP component of IFOMPT approved programmes. The COVID-19 pandemic has further compounded these issues forcing us to rethink how we approach healthcare delivery and mentorship. This has resulted in a shift of all initial contact MSK physical therapy being delivered as telehealth via remote digital consultation (telephone consultation and/or video consultation) and a stepped

rationale for escalation to face to face consultation. [5]In light of these changes, alternative MCP approaches are urgently required to fulfil student and IFOMPT approved programme' needs.

Telehealth, which encompasses 'telemedicine', 'telecare', 'telerehabilitation' 'teleconsult' and 'e-health' [6] delivers healthcare using virtual technology and online communication platforms and can move beyond traditional practice settings, [5, 7] to overcome barriers to accessing healthcare such as time, geography and costs of specialist services. [6, 8] Considerable evidence exists to support its effectiveness (clinical and cost) and acceptability for improving health outcomes for patients, including reducing hospital admissions. [5, 6, 9]. Patient satisfaction with telehealth in MSK physical therapy is widely reported as high [5] and in fact recent trials reported higher levels than face to face care. [5, 10] Yet, widespread adoption of telehealth within physical therapy has been slow [5] and to the author's knowledge has not yet been used as a medium to support postgraduate professional development in MSK physical therapy. Whilst a high level of psychomotor skills are deemed a core construct of MSK advanced practice, [11] a considerable number of other core constructs (e.g. high levels of clinical reasoning, background knowledge and self-analysis as well as patient-centred approach, critical approach to practice etc.) could be achieved via telehealth. [10-12] With evidence of good concurrent validity for a range of outcomes (pain, swelling, joint mobility, muscle strength etc.) [13] and a range of studies within medicine supporting that 75-83% of diagnoses are derived from the patient history data alone, [14, 15] learning outcomes could arguably be achieved through telehealth e-mentoring.

By drawing on a myriad of approaches (face to face, e-mentoring and telehealth) to enable fulfilment of the requirements of a specialist educational programme, we have the potential to offer the next generation of advanced MSK physical therapists a novel and adjunctive mechanism for professional growth and development, whilst optimising patient care within a biopsychosocial framework of care; allowing for both synchronous and asynchronous communication to occur, which is not limited by geography, cost or time. A unique opportunity currently exists to explore the use of telehealth e-

mentoring as a means of fulfilling the requirements of IFOMPT Educational Standards for advanced MSK physical therapy practice. Moreover, telehealth e-mentoring could be an adjunct to conventional face-to-face MCP approaches beyond Covid-19, to better prepare students through novel approaches to delivery of specialist MSK physical therapy; using remote and digital consultation as part of clinical triage in outpatient healthcare consultations. [16-18]

Where telehealth e-mentoring has been introduced in light of Covid-19 we urgently need to evaluate its acceptability, appropriateness, satisfaction from the stakeholder perspectives of patients, mentors and students as a novel approach for professional growth and development, integrating knowledge and skills acquired in a University setting into clinical practice. Findings from this international study will place a spotlight on the MACP and CAMPT as leading and collaborating internationally in innovative approaches to enable fulfilment of IFOMPT Educational Standards.

Aim

To investigate the experiences of post-graduate Masters (MSc) physical therapy students, their mentors, and patients with MSK complaints engaged telehealth e-mentoring (consultation/rehabilitation) in a UK and Canadian University setting.

Objectives

1) To examine the influence of telehealth e-mentoring on health outcomes in patients with MSK complaints
2) To explore the development of critical thinking, clinical reasoning, communication skills and confidence of post graduate students engaged in telehealth e-mentoring.
3) To explore the mentor acceptability and appropriateness of telehealth e-mentoring to facilitate student development towards achievement IFOMPT Educational Standards
4) To conduct a cross cultural comparison of findings to inform international stakeholders

METHODS AND ANALYSIS

Design and methods

Using case study design [19] we will use sequential mixed qualitative and quantitative methods (Figure 1). In the absence of reporting guidelines for mixed methods studies, the study is designed in line with the COnsolidated criteria for REporting Qualitative research (COREQ). [20] and STrengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [21] for qualitative and observational study designs respectively.

Semi structured interviews will be used to explore development of critical thinking, clinical reasoning, communication skills and confidence of post graduate students, patient reported outcomes to explore patient experiences and changes in MSK health following telehealth e-mentoring, a focus groups to explore mentor acceptability and appropriateness of telehealth e-mentoring and a focus group for cross cultural comparison of all data.

Participant recruitment and eligibility for each site

All participants must be able to communicate fluently in English, with access to a video consultation platform and able and willing to give informed consent.

- Patients (expected n=~50+) who self-refer to the UK University Advanced Manipulative Physical therapy telehealth service with a MSK complaint will be invited to participate.
- Students (n=10-15) from the cohort of postgraduate students registered on the respective IFOMPT approved programmes who are registered on the MCP module/course will be invited to participate in a semi structured interview. Purposive sampling will be used to ensure a

variance in the profile of participants with respect to age, gender, geographical and clinical experience on entry to the programme.

- Clinical mentors from the University of Birmingham and Western University programme (n=6-8) will be invited to participate in the focus group

Study setting

Two sites will be used to collect data; the University of Birmingham and Western University, London Ontario. Both Universities host programmes that offer eligibility to IFOMPT via nationally accredited programmes in MSK physical therapy; Birmingham since 2004 and Western since 2007. Each site experiences unique challenges to fulfilment of MCP thereby affording a different lens on the potential merits of telehealth e-mentoring. The video consulting platform Zoom (password protected) will be used to conduct interviews and the focus group.

Data collection and procedures

Objective 1, longitudinal observational study (UK only): Participants (patients) will be invited to participate in the study and complete the following questionnaires on initial assessment and/or discharge or onward referral (Supplementary file 1).

1. Patient Health: The Musculoskeletal Health Questionnaire (MSK-HQ) [23] is a recently developed Patient Reported Outcome Measure (PROM) for use with patients with MSK conditions and Patient Specific Functional Scale [24] is a patient specific valid, reliable, and responsive outcome measure for patients with MSK complaints. [24, 25]
2. Patient Enablement: The Patient Enablement Instrument (PEI) [26] is a well-established measure of self-care ability in first contact and primary care consultations.[26, 27] It has also

been reported to demonstrate fair content validity, construct validity and internal consistency in patients with chronic MSK symptoms [28]

3. Patient Reported Experience Measures (PREM): Rating of patient satisfaction will include key telehealth patient satisfaction themes - namely overall satisfaction, audio-visual quality, and the Consultation and Relational Empathy (CARE) measure. [29]

Objective 2, semi-structured interviews: Participants (students) will be invited to participate in a semi structured interview which will last 45-60 minutes. The interview will explore students' expectations and perceptions prior, during and after the period of telehealth e-mentoring, as well as exploring their individual experiences and beliefs around their development of clinical reasoning. The topic guide (Supplementary file 2) was informed by existing evidence including the M-Level health education Logic Model [22] and the core constructs of MSc level practice in MSK physical therapy. [11]

Objective 3, focus group: Participants (mentors) will be invited to participate in a focus group which will last 60-90 minutes. The focus group will explore acceptability and appropriateness of telehealth e-mentorship to facilitate student development towards achievement of IFOMPT Educational Standards. The topic guide will be developed inductively from the interim analysis of semi-structured interview data.

Objective 4, focus group: Researchers and representatives from participant groups (patient, mentor and mentee) will be invited to participate in a focus group which will last 90-120 minutes. The focus group will explore key themes and outcomes from country specific findings as part of a cross cultural analysis. The topic guide for this will be developed inductively from the analysis of data from focus group, semi structured interviews and patient outcomes in each country.

Data management and data analysis

Quantitative data, including participant demographics will be analysed descriptively using means and SD to determine change pre and post management. Interviews and focus group will be audio recorded and transcribed verbatim. Post transcription, response clarification will be completed to enhance accuracy and trustworthiness of participant views (member checking), with field notes used to maintain contextual details and non-verbal responses during data analysis/interpretation. [20]

Qualitative data will be analysed using the well-established Framework Method [30] (a seven stage process for qualitative data management and analysis) to examine and understand the experiences of telehealth and e-mentoring from interview and focus group data. The method highlights the importance involvement of individuals with experience in qualitative research, therefore experienced qualitative researchers will be involved at every stage of analysis.

Data storage, access and disposal

All quantitative data from the study will be collected using a bespoke online questionnaire, incorporating the measures as detailed above. Audio data will be transferred securely, transcribed by an approved service. Participant data will be stored confidentially for 10 years on password-protected computers that can only be accessed by the researchers, and in accordance with General Data Protection Regulation (GDPR), the Data Protection Act 2018 and University of Birmingham's research governance frameworks in the UK and Western University Health Science Research Ethics Board.

Patient and public involvement

Whilst conceived during the Covid-19 pandemic as a means of supporting ongoing student progression and development, the study is informed through many years of working (clinically and educationally) with patients, postgraduate students and MACP/CAMPT mentors. Mentors, mentees and patient representatives from each country will be invited to participate in the focus group to support cross

cultural analysis and interpretation of results, including key recommendations. Key stakeholders in postgraduate education for MSK physical therapists may also be contacted for their contribution and insight to help aid analysis and interpretation of results including the MACP and CAMPT. Patient and Public Involvement in the full study will be reported using the GRIPP2-SF when disseminating study results.[31]

Ethics approval and dissemination

Ethical approval has been granted by the University of Birmingham Ethics Committee (15/5/2020 ref ERN_20-0695) for the UK and will be granted by Western University, London Canada (under review). All participants will sign a consent form and receive a participant information sheet prior to participation. They will have the right to withdraw from the study at any point and up to four weeks after data collection is completed. Patient participants will be advised that any involvement will not impact on any current and future healthcare. There are minimal risks associated with this study. When presenting the study findings, pseudonyms will be used to protect the participants' identities. Any protocol deviations will be documented. The findings from this research will be disseminated to key stakeholders in postgraduate MSK physical therapy education nationally and internationally, including MACP and IFOMPT.

DISCUSSION

This protocol outlines the rationale and methodology of a mixed methods case study design across 2 countries to explore the experiences of telehealth e-mentoring within postgraduate MSK physical therapy education. The lead researcher for each site have considerable experience of postgraduate education in MSK physical therapy and experiences of the proposed research methodologies including relevant publications [1, 11, 22]. Findings from this research will inform the advancement of international practice in advanced MSK physical therapy postgraduate education, overcoming the

limitations of conventional approaches to MCP. It is anticipated that the findings from this study will also improve the access to mentors with specialist skills and knowledge globally, thus improving the educational fulfilment of student mentees and in turn patient outcomes.

AUTHOR CONTRIBUTIONS

NH is the CI leading the protocol development, analyses, and dissemination. NH and AR are lead researchers for each site, ensuring rigour and quality in project management. NH, WJ, MN, IT, JS, HG and AR have contributed to the design and development of the protocol and have contributed to the manuscript draft. All authors have read, provided feedback and approved the final manuscript.

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PATIENT CONSENT FOR PUBLICATION

Not required

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

References

1. International Federation of Orthopaedic Manipulative Physical Therapists. *IFOMPT Standards Document* 2016; Available from: https://www.ifompt.org/STANDARD+COMPLIANCE++TRAINING.html.
2. Ezzat AM, M.M., *Building passion develops meaningful mentoring relationships among Canadian physiotherapists.* Physiother Can, 2012. **64**(1): p.:77–85.
3. Rodeghero J, W.Y., Flynn T, Cleland JA, Wainner RS, Whitman JM, , *The impact of physical therapy residency or fellowship education on clinical outcomes for patients with musculoskeletal conditions.* Journal of Orthopaedic & Sports Physical Therapy, 2015. **45**: p. 86-96.
4. Williams A, R.A., James J Lewis, Phillips C, *Evaluation of the clinical effectiveness of a work-based mentoring programme to develop clinical reasoning on patient outcome: A stepped wedge cluster randomised controlled trial.* PLoS ONE, 2019. **14**(7): p. e0220110.
5. Cottrell MA, G.O., OLeary SP., *Telehealth for musculoskeletal physiotherapy.* Musculoskelet Sci Pract, 2020. **48**: p. 102193.
6. Tenforde AS, H.J., Kodish-Wachs JE, Iaccarino MA, Paganoni S., *Telehealth in Physical Medicine and Rehabilitation: A Narrative Review. .* TPM&R, 2017. **9**: p. S51-S58.
7. Chartered Society of Physiotherapy. *What is telehealth? .* 2020; Available from: https://www.csp.org.uk/professional-clinical/digital-physiotherapy/telehealth.
8. Dario AB, M.C.A., Almeida L, Ferreira ML, Refshauge K, Simic M, Pappas E, Ferreira PH., *Effectiveness of telehealth-based interventions in the management of non-specific low back pain: a systematic review with meta-analysis.* Spine (Phila Pa 1976), 2017. **17**: p. 1342-1351.

9. Holland A, *Telehealth reduces hospital admission rates in patients with COPD.* J Physiother, 2013. **59**(2): p. 129.
10. Cottrell MA, G.O., OLeary SP. , *Real-time telerehabilitation for the treatment of musculoskeletal conditions is effective and comparable to standard practice: a systematic review and meta-analysis.* Clinical Rehabiliation 2016. **31**: p. 625-638.
11. Rushton A, L.G., *Defining the construct of masters level clinical practice in manipulative physiotherapy.* Manual Therapy, 2010. **15**(1): p. 93-99.
12. Cottell MA, H.A., OLeary SP, Raymer ME, Russell TG, , *Service provider perceptions of telerehabilitation as an additional service delivery option within an Australian neurosurgical and orthopaedic physiotherapy screening clinic: A qualitative study.* Musculoskelet Sci Pract, 2017. **32**: p. 7-16.
13. Mani S, S.S., Omar B, Paungmali A, Joseph L, *Validity and reliability of Internet-based physiotherapy assessment for musculoskeletal disorders: a systematic review.* J. Telemed. Telecare, 2017. **23**(3): p. 379-391.
14. Ohm F, V.D., Sehner S, Wijnen-Meijer M, Harendza S, *Details acquired from medical history and patients' experience of empathy – two sides of the same coin.* BMC Medical Education, 2013. **13**: p. 67.
15. Keifenheim KE, T.M., Ip J, Speiser N, Leehr EJ, Zipfel S, Hermann-Werner A, , *Teaching history taking to medical students: a systematic review.* BMC Medical Education, 2015. **15**: p. 159.
16. Greenhalgh T, W.J., Shaw S, Morrison C, , *Video consultations for covid-19* BMJ, 2020. **368**: p. m998.
17. Thornton J, *Covid-19: how coronavirus will change the face of general practice forever.* 368, 2020: p. m1279.
18. Nitkunan A, P.D., Nitkunan T. , *COVID-19: switching to remote neurology outpatient consultation.* Practical Neurology 2020. **Published Online First: 04 May 2020.** .
19. M. Miles, A.H., *Qualitative data analysis: an expanded sourcebook*. 1994, Beverley Hills: Sage
20. Tong A, S.P., Craig J. , *Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups.* Int J Qual Health Care, 2007. **19**(6): p. 349-357.
21. von Elm E, et al., *Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)statement: guidelines for reporting observational studies.* BMJ, 2007. **335**(7624): p. 806-808.
22. Madi M, H., H, Griffiths M, Rushton A, Heneghan NR, , *Exploring Taught Masters Education for Healthcare Practitioners: A Systematic Review of Literature.* BMC Medical Education, 2018. **19**: p. 340.
23. Hill JC, K.S., Benedetto E, et al, *Development and initial cohort validation of the Arthritis Research UK Musculoskeletal Health Questionnaire (MSK-HQ) for use across musculoskeletal care pathways.* BMJ Open, 2016: p. 6:e012331.
24. Horn KK, J.S., Richardson G, Van Vliet D, Hefford C, Abbott JH. , *The patient-specific functional scale: psychometrics, clinimetrics, and application as a clinical outcome measure.* JOSPT, 2012. **42**(1): p. 30-D17.
25. Nicholas P, H.C., Tumilty S, , *The use of the Patient-Specific Functional Scale to measure rehabilitative progress in a physiotherapy setting.* Journal of Manual & Manipulative Therapy, 2012. **20**(3): p. 147-152.
26. Howie JG, H.D., Maxwell M, Walker JJ., *A comparison of a Patient Enablement Instrument (PEI) against two established satisfaction scales as an outcome measure of primary care consultations.* Family Practice, 1998. **15**(2): p. 165-71.
27. McKinstry B, C.I., Walker J, , *Can doctors predict patients' satisfaction and enablement? A cross-sectional observational study.* Family Practice, 2006. **23**(2): p. 240-245.

28. Enthoven P, P.A., Ludvigsson ML, Wibault J, Peterson G, Öberg B., *Validity, internal consistency and self-rated change of the patient enablement instrument in patients with chronic musculoskeletal pain.* J Rehabil Med, 2019. **51**(8): p. 587-597.
29. Mercer SW, M.M., Heaney D, Watt GC., *The consultation and relational empathy (CARE) measure: development and preliminary validation and reliability of an empathy-based consultation process measure.* Family Practice, 2004. **21**(6): p. 699-705.
30. Gale NK, H.G., Cameron E, Rashid S, Redwood S., *Using the framework method for the analysis of qualitative data in multi-disciplinary health research. .* BMC Medical Research Methodology, 2013. **13**(1): p. 117.
31. Staniszewska, S., et al., *GRIPP2 reporting checklists: tools to improve reporting of patient and public involvement in research.* BMJ, 2017. **358**: p. j3453.

Figure Legend

Figure 1: Exploratory sequential case study design

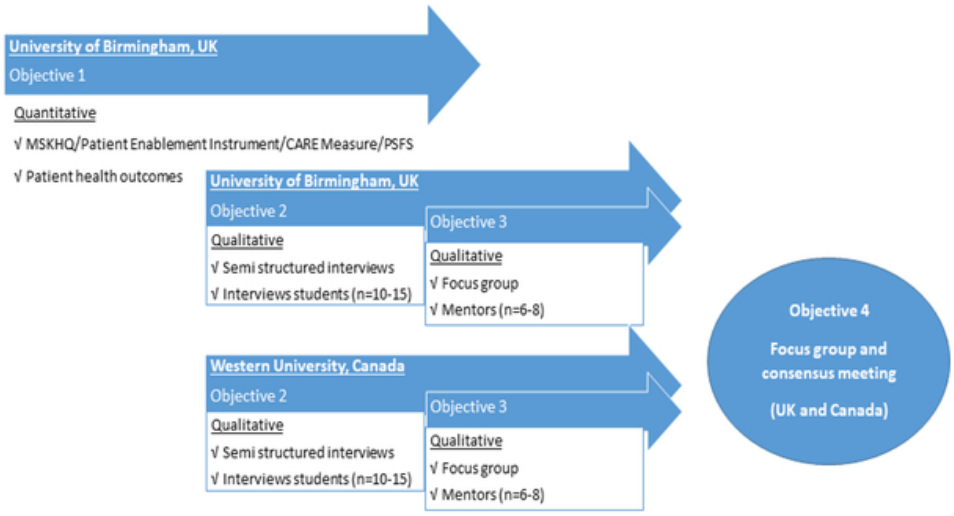

Figure 1: Exploratory sequential case study design

53x30mm (300 x 300 DPI)

Supplementary file 1.

MUSCULOSKELETAL HEALTH QUESTIONNAIRE (MSK-HQ) *(WITH PERMISSION)*

This questionnaire is about your **joint, back, neck, bone and muscle symptoms** such as aches, pains and/or stiffness.

Please focus on the particular health problem(s) for which you sought treatment from this service.

*For each question **tick** (✓) **or X one box** to indicate which statement best describes you **over the last 2 weeks**.*

1. Pain/stiffness during the **day** How severe was your usual joint or muscle pain and/or stiffness overall during the **day** in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Fairly severe ☐ 1	Very severe ☐ 0
2. Pain/stiffness during the **night** How severe was your usual joint or muscle pain and/or stiffness overall during the **night** in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Fairly severe ☐ 1	Very severe ☐ 0
3. Walking How much have your symptoms interfered with your ability to walk in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Unable to walk ☐ 0
4. Washing/Dressing How much have your symptoms interfered with your ability to wash or dress yourself in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Unable to wash or dress myself ☐ 0
5. Physical activity levels How much has it been a problem for you to do physical activities (e.g. going for a walk or jogging) to the level you want because of your joint or muscle symptoms in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Very much ☐ 1	Unable to do physical activities ☐ 0
6. Work/daily routine How much have your joint or muscle symptoms interfered with your work or daily routine in the last 2 weeks (including work & jobs around the house)?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Extremely ☐ 0
7. Social activities and hobbies How much have your joint or muscle symptoms interfered with your social activities and hobbies in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Extremely ☐ 0

8. Needing help How often have you needed help from others (including family, friends or carers) because of your joint or muscle symptoms in the last 2 weeks?	Not at all ☐ 4	Rarely ☐ 3	Sometimes ☐ 2	Frequently ☐ 1	All the time ☐ 0
9. Sleep How often have you had trouble with either falling asleep or staying asleep because of your joint or muscle symptoms in the last 2 weeks?	Not at all ☐ 4	Rarely ☐ 3	Sometimes ☐ 2	Frequently ☐ 1	Every night ☐ 0
10. Fatigue or low energy How much fatigue or low energy have you felt in the last 2 weeks?	Not at all ☐ 4	Slight ☐ 3	Moderate ☐ 2	Severe ☐ 1	Extreme ☐ 0
11. Emotional well-being How much have you felt anxious or low in your mood because of your joint or muscle symptoms in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Extremely ☐ 0
12. Understanding of your condition and any current treatment Thinking about your joint or muscle symptoms, how well do you feel you understand your condition and any current treatment (including your diagnosis and medication)?	Completely ☐ 4	Very well ☐ 3	Moderately ☐ 2	Slightly ☐ 1	Not at all ☐ 0
13. Confidence in being able to manage your symptoms How confident have you felt in being able to manage your joint or muscle symptoms by yourself in the last 2 weeks (e.g. medication, changing lifestyle)?	Extremely ☐ 4	Very ☐ 3	Moderately ☐ 2	Slightly ☐ 1	Not at all ☐ 0
14. Overall impact How much have your joint or muscle symptoms bothered you overall in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Very much ☐ 1	Extremely ☐ 0

Physical activity levels

In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your heart rate? *This may include sport, exercise and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that is part of your job.*

None	1 day	2 days	3 days	4 days	5 days	6 days	7 days
☐	☐	☐	☐	☐	☐	☐	☐

PATIENT SPECIFIC FUNCTIONAL SCALE

Please identify up to two important activities that you are unable to do or are having difficulty with as a result of your current problem/diagnosis.

Please rate each of these problems on the 0-10 scale below.

0 = Able to perform activity at the same level as before injury or problem (No issues) 10 = Unable to perform activity (Cannot perform)

Patient-specific activity scoring scheme (Circle one number or provide a range):

1. Activity										
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
No issues										**Cannot perform**

2. Activity										
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
No issues										**Cannot perform**

THE PATIENT ENABLEMENT INSTRUMENT (PEI)

As a result of your visit to the physiotherapist today, so you feel you are……

	Much better	**Better**	**Same or less**	**Not applicable**
able to cope with life				
able to understand your musculoskeletal complaint				
able to cope with your musculoskeletal complaint				
able to keep yourself healthy				
	Much more	**More**	**Same or less**	**Not applicable**
confident about your help				
able to help your self				

CONSULTATION AND RELATIONAL EMPATHY MEASURE (CARE Measure)

Please rate the following statement about today consultation. Please tick one box for each statement and answer every statement.

	Poor	Fair	Good	Very good	Excellent	Does not apply
1. Making you feel at ease….. (being friendly and warm toward you, treating you with respect; not cold or abrupt)						
2. Letting you tell your 'story' (giving you time to fully describe your complaint in your own words, not interrupting or diverting you)						
3. Really listening…. (paying close attention to what you were saying; not looking at the notes or computer as you were talking)						
4. Being interested in you as a whole person…… (asking/knowing relevant details about your life, your situation; not treating you as just a number)						
5. Fully understanding your concerns…. (communicating that he/she had accurately understood your concerns; not overlooking or dismissing anything)						
6. Showing care and compassion…. (seeming genuinely concerned, connecting with you on a human level; not being indifferent or detached)						
7. Being positive… (having a positive approach and a positive attitude; being honest but not negative about your problems)						
8. Explaining things clearly…. (fully answering your questions, explaining clearly, giving you adequate information; not being vague)						
9. Helping you take control… (exploring with you about what you can do to improve your health yourself, encouraging rather than lecturing you)						
10. Making a plan of action with you… (discussing the options, involving you in decisions as much as you want to be involved; not ignoring your views)						
Any other comments						

Supplementary file 2

Research Aim	Experiences of telehealth e-mentoring within postgraduate MSK physical therapy education: protocol for a mixed methods study		
Interview Section	**Questions/Content**	**Prompts**	**Aims**
Ethics Statement	Firstly, I would like to thank you for participating in this interview. Just a reminder that it will be audio/video-recorded but all information shared will be kept strictly confidential. You are entitled to stop the interview and the recording at any point or terminate the interview altogether if you wish. You also have the right not to answer a question if you do not wish to. There are no right or wrong answers. I am interested in your own personal experiences, thoughts and perceptions, with the aim of today being to understand your experiences of telehealth e-mentoring, which covers all forms of consultation with patients using remote means, within postgraduate MSK physical therapy education. Before we start do you have any further questions?	• *Can I confirm that you have read and understand the information sheet and signed the consent form?* • *Are you comfortable?*	• To ensure full understanding of what is expected of the participant during this interview. • Make sure the participant is comfortable and ready to begin.
Introductory Questions	1. Can you tell me a bit about yourself? 2. Can you tell me about your clinical background and recent posts/roles? 3. Can you tell me about your experiences of professional development and approaches to learning/development? 4. How many weeks into your CMP module are You?	• *Age, where do you come from, clinical posts, setting (NHS/private/sport/military)* • *What professional development have you been involved in before- weekend courses, IST* • *Thinking back what approaches worked best and you remember the most?*	• Make participant relax and feel comfortable with talking and opening up. • Build rapport. • To gain an insight into the participant's background

Transition Questions	1. What is your overall experience of being a postgraduate MSK physical therapy student? 2. How do you study through the week? Can you run me through the different approaches you use? 3. When this telehealth e-mentoring was first proposed as alternative approach to conventional clinical mentorship, how did it make you feel?	• *What does being a masters level student mean to you?* • *What aspects of your studies do you enjoy?* • *Any challenges with studying at masters level?* • *How do you break up your studies to keep focused?* • *Are there approaches used in the University that work best or engage you more? Seminars, workshops, lectures, patient presentations etc* • *Do you meet with other students? How does that work and what e-platforms do you use? Does this involve just those in your cohort or other individuals?* • *What works well and what does not work so well?* • *Thoughts, beliefs and expectations around different approach to development? Anxieties and thoughts about relevance?*	• Start to guide the interview towards experiences of masters level professional development • To get an idea of their approach to studying at masters level • To explore approaches used and their preferences to learning • Explore beliefs and perceptions of something unplanned.
E-mentoring and telehealth background	As well as a considerable body of evidence supporting the use of telehealth as cost effective, accessible means of providing patient care there is an emergence body of evidence supporting the use of e-mentoring to facilitate professional development. With the widespread use of telehealth to offer MSK physical therapy during the Covid-19 pandemic, this offered you as a student an opportunity to integrate knowledge and skills gained from the programme thus far in an authentic way and towards achievement of your programme learning outcomes. Where we are focusing on telehealth e-mentoring to develop advanced clinical reasoning skills to optimise care of patients with MSK symptoms, we will consider outcomes of masters level	• *Do you have any questions?* • *If you are unsure at any point regarding aspects of the Logic Model, please ask.*	• Inform the participant of the background of the study • Ensure the participant knows they can ask questions if they are unsure.

	education in MSK physical therapy, which includes 1. *Critical thinking skills and analysis* 2. *Clinical reasoning* 3. *Confidence and motivation to practice* 4. *Enhanced career progression* 5. *Becoming a lifelong learner* 6. *Advanced communication skills* 7. *Enhanced sense of autonomy* I have a number of questions for you founded on this model and if you are not clear on anything as we go through, then please let me know.		
	1. To start with, could you perhaps give me an idea of how the telehealth e-mentoring has influenced your **critical thinking skills?**	• *In what way do you think you have become more critical or analytical?* • *Has your clinical decision making changed?* • *In what way has your evidenced based practice changed?* • *What aspects of the process facilitated that?* • *What role did the others have in your group to enable that?* • *What role did the mentor have in facilitating this?* • *Have there been any additional learning activities you have been set during the CMP module which you have found beneficial?* • *How have different patient presentations influenced your critical analysis and decision making skills* • *Is there any different challenges between NP/FU* • *Assessment/management/rehab*	• To explore the influences of the experience on critical thinking and development of analytical skills across a range of patient presentations

Main Questions	2. Could you perhaps give me an idea of how the telehealth e-mentoring has influenced your **ability to clinical reasonin?**	• *Has this influenced your approach to reasoning e.g. collaborative or narrative reasoning of cases?* • *How did the different patients you saw influence this?* • *Knowledge is a component of clinical reasoning – was this challenged in anyway?* • *How did time influence this – reflection on and in action* • *Where you were involved in peer mentoring, how did this influence your own development?* • *Has this experience changed your meta cognition? If so, how?* • *What strategies did you use to support development of your clinical reasoning? Planning sheets, PROMs etc* • *Are your experiences the same for NP and FP* • *Did you feel this differed accordingly to stages of management e.g. assessment, management and rehab? What about doing physical tests? What about approaches to management?*	• To explore the influences of the experience on their ability to clinically reason and justify patient management across a range of patient presentations
	3. How do you feel the telehealth e-mentoring has influenced your **confidence and motivation to practice in MSK physical therapy**	• *Do you feel more of less confidence in managing patients within a biopsychosocial model of practice?* • *Why do you feel that? Is there any specific aspect of the mentorship that has helped or hindered that?* • *Does this reflect all stages of patient care – assessment, management and rehab* • *What aspects of your practice do you have more or less confidence in – e.g. reasoning complex cases, certain presentations, etc.* • *How do you feel about now going back into practice?* • *How do feel about dealing with uncertainty in managing complex patient cases in the future?*	• To explore confidence and motivation to practice in MSK physical therapy, drawing on new skills and knowledge • To explore how comfortable they are with dealing with uncertainty and problem solving to inform clinical decision making?

	4. **Advanced communication skills** are central to patient history taking and I wonder how you feel these have been influenced by the telehealth e mentoring?	• *Do you think your communication skills have changed? If so in what way? Which skills – listening, oral, written?* • *Do you feel there are any barriers or facilitators that have aided the development of your communication skills* • *How do you think this has influenced your relationship with your patients and peers?* • *Have your communications skills changed as a result of working in a small group? If so in what way?* • *What influence has this medium had on building a rapport with your patients?* • *What communication strategies have you used to develop your therapeutic relationship with patients?* • *Do you feel these experience have influenced your ability to interpret patient data, and articulate clinical diagnosis and treatment decisions* • *How have you optimised patient engagement in management plans?*	• To explore the scope of communication and the influences of this at a personnel, group and professional level
	5. How do you feel the telehealth e-mentoring may have influenced **a. Career progression** **b. Becoming a lifelong learner** **c. Enhanced sense of autonomy**	• *How do you feel now you have completed the clinical mentorship?* • *Do you feel this experience will be useful in supporting career progression e.g. triage?* • *Where students have reported changes such as career enhancement, becoming a lifelong learner or increased sense of autonomy, do you feel the experiences you have had will be useful? If so in what way?* • *In light of Covid-19 and social distancing how do you feel about the next stage of your career? What are your priorities and plans following completion of the programme?*	• To explore views and perceptions of this authentic experience on career progression, being a lifelong learning and sense of autonomy
Conclusion	That's all the questions, is there anything else you would like to add about your experiences of telehealth e-mentoring?	• *Is there anything you would like to ask regarding the analysis of the data or the next steps of the process?*	• Ensure the participant is comfortable with what has been discussed.

	The interview has now finished. Thank you for participating in this study, I really appreciate your time and input.		

BMJ Open

Experiences of telehealth e-mentoring within postgraduate musculoskeletal physical therapy education in the United Kingdom and Canada: a protocol for parallel mixed methods studies and cross cultural comparison

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TITLE

Experiences of telehealth e-mentoring within postgraduate musculoskeletal physical therapy education in the United Kingdom and Canada: a protocol for parallel mixed methods studies and cross cultural comparison

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ABSTRACT

Introduction:

Mentored clinical practice is central to demonstrating achievement of International Educational Standards in advanced musculoskeletal physical therapy. Whilst traditionally delivered face-to-face, telehealth e-mentoring is a novel alternative to offering this unique pedagogy, to facilitate mentee critical reflection, deeper learning and enhanced knowledge translation to optimise patient care. With Covid-19 resulting in widespread adoption of telehealth and access to mentors often limited by geography or cost, the potential value of telehealth e-mentoring needs investigating. To investigate the experiences and outcomes of multiple stakeholders (student-mentees, mentors and patients) engaged in musculoskeletal physical therapy telehealth e-mentoring across two Universities (United Kingdom, Canada).

Methods and analysis:

Using case study design, we will use sequential mixed methods involving qualitative and quantitative components based on existing evidence. To examine the influence of telehealth e-mentoring on health outcomes in patients with musculoskeletal complaints we will use patient reported outcomes for satisfaction, patient empowerment and change in musculoskeletal health. We will conduct semi structured interviews to explore the development of critical thinking, clinical reasoning, communication skills and confidence of students engaged in telehealth e-mentoring. To explore the mentor acceptability and appropriateness of telehealth e-mentoring we will conduct a focus group in each site. Finally, we will include a focus group of participants from each site to allow a cross cultural comparison of findings to inform international stakeholders. Quantitative data will be analysed using descriptive statistics (median and IQR) to describe changes in outcome data and qualitative data will be analysed following the Framework Method.

Ethics and dissemination:

This study has ethical approval (ERN_20-0695) granted by the University of Birmingham and will have approval at Western University prior to data collection. Findings will be published in a peer reviewed journal and disseminated to key stakeholders in musculoskeletal physical therapy education and practice.

Keywords

Telehealth; e-mentoring; postgraduate education; musculoskeletal physical therapy

ARTICLE SUMMARY

Strengths and Limitations

- This is the first study to explore the experiences of multiple stakeholders engaged in telehealth e-mentoring for postgraduate physical therapy
- The mixed methods case study design enables detailed exploration of experiences and outcomes involving all stakeholders as participants
- Cross cultural comparison is enabled through use of multiple study site settings across countries/ continents
- Findings will be specific to physical therapy, the two Universities and their respective countries, thus limiting transferability to other professions, settings and countries

INTRODUCTION

Telehealth, which encompasses 'telemedicine', 'telecare', 'telerehabilitation' 'teleconsult' and 'e-health' [1] delivers healthcare using virtual technology and online communication platforms and can move beyond traditional practice settings, [2, 3] to overcome barriers to accessing healthcare such as time, geography and costs of specialist services. [1, 4] Considerable evidence exists to support its effectiveness (clinical and cost) and acceptability for improving health outcomes for patients, including reducing hospital admissions. [1, 3, 5]. Patient satisfaction with telehealth in MSK physical therapy is widely reported as high [3] and in fact recent trials reported higher levels than face to face care. [3, 6] Yet, widespread adoption of telehealth within physical therapy has been slow [3] and to the author's knowledge has not yet been used as a medium to support postgraduate professional development in MSK physical therapy. Whilst a high level of psychomotor skills are deemed a core construct of MSK advanced practice, [7] a considerable number of other core constructs (e.g. high levels of clinical reasoning, background knowledge and self-analysis as well as patient-centred approach, critical approach to practice etc.) could be achieved via telehealth. [6-8] With evidence of good concurrent validity for a range of outcomes (pain, swelling, joint mobility, muscle strength etc.) [9] and a range of studies within medicine supporting that 75-83% of diagnoses are derived from the patient history data alone, [10, 11] learning outcomes could arguably be achieved through telehealth e-mentoring.

In MSK physical therapy the International Federation of Orthopaedic Manipulative Physical Therapists (IFOMPT) sets the international educational standards; [12] being then operationalised through approved programmes in the United Kingdom (UK) by the Musculoskeletal Association of Chartered Physiotherapists (MACP) and in Canada by the Canadian Association of Manipulative Physical Therapy (CAMPT). Mentored clinical practice (MCP) is central to demonstrating achievement of these educational standards and using a framework of clinical reasoning, students as mentees, facilitated by

a mentor, are able to integrate new skills and knowledge (procedural and propositional) acquired within a University setting into their assessment and management of patients with musculoskeletal (MSK) complaints in a practice setting. MCP offers a unique pedagogy to facilitate critical reflection, deeper learning and enhanced knowledge translation [13] to optimise patient care. Improvements in patient outcomes for those physical therapists who had completed fellowships with a component of MCP [14] and clinical trial data supporting its clinical effectiveness now exist. [15]

MCP is highly dependent on specialist input and suitably qualified MSK physical therapy mentors. Access to these mentors has become increasingly difficult in the UK with many of these highly trained mentors often working at an advanced practice level or in consultant practitioner roles; therefore being involved in managing or leading large physical therapy services with no capacity for mentorship. Additionally, in Canada the geography of the country makes access to mentors challenging and limits opportunities for mentees to access mentors based on location. This often results in professional isolation for physical therapists practising in rural areas.[13] Likewise, students report increasing difficulties when negotiating time away from work (costs, access, impact on service etc.) to complete the MCP component of IFOMPT approved programmes. The COVID-19 pandemic has further compounded these issues forcing us to rethink how we approach healthcare delivery and mentorship. This has resulted in a shift of all initial contact MSK physical therapy being delivered as telehealth via remote digital consultation (telephone consultation and/or video consultation) and a stepped rationale for escalation to face to face consultation. [3] In light of these changes, alternative MCP approaches are urgently required to fulfil student and IFOMPT approved programmes' needs, including the use of telehealth e-mentoring

Whilst a myriad of approaches are used (face to face, e-mentoring and telehealth) telehealth e-mentoring could be an adjunct to conventional face-to-face MCP approaches beyond Covid-19, to better prepare students through novel approaches to delivery of specialist MSK physical therapy; using

remote and digital consultation as part of clinical triage in outpatient healthcare consultations. [16-18]

Where telehealth e-mentoring has been introduced in light of Covid-19 we urgently need to evaluate its acceptability, appropriateness, satisfaction from the stakeholder perspectives of patients, mentors and students as a novel approach for professional growth and development, integrating knowledge and skills acquired in a University setting into clinical practice.

Aim

To investigate the experiences of post-graduate Masters (MSc) physical therapy students, their mentors, and patients with MSK complaints engaged telehealth e-mentoring (consultation/rehabilitation) in a UK and Canadian University setting.

Objectives

1) To examine the influence of telehealth e-mentoring on health outcomes in patients with MSK complaints
2) To explore the development of critical thinking, clinical reasoning, communication skills and confidence of post graduate students engaged in telehealth e-mentoring.
3) To explore the mentor acceptability and appropriateness of telehealth e-mentoring to facilitate student development towards achievement IFOMPT Educational Standards
4) To conduct a cross cultural comparison of findings to inform international stakeholders

METHODS AND ANALYSIS

Design and methods

Using case study design [19] we will use sequential mixed qualitative and quantitative methods to investigate telehealth e-mentoring as part of postgraduate physiotherapy education (Figure 1). Data collection will take place from May 2020 through to December 2021. Details of the telehealth e-mentoring are detailed in Figure 2. In the absence of reporting guidelines for mixed methods studies, the study is designed in line with the COnsolidated criteria for REporting Qualitative research (COREQ). [20] and STrengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [21] for qualitative and observational study designs respectively.

Semi structured interviews will be used to explore development of critical thinking, clinical reasoning, communication skills and confidence of post graduate students, patient reported outcomes to explore patient experiences and changes in MSK health following telehealth e-mentoring, a focus groups to explore mentor acceptability and appropriateness of telehealth e-mentoring and a focus group for cross cultural comparison of all data.

Participant recruitment and eligibility for each site

All participants must be able to communicate fluently in English, with access to a video consultation platform and able and willing to give informed consent.

- Patients (expected n=~50+) who self-refer to the UK University Advanced Manipulative Physical therapy telehealth service with a MSK complaint will be invited to participate.
- Students (n=10-15) from the cohort of postgraduate students registered on the respective IFOMPT approved programmes who are registered on the MCP module/course will be invited

to participate in a semi structured interview. Purposive sampling will be used to ensure a variance in the profile of participants with respect to age, gender, geographical and clinical experience on entry to the programme.

- Clinical mentors from the University of Birmingham and Western University programme (n=6-8) will be invited to participate in the focus group

Exclusion criteria for patient participants includes those who are not reporting a MSK complaint e.g. stroke rehabilitation. Mentees and mentors without licence to practice and professional indemnity insurance for the respective countries will be excluded.

Study setting

Two sites will be used to collect data; the University of Birmingham, United Kingdom and Western University, London Ontario, Canada. Both Universities host programmes that offer eligibility to IFOMPT via nationally accredited programmes in MSK physical therapy; Birmingham since 2004 and Western since 2007. Each site experiences unique challenges to fulfilment of MCP thereby affording a different lens on the potential merits of telehealth e-mentoring. The video consulting platform Zoom (password protected) will be used to conduct interviews and the focus group.

Data collection and procedures

Objective 1, longitudinal observational study (UK only): Participants (patients) will be invited to participate in the study and complete the following questionnaires on initial assessment and/or discharge or onward referral (Supplementary file 1). Outcomes were selected to enable characterisation of the patient population and evaluation of their experiences of telehealth (self-care ability and satisfaction).

1. Patient Health: The 15-item Musculoskeletal Health Questionnaire (MSK-HQ) [22] is a recently developed Patient Reported Outcome Measure (PROM) for use with patients with MSK

conditions and Patient Specific Functional Scale [23] is a patient specific valid, reliable, and responsive outcome measure for patients with MSK complaints (participants selecting 2-acitvties to rate; 2-item. [23, 24]

2. Patient Enablement: The 6-item Patient Enablement Instrument (PEI) [25] is a well-established measure of self-care ability in first contact and primary care consultations.[25, 26] It has also been reported to demonstrate fair content validity, construct validity and internal consistency in patients with chronic MSK symptoms [27]
3. Patient Reported Experience Measures (PREM) (10-item): Rating of patient satisfaction will include key telehealth patient satisfaction themes - namely overall satisfaction, audio-visual quality, and the Consultation and Relational Empathy (CARE) measure. [28]

Objective 2, semi-structured interviews: Participants (students) will be invited to participate in a semi structured interview which will last 45-60 minutes. The interview will explore students' expectations and perceptions prior, during and after the period of telehealth e-mentoring, as well as exploring their individual experiences and beliefs around their development of clinical reasoning. The topic guide (Supplementary file 2) was informed by existing evidence including the M-Level health education Logic Model [29] and the core constructs of MSc level practice in MSK physical therapy. [7]

Objective 3, focus group: Participants (mentors) will be invited to participate in a focus group which will last 60-90 minutes. The focus group will explore acceptability and appropriateness of telehealth e-mentorship to facilitate student development towards achievement of IFOMPT Educational Standards. The topic guide will be developed inductively from the interim analysis of semi-structured interview data.

Objective 4, focus group: Researchers and representatives from participant groups (patient, mentor and mentee) will be invited to participate in a focus group which will last 90-120 minutes. The focus group will explore key themes and outcomes from country specific findings as part of a cross cultural

analysis. The topic guide for this will be developed inductively from the analysis of data from focus group, semi structured interviews and patient outcomes in each country.

Data management and data analysis

Quantitative data, including participant demographics will be analysed descriptively using means and SD to determine change pre and post management, and to characterise the patient population who presented for telehealth in this study. Interviews and focus group will be audio recorded and transcribed verbatim. Post transcription, response clarification will be completed to enhance accuracy and trustworthiness of participant views (member checking), with field notes used to maintain contextual details and non-verbal responses during data analysis/interpretation. [20]

Qualitative data will be analysed using the well-established Framework Method [30]. This is a seven stage process for qualitative data management and analysis involving 1) Transcription, 2) Familiarisation with the interview, 3) Coding, 4) Developing a working analytical framework, 5) Applying the analytical framework, 6) Charting data into the framework matrix and 7) Interpreting the data). This approach will allow us to examine and understand the experiences of telehealth and e-mentoring from interview and focus group data. The method highlights the importance involvement of individuals with experience in qualitative research, therefore experienced qualitative researchers will be involved at every stage of analysis.

Data storage, access and disposal

All quantitative data from the study will be collected using a bespoke online questionnaire, incorporating the measures as detailed above. Audio data will be transferred securely, transcribed by an approved service. Participant data will be stored confidentially for 10 years on password-protected

computers that can only be accessed by the researchers, and in accordance with General Data Protection Regulation (GDPR), the Data Protection Act 2018 and University of Birmingham's research governance frameworks in the UK and Western University Health Science Research Ethics Board.

Patient and public involvement

Whilst conceived during the Covid-19 pandemic as a means of supporting ongoing student progression and development, the study is informed through many years of working (clinically and educationally) with patients, postgraduate students and MACP/CAMPT mentors. Given the novelty of this approach to postgraduate education, our pre-study consultation involved, students, patients, practitioners, and representatives from relevant professional, ethical and legal bodies.

Mentors, mentees and patient representatives from each country will be invited to participate in the focus group to support cross cultural analysis and interpretation of results, including key recommendations. Key stakeholders in postgraduate education for MSK physical therapists may also be contacted for their contribution and insight to help aid analysis and interpretation of results including the MACP and CAMPT. Patient and Public Involvement in the full study will be reported using the GRIPP2-SF when disseminating study results.[31]

Ethics approval and dissemination

Ethical approval has been granted by the University of Birmingham Ethics Committee (15/5/2020 ref ERN_20-0695) for the UK and will be granted by Western University, London Canada (under review). All participants will sign a consent form and receive a participant information sheet prior to participation. They will have the right to withdraw from the study at any point and up to four weeks after data collection is completed. Patient participants will be advised that any involvement will not impact on any current and future healthcare. There are minimal risks associated with this study. When

presenting the study findings, pseudonyms will be used to protect the participants' identities. Any protocol deviations will be documented. The findings from this research will be disseminated to key stakeholders in postgraduate MSK physical therapy education nationally and internationally, including MACP and IFOMPT.

DISCUSSION

This protocol outlines the rationale and methodology of a mixed methods case study design across 2 countries to explore the experiences of telehealth e-mentoring within postgraduate MSK physical therapy education. The lead researchers for each site have considerable experience of postgraduate education in MSK physical therapy and experiences of the proposed research methodologies including relevant publications [7, 12, 29].

Findings from this international study will place a spotlight on the MACP and CAMPT as leading and collaborating internationally in innovative approaches to enable fulfilment of IFOMPT Educational Standards. The cross cultural analysis will allow us to consider and share best practice experiences in telehealth e-mentoring, recognising that telehealth is well established in Canada as a means of delivering healthcare. We plan to explore how this and other cultural factors may influence the experiences of stakeholders to inform recommendations to IFOMPT for the adoption of telehealth e-mentoring in other member countries. Findings will inform the advancement of curriculum design in advanced MSK physical therapy postgraduate education, specifically overcoming the known limitations of existing approaches to MCP and to support development of advanced clinical reasoning using an authentic alternative to conventional approaches. It is anticipated that the findings from this study will also improve the access to mentors with specialist skills and knowledge globally, thus improving the educational fulfilment of student mentees and in turn patient outcomes.

Limitations

Where data collection is occurring across two sites (country and setting) at different time points, the experiences for all participants may differ across sites. Likewise those leading the interviews and focus groups across sites will differ. Steps will be taken to minimise the influence of these factors on the cross cultural analysis, including use of a co-written standardised topic guide, collaboration through stages of data analysis and interpretation etc. Furthermore this will be specifically explored with participants from both sites involved in the final focus group.

AUTHOR CONTRIBUTIONS

NH is the CI leading the protocol development, analyses, and dissemination. NH and AR are lead researchers for each site, ensuring rigour and quality in project management. NH, WJ, MN, IT, JS, HG and AR have contributed to the design and development of the protocol and have contributed to the manuscript draft. All authors have read, provided feedback and approved the final manuscript.

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PATIENT CONSENT FOR PUBLICATION

Not required

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

References

1. Tenforde AS, H.J., Kodish-Wachs JE, Iaccarino MA, Paganoni S., *Telehealth in Physical Medicine and Rehabilitation: A Narrative Review. .* TPM&R, 2017. **9**: p. S51-S58.
2. Chartered Society of Physiotherapy. *What is telehealth? .* 2020; Available from: https://www.csp.org.uk/professional-clinical/digital-physiotherapy/telehealth.
3. Cottrell MA, G.O., OLeary SP., *Telehealth for musculoskeletal physiotherapy.* Musculoskelet Sci Pract, 2020. **48**: p. 102193.
4. Dario AB, M.C.A., Almeida L, Ferreira ML, Refshauge K, Simic M, Pappas E, Ferreira PH., *Effectiveness of telehealth-based interventions in the management of non-specific low back pain: a systematic review with meta-analysis.* Spine (Phila Pa 1976), 2017. **17**: p. 1342-1351.
5. Holland A, *Telehealth reduces hospital admission rates in patients with COPD.* J Physiother, 2013. **59**(2): p. 129.
6. Cottrell MA, G.O., OLeary SP. , *Real-time telerehabilitation for the treatment of musculoskeletal conditions is effective and comparable to standard practice: a systematic review and meta-analysis.* Clinical Rehabiliation 2016. **31**: p. 625-638.

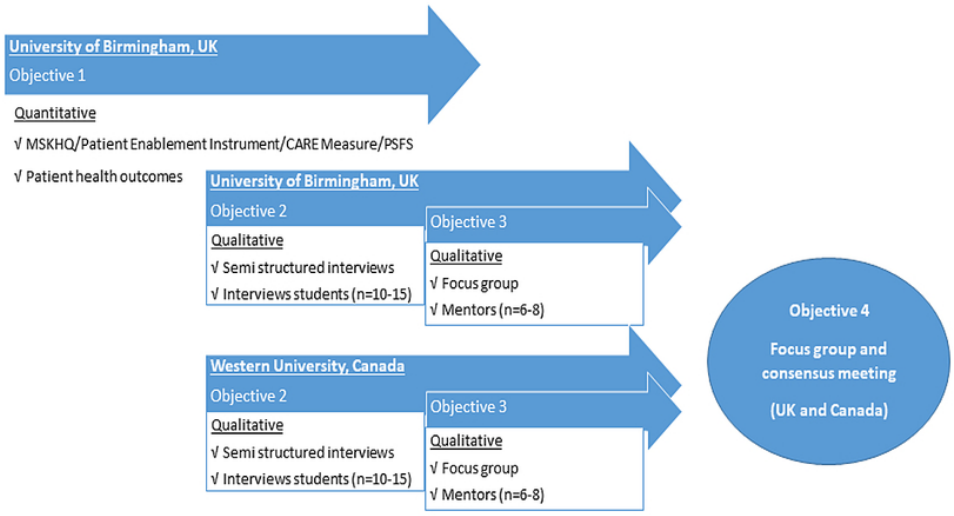
7. Rushton A, L.G., *Defining the construct of masters level clinical practice in manipulative physiotherapy.* Manual Therapy, 2010. **15**(1): p. 93-99.
8. Cottell MA, H.A., OLeary SP, Raymer ME, Russell TG, , *Service provider perceptions of telerehabilitation as an additional service delivery option within an Australian neurosurgical and orthopaedic physiotherapy screening clinic: A qualitative study.* Musculoskelet Sci Pract, 2017. **32**: p. 7-16.
9. Mani S, S.S., Omar B, Paungmali A, Joseph L, *Validity and reliability of Internet-based physiotherapy assessment for musculoskeletal disorders: a systematic review.* J. Telemed. Telecare, 2017. **23**(3): p. 379-391.
10. Ohm F, V.D., Sehner S, Wijnen-Meijer M, Harendza S, *Details acquired from medical history and patients' experience of empathy – two sides of the same coin.* BMC Medical Education, 2013. **13**: p. 67.
11. Keifenheim KE, T.M., Ip J, Speiser N, Leehr EJ, Zipfel S, Hermann-Werner A, , *Teaching history taking to medical students: a systematic review.* BMC Medical Education, 2015. **15**: p. 159.
12. International Federation of Orthopaedic Manipulative Physical Therapists. *IFOMPT Standards Document* 2016; Available from: https://www.ifompt.org/STANDARD+COMPLIANCE++TRAINING.html.
13. Ezzat AM, M.M., *Building passion develops meaningful mentoring relationships among Canadian physiotherapists.* Physiother Can, 2012. **64**(1): p.:77–85.
14. Rodeghero J, W.Y., Flynn T, Cleland JA, Wainner RS, Whitman JM, , *The impact of physical therapy residency or fellowship education on clinical outcomes for patients with musculoskeletal conditions.* Journal of Orthopaedic & Sports Physical Therapy, 2015. **45**: p. 86-96.
15. Williams A, R.A., James J Lewis, Phillips C, *Evaluation of the clinical effectiveness of a work-based mentoring programme to develop clinical reasoning on patient outcome: A stepped wedge cluster randomised controlled trial.* PLoS ONE, 2019. **14**(7): p. e0220110.
16. Greenhalgh T, W.J., Shaw S, Morrison C, , *Video consultations for covid-19* BMJ, 2020. **368**: p. m998.
17. Thornton J, *Covid-19: how coronavirus will change the face of general practice forever.* 368, 2020: p. m1279.
18. Nitkunan A, P.D., Nitkunan T. , *COVID-19: switching to remote neurology outpatient consultation.* Practical Neurology 2020. **Published Online First: 04 May 2020.** .
19. M. Miles, A.H., *Qualitative data analysis: an expanded sourcebook*. 1994, Beverley Hills: Sage
20. Tong A, S.P., Craig J. , *Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups.* Int J Qual Health Care, 2007. **19**(6): p. 349-357.
21. von Elm E, et al., *Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)statement: guidelines for reporting observational studies.* BMJ, 2007. **335**(7624): p. 806-808.
22. Hill JC, K.S., Benedetto E, et al, *Development and initial cohort validation of the Arthritis Research UK Musculoskeletal Health Questionnaire (MSK-HQ) for use across musculoskeletal care pathways.* BMJ Open, 2016: p. 6:e012331.
23. Horn KK, J.S., Richardson G, Van Vliet D, Hefford C, Abbott JH. , *The patient-specific functional scale: psychometrics, clinimetrics, and application as a clinical outcome measure.* JOSPT, 2012. **42**(1): p. 30-D17.
24. Nicholas P, H.C., Tumilty S, , *The use of the Patient-Specific Functional Scale to measure rehabilitative progress in a physiotherapy setting.* Journal of Manual & Manipulative Therapy, 2012. **20**(3): p. 147-152.
25. Howie JG, H.D., Maxwell M, Walker JJ., *A comparison of a Patient Enablement Instrument (PEI) against two established satisfaction scales as an outcome measure of primary care consultations.* Family Practice, 1998. **15**(2): p. 165-71.

26. McKinstry B, C.I., Walker J, , *Can doctors predict patients' satisfaction and enablement? A cross-sectional observational study.* Family Practice, 2006. **23**(2): p. 240-245.
27. Enthoven P, P.A., Ludvigsson ML, Wibault J, Peterson G, Öberg B., *Validity, internal consistency and self-rated change of the patient enablement instrument in patients with chronic musculoskeletal pain.* J Rehabil Med, 2019. **51**(8): p. 587-597.
28. Mercer SW, M.M., Heaney D, Watt GC., *The consultation and relational empathy (CARE) measure: development and preliminary validation and reliability of an empathy-based consultation process measure.* Family Practice, 2004. **21**(6): p. 699-705.
29. Madi M, H., H, Griffiths M, Rushton A, Heneghan NR, , *Exploring Taught Masters Education for Healthcare Practitioners: A Systematic Review of Literature.* BMC Medical Education, 2018. **19**: p. 340.
30. Gale NK, H.G., Cameron E, Rashid S, Redwood S., *Using the framework method for the analysis of qualitative data in multi-disciplinary health research. .* BMC Medical Research Methodology, 2013. **13**(1): p. 117.
31. Staniszewska, S., et al., *GRIPP2 reporting checklists: tools to improve reporting of patient and public involvement in research.* BMJ, 2017. **358**: p. j3453.

Figure Legend

Figure 1: Exploratory sequential case study design

Figure 2: Description of telehealth



Study design and methods

35x20mm (600 x 600 DPI)

	UK	Canada
Setting	University	Private Practice, University
Platform	Secure, password encrypted platforms (Zoom, WebEx, Canvas Virtual Learning Platform)	
Delivery model (150 hours of mentored practice)	May to September 2020 One telehealth clinic per week over 20 weeks Mentee assesses new patient (NP) each week with follow up patient (FP) appointments	October 2000 to July 2021 In-person, e-mentoring and/or mock scenarios. Patient assessment are in person or e-mentoring.
Mentor : mentee ratio	1:1 to 1:4	
Formative feedback	Weekly formative feedback (verbal/written) virtually and/or in-person (peer and mentor observation). Formative individual assessment week 10	Weekly formative feedback virtually and/or in-person
Summative feedback	Week 20 (assessment and management of a NP (1 hour) and FP (30 mins) with 30 minutes clinical reasoning viva. Examination includes evaluation of personal professional portfolio	Two NP assessment with expectations differing fall to spring. Written report of clinical reasoning of patient assessment and management, with evaluation of patient goals and expectations
Key components	• Student mentee's individual learning contract and aligned to IFOMPT Educational Standards • Assessment and management of a range of msk patients (spinal, peripheral etc.) • Full informed consent gained by mentor/mentee (clinical and research) • Following mentee patient history taking (observed by mentor), mentee plans for physical examination. • Physical examination and management provided as required (adapted examination, exercise prescription etc.) • Patient centred care supported via additional resources e.g. exercise sheets etc. • Mentor observation of mentee • Peer mentoring facilitated through observation of mentee	
PROM	MSK-HQ, PEI, PSFS and CARE	
Governance procedures	Patient care provided with a UK licenced physical therapist (HCPC registration) Patient data managed in accordance with University Guidelines and GDPR 2018 – University secure server including record of informed consent (patient care and research)	Patient/client consent is in accordance with the Canadian Physiotherapy Provincial license board

Telehealth e-mentoring description

52x33mm (600 x 600 DPI)

Supplementary file 1.

MUSCULOSKELETAL HEALTH QUESTIONNAIRE (MSK-HQ) *(WITH PERMISSION)*

This questionnaire is about your **joint, back, neck, bone and muscle symptoms** such as aches, pains and/or stiffness.

Please focus on the particular health problem(s) for which you sought treatment from this service.

*For each question **tick** (✓) **or X one box** to indicate which statement best describes you **over the last 2 weeks**.*

1. Pain/stiffness during the **day** How severe was your usual joint or muscle pain and/or stiffness overall during the **day** in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Fairly severe ☐ 1	Very severe ☐ 0
2. Pain/stiffness during the **night** How severe was your usual joint or muscle pain and/or stiffness overall during the **night** in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Fairly severe ☐ 1	Very severe ☐ 0
3. Walking How much have your symptoms interfered with your ability to walk in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Unable to walk ☐ 0
4. Washing/Dressing How much have your symptoms interfered with your ability to wash or dress yourself in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Unable to wash or dress myself ☐ 0
5. Physical activity levels How much has it been a problem for you to do physical activities (e.g. going for a walk or jogging) to the level you want because of your joint or muscle symptoms in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Very much ☐ 1	Unable to do physical activities ☐ 0
6. Work/daily routine How much have your joint or muscle symptoms interfered with your work or daily routine in the last 2 weeks (including work & jobs around the house)?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Extremely ☐ 0
7. Social activities and hobbies How much have your joint or muscle symptoms interfered with your social activities and hobbies in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Extremely ☐ 0

8. Needing help How often have you needed help from others (including family, friends or carers) because of your joint or muscle symptoms in the last 2 weeks?	Not at all ☐ 4	Rarely ☐ 3	Sometimes ☐ 2	Frequently ☐ 1	All the time ☐ 0
9. Sleep How often have you had trouble with either falling asleep or staying asleep because of your joint or muscle symptoms in the last 2 weeks?	Not at all ☐ 4	Rarely ☐ 3	Sometimes ☐ 2	Frequently ☐ 1	Every night ☐ 0
10. Fatigue or low energy How much fatigue or low energy have you felt in the last 2 weeks?	Not at all ☐ 4	Slight ☐ 3	Moderate ☐ 2	Severe ☐ 1	Extreme ☐ 0
11. Emotional well-being How much have you felt anxious or low in your mood because of your joint or muscle symptoms in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Extremely ☐ 0
12. Understanding of your condition and any current treatment Thinking about your joint or muscle symptoms, how well do you feel you understand your condition and any current treatment (including your diagnosis and medication)?	Completely ☐ 4	Very well ☐ 3	Moderately ☐ 2	Slightly ☐ 1	Not at all ☐ 0
13. Confidence in being able to manage your symptoms How confident have you felt in being able to manage your joint or muscle symptoms by yourself in the last 2 weeks (e.g. medication, changing lifestyle)?	Extremely ☐ 4	Very ☐ 3	Moderately ☐ 2	Slightly ☐ 1	Not at all ☐ 0
14. Overall impact How much have your joint or muscle symptoms bothered you overall in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Very much ☐ 1	Extremely ☐ 0

Physical activity levels
In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your heart rate? *This may include sport, exercise and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that is part of your job.*

None	1 day	2 days	3 days	4 days	5 days	6 days	7 days
☐	☐	☐	☐	☐	☐	☐	☐

PATIENT SPECIFIC FUNCTIONAL SCALE

Please identify up to two important activities that you are unable to do or are having difficulty with as a result of your current problem/diagnosis.

Please rate each of these problems on the 0-10 scale below.

0 = Able to perform activity at the same level as before injury or problem (No issues) 10 = Unable to perform activity (Cannot perform)

Patient-specific activity scoring scheme (Circle one number or provide a range):

1. Activity										
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
No issues										**Cannot perform**

2. Activity										
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
No issues										**Cannot perform**

THE PATIENT ENABLEMENT INSTRUMENT (PEI)

As a result of your visit to the physiotherapist today, so you feel you are……

	Much better	**Better**	**Same or less**	**Not applicable**
able to cope with life				
able to understand your musculoskeletal complaint				
able to cope with your musculoskeletal complaint				
able to keep yourself healthy				
	Much more	**More**	**Same or less**	**Not applicable**
confident about your help				
able to help your self				

CONSULTATION AND RELATIONAL EMPATHY MEASURE (CARE Measure)

Please rate the following statement about today consultation. Please tick one box for each statement and answer every statement.

	Poor	Fair	Good	Very good	Excellent	Does not apply
1. Making you feel at ease….. (being friendly and warm toward you, treating you with respect; not cold or abrupt)						
2. Letting you tell your 'story' (giving you time to fully describe your complaint in your own words, not interrupting or diverting you)						
3. Really listening…. (paying close attention to what you were saying; not looking at the notes or computer as you were talking)						
4. Being interested in you as a whole person…… (asking/knowing relevant details about your life, your situation; not treating you as just a number)						
5. Fully understanding your concerns…. (communicating that he/she had accurately understood your concerns; not overlooking or dismissing anything)						
6. Showing care and compassion…. (seeming genuinely concerned, connecting with you on a human level; not being indifferent or detached)						
7. Being positive… (having a positive approach and a positive attitude; being honest but not negative about your problems)						
8. Explaining things clearly…. (fully answering your questions, explaining clearly, giving you adequate information; not being vague)						
9. Helping you take control… (exploring with you about what you can do to improve your health yourself, encouraging rather than lecturing you)						
10. Making a plan of action with you… (discussing the options, involving you in decisions as much as you want to be involved; not ignoring your views)						
Any other comments						

Supplementary file 2

Research Aim	Experiences of telehealth e-mentoring within postgraduate MSK physical therapy education: protocol for a mixed methods study		
Interview Section	**Questions/Content**	**Prompts**	**Aims**
Ethics Statement	Firstly, I would like to thank you for participating in this interview. Just a reminder that it will be audio/video-recorded but all information shared will be kept strictly confidential. You are entitled to stop the interview and the recording at any point or terminate the interview altogether if you wish. You also have the right not to answer a question if you do not wish to. There are no right or wrong answers. I am interested in your own personal experiences, thoughts and perceptions, with the aim of today being to understand your experiences of telehealth e-mentoring, which covers all forms of consultation with patients using remote means, within postgraduate MSK physical therapy education. Before we start do you have any further questions?	• *Can I confirm that you have read and understand the information sheet and signed the consent form?* • *Are you comfortable?*	• To ensure full understanding of what is expected of the participant during this interview. • Make sure the participant is comfortable and ready to begin.
Introductory Questions	1. Can you tell me a bit about yourself? 2. Can you tell me about your clinical background and recent posts/roles? 3. Can you tell me about your experiences of professional development and approaches to learning/development? 4. How many weeks into your CMP module are You?	• *Age, where do you come from, clinical posts, setting (NHS/private/sport/military)* • *What professional development have you been involved in before- weekend courses, IST* • *Thinking back what approaches worked best and you remember the most?*	• Make participant relax and feel comfortable with talking and opening up. • Build rapport. • To gain an insight into the participant's background

Transition Questions	1. What is your overall experience of being a postgraduate MSK physical therapy student? 2. How do you study through the week? Can you run me through the different approaches you use? 3. When this telehealth e-mentoring was first proposed as alternative approach to conventional clinical mentorship, how did it make you feel?	• *What does being a masters level student mean to you?* • *What aspects of your studies do you enjoy?* • *Any challenges with studying at masters level?* • *How do you break up your studies to keep focused?* • *Are there approaches used in the University that work best or engage you more? Seminars, workshops, lectures, patient presentations etc* • *Do you meet with other students? How does that work and what e-platforms do you use? Does this involve just those in your cohort or other individuals?* • *What works well and what does not work so well?* • *Thoughts, beliefs and expectations around different approach to development? Anxieties and thoughts about relevance?*	• Start to guide the interview towards experiences of masters level professional development • To get an idea of their approach to studying at masters level • To explore approaches used and their preferences to learning • Explore beliefs and perceptions of something unplanned.
E-mentoring and telehealth background	As well as a considerable body of evidence supporting the use of telehealth as cost effective, accessible means of providing patient care there is an emergence body of evidence supporting the use of e-mentoring to facilitate professional development. With the widespread use of telehealth to offer MSK physical therapy during the Covid-19 pandemic, this offered you as a student an opportunity to integrate knowledge and skills gained from the programme thus far in an authentic way and towards achievement of your programme learning outcomes. Where we are focusing on telehealth e-mentoring to develop advanced clinical reasoning skills to optimise care of patients with MSK symptoms, we will consider outcomes of masters level	• *Do you have any questions?* • *If you are unsure at any point regarding aspects of the Logic Model, please ask.*	• Inform the participant of the background of the study • Ensure the participant knows they can ask questions if they are unsure.

	education in MSK physical therapy, which includes 1. *Critical thinking skills and analysis* 2. *Clinical reasoning* 3. *Confidence and motivation to practice* 4. *Enhanced career progression* 5. *Becoming a lifelong learner* 6. *Advanced communication skills* 7. *Enhanced sense of autonomy* I have a number of questions for you founded on this model and if you are not clear on anything as we go through, then please let me know.		
	1. To start with, could you perhaps give me an idea of how the telehealth e-mentoring has influenced your **critical thinking skills?**	• *In what way do you think you have become more critical or analytical?* • *Has your clinical decision making changed?* • *In what way has your evidenced based practice changed?* • *What aspects of the process facilitated that?* • *What role did the others have in your group to enable that?* • *What role did the mentor have in facilitating this?* • *Have there been any additional learning activities you have been set during the CMP module which you have found beneficial?* • *How have different patient presentations influenced your critical analysis and decision making skills* • *Is there any different challenges between NP/FU* • *Assessment/management/rehab*	• To explore the influences of the experience on critical thinking and development of analytical skills across a range of patient presentations

Main Questions	2. Could you perhaps give me an idea of how the telehealth e-mentoring has influenced your **ability to clinical reasonin?**	• *Has this influenced your approach to reasoning e.g. collaborative or narrative reasoning of cases?* • *How did the different patients you saw influence this?* • *Knowledge is a component of clinical reasoning – was this challenged in anyway?* • *How did time influence this – reflection on and in action* • *Where you were involved in peer mentoring, how did this influence your own development?* • *Has this experience changed your meta cognition? If so, how?* • *What strategies did you use to support development of your clinical reasoning? Planning sheets, PROMs etc* • *Are your experiences the same for NP and FP* • *Did you feel this differed accordingly to stages of management e.g. assessment, management and rehab? What about doing physical tests? What about approaches to management?*	• To explore the influences of the experience on their ability to clinically reason and justify patient management across a range of patient presentations
	3. How do you feel the telehealth e-mentoring has influenced your **confidence and motivation to practice in MSK physical therapy**	• *Do you feel more of less confidence in managing patients within a biopsychosocial model of practice?* • *Why do you feel that? Is there any specific aspect of the mentorship that has helped or hindered that?* • *Does this reflect all stages of patient care – assessment, management and rehab* • *What aspects of your practice do you have more or less confidence in – e.g. reasoning complex cases, certain presentations, etc.* • *How do you feel about now going back into practice?* • *How do feel about dealing with uncertainty in managing complex patient cases in the future?*	• To explore confidence and motivation to practice in MSK physical therapy, drawing on new skills and knowledge • To explore how comfortable they are with dealing with uncertainty and problem solving to inform clinical decision making?

	4. **Advanced communication skills** are central to patient history taking and I wonder how you feel these have been influenced by the telehealth e mentoring?	• *Do you think your communication skills have changed? If so in what way? Which skills – listening, oral, written?* • *Do you feel there are any barriers or facilitators that have aided the development of your communication skills* • *How do you think this has influenced your relationship with your patients and peers?* • *Have your communications skills changed as a result of working in a small group? If so in what way?* • *What influence has this medium had on building a rapport with your patients?* • *What communication strategies have you used to develop your therapeutic relationship with patients?* • *Do you feel these experience have influenced your ability to interpret patient data, and articulate clinical diagnosis and treatment decisions* • *How have you optimised patient engagement in management plans?*	• To explore the scope of communication and the influences of this at a personnel, group and professional level
	5. How do you feel the telehealth e-mentoring may have influenced **a. Career progression** **b. Becoming a lifelong learner** **c. Enhanced sense of autonomy**	• *How do you feel now you have completed the clinical mentorship?* • *Do you feel this experience will be useful in supporting career progression e.g. triage?* • *Where students have reported changes such as career enhancement, becoming a lifelong learner or increased sense of autonomy, do you feel the experiences you have had will be useful? If so in what way?* • *In light of Covid-19 and social distancing how do you feel about the next stage of your career? What are your priorities and plans following completion of the programme?*	• To explore views and perceptions of this authentic experience on career progression, being a lifelong learning and sense of autonomy
Conclusion	That's all the questions, is there anything else you would like to add about your experiences of telehealth e-mentoring?	• *Is there anything you would like to ask regarding the analysis of the data or the next steps of the process?*	• Ensure the participant is comfortable with what has been discussed.

	The interview has now finished. Thank you for participating in this study, I really appreciate your time and input.		

BMJ Open

Experiences of telehealth e-mentoring within postgraduate musculoskeletal physical therapy education in the United Kingdom and Canada: a protocol for parallel mixed methods studies and cross cultural comparison

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TITLE

Experiences of telehealth e-mentoring within postgraduate musculoskeletal physical therapy education in the United Kingdom and Canada: a protocol for parallel mixed methods studies and cross cultural comparison

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ABSTRACT

Introduction:

Mentored clinical practice is central to demonstrating achievement of International Educational Standards in advanced musculoskeletal physical therapy. Whilst traditionally delivered face-to-face, telehealth e-mentoring is a novel alternative to offering this unique pedagogy, to facilitate mentee critical reflection, deeper learning and enhanced knowledge translation to optimise patient care. With Covid-19 resulting in widespread adoption of telehealth and access to mentors often limited by geography or cost, the potential value of telehealth e-mentoring needs investigating. To investigate the experiences and outcomes of multiple stakeholders (student-mentees, mentors and patients) engaged in musculoskeletal physical therapy telehealth e-mentoring across two Universities (United Kingdom, Canada).

Methods and analysis:

Using case study design, we will use sequential mixed methods involving qualitative and quantitative components based on existing evidence. To examine the influence of telehealth e-mentoring on health outcomes in patients with musculoskeletal complaints we will use patient reported outcomes for satisfaction, patient empowerment and change in musculoskeletal health. We will conduct semi structured interviews to explore the development of critical thinking, clinical reasoning, communication skills and confidence of students engaged in telehealth e-mentoring. To explore the mentor acceptability and appropriateness of telehealth e-mentoring we will conduct a focus group in each site. Finally, we will include a focus group of participants from each site to allow a cross cultural comparison of findings to inform international stakeholders. Quantitative data will be analysed using descriptive statistics (median and IQR) to describe changes in outcome data and qualitative data will be analysed following the Framework Method.

Ethics and dissemination:

This study has ethical approval (ERN_20-0695) granted by the University of Birmingham and will have approval at Western University prior to data collection. Findings will be published in a peer reviewed journal and disseminated to key stakeholders in musculoskeletal physical therapy education and practice.

Keywords

Telehealth; e-mentoring; postgraduate education; musculoskeletal physical therapy

ARTICLE SUMMARY

Strengths and Limitations

- This is the first study to explore the experiences of multiple stakeholders engaged in telehealth e-mentoring for postgraduate physical therapy
- The mixed methods case study design enables detailed exploration of experiences and outcomes involving all stakeholders as participants
- Cross cultural comparison is enabled through use of multiple study site settings across countries/ continents
- Findings will be specific to physical therapy, the two Universities and their respective countries, thus limiting transferability to other professions, settings and countries

INTRODUCTION

Telehealth, which encompasses 'telemedicine', 'telecare', 'telerehabilitation' 'teleconsult' and 'e-health' [1] delivers healthcare using virtual technology and online communication platforms and can move beyond traditional practice settings, [2, 3] to overcome barriers to accessing healthcare such as time, geography and costs of specialist services. [1, 4] Considerable evidence exists to support its effectiveness (clinical and cost) and acceptability for improving health outcomes for patients, including reducing hospital admissions. [1, 3, 5]. Patient satisfaction with telehealth in MSK physical therapy is widely reported as high [3] and in fact recent trials reported higher levels than face to face care. [3, 6] Yet, widespread adoption of telehealth within physical therapy has been slow [3] and to the author's knowledge has not yet been used as a medium to support postgraduate professional development in MSK physical therapy. Whilst a high level of psychomotor skills are deemed a core construct of MSK advanced practice, [7] a considerable number of other core constructs (e.g. high levels of clinical reasoning, background knowledge and self-analysis as well as patient-centred approach, critical approach to practice etc.) could be achieved via telehealth. [6-8] With evidence of good concurrent validity between telehealth based physiotherapy assessment and that involving face to face assessment for a range of outcomes (pain, swelling, joint mobility, muscle strength etc.) [9] and a range of studies within medicine supporting that 75-83% of diagnoses are derived from the patient history data alone, [10, 11] learning outcomes could arguably be achieved through telehealth e-mentoring.

In MSK physical therapy the International Federation of Orthopaedic Manipulative Physical Therapists (IFOMPT) sets the international educational standards; [12] being then operationalised through approved programmes in the United Kingdom (UK) by the Musculoskeletal Association of Chartered Physiotherapists (MACP) and in Canada by the Canadian Association of Manipulative Physical Therapy

(CAMPT). Mentored clinical practice (MCP) is central to demonstrating achievement of these educational standards and using a framework of clinical reasoning, students as mentees, facilitated by a mentor, are able to integrate new skills and knowledge (procedural and propositional) acquired within a University setting into their assessment and management of patients with musculoskeletal (MSK) complaints in a practice setting. MCP offers a unique pedagogy to facilitate critical reflection, deeper learning and enhanced knowledge translation [13] to optimise patient care. Improvements in patient outcomes for those physical therapists who had completed fellowships with a component of MCP [14] and clinical trial data supporting its clinical effectiveness now exist. [15]

MCP is highly dependent on specialist input and suitably qualified MSK physical therapy mentors. Access to these mentors has become increasingly difficult in the UK with many of these highly trained mentors often working at an advanced practice level or in consultant practitioner roles; therefore being involved in managing or leading large physical therapy services with no capacity for mentorship. Additionally, in Canada the geography of the country makes access to mentors challenging and limits opportunities for mentees to access mentors based on location. This often results in professional isolation for physical therapists practising in rural areas.[13] Likewise, students report increasing difficulties when negotiating time away from work (costs, access, impact on service etc.) to complete the MCP component of IFOMPT approved programmes. The COVID-19 pandemic has further compounded these issues forcing us to rethink how we approach healthcare delivery and mentorship. This has resulted in a shift of all initial contact MSK physical therapy being delivered as telehealth via remote digital consultation (telephone consultation and/or video consultation) and a stepped rationale for escalation to face to face consultation. [3] In light of these changes, alternative MCP approaches are urgently required to fulfil student and IFOMPT approved programmes' needs, including the use of telehealth e-mentoring

Whilst a myriad of approaches are used (face to face, e-mentoring and telehealth) telehealth e-mentoring could be an adjunct to conventional face-to-face MCP approaches beyond Covid-19, to

better prepare students through novel approaches to delivery of specialist MSK physical therapy; using remote and digital consultation as part of clinical triage in outpatient healthcare consultations. [16-18]

Where telehealth e-mentoring has been introduced in light of Covid-19 we urgently need to evaluate its acceptability, appropriateness, satisfaction from the stakeholder perspectives of patients, mentors and students as a novel approach for professional growth and development, integrating knowledge and skills acquired in a University setting into clinical practice.

Aim

To investigate the experiences of post-graduate Masters (MSc) physical therapy students, their mentors, and patients with MSK complaints engaged telehealth e-mentoring (consultation/rehabilitation) in a UK and Canadian University setting.

Objectives

1) To examine the influence of telehealth e-mentoring on health outcomes in patients with MSK complaints
2) To explore the development of critical thinking, clinical reasoning, communication skills and confidence of post graduate students engaged in telehealth e-mentoring.
3) To explore the mentor acceptability and appropriateness of telehealth e-mentoring to facilitate student development towards achievement IFOMPT Educational Standards
4) To conduct a cross cultural comparison of findings to inform international stakeholders

METHODS AND ANALYSIS

Design and methods

Using case study design [19] we will use sequential mixed qualitative and quantitative methods to investigate telehealth e-mentoring as part of postgraduate physiotherapy education (Figure 1). Data collection will take place from May 2020 through to December 2021. Details of the telehealth e-mentoring are detailed in Figure 2. In the absence of reporting guidelines for mixed methods studies, the study is designed in line with the COnsolidated criteria for REporting Qualitative research (COREQ). [20] and STrengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [21] for qualitative and observational study designs respectively.

Semi structured interviews will be used to explore development of critical thinking, clinical reasoning, communication skills and confidence of post graduate students, patient reported outcomes to explore patient experiences and changes in MSK health following telehealth e-mentoring, a focus groups to explore mentor acceptability and appropriateness of telehealth e-mentoring and a focus group for cross cultural comparison of all data.

Participant recruitment and eligibility for each site

All participants must be able to communicate fluently in English, with access to a video consultation platform and able and willing to give informed consent.

- Patients (expected n=~50+) who self-refer to the UK University Advanced Manipulative Physical therapy telehealth service with a MSK complaint will be invited to participate.
- Students (n=10-15) from the cohort of postgraduate students registered on the respective IFOMPT approved programmes who are registered on the MCP module/course will be invited

to participate in a semi structured interview. Purposive sampling will be used to ensure a variance in the profile of participants with respect to age, gender, geographical and clinical experience on entry to the programme.

- Clinical mentors from the University of Birmingham and Western University programme (n=6-8) will be invited to participate in the focus group

Exclusion criteria for patient participants includes those who are not reporting a MSK complaint e.g. stroke rehabilitation. Mentees and mentors without licence to practice and professional indemnity insurance for the respective countries will be excluded.

Study setting

Two sites will be used to collect data; the University of Birmingham, United Kingdom and Western University, London Ontario, Canada. Both Universities host programmes that offer eligibility to IFOMPT via nationally accredited programmes in MSK physical therapy; Birmingham since 2004 and Western since 2007. Each site experiences unique challenges to fulfilment of MCP thereby affording a different lens on the potential merits of telehealth e-mentoring. The video consulting platform Zoom (password protected) will be used to conduct interviews and the focus group.

Data collection and procedures

Objective 1, longitudinal observational study (UK only): Participants (patients) will be invited to participate in the study and complete the following questionnaires on initial assessment and/or discharge or onward referral (Supplementary file 1). Outcomes were selected to enable characterisation of the patient population and evaluation of their experiences of telehealth (self-care ability and satisfaction).

1. Patient Health: The 15-item Musculoskeletal Health Questionnaire (MSK-HQ) [22] is a recently developed Patient Reported Outcome Measure (PROM) for use with patients with MSK

conditions and Patient Specific Functional Scale [23] is a patient specific valid, reliable, and responsive outcome measure for patients with MSK complaints (participants selecting 2-acitvties to rate; 2-item. [23, 24]

2. Patient Enablement: The 6-item Patient Enablement Instrument (PEI) [25] is a well-established measure of self-care ability in first contact and primary care consultations.[25, 26] It has also been reported to demonstrate fair content validity, construct validity and internal consistency in patients with chronic MSK symptoms [27]
3. Patient Reported Experience Measures (PREM) (10-item): Rating of patient satisfaction will include key telehealth patient satisfaction themes - namely overall satisfaction, audio-visual quality, and the Consultation and Relational Empathy (CARE) measure. [28]

Objective 2, semi-structured interviews: Participants (students) will be invited to participate in a semi structured interview which will last 45-60 minutes. The interview will explore students' expectations and perceptions prior, during and after the period of telehealth e-mentoring, as well as exploring their individual experiences and beliefs around their development of clinical reasoning. The topic guide (Supplementary file 2) was informed by existing evidence including the M-Level health education Logic Model [29] and the core constructs of MSc level practice in MSK physical therapy. [7]

Objective 3, focus group: Participants (mentors) will be invited to participate in a focus group which will last 60-90 minutes. The focus group will explore acceptability and appropriateness of telehealth e-mentorship to facilitate student development towards achievement of IFOMPT Educational Standards. The topic guide will be developed inductively from the interim analysis of semi-structured interview data.

Objective 4, focus group: Researchers and representatives from participant groups (patient, mentor and mentee) will be invited to participate in a focus group which will last 90-120 minutes. The focus group will explore key themes and outcomes from country specific findings as part of a cross cultural

analysis. The topic guide for this will be developed inductively from the analysis of data from focus group, semi structured interviews and patient outcomes in each country.

Data management and data analysis

Quantitative data, including participant demographics will be analysed descriptively using means and SD to determine change pre and post management, and to characterise the patient population who presented for telehealth in this study. Interviews and focus group will be audio recorded and transcribed verbatim. Post transcription, response clarification will be completed to enhance accuracy and trustworthiness of participant views (member checking), with field notes used to maintain contextual details and non-verbal responses during data analysis/interpretation. [20]

Qualitative data will be analysed using the well-established Framework Method [30]. This is a seven stage process for qualitative data management and analysis involving 1) Transcription, 2) Familiarisation with the interview, 3) Coding, 4) Developing a working analytical framework, 5) Applying the analytical framework, 6) Charting data into the framework matrix and 7) Interpreting the data). This approach will allow us to examine and understand the experiences of telehealth and e-mentoring from interview and focus group data. The method highlights the importance involvement of individuals with experience in qualitative research, therefore experienced qualitative researchers will be involved at every stage of analysis.

Data storage, access and disposal

All quantitative data from the study will be collected using a bespoke online questionnaire, incorporating the measures as detailed above. Audio data will be transferred securely, transcribed by an approved service. Participant data will be stored confidentially for 10 years on password-protected

computers that can only be accessed by the researchers, and in accordance with General Data Protection Regulation (GDPR), the Data Protection Act 2018 and University of Birmingham's research governance frameworks in the UK and Western University Health Science Research Ethics Board.

Patient and public involvement

Whilst conceived during the Covid-19 pandemic as a means of supporting ongoing student progression and development, the study is informed through many years of working (clinically and educationally) with patients, postgraduate students and MACP/CAMPT mentors. Given the novelty of this approach to postgraduate education, our pre-study consultation involved, students, patients, practitioners, and representatives from relevant professional, ethical and legal bodies.

Mentors, mentees and patient representatives from each country will be invited to participate in the focus group to support cross cultural analysis and interpretation of results, including key recommendations. Key stakeholders in postgraduate education for MSK physical therapists may also be contacted for their contribution and insight to help aid analysis and interpretation of results including the MACP and CAMPT. Patient and Public Involvement in the full study will be reported using the GRIPP2-SF when disseminating study results.[31]

Ethics approval and dissemination

Ethical approval has been granted by the University of Birmingham Ethics Committee (15/5/2020 ref ERN_20-0695) for the UK and will be granted by Western University, London Canada (under review). All participants will sign a consent form and receive a participant information sheet prior to participation. They will have the right to withdraw from the study at any point and up to four weeks after data collection is completed. Patient participants will be advised that any involvement will not impact on any current and future healthcare. There are minimal risks associated with this study. When

presenting the study findings, pseudonyms will be used to protect the participants' identities. Any protocol deviations will be documented. The findings from this research will be disseminated to key stakeholders in postgraduate MSK physical therapy education nationally and internationally, including MACP and IFOMPT.

DISCUSSION

This protocol outlines the rationale and methodology of a mixed methods case study design across 2 countries to explore the experiences of telehealth e-mentoring within postgraduate MSK physical therapy education. The lead researchers for each site have considerable experience of postgraduate education in MSK physical therapy and experiences of the proposed research methodologies including relevant publications [7, 12, 29].

Findings from this international study will place a spotlight on the MACP and CAMPT as leading and collaborating internationally in innovative approaches to enable fulfilment of IFOMPT Educational Standards. The cross cultural analysis will allow us to consider and share best practice experiences in telehealth e-mentoring, recognising that telehealth is well established in Canada as a means of delivering healthcare. We plan to explore how this and other cultural factors may influence the experiences of stakeholders to inform recommendations to IFOMPT for the adoption of telehealth e-mentoring in other member countries. Findings will inform the advancement of curriculum design in advanced MSK physical therapy postgraduate education, specifically overcoming the known limitations of existing approaches to MCP and to support development of advanced clinical reasoning using an authentic alternative to conventional approaches. It is anticipated that the findings from this study will also improve the access to mentors with specialist skills and knowledge globally, thus improving the educational fulfilment of student mentees and in turn patient outcomes.

Limitations

Where data collection is occurring across two sites (country and setting) at different time points, the experiences for all participants may differ across sites. Likewise those leading the interviews and focus groups across sites will differ. Steps will be taken to minimise the influence of these factors on the cross cultural analysis, including use of a co-written standardised topic guide, collaboration through stages of data analysis and interpretation etc. Furthermore this will be specifically explored with participants from both sites involved in the final focus group.

AUTHOR CONTRIBUTIONS

NH is the CI leading the protocol development, analyses, and dissemination. NH and AR are lead researchers for each site, ensuring rigour and quality in project management. NH, WJ, MN, IT, JS, HG and AR have contributed to the design and development of the protocol and have contributed to the manuscript draft. All authors have read, provided feedback and approved the final manuscript.

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PATIENT CONSENT FOR PUBLICATION

Not required

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

References

1. Tenforde AS, H.J., Kodish-Wachs JE, Iaccarino MA, Paganoni S., *Telehealth in Physical Medicine and Rehabilitation: A Narrative Review. .* TPM&R, 2017. **9**: p. S51-S58.
2. Chartered Society of Physiotherapy. *What is telehealth? .* 2020; Available from: https://www.csp.org.uk/professional-clinical/digital-physiotherapy/telehealth.
3. Cottrell MA, G.O., OLeary SP., *Telehealth for musculoskeletal physiotherapy.* Musculoskelet Sci Pract, 2020. **48**: p. 102193.
4. Dario AB, M.C.A., Almeida L, Ferreira ML, Refshauge K, Simic M, Pappas E, Ferreira PH., *Effectiveness of telehealth-based interventions in the management of non-specific low back pain: a systematic review with meta-analysis.* Spine (Phila Pa 1976), 2017. **17**: p. 1342-1351.
5. Holland A, *Telehealth reduces hospital admission rates in patients with COPD.* J Physiother, 2013. **59**(2): p. 129.
6. Cottrell MA, G.O., OLeary SP. , *Real-time telerehabilitation for the treatment of musculoskeletal conditions is effective and comparable to standard practice: a systematic review and meta-analysis.* Clinical Rehabiliation 2016. **31**: p. 625-638.

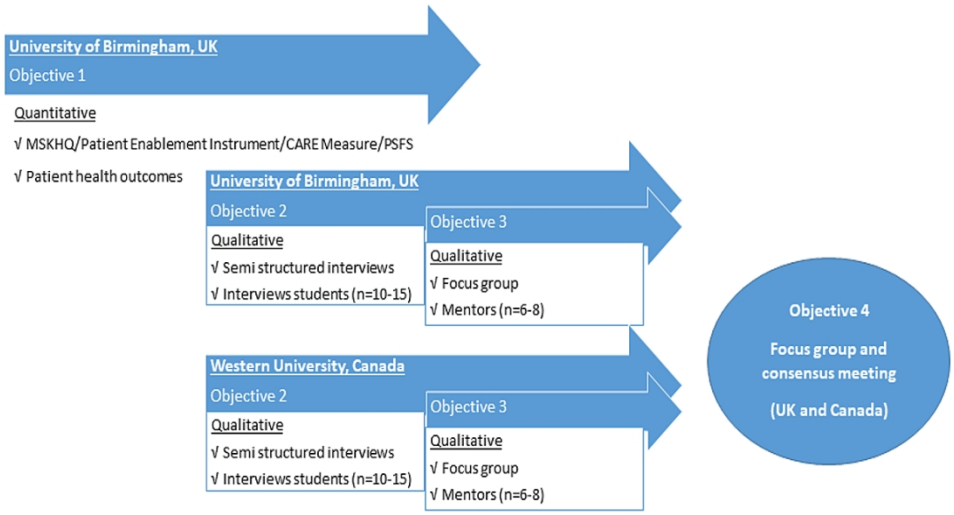
7. Rushton A, L.G., *Defining the construct of masters level clinical practice in manipulative physiotherapy.* Manual Therapy, 2010. **15**(1): p. 93-99.
8. Cottell MA, H.A., OLeary SP, Raymer ME, Russell TG, , *Service provider perceptions of telerehabilitation as an additional service delivery option within an Australian neurosurgical and orthopaedic physiotherapy screening clinic: A qualitative study.* Musculoskelet Sci Pract, 2017. **32**: p. 7-16.
9. Mani S, S.S., Omar B, Paungmali A, Joseph L, *Validity and reliability of Internet-based physiotherapy assessment for musculoskeletal disorders: a systematic review.* J. Telemed. Telecare, 2017. **23**(3): p. 379-391.
10. Ohm F, V.D., Sehner S, Wijnen-Meijer M, Harendza S, *Details acquired from medical history and patients' experience of empathy – two sides of the same coin.* BMC Medical Education, 2013. **13**: p. 67.
11. Keifenheim KE, T.M., Ip J, Speiser N, Leehr EJ, Zipfel S, Hermann-Werner A, , *Teaching history taking to medical students: a systematic review.* BMC Medical Education, 2015. **15**: p. 159.
12. International Federation of Orthopaedic Manipulative Physical Therapists. *IFOMPT Standards Document* 2016; Available from: https://www.ifompt.org/STANDARD+COMPLIANCE++TRAINING.html.
13. Ezzat AM, M.M., *Building passion develops meaningful mentoring relationships among Canadian physiotherapists.* Physiother Can, 2012. **64**(1): p.:77–85.
14. Rodeghero J, W.Y., Flynn T, Cleland JA, Wainner RS, Whitman JM, , *The impact of physical therapy residency or fellowship education on clinical outcomes for patients with musculoskeletal conditions.* Journal of Orthopaedic & Sports Physical Therapy, 2015. **45**: p. 86-96.
15. Williams A, R.A., James J Lewis, Phillips C, *Evaluation of the clinical effectiveness of a work-based mentoring programme to develop clinical reasoning on patient outcome: A stepped wedge cluster randomised controlled trial.* PLoS ONE, 2019. **14**(7): p. e0220110.
16. Greenhalgh T, W.J., Shaw S, Morrison C, , *Video consultations for covid-19* BMJ, 2020. **368**: p. m998.
17. Thornton J, *Covid-19: how coronavirus will change the face of general practice forever.* 368, 2020: p. m1279.
18. Nitkunan A, P.D., Nitkunan T. , *COVID-19: switching to remote neurology outpatient consultation.* Practical Neurology 2020. **Published Online First: 04 May 2020.** .
19. M. Miles, A.H., *Qualitative data analysis: an expanded sourcebook*. 1994, Beverley Hills: Sage
20. Tong A, S.P., Craig J. , *Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups.* Int J Qual Health Care, 2007. **19**(6): p. 349-357.
21. von Elm E, et al., *Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)statement: guidelines for reporting observational studies.* BMJ, 2007. **335**(7624): p. 806-808.
22. Hill JC, K.S., Benedetto E, et al, *Development and initial cohort validation of the Arthritis Research UK Musculoskeletal Health Questionnaire (MSK-HQ) for use across musculoskeletal care pathways.* BMJ Open, 2016: p. 6:e012331.
23. Horn KK, J.S., Richardson G, Van Vliet D, Hefford C, Abbott JH. , *The patient-specific functional scale: psychometrics, clinimetrics, and application as a clinical outcome measure.* JOSPT, 2012. **42**(1): p. 30-D17.
24. Nicholas P, H.C., Tumilty S, , *The use of the Patient-Specific Functional Scale to measure rehabilitative progress in a physiotherapy setting.* Journal of Manual & Manipulative Therapy, 2012. **20**(3): p. 147-152.
25. Howie JG, H.D., Maxwell M, Walker JJ., *A comparison of a Patient Enablement Instrument (PEI) against two established satisfaction scales as an outcome measure of primary care consultations.* Family Practice, 1998. **15**(2): p. 165-71.

26. McKinstry B, C.I., Walker J, , *Can doctors predict patients' satisfaction and enablement? A cross-sectional observational study.* Family Practice, 2006. **23**(2): p. 240-245.
27. Enthoven P, P.A., Ludvigsson ML, Wibault J, Peterson G, Öberg B., *Validity, internal consistency and self-rated change of the patient enablement instrument in patients with chronic musculoskeletal pain.* J Rehabil Med, 2019. **51**(8): p. 587-597.
28. Mercer SW, M.M., Heaney D, Watt GC., *The consultation and relational empathy (CARE) measure: development and preliminary validation and reliability of an empathy-based consultation process measure.* Family Practice, 2004. **21**(6): p. 699-705.
29. Madi M, H., H, Griffiths M, Rushton A, Heneghan NR, , *Exploring Taught Masters Education for Healthcare Practitioners: A Systematic Review of Literature.* BMC Medical Education, 2018. **19**: p. 340.
30. Gale NK, H.G., Cameron E, Rashid S, Redwood S., *Using the framework method for the analysis of qualitative data in multi-disciplinary health research. .* BMC Medical Research Methodology, 2013. **13**(1): p. 117.
31. Staniszewska, S., et al., *GRIPP2 reporting checklists: tools to improve reporting of patient and public involvement in research.* BMJ, 2017. **358**: p. j3453.

Figure Legend

Figure 1: Exploratory sequential case study design

Figure 2: Description of telehealth



Study design and methods

36x20mm (900 x 900 DPI)

	UK	Canada
Setting	University	Private Practice, University
Platform	Secure, password encrypted platforms (Zoom, WebEx, Canvas Virtual Learning Platform)	
Delivery model (150 hours of mentored practice)	May to September 2020 One telehealth clinic per week over 20 weeks Mentee assesses new patient (NP) each week with follow up patient (FP) appointments	October 2000 to July 2021 In-person, e-mentoring and/or mock scenarios. Patient assessment are in person or e-mentoring.
Mentor : mentee ratio	1:1 to 1:4	
Formative feedback	Weekly formative feedback (verbal/written) virtually and/or in-person (peer and mentor observation). Formative individual assessment week 10	Weekly formative feedback virtually and/or in-person
Summative feedback	Week 20 (assessment and management of a NP (1 hour) and FP (30 mins) with 30 minutes clinical reasoning viva. Examination includes evaluation of personal professional portfolio	Two NP assessment with expectations differing fall to spring. Written report of clinical reasoning of patient assessment and management, with evaluation of patient goals and expectations
Key components	• Student mentee's individual learning contract and aligned to IFOMPT Educational Standards • Assessment and management of a range of msk patients (spinal, peripheral etc.) • Full informed consent gained by mentor/mentee (clinical and research) • Following mentee patient history taking (observed by mentor), mentee plans for physical examination. • Physical examination and management provided as required (adapted examination, exercise prescription etc.) • Patient centred care supported via additional resources e.g. exercise sheets etc. • Mentor observation of mentee • Peer mentoring facilitated through observation of mentee	
PROM	MSK-HQ, PEI, PSFS and CARE	
Governance procedures	Patient care provided with a UK licenced physical therapist (HCPC registration) Patient data managed in accordance with University Guidelines and GDPR 2018 – University secure server including record of informed consent (patient care and research)	Patient/client consent is in accordance with the Canadian Physiotherapy Provincial license board

Telehealth e-mentoring description

52x33mm (900 x 900 DPI)

Supplementary file 1.

MUSCULOSKELETAL HEALTH QUESTIONNAIRE (MSK-HQ) *(WITH PERMISSION)*

This questionnaire is about your **joint, back, neck, bone and muscle symptoms** such as aches, pains and/or stiffness.

Please focus on the particular health problem(s) for which you sought treatment from this service.

*For each question **tick** (✓) **or X one box** to indicate which statement best describes you **over the last 2 weeks**.*

1. Pain/stiffness during the **day** How severe was your usual joint or muscle pain and/or stiffness overall during the **day** in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Fairly severe ☐ 1	Very severe ☐ 0
2. Pain/stiffness during the **night** How severe was your usual joint or muscle pain and/or stiffness overall during the **night** in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Fairly severe ☐ 1	Very severe ☐ 0
3. Walking How much have your symptoms interfered with your ability to walk in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Unable to walk ☐ 0
4. Washing/Dressing How much have your symptoms interfered with your ability to wash or dress yourself in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Unable to wash or dress myself ☐ 0
5. Physical activity levels How much has it been a problem for you to do physical activities (e.g. going for a walk or jogging) to the level you want because of your joint or muscle symptoms in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Very much ☐ 1	Unable to do physical activities ☐ 0
6. Work/daily routine How much have your joint or muscle symptoms interfered with your work or daily routine in the last 2 weeks (including work & jobs around the house)?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Extremely ☐ 0
7. Social activities and hobbies How much have your joint or muscle symptoms interfered with your social activities and hobbies in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Extremely ☐ 0

8. Needing help How often have you needed help from others (including family, friends or carers) because of your joint or muscle symptoms in the last 2 weeks?	Not at all ☐ 4	Rarely ☐ 3	Sometimes ☐ 2	Frequently ☐ 1	All the time ☐ 0
9. Sleep How often have you had trouble with either falling asleep or staying asleep because of your joint or muscle symptoms in the last 2 weeks?	Not at all ☐ 4	Rarely ☐ 3	Sometimes ☐ 2	Frequently ☐ 1	Every night ☐ 0
10. Fatigue or low energy How much fatigue or low energy have you felt in the last 2 weeks?	Not at all ☐ 4	Slight ☐ 3	Moderate ☐ 2	Severe ☐ 1	Extreme ☐ 0
11. Emotional well-being How much have you felt anxious or low in your mood because of your joint or muscle symptoms in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Severely ☐ 1	Extremely ☐ 0
12. Understanding of your condition and any current treatment Thinking about your joint or muscle symptoms, how well do you feel you understand your condition and any current treatment (including your diagnosis and medication)?	Completely ☐ 4	Very well ☐ 3	Moderately ☐ 2	Slightly ☐ 1	Not at all ☐ 0
13. Confidence in being able to manage your symptoms How confident have you felt in being able to manage your joint or muscle symptoms by yourself in the last 2 weeks (e.g. medication, changing lifestyle)?	Extremely ☐ 4	Very ☐ 3	Moderately ☐ 2	Slightly ☐ 1	Not at all ☐ 0
14. Overall impact How much have your joint or muscle symptoms bothered you overall in the last 2 weeks?	Not at all ☐ 4	Slightly ☐ 3	Moderately ☐ 2	Very much ☐ 1	Extremely ☐ 0

Physical activity levels
In the past week, on how many days have you done a total of 30 minutes or more of physical activity, which was enough to raise your heart rate? *This may include sport, exercise and brisk walking or cycling for recreation or to get to and from places, but should not include housework or physical activity that is part of your job.*

None	1 day	2 days	3 days	4 days	5 days	6 days	7 days
☐	☐	☐	☐	☐	☐	☐	☐

PATIENT SPECIFIC FUNCTIONAL SCALE

Please identify up to two important activities that you are unable to do or are having difficulty with as a result of your current problem/diagnosis.

Please rate each of these problems on the 0-10 scale below.

0 = Able to perform activity at the same level as before injury or problem (No issues) 10 = Unable to perform activity (Cannot perform)

Patient-specific activity scoring scheme (Circle one number or provide a range):

1. Activity										
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
No issues										**Cannot perform**

2. Activity										
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
No issues										**Cannot perform**

THE PATIENT ENABLEMENT INSTRUMENT (PEI)

As a result of your visit to the physiotherapist today, so you feel you are……

	Much better	**Better**	**Same or less**	**Not applicable**
able to cope with life				
able to understand your musculoskeletal complaint				
able to cope with your musculoskeletal complaint				
able to keep yourself healthy				
	Much more	**More**	**Same or less**	**Not applicable**
confident about your help				
able to help your self				

CONSULTATION AND RELATIONAL EMPATHY MEASURE (CARE Measure)

Please rate the following statement about today consultation. Please tick one box for each statement and answer every statement.

	Poor	Fair	Good	Very good	Excellent	Does not apply
1. Making you feel at ease….. (being friendly and warm toward you, treating you with respect; not cold or abrupt)						
2. Letting you tell your 'story' (giving you time to fully describe your complaint in your own words, not interrupting or diverting you)						
3. Really listening…. (paying close attention to what you were saying; not looking at the notes or computer as you were talking)						
4. Being interested in you as a whole person…… (asking/knowing relevant details about your life, your situation; not treating you as just a number)						
5. Fully understanding your concerns…. (communicating that he/she had accurately understood your concerns; not overlooking or dismissing anything)						
6. Showing care and compassion…. (seeming genuinely concerned, connecting with you on a human level; not being indifferent or detached)						
7. Being positive… (having a positive approach and a positive attitude; being honest but not negative about your problems)						
8. Explaining things clearly…. (fully answering your questions, explaining clearly, giving you adequate information; not being vague)						
9. Helping you take control… (exploring with you about what you can do to improve your health yourself, encouraging rather than lecturing you)						
10. Making a plan of action with you… (discussing the options, involving you in decisions as much as you want to be involved; not ignoring your views)						
Any other comments						

Supplementary file 2

Research Aim	Experiences of telehealth e-mentoring within postgraduate MSK physical therapy education: protocol for a mixed methods study		
Interview Section	**Questions/Content**	**Prompts**	**Aims**
Ethics Statement	Firstly, I would like to thank you for participating in this interview. Just a reminder that it will be audio/video-recorded but all information shared will be kept strictly confidential. You are entitled to stop the interview and the recording at any point or terminate the interview altogether if you wish. You also have the right not to answer a question if you do not wish to. There are no right or wrong answers. I am interested in your own personal experiences, thoughts and perceptions, with the aim of today being to understand your experiences of telehealth e-mentoring, which covers all forms of consultation with patients using remote means, within postgraduate MSK physical therapy education. Before we start do you have any further questions?	• *Can I confirm that you have read and understand the information sheet and signed the consent form?* • *Are you comfortable?*	• To ensure full understanding of what is expected of the participant during this interview. • Make sure the participant is comfortable and ready to begin.
Introductory Questions	1. Can you tell me a bit about yourself? 2. Can you tell me about your clinical background and recent posts/roles? 3. Can you tell me about your experiences of professional development and approaches to learning/development? 4. How many weeks into your CMP module are You?	• *Age, where do you come from, clinical posts, setting (NHS/private/sport/military)* • *What professional development have you been involved in before- weekend courses, IST* • *Thinking back what approaches worked best and you remember the most?*	• Make participant relax and feel comfortable with talking and opening up. • Build rapport. • To gain an insight into the participant's background

Transition Questions	1. What is your overall experience of being a postgraduate MSK physical therapy student? 2. How do you study through the week? Can you run me through the different approaches you use? 3. When this telehealth e-mentoring was first proposed as alternative approach to conventional clinical mentorship, how did it make you feel?	• *What does being a masters level student mean to you?* • *What aspects of your studies do you enjoy?* • *Any challenges with studying at masters level?* • *How do you break up your studies to keep focused?* • *Are there approaches used in the University that work best or engage you more? Seminars, workshops, lectures, patient presentations etc* • *Do you meet with other students? How does that work and what e-platforms do you use? Does this involve just those in your cohort or other individuals?* • *What works well and what does not work so well?* • *Thoughts, beliefs and expectations around different approach to development? Anxieties and thoughts about relevance?*	• Start to guide the interview towards experiences of masters level professional development • To get an idea of their approach to studying at masters level • To explore approaches used and their preferences to learning • Explore beliefs and perceptions of something unplanned.
E-mentoring and telehealth background	As well as a considerable body of evidence supporting the use of telehealth as cost effective, accessible means of providing patient care there is an emergence body of evidence supporting the use of e-mentoring to facilitate professional development. With the widespread use of telehealth to offer MSK physical therapy during the Covid-19 pandemic, this offered you as a student an opportunity to integrate knowledge and skills gained from the programme thus far in an authentic way and towards achievement of your programme learning outcomes. Where we are focusing on telehealth e-mentoring to develop advanced clinical reasoning skills to optimise care of patients with MSK symptoms, we will consider outcomes of masters level	• *Do you have any questions?* • *If you are unsure at any point regarding aspects of the Logic Model, please ask.*	• Inform the participant of the background of the study • Ensure the participant knows they can ask questions if they are unsure.

	education in MSK physical therapy, which includes 1. *Critical thinking skills and analysis* 2. *Clinical reasoning* 3. *Confidence and motivation to practice* 4. *Enhanced career progression* 5. *Becoming a lifelong learner* 6. *Advanced communication skills* 7. *Enhanced sense of autonomy* I have a number of questions for you founded on this model and if you are not clear on anything as we go through, then please let me know.		
	1. To start with, could you perhaps give me an idea of how the telehealth e-mentoring has influenced your **critical thinking skills?**	• *In what way do you think you have become more critical or analytical?* • *Has your clinical decision making changed?* • *In what way has your evidenced based practice changed?* • *What aspects of the process facilitated that?* • *What role did the others have in your group to enable that?* • *What role did the mentor have in facilitating this?* • *Have there been any additional learning activities you have been set during the CMP module which you have found beneficial?* • *How have different patient presentations influenced your critical analysis and decision making skills* • *Is there any different challenges between NP/FU* • *Assessment/management/rehab*	• To explore the influences of the experience on critical thinking and development of analytical skills across a range of patient presentations

Main Questions	2. Could you perhaps give me an idea of how the telehealth e-mentoring has influenced your **ability to clinical reasoning?**	• *Has this influenced your approach to reasoning e.g. collaborative or narrative reasoning of cases?* • *How did the different patients you saw influence this?* • *Knowledge is a component of clinical reasoning – was this challenged in anyway?* • *How did time influence this – reflection on and in action* • *Where you were involved in peer mentoring, how did this influence your own development?* • *Has this experience changed your meta cognition? If so, how?* • *What strategies did you use to support development of your clinical reasoning? Planning sheets, PROMs etc* • *Are your experiences the same for NP and FP* • *Did you feel this differed accordingly to stages of management e.g. assessment, management and rehab? What about doing physical tests? What about approaches to management?*	• To explore the influences of the experience on their ability to clinically reason and justify patient management across a range of patient presentations
	3. How do you feel the telehealth e-mentoring has influenced your **confidence and motivation to practice in MSK physical therapy**	• *Do you feel more of less confidence in managing patients within a biopsychosocial model of practice?* • *Why do you feel that? Is there any specific aspect of the mentorship that has helped or hindered that?* • *Does this reflect all stages of patient care – assessment, management and rehab* • *What aspects of your practice do you have more or less confidence in – e.g. reasoning complex cases, certain presentations, etc.* • *How do you feel about now going back into practice?* • *How do feel about dealing with uncertainty in managing complex patient cases in the future?*	• To explore confidence and motivation to practice in MSK physical therapy, drawing on new skills and knowledge • To explore how comfortable they are with dealing with uncertainty and problem solving to inform clinical decision making?

	4. **Advanced communication skills** are central to patient history taking and I wonder how you feel these have been influenced by the telehealth e mentoring?	• *Do you think your communication skills have changed? If so in what way? Which skills – listening, oral, written?* • *Do you feel there are any barriers or facilitators that have aided the development of your communication skills* • *How do you think this has influenced your relationship with your patients and peers?* • *Have your communications skills changed as a result of working in a small group? If so in what way?* • *What influence has this medium had on building a rapport with your patients?* • *What communication strategies have you used to develop your therapeutic relationship with patients?* • *Do you feel these experience have influenced your ability to interpret patient data, and articulate clinical diagnosis and treatment decisions* • *How have you optimised patient engagement in management plans?*	• To explore the scope of communication and the influences of this at a personnel, group and professional level
	5. How do you feel the telehealth e-mentoring may have influenced **a. Career progression** **b. Becoming a lifelong learner** **c. Enhanced sense of autonomy**	• *How do you feel now you have completed the clinical mentorship?* • *Do you feel this experience will be useful in supporting career progression e.g. triage?* • *Where students have reported changes such as career enhancement, becoming a lifelong learner or increased sense of autonomy, do you feel the experiences you have had will be useful? If so in what way?* • *In light of Covid-19 and social distancing how do you feel about the next stage of your career? What are your priorities and plans following completion of the programme?*	• To explore views and perceptions of this authentic experience on career progression, being a lifelong learning and sense of autonomy
Conclusion	That's all the questions, is there anything else you would like to add about your experiences of telehealth e-mentoring?	• *Is there anything you would like to ask regarding the analysis of the data or the next steps of the process?*	• Ensure the participant is comfortable with what has been discussed.

	The interview has now finished. Thank you for participating in this study, I really appreciate your time and input.		