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Telehealth e-mentoring in postgraduate musculoskeletal physiotherapy education: A mixed methods case study

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ABSTRACT

Background: Educational standards of advanced musculoskeletal physiotherapy include mentored clinical practice. Whilst traditionally delivered *face-to-face*, telehealth e-mentoring affords a distinctive andragogy to facilitate mentee development.
Objective: To understand the experiences and outcomes of stakeholders participating in musculoskeletal physiotherapy telehealth e-mentoring.
Design: A case study design with sequential mixed methods (quantitative patient outcome data and qualitative interviews and a focus group) of a 20-week e-mentored telehealth physiotherapy service.
Methods: Data collection comprised 1) Patient experiences and measures of musculoskeletal health 2) Mentee semi-structured interviews 3) Mentor focus group. Data analysis included descriptive statistics (median and IQR) and the Framework Method for qualitative and quantitative data respectively. An exploratory bidirectional approach supported data integration across all participants.
Results: Participants included patients (n = 90), mentees (n = 10) and mentors (n = 6). Patients reported improvements (>MCID) in MSK-HQ and Patient Specific Functional Scale, with high scores for Consultation and Relational Empathy and Patient Enablement Instruments. Main themes were a) social learning b) advanced professional practice c) learner experience and d) limitations of telehealth for mentees, and for mentors a) preparedness b) journey of development and c) challenges. Participant data integration resulted in 4 main themes 1) energising/positive experience 2) communications skills valued 3) perceptions of telehealth 4) upskilling required.
Conclusions: Telehealth e-mentoring is a valuable alternative to *face-to-face* mentored physiotherapy practice to support development in advanced musculoskeletal physiotherapy practice. Findings indicate that technical and professional skills are required, high levels of communication skills were valued, there is a need for reconceptualisation of musculoskeletal physiotherapeutic interventions.

1. Introduction

Telehealth encompasses 'telemedicine', 'telecare', 'telerehabilitation' 'teleconsult' and 'e-health' (Tenforde et al., 2017) and refers to the use of virtual technology and online communication platforms to deliver healthcare, moving away from traditional practice settings (Chartered Society of Phys, 2020; Cottrell and Russell, 2020). Telehealth improves accessibility to healthcare (Tenforde et al., 2017;

Dario AB et al., 2017), and in musculoskeletal (MSK) complaints exhibits good concurrent validity to *face-to-face* physiotherapy assessment for a range of outcomes (pain, joint mobility, etc.) (Mani S et al., 2017). Furthermore, literature now supports its effectiveness (clinical and cost) and acceptability with improved health outcomes and reduced hospital admissions. (Tenforde et al., 2017; Cottrell and Russell, 2020; Holland, 2013). Despite high levels of patient satisfaction with MSK physiotherapy telehealth (Cottrell and Russell, 2020; Cottrell et al., 2016)

adoption within MSK physiotherapy has been slow (Cottrell and Russell, 2020; Malliaras P et al., 2020).

While there is growing international interest and recent engagement with telehealth (Cottrell and Russell, 2020; Malliaras P et al., 2020), it has not yet been used to support postgraduate professional development in MSK physiotherapy. Notwithstanding the need for psychomotor skill development in MSK advanced practice (Rushton A, 2010), many other constructs (e.g. high levels of clinical reasoning, critical approach to practice etc.) could feasibly be developed via telehealth (Cottrell and G. OOLeary, 2016; Rushton A, 2010; Cottell MA et al., 2017). Clinical reasoning, defined by Higgs and Jones (Higgs et al., 2008) as "an inferential process used by practitioners to collect and evaluate data and to make judgments about the diagnosis and management of patient problems," is central to the development of advanced MSK physiotherapy practice. Thus with 75–83 % of clinical diagnoses derived from the patient history data alone (Ohm et al., 2013; Keifenheim KE et al., 2015), research is needed into telehealth e-mentoring as a means of supporting professional development towards advanced MSK physiotherapy practice.

National and international professional/educational standards specify the core capabilities required for advanced clinical practice, with the 'Multi-professional framework for advanced clinical practice' (England, 2017) a national standard for all professional groups, and the International Federation of Orthopaedic Manipulative Physical Therapists (IFOMPT) Educational Standards (International Federation, 2016) providing international advanced MSK physiotherapy standards. Operationalised in the United Kingdom (UK) by the Musculoskeletal Association of Chartered Physiotherapists (MACP) with 7 approved programmes, the IFOMPT Educational Standards fully map to the national core capabilities of advanced clinical practice (Noblet T et al., 2021). Mentored clinical practice (MCP) is a distinctive feature of the curricula of programmes; students as mentees, facilitated by a mentor, integrate new skills and knowledge (procedural and propositional) acquired in an educational setting into clinical practice, using a framework of clinical reasoning. MCP is a unique andragogy (i.e. methods and principles used in adult education) allowing critical reflection and enhanced knowledge translation (Ezzat AM, 2012) with recent evidence supporting a positive impact on patient outcomes (Rodeghero et al., 2015; Williams et al., 2019). Telehealth e-mentoring has the potential to overcome existing and current obstacles, but could be an adjunct to conventional *face-to-face* MCP beyond Covid-19, thus better preparing mentees for future roles where remote and digital consultation potentially becomes the new norm in clinical practice. (Greenhalgh et al., 2020; Thornton, 2020; Nitkunan et al., 2020).

As well as physical distancing in the COVID-19 pandemic forcing a change in conventional MCP, accessibility to suitably qualified MSK physiotherapy mentors has long been a challenge to education providers (Westervelt KC et al., 2018). Those with the necessary skills may be in leadership or managerial positions with limited capacity to offer mentorship. Student mentees alsofind this aspect of the educational programme challenging, with associated costs (travel, accommodation etc.) and time needed away from practice commonly cited as barriers to MCP (Westervelt KC et al., 2018; Feretti and K.LGroff, 2020). Alternative flexible MCP approaches are therefore needed to safeguard the future of this vital andragogy, with telehealth e-mentoring being an option.

Telehealth e-mentoring has been rapidly introduced in response to Covid-19; we now need to evaluate its acceptability and appropriateness from the perspectives of patients, mentors and mentees. Data from this evaluation will, in turn, inform recommendations for education providers and practitioners to support professional growth and development of MSK physiotherapists.

1.1. Aim

The purpose of this study was to explore the experiences of post-graduate Masters (MSc) physiotherapy mentees, their mentors, and patients with MSK complaints engaged in telehealth e-mentoring (consultation/rehabilitation) in the UK.

1.2. Objectives

1) To explore 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 postgraduate mentees engaged in telehealth e-mentoring.
3) To explore the mentor acceptability and appropriateness of telehealth e-mentoring to facilitate student development towards achievement of IFOMPT Educational Standards

2. Methods and analysis

2.1. Design and methods

Using a case study design, a longitudinal observational study including sequential mixed qualitative and quantitative methods were used to investigate stakeholder experiences of telehealth e-mentoring in the UK. An MSK physiotherapy telehealth service was set up in response to the Covid-19 global pandemic to enable student progression where government restrictions prevented conventional *face-to-face* MCP. Fig. 1 details the telehealth e-mentoring provision. Using a predefined and published protocol (Heneghan NR et al., 2021) data collection occurred between May and December 2020. Semi-structured interviews were used to explore development of critical thinking, clinical reasoning, communication skills and confidence of postgraduate mentees. Patient reported outcomes were used to explore experiences and changes in MSK health, and a focus group explored mentor acceptability and appropriateness of telehealth e-mentoring. The study is reported in line with the COnsolidated criteria for REporting Qualitative research (COREQ) (Tong et al., 2007) (Supplementary file 1) and the STrengthening the Reporting of Observational Studies in Epidemiology statement (von Elm et al., 2007) (Supplementary file 2).

2.2. Research team

Data collection and analysis involved multiple researchers. Patient participant data was collected by a teaching fellow (IT) with 8 years' experience as a MSK physiotherapist and 1 year leading the MCP module in the University. Mentee interviews were conducted by researcher (JJ), a specialist MSK physiotherapist (18 years' experience) and a student on the Advanced Manipulative Physiotherapy (AMP) MSc programme. As a fellow student, an established relationship existed with participants prior to data collection, thus facilitating a relaxed and honest discussion whilst enhancing credibility (King and H.CBrookes, 2018). Interview training and piloting of the topic guide were provided. The mentor focus group was led by an experienced researcher and lead author (NH). As lead for the MSc programme, the lead author had existing relationships with focus group participants which aided an open discussion. The topic guide for the focus group was informed by mentee data, and co-designed with researchers from another academic institution to minimise bias.

2.3. Participant recruitment and eligibility

In line with the published protocol (Heneghan NR et al., 2021) eligibility criteria for all participants included access to a video consultation platform and ability to give informed consent.

- *Patients* who self-referred to the UK University AMP telehealth service with an MSK complaint (consecutive sampling) were invited to participate by researcher IT.

Setting	University telehealth service (self-referral from University staff, students and local community)
Platform	Secure, password encrypted platforms (Zoom, Canvas Virtual Learning Platform)
Delivery model	May to September 2020 150 hours of mentored practice. [Mentor: mentee ratio 1:1-1:4] One telehealth clinic per week over 20 weeks Mentee assesses new patient (NP) each week with follow up patient (FP) appointments
Formative feedback	Weekly formative feedback (verbal/written) virtually and/or in-person (peer and mentor observation) Formative individual assessment week 10
Summative feedback	Week 20 which included 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 This involves University tutor and mentor
Key components	• Student's individual learning contract learning outcomes aligned to IFOMPT Educational Standards • Assessment and management of a range of patients (spinal, peripheral etc.) • Full informed consent gained by mentor/mentee • Following mentee patient history taking (observed by mentor), mentees reflect on data to plan for physical examination. • Physical examination and management provided as required (adapted examination, exercise prescription etc.) • Mentor observation of mentee • Peer mentoring facilitated through observation of mentee • Patient centred care supported with resources e.g. exercise sheets etc. • Ongoing formative feedback & discussion of clinical reasoning for all cases
PROM	MSK-HQ, PEI, PSFS and CARE
Governance procedures	UK licenced physiotherapist (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)

Note: MSK-HQ: Musculoskeletal Health Questionnaire, PEI: Patient Enablement Instrument, PSFS:Patient Specific Functional Scale, CARE; Consultation and Relational Empathy

Fig. 1. Telehealth e-mentoring provision (Heneghan NR et al., 2021)
Note: MSK-HQ: Musculoskeletal Health Questionnaire, PEI: Patient Enablement Instrument, PSFS:Patient Specific Functional Scale, CARE; Consultation and Relational Empathy.

• *Mentees* from the 2019–2020 cohort of postgraduate mentees registered on the IFOMPT approved programme and registered on the MCP module were invited to participate (via email) in a semi structured interview by researchers IT and NH. Purposive sampling was used to ensure representation, with variance in sample with respect to age, gender, geographical and clinical experience.

Clinical mentors from the University of Birmingham, MSc Advanced Manipulative Physiotherapy programme were invited (via email) to participate in the focus group at the end of the programme (sample of convenience) by lead researcher NH.

Exclusion criteria for patients included inability to communicate fluently in English and those not reporting a primary MSK complaint e.g. seeking stroke rehabilitation.

2.4. Data collection and procedures

Patient data were collected and stored on BEAR Share (a secure password protected server) and the video platforms Skype and Zoom used to conduct interviews and the focus group.

Objective 1, longitudinal observational study: In line with the published protocol (Heneghan NR et al., 2021), patients participated in an initial assessment and follow up management sessions with mentees and clinical mentors. Patient reported outcome measures (PROM) were collected: Musculoskeletal Health Questionnaire (MSK-HQ) (Hill JC et al., 2016), Patient Specific Functional Scale (Horn et al., 2012; Nicholas and H.CTumilty, 2012), Patient Enablement Instrument (PEI)

(Howie JG et al., 1998) and Consultation and Relational Empathy (CARE) measure (which includes an option to add free text response). (Mercer SW et al., 2004).

Objective 2, semi-structured interviews: Mentees participated in a semi structured interview. The topic guide (Supplementary file 3) was informed by existing evidence and the core constructs of MSc level practice in MSK physiotherapy. (Rushton A, 2010).

Objective 3, focus group: Mentors participated in a focus group to explore the acceptibility and appropriateness of telehealth e-mentoring to facilitate mentee development towards achievement of IFOMPT Educational Standards. The topic guide was informed inductively from the interim analysis of mentee data.

2.5. Data management

Interviews and focus group were audio-recorded and transcribed verbatim by an external professional provider. Post transcription, member checking was completed to aid trustworthiness, and field notes used for contextual details and non-verbal responses. (Tong et al., 2007).

2.6. Data analysis

Quantitative data, including participant demographics were analysed descriptively to characterise the patient population and to determine change in outcome scores comparing pre and post management. Boxplots for the median and inter-quartile ranges (IQR) were constructed. Free text responses from the CARE instrument were analysed

using content analysis to enable themes/categories to be derived (Vaismoradi and T.HBondas, 2013).

Qualitative data from interviews and focus group were analysed using the Framework Method (Gale NK et al., 2013). 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 and supported with quotations.

2.7. Data integration

An exploratory bidirectional approach was used to support data integration of data derived from all participants enabling exploration of common or divergent themes (Moseholm E, 2017).

2.8. Reflexivity

All stages of the project (design, methods, analysis and interpretation) involved authors (NH, AR, JS, HG, WJ, IT, EY) with research and/or clinical expertise. Experts included those based at other academic institutions, including one in Canada, which also hosts an IFOMPT approved programme. Members of the research team (AR, JS, WJ, HG, JJ, EY) met at multiple time points (via Zoom) to discuss data analysis, emergent themes/subthemes, and data interpretation thus ensuring rigour and trustworthiness (Gale NK et al., 2013).

2.9. Patient and public involvement and engagement

Pre-study consultation involved students, patients, practitioners, and representatives from relevant professional, ethical and legal bodies. A student participant (JJ), mentors (IT, MN), clinician (WJ), and educators (JS, HG) were involved; the student participant conducted the mentee interviews and was involved in the analysis and interpretation of data. Patient data were monitored throughout, including free text responses on the CARE measure.

2.10. Ethical approval

Ethical approval was granted by the University of Birmingham STEM Ethics Committee (15/5/2020 ref ERN_20–0695) for the UK. All participants provided written informed consent and were made aware of their rights to withdraw participation and/or data.

3. Results

3.1. Participant characteristics

3.2. Patient outcomes (Objective 1)

Data in Table 1 details participant characteristics, patient MSK complaints and baseline measures. Table 2 provides follow up scores, with around half of participants being seen on a second occasion.

Findings suggest that for those patients seen on a second occasion (n = 52) the change in MSK-HQ score exceeded the minimal clinically important difference (MCID) of 6, with a change in the median score of 11 points (Fig. 2). Days physically active increased by a single point and the median scores for PSFS 1 (n = 48) and 2 (n = 41) reduced by 4 points (Fig. 3), exceeding the MCID of 2.7 (Abbott JH, 2014). Both the CARE (n = 47) and PEI (n = 46) scores remained high across visits with a ceiling effect noted (Fig. 4).

From analysis of the CARE instrument free text responses, 2 main themes emerged, 'experiences of telehealth MSK physiotherapy' and 'challenges with telehealth'. For 'experiences of telehealth' there were 5

Table 1
Details of participant characteristics.

	Mentees (n = 10)	Mentors (n = 5)	Patients (n = 90)
Male: Female n	4:6	2:4	45:45
Age Median (Range) years	28 (24–44)	33 (32–36)	42 (18–73)
Years qualified Median (Range)	3 (1.5–20)	–	–
Years as a mentor	–	4 (1–6)	–
Duration (interview/focus group) minutes	73	102	–
Full time: part time n	8:2	–	–
Timing	July–Oct 2020	December 2020	May–Sept 2020
Complaints n (%)			
• Lower limb	–	–	35 (39)
• Low back/pelvis	–	–	21 (23)
• Upper limb	–	–	20 (22)
• Neck/headaches	–	–	9 (10)
• Other e.g. rib, thoracic pain	–	–	5 (6)
Patient measures Median (Range) n			
• MSK-HQ	–	–	36 (10–52)
• PAL	–	–	3 (0–9) n = 89
• PSFS 1	–	–	7 (0–10) n = 79
• PSFS 2	–	–	6 (0–10) n = 73
• CARE	–	–	49 (26–50) n = 74
• PEI			6 (0–9) n = 69

CARE: Consultation and Relational Empathy, MSK-HQ: Musculoskeletal Health Questionnaire (MSK-HQ), PAL: Physical Actitvity Levels, PSFS: Patient Specific Functional Scale, PEI: Patient Enablement Instrument.

Table 2
Patient follow up measures.

	MSKHQ (n = 52)	PAL (n = 52)	PSFS 1 (n = 48)	PSFS 2 (n = 41)	CARE (n = 47)	PEI (n = 46)
Median	47	4	3	2	50	7
Min	17	0	0	0	26	0
Max	56	7	10	10	50	12

CARE: Consultation and Relational Empathy, MSK-HQ: Musculoskeletal Health Questionnaire (MSK-HQ), PAL: Physical Actitvity Levels, PSFS: Patient Specific Functional Scale, PEI: Patient Enablement Instrument.

subthemes (surprisingly positive and effective experience, communication skills important, patient empowerment and self-management, therapeutic relationship and patient preference for telehealth). Within the 'challenges with telehealth', 3 subthemes emerged (needing instructions for telehealth, feeling fully understood, using camera for demonstrations was difficult) (Table 3).

3.3. Mentee perceptions of the development of advanced practice (Objective 2)

For the mentees, 4 main themes emerged, 'The learner experience', 'Social learning', 'Advanced professional practice' and 'Telehealth has its limitations'. See Table 4 for supporting quotes.

3.3.1. 'The learner experience'
This centred on mentees having high expectations of MCP, and the opportunity to spend time with an experienced mentor in a practice setting, integrating new knowledge and skills in clinical practice (subtheme: high expectations and acceptance of telehealth). The unexpected move to telehealth e-mentoring was initially met with resistance and anxiety, although the value of added skills was later acknowledged.
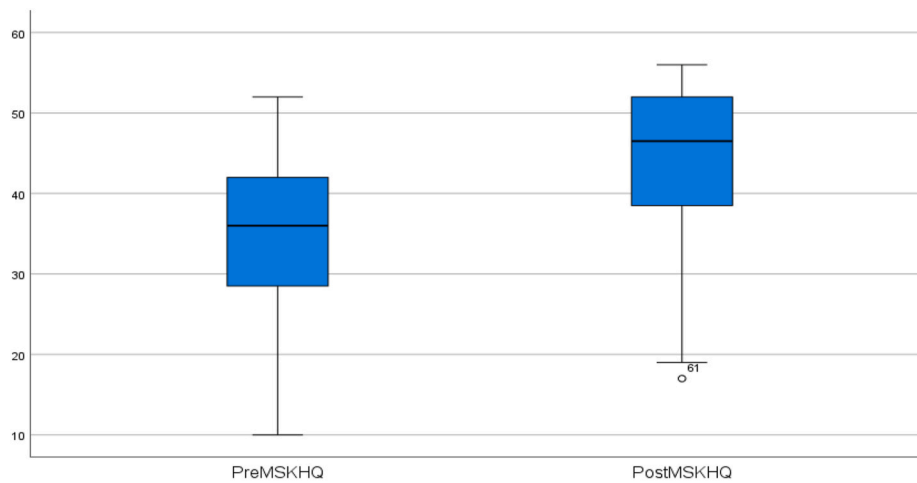
Fig. 2. MSKHQ Pre-post MSK physiotherapy telehealth intervention (median and IQR).
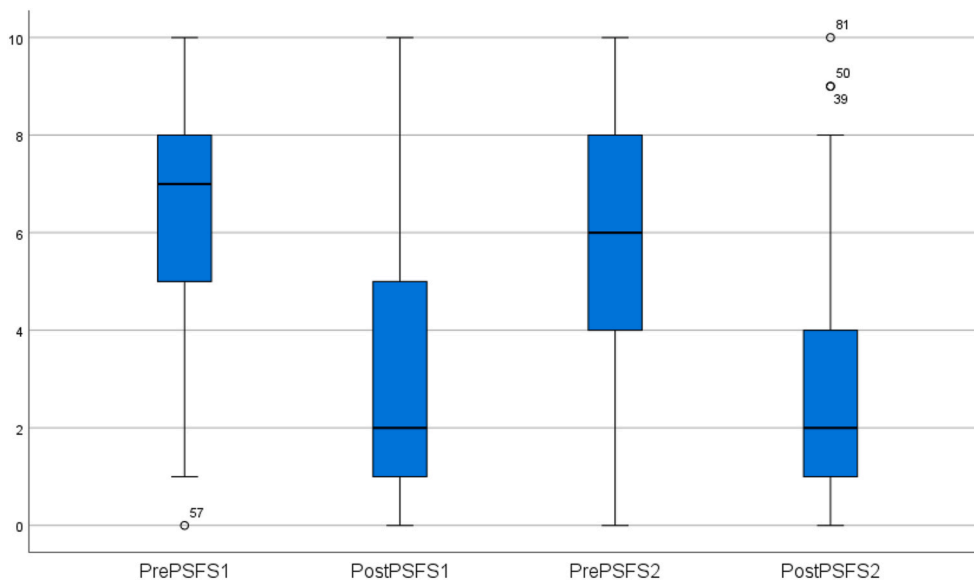

Fig. 3. PSFS Pre-post MSK physiotherapy telehealth intervention (median and IQR).

Moreover there was a recognition for specific skills to practice telehealth (subtheme: modifying physical testing and problem solving).

Notwithstanding the necessary and unexpected change in MCP, mentees were amenable to the telehealth e-mentoring (subtheme: energising experience) and gained considerable confidence using clinical reasoning skills in practice (subtheme: confidence from using clinical reasoning skills).

3.3.2. 'Social learning'

Mentees valued the opportunity for individual and peer mentoring (subthemes: one-to-one discussions with mentor valued, and an opportunity to learn from others). Furthermore, the role and importance of feedback to learning were seen as an integral part of the social learning experience (subtheme: being open to giving and receiving feedback). However, matching of mentees with respect to experience was identified as an important consideration for the process; avoiding mentee groups with disparate needs.

3.3.3. 'Advanced professional practice'

Through telehealth e-mentoring, mentees identified the development of specific skills commensurate to advanced professional practice.

These included communication (subtheme: communication skills development), advanced clinical reasoning (subtheme: clinical reasoning skills development). More specifically, they valued oppportunties for reflection (subtheme: focus on use of reflective practice) and focus on evidence-based practice, (subtheme: consistency in applying evidence-based practice). Whilst arguably these skills are not unique to telehealth e-mentoring, the inability to use hands-on management interventions supported a shift to patient empowerment (subtheme: focus on self-management).

3.3.4. 'Telehealth has its limitations'

Unequivocally, mentees reported feelings of missing out on practical skills development (subtheme: lost opportunity for hands-on skill development), related to psychomotor skills for physical examination in assessment and management. Mentees perceived telehealth to limit both the scope of techniques they could use, and also precision when performed remotely (subtheme: remote physical testing is limited and less precise). With exercise the main focus in intervention planning, mentees perceived an adverse impact on exercise precription (subtheme: perception of reduced precision in exercise facilitation).

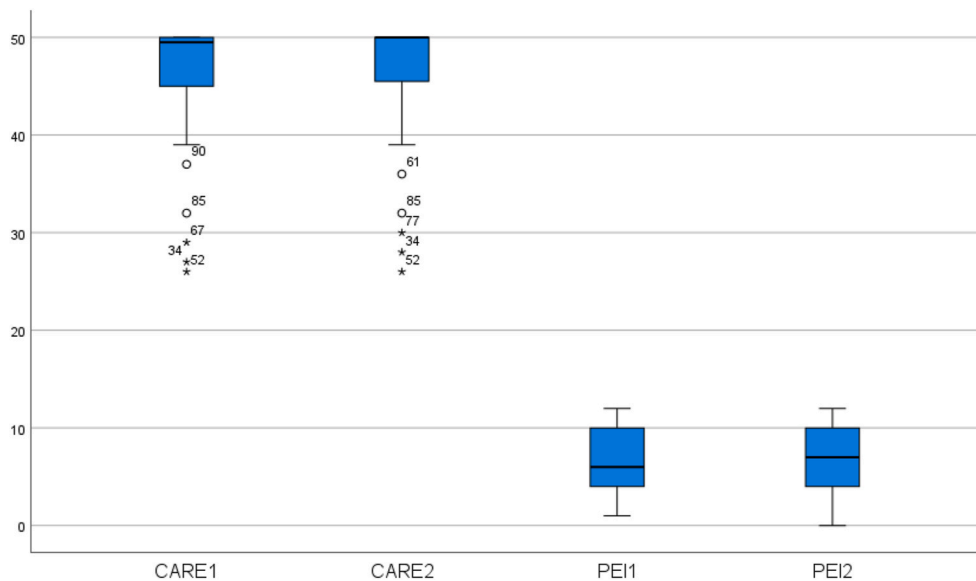More general concerns related to the remote consultation affecting

Fig. 4. CARE and PEI Pre-post MSK physiotherapy telehealth intervention (median and IQR).

the therapeutic relationship (subtheme: connectivity affecting therapeutic relationship) and a perception of needing more time/patients to develop proficiency of skills in remote physical examination (subtheme: perception of needing large caseload to improve learning).

3.4. Mentor perceptions of acceptability and appropriateness (Objective 3)

For the mentors, 3 main themes emerged, 'preparedness for telehealth e-mentoring', 'journey of development with telehealth e-mentoring', 'challenges for implementation of telehealth e-mentoring'. See Table 5 for supporting quotes.

3.4.1. 'Preparedness for telehealth e-mentoring'
Mentors placed importance on and valued individual mentee's learning contracts (subtheme: individual learning contract valuable) to individualise mentorship. Mentors recognised the need to further plan and prepare mentees for the mentorship, and further emphasise clinical reasoning and metacognitive processes over 'physical interaction' (subtheme: reconceptualising clinical reasoning process). Mentors, being relatively new to telehealth themselves and their first experience of telehealth e-mentoring, readily acknowledged their own anxieties embarking on this journey (subtheme: managing perceptions and own expectations). This notably settled over time and reflected the collective journey (subtheme: illumination of professional development) and getting to know the mentees (subtheme: relationship building). Mentors were able to identify areas where upskilling was needed in advance of the MCP, including technical skills and adapting techniques for remote practice (subtheme: skills for telehealth).

3.4.2. 'Journey of development with telehealth e-mentoring'
Mentors, like mentees, valued the opportunity to further develop an array of communications skills (subtheme: communication skills development), mentees' reflective practice (subtheme: facilitation of reflective practice) and advancement of evidence-based practice and shared decision-making (subtheme: framework of evidence based decision-making). Opportunities for shared learning through discussions, observed behaviours (mimicking) (subthemes: peer mentoring/learning and peer discussions and challenge) and developing skills in giving and receiving feedback (subtheme: formative feedback for development) were also identified, although arguably not unique to telehealth e-mentoring.

3.4.3. 'Challenges for implementation of telehealth e-mentoring'
Mentors reported a number of challenges for implementation of telehealth e-mentoring, ranging from a perception of missed opportunities which exist in a practice setting e.g. time with other staff, clinics etc. (subtheme: mentor perception of missed opportunities). Beyond this, there was a sense of responsibility to optimise the experience, including problem solving (subtheme: modelling creativity to solve problems), supporting patients' engagement in telehealth (subtheme: managing patient discomfort with telehealth), and within a different setting (subtheme: patients in their home environment). Where this was the mentors' first experience of telehealth e-mentoring there were concerns regarding precision and missing important information (subtheme: missing non-verbal cues) and mentees' ability to design active interventions (e.g. exercise) with goal setting (subtheme: reconceptualising intervention and goal setting).

3.5. Participant data integration of telehealth e-mentoring experiences

Despite some reservations, the experiences for participants was largely positive, with patients being surprised how effective the encounter was (main theme: energising and positive experience), and mentors/mentees reporting the benefits of telehealth e-mentoring for the development of 'advanced MSK practice' (Fig. 5) and see supplementary file 4 for data synthesis. Unequivocally, the opportunities to develop and demonstrate advanced communication skills were appreciated by all participants, with mentors and mentees valuing peer discussion and this extending to feedback (main theme: communication skills).

All participants recognised that adoption of this andragogy necessitates planning, with skills training/instruction in using an online platform to support development of the therapeutic relationship and a need to reconceptualise intervention and goal setting (self-management and exercise prescription) (main theme: upskilling required). A further main theme (main theme: perceptions of telehealth) was shaped by participant expectations of telehealth.

Whilst both mentors and mentees felt a sense of loss with telehealth e-mentoring (e.g. hands on skill development), this was not reflected in the patient data where they stated a preference for telehealth, valued the focus on self-management leading to empowerment and further evidenced by improved MSK outcomes. For mentors, they uniquely recognised a need for them to reconceptualise the clinical reasoning process, the value of the learning contract and note an illumination of

Table 3
Patient themes and subthemes.

Theme	Subtheme	Code
Experiences of telehealth MSK physiotherapy	Surprisingly positive and effective	*My consultation was a very positive experience thank you. Patient 158*
		I was slightly anxious about all the students listening in, but it worked really well and you never knew they were there! Patient 114
		I wasn't sure how an online appointment would work but it was really helpful considering the physio could not physically touch me. Patient 169
		They helped me regain a lot of mobility in my shoulder & the 'real-life' physio I've recently started seeing is surprised how much mobility I have with the level of injury I sustained considering that I hadn't received any face to face physio. Patient 88
	Communication skills important	*XXXX was outstanding in listening, engaging and responding. He was clear in the actions to take, and followed up quickly and clearly. He made the whole experience understandable, comfortable and insightful. Patient 55*
		Although there was some communication issues over zoom, using demonstrations and descriptions I was able to perform the tests and exercises recommended. This was followed up with a document describing the exercises for my reference. Patient 110
	Patient empowerment and self-management	*I was given the confidence to continue to self-treat using the exercises given to me and advice on when I can push myself further. Through the consultations I have been given the confidence to treat this condition myself should it reoccur in the future. Patient 110*
		XXXX not only gave me exercises to try but helped me to view my pain in a different way and try another way of managing it. In particular, I really appreciated having the opportunity to voice my concerns with the suggested plan; by voicing negative views – I really didn't like the idea of cutting back on running and dance - we were able to discuss how this would work in practice and I felt empowered. Patient 92
	Therapeutic relationship	*I thought XXX was excellent, came across as really wanting to understand the issues, exploring a range of movements, articulating in a very clear way and came across in a very easy comfortable way that put me at ease. Patient 82*
	Patient preference for telehealth	*On the whole I found it extremely helpful. I am now under the care of an NHS physiotherapist, but this is all done via the phone and I think the service which was offered with the online face to face element was excellent and really helped me to understand what I was supposed to be doing. Patient 122*

Table 3 (*continued*)

Theme	Subtheme	Code
Challenges with telehealth	Needing instructions for telehealth	*It would have been helpful if there were clearer instructions on how to use the online platform for the consultation. I was anxious before the appointment as I had not used the software before. Patient 137*
	Feeling fully understood	*Some things lost in translation over zoom. Patient 111*
		When going through range of motion tests, I don't think the physio understood that I couldn't press down with my injured hand; how would the physio gauge how much pressure could be applied. Patient 127
		The only thing to comment on is it is hard to show care/compassion etc over video, so its not a reflection on the physiotherapist more just that it is a harder modality to be compassionate over. Patient 10
	Using camera for demonstrations was difficult	*In normal sessions the Physiotherapist can demonstrate the actions and exercises. This is more difficult with a camera. I think this aspect can be improved. Patient 65*
		The only difficulty I had was how to work the camera, but to undertake an on-line consultation was admirable. Patient 66

the professional development journey.

4. Discussion

Findings support the use of telehealth e-mentoring an acceptable and appropriate andragogy to fulfilling AMP programme learning outcomes. With the sudden shift to telehealth as the mainstay of MSK physiotherapy practice in the UK, and the need to implement telehealth e-mentoring for mentee progression during the Covid pandemic, preparation for both mentors and mentees was minimal. Unsurprisingly adapting to this new andragogy took time, and highlights the need for specific technical and professional upskilling to enhance stakeholder experience. Notwithstanding this, acquisition and achievement of advanced MSK physiotherapy practice capabilities were observed, including but not limited to advanced communication skills, critical use of evidence to inform clinical reasoning of patients with MSK complaints. Main themes from the integration of all participant data centred on the value and importance of advanced communication skills, in the main telehealth e-mentoring being a positive and an effective experience, a need for upskilling for remote consultations and managing expectations and perceptions of telehealth. Many of our themes/subthemes echo those of Malliaras et al. (Malliaras P et al., 2020) and, despite using different methods, professional groups etc., collectively add weight to a call for action to professional bodies and universities/education providers to capitalise on the opportunities afforded at this time. Embedding training for telehealth and telehealth e-mentoring in pre- and post-registration MSK physiotherapy education is essential to support continued engagement with telehealth in the MSK care pathway beyond the Covid-19 pandemic.

4.1. Patient experiences and health outcomes

Despite being a time limited service, meaningful improvements were observed for all health-related measures (MSK-HQ, PSFS, PAL) and consistently high scores for PEI and CARE. Improvements may reflect

Table 4

Mentee perceptions of the development of advanced practice.

Theme	Subtheme	Code
Learner Experience	Having high expectations and acceptance of telehealth	*"… We came with high expectations because the name of the course was Advanced Manipulative Physiotherapy – and not having a hands-on approach would be disturbing to anybody …" Mentee 6*
		"… I see the benefits and I am more accepting of it. Initially it was met with bad taste and mixed feelings – as time goes on the more I enjoy it. It's something that could be pursued as a skill if we assume there's going to be a change in practice – it can be offered as an alternative …" Mentee 1
	Modifying physical testing and problem solving	*"… We have to think on our feet and modify the already existing, either orthopaedic tests or modify the movement that we'd have done if we were to do a face-to-face, somehow now to describe that to patient and hopefully get something out of it …." Mentee 1*
		"… I suppose in some ways you've got to reason around what you can and can't do, in terms of that practical side. You've got to try and think, okay, how do I do that differently …." Mentee 4
	Energising experience	*"… I mean the whole placement experience has been really good and has energised me, what's the word, a bit more enthusiasm …" Mentee 2*
	Confidence from using clinical reasoning skills	*"… I think in fact I'll be more confident this time because I know I've built up my clinical reasoning skills, and I can rely majorly on them …" Mentee 5*
Social learning	An opportunity to learn from others	*"… the level of discussion when you have three more other people there, it's so much more diverse in terms of opinion and knowledge and sharing …" Mentee 10*
		"… I think you learn a lot from those people, or that's an opportunity, learning from those people. But I suppose where I didn't feel like they had quite the same experience level as me, perhaps slightly selfishly, maybe I would have at times felt like I would have got more out of one-to-one mentorship, where at times they were detracting from my learning outcomes …" Mentee 7
	One-to-one discussions with mentor valued	*" …. one of the biggest things would be having regular independent time with the mentor to discuss your progress, reflect on achieving your goals from your learning objectives. And also just time to develop a relationship with them so that when you are seeing patients or when you have questions, you can feel that you are fully supported and it's not just in a group setting …" Mentee 8*
	Being open to giving and receiving feedback	*" …. Before, I wasn't very good at receiving feedback before my placement, now that's changed, I'm open to receiving different opinions. … I felt confident to give feedback in a constructive way. They felt confident to tell me when I was*

Table 4 (*continued*)

Theme	Subtheme	Code
		being a bit rude and frank. I learned to say things in a better way and be more constructive …" Mentee 9
Advanced Professional Practice	Communication skills development	*"… patient information is the only thing that we have to come down to a diagnosis, build our hypothesis, plan the assessment. So listening skills have massively increased …." Mentee 5*
		"… But for now its helping to improve our communication skills and reasoning. You need to be very aware of everything the patient is telling you because everything could be important. I think after COVID our assessment and treatment is going to change in that sense …." Mentee 9
	Using a lot more patient self-management	*"… A lot more self-management as a result of not being able to get hands-on. I use that more now than I would have done …" Mentee 2*
	Consistency in applying evidence based practice	*"… It's changed a lot. It was a weakness. I've focused a lot on that. Trying to make it a constant practice. Share evidence and discuss. Before I had a tendency to look at what I want to know – confirmation bias, but now I'm trying to include everything …" Mentee 3*
	Clinical reasoning skills development	*" …. I test my hypothesis with subjective explanation. I tried to put the specific question I would ask to rule out/in a hypothesis. I was able to explain exactly why I was picking the mechanical pain mechanism, myogenic component, autogenic driver for example and why this was my main hypothesis. It helps to have a structure to clinical reasoning for hypothesis generation …." Mentee 9*
	Focus on use of reflective practice	*"… Now I am very present all the time, my thought analysis, like my weaknesses and bias I am trying to confront them and improve my weaknesses …." Mentee 1*
Telehealth has its limitations	Connectivity affecting therapeutic relationship	*"… connectivity is a major barrier. Because the patient gets agitated, you get anxious and you miss out on information …" Mentee 3*
	Remote physical testing is limited and less precise	*"… you can do endurance testing, but you can't do strength testing. And certain tests in terms of precision, it's not very precise if you do it over the laptop …" Mentee 10*
	Lost opportunity for Hands-on skill development	*" …. I feel less confident with mobilisation techniques. I wasn't confident before the program and I feel less confident now. I thought someone would be able to supervise me and correct my technique. So I missed out …." Mentee 4*
	Perception of reduced precision in exercise facilitation	*"… it's the precision of performing let's say a motor control exercise. Yeah, the precision of it and that extra little help of proprioceptive feedback …." Mentee 10*
	Perception of needing large caseload to improve learning	*"… To actually develop that expertise of telehealth physical assessments I would've wanted to do more. I would have liked to have seen more patients – that would have increased the learning for me …" Mentee 9*

Table 5

Mentor acceptability and appropriateness

Theme	Subtheme	Code
Preparedness for telehealth e-mentoring	Individual learning contract valuable	'Some of it needs to be based on the mentee developing kind of their skills and also identifying their weak areas, … … … supporting them being a more critical, reflective practitioner' Mentor 1 'To figure out with every mentee where their starting point is because everybody starts at a different point' Mentor 1
	Reconceptualising clinical reasoning process	'having paper based case studies …. .I mean we could spend upto an hour and a half, 2 h just trying to develop clinical reasoning' Mentor 1 'You really get pushed to go through the clinical reasoning process' I think that's the beauty of telehealth because you physically can't' Mentor 2
	Skills for telehealth	'Learning how to verbalise your dermatomes and how to test their myotomes on video would have been useful. There is a lot of pre-placement stuff that can be done in telehealth to make that a lot easier' Mentor 3 '… little things like positioning the camera was a, real challenge for some …. ' Mentor 3
	Relationship building	'So I found the initial bit more challenging and once I knew everyone and I knew their personality like you would normally. I knew how they liked to learn and have feedback that made my relationship with them better.' Mentor 3
	Managing perceptions and own expectations	'How were they going to perceive it. Were they going to be interactive, would they engage?' Mentor 3 'Putting pressure on yourself as opposed to creating an environment for them to grow & learn' Mentor 1
	Illumination of professional development	'Everyone had their own transition period' Mentor 3 'A tipping point where they did really get along with the programme and they were able to see that this is very very beneficial and this actually produces good results with the patients …. ' Mentor 4
Journey of development with telehealth e-mentoring	Communication skills development	'… … the communication within and between the group just developed quite nicely from the beginning to the end. I think confidence grew, camera positioning improved and I just think they generally shined towards the end of the placement, it was like a normal clinic' Mentor 3 'e-mentoring telehealth improved communication skills & clinical reasoning better than face to face in some

Table 5 (*continued*)

Theme	Subtheme	Code
		situations because they couldn't rush in to doing a full blown hour of physical examination and testing'. Mentor 1
	Peer discussions and challenge	'… everyone was able to contribute in a really nice and open manner, challenging or, you know asking those questions to their peers' Mentor 4 'They immediately realised that actually the essence of the placement is these discussions we have with the mentor rather than showing them how we can do a PA mobilisation … …' Mentor 5
	Mimicking positive behaviours	'I noticed some students started mimicking the approach of other students when that was commented on as a good performance' Mentor 5
	Facilitation of reflective practice	'… they blew me away because they could fully reflect on their learning and identify where the issues were' P11 '… they had the opportunity to re-watch the session, I think was especially helpful for the subjective because they had the video to go back to' Mentor 2
	Framework of evidence based decision making	'.telehealth helps the student to be more evidence based …. . because they have to think about the test' P15 '…. always a discussion between functional test or special test, which one is better …. .which one has better validity or which one gives you the most information about the patients' issue' Mentor 3
	Formative feedback for development	'… definitely confidence grew and grew to the point I almost think they all felt empowered after the half way assessment (formative assessment)' Mentor 3 '…. .put pen on paper. So it felt real … …they saw that this an assessment, this is an exam and it's not much different to the clinical reasoning viva. I think that really did turn the tables for a lot of them' Mentor 3
Challenges for implementation of telehealth e-mentoring	Mentor perception of missed opportunities	'… …if a student was with me in a face-to-face clinic, they'd be doing stuff like triage or, you know other sort, other forms of training. Whereas that was something they would have missed out on because it was, it was um, telehealth' Mentor 3
	Modelling creativity to solve problems	'I always encourage them to try and to test and not use the excuse that they couldn't-test it' Mentor 2 '… in the initial stages when they didn't believe, you know, there were some odd comments about 'If I was in front of you, I'd do this' … … … ' Mentor 3

Table 5 (*continued*)

Theme	Subtheme	Code
		'…. .we (mentors) were trying to be creative on the go …. ' Mentor 4
	Missing non-verbal cues	'I feel some of those non verbal cues, particularly if you are sitting down are maybe missed' Mentor 1
	Managing patient discomfort with telehealth	'Some patients didn't enjoy you know, moving their laptop around and doing this and doing that and doing this' Mentor 3
	Patients in their home environment	'They didn't have enough space in some cases …. .or they were not dressed appropriately, for example they would be wearing flip flops' Mentor 5 '… … … in the face-to-face consultation, uh, the environment would be much easier to control and perhaps it would save, save you time to prescribe the exercises' Mentor 5 '…. .they were able to actually do that in their home environment …. .normally in clinic you would have to start thinking … …..how the patient can incorporate that into their home setting' Mentor 4
	Reconceptualising intervention and goal setting	'…. we didn't get the chance to actually demonstrate and even put our hands on the patient to correct them, to adjust an exercise or to show them how this would feel' Mentor 4 '…. they were struggling a lot with designing treatment plans …. 'design a plan with milestones, 'if you have reached this, you go onto the next stage …. .' Mentor 2

the patient population who were self-referring and drawn largely from a community near, or related to, a University. Although some patients understandably felt uncertain or apprehensive when using telehealth for what would normally be perceived as a predominantly hands-on therapy, their experiences of telehealth generally exceeded their expectations of what could be achieved in a remote consultation (physically, therapeutically and emotionally). Unsurprisingly, a few practical issues were reported by patients in setting up the technology or managing it to assist the consultation e.g. camera use. Written guidance on setting up the physical, acoustic, and visual environment and appropriate clothing for the encounter had been sent out ahead of the consultation with an opportunity to speak with someone ahead of the assessment provided where necessary (Tenforde et al., 2017; Chartered Society of Phys, 2020; Cottrell and Russell, 2020). Further adoption of and more opportunities for telehealth may further develop confidence with remote-accessed healthcare access and delivery.

4.2. Mentee and mentor experiences and the development of advanced practice skills

For mentors and mentees there was some concern around what was lost with telehealth e-mentoring (opportunities in a practice setting and hands-on skills development for physical examination and passive management interventions) rather than what was gained. Whilst this is consistent with other recent research from Australia (Malliaras P et al.,

2020), it is perhaps conspicuous given limited use of telehealth in MSK physiotherapy in the UK. (Cottrell and Russell, 2020) The perceived shift in the focus for consultations using telehealth was something mentees were under-prepared for, contributing to some of their initial questioning of the appropriateness of telehealth e-mentoring. This is unquestionably a reflection of the limited preparation in University (4-weeks lead time), prior expectations of being physically in a clinic/hospital setting (as is the norm for students on the programme) and data being collected during, rather than following the 20-week mentoring period. Moreover, the mentors were themselves 'learning on the job' with none having personal experience of telehealth. As well as drawing on familiar facilitation skills for mentee development of advanced MSK practice, the use of telehealth placed an added sense of responsibility on mentors. This included managing expectations, supporting mentees and patients with setting up the 'technical and home environment', whilst also needing to model/promote creative practice and problem solving to support patient care remotely.

In terms of advanced MSK practice skills, mentors and mentees concurred that telehealth e-mentoring facilitated the development and attainment of a high level of clinical reasoning. Reconceptualising the clinical reasoning process for the purpose of telehealth e-mentoring is needed, with greater critical consideration of some specific knowledge, skills and attributes required to assess and manage patients with complex presentations in remote consultations (England, 2017). The use of, and further development of advanced communications skills were valued, with participants' data supporting the importance of listening skills, precision in advice and patient education, clear instructions (written and verbal), peer discussions/mentoring, and giving and receiving feedback (formative feedback). Collectively, development in communication skills contributed to mentee empowerment and confidence-building in using clinical reasoning skills, reflective practice, evidence based practice, creativity/problem solving, patient centred care; all well-established core constructs of advanced MSK physiotherapy practice (Rushton A, 2010).

Mentees required time to reconceptualise the use of physiotherapy interventions for telehealth, with self-management (education/advice) and exercise being the mainstays of management, with less emphasis of therapeutic/physical touch. Appropriate upskilling and planning for patient centred exercise prescription and goal setting needs further consideration, with greater emphasis on rehabilitation programme planning and curriculum design (Malliaras P et al., 2020). Several clinical guidelines advocate physical activity as a means of managing MSK complaints (National Institute for He, 2018; National Institute for He, 2016; Blanpied et al., 2017), knowledge of telehealth efficacy/effectiveness (Cottrell and Russell, 2020; Malliaras P et al., 2020) and advanced exercise prescription, and goal setting. As such, critical appraisal and implementation of these guidelines in telehealth is recommended.

Whilst not unique to telehealth e-mentoring, mentors and mentees valued the opportunity to individualise mentee journeys, with learning contracts being central to this. Whilst they are a vehicle to support the development of the mentor-mentee relationship, further considered planning of learning contracts may be needed for telehealth settings. Consistent with earlier research (Westervelt KC et al., 2018), our findings strongly support group telehealth e-mentoring, whereby mentees at similar stages of development can actively engage in peer mentoring and discussions to advance their practice.

As advanced clinical practitioners are expected to work across all practice settings (England, 2017), the mentees and mentors experiences provides valuable experience for current (due to ongoing Covid-19 restrictions) and future practice; assuming continued use of telehealth in UK beyond the end of government restrictions.

4.3. Further research

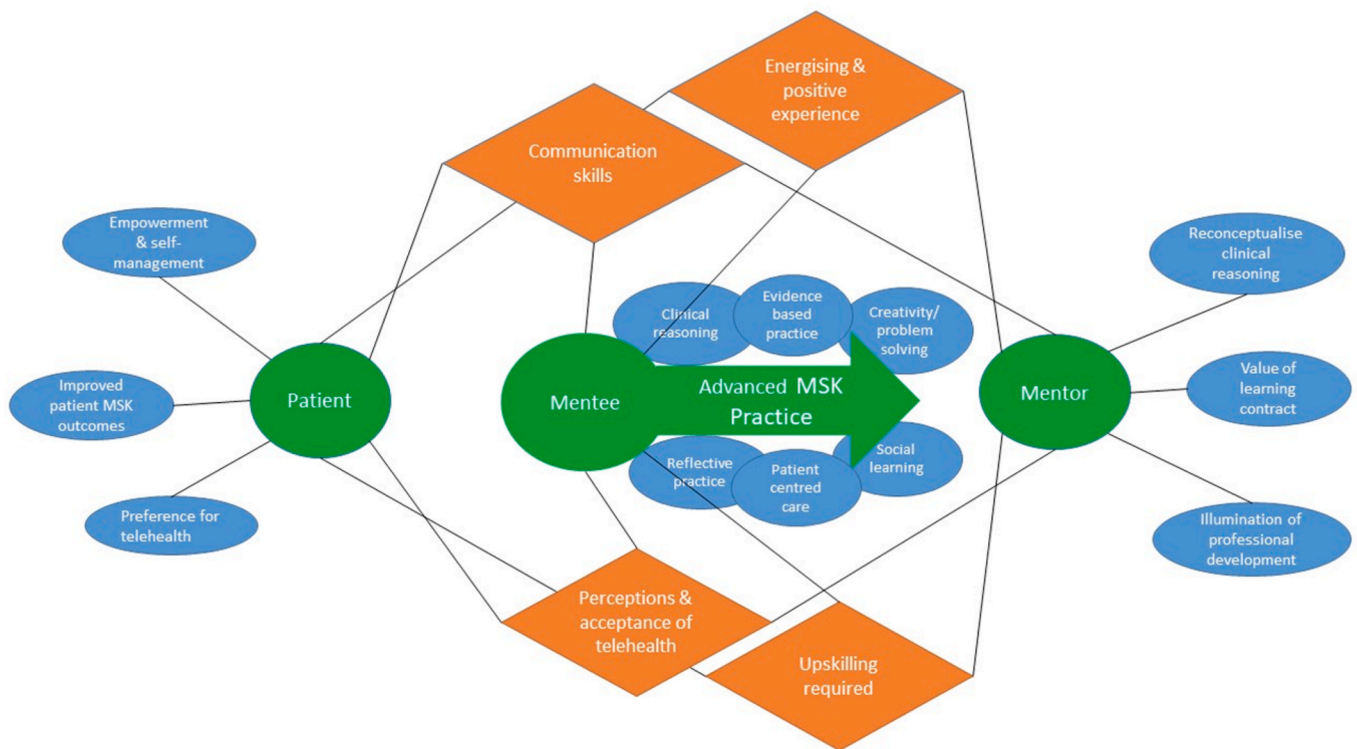Further research is now required to explore telehealth e-mentoring in

Fig. 5. Data integration.

other settings, countries, (recognising that telehealth is well established in some countries e.g. Australia, Canada), professions, and in other specialist skills training programmes. Further research is required to investigate cost and clinical effectiveness of telehealth e-mentoring compared with conventional approaches, including long-term follow-up of patient outcomes, especially given the shift in focus to self-management, shared goal setting and patient enablement.

4.4. Implications

Adoption of telehealth e-mentoring and integration within pre-registration education may enhance opportunities for practice-based professional development, and provide additional capacity and capability to meet demand for clinical placements and specifically the planned growth in advanced MSK physiotherapists in the UK. Notwithstanding the loss of opportunity to use manual testing and practice passive management interventions, this study provides multi-stakeholder evidence that endorses the use of telehealth e-mentorship. Bespoke preparation and planning for telehealth e-mentoring is essential to optimise the experience for all stakeholders.

4.5. Strengths and limitations

A strength of this study is the multi-stakeholder evaluation, including PPI, enabling in-depth qualitative evaluation of mentors and mentees, plus quantitative patient data using validated PROM. The design and methods of this study, involved individuals with considerable expertise in education, research methods and professional practice at all stages of the process, this adds credibility and trustworthiness in the data analyses and interpretation. Mentee data collection involved a student mentee, thus minimising the risk of bias. Limitations include mentee data collected during the telehealth e-mentoring rather than on completion of the experience. Whilst intended to explore experiences through the journey and reduce recall bias, the experiences may have differed had interviews been done on completion of the mentorship period (150

hours stipulated by IFOMPT and a programme requirement) (International Federation, 2016). Self-selecting patients were local to the University so may not be representative of a wider patient population. Missing some follow up data and variability in timing when the PROM were returned. Findings reflect telehealth with video consultation and are therefore not transferable to telehealth without such a facility.

5. Conclusion

Telehealth e-mentoring may be used to support mentee development towards and attainment of advanced musculoskeletal physiotherapy practice. Findings indicates that technical and professional skills are required for telehealth, that high levels of communication skills are recognised as valuable, and that telehealth emphasises the reconceptualisation of MSK physiotherapeutic interventions across a spectrum of hands-on and hands-off approaches. Multi-stakeholders' preparation for telehealth e-mentoring is required to enhance participant experiences.

Ethics approval and consent to participate

Funding

Authors' contributions

NH is the CI leading the study, ensuring rigour and quality in project management. The study was conceived by NH, with AR, IT, MN, WJ contributing to planning the design and methods. IT, NH, MN and JJ collected data. NH, WJ, MN, IT, EY, JS, HG and AR have contributed to

the data analysis and interpretation throughout the study. NH drafted the manuscript, with all authors having read, provided feedback and approved the final manuscript.

Declaration of competing interest

None.

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Abbreviations

AMP	Advanced Manipulative Physiotherapy
CARE	Consultation and Relationship Empathy measure
COREQ	COnsolidated criteria for REporting Qualitative research
IFOMPT	International Federation of Orthopaedic Manipulative Physical Therapy
MACP	Musculoskeletal Association of Chartered Physiotherapists
MCID	Minimal clinically important difference
MCP	Mentored clinical practice
MSK	Musculoskeletal
MSK-HQ	Musculoskeletal Health Questionnaire
NPRS	Numerical Pain Rating Scale
PAL	Physical Actitvity Level
PEI	Patient Enablement Instrument
PPI	Patient and Public Involvement
ROM	Patient reported outcome measure
PSFS	Patient Specific Functional Scale

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.msksp.2021.102448.

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