

Exploring physiotherapists' experiences and perceptions about the factors influencing the delivery of care via videoconferencing. A qualitative description design.

By

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Abstract

Introduction: The delivery of care via videoconferencing (VC) allows physiotherapists (PTs) to connect with patients at a distance. VC requires an entirely hands-off approach, which does not align with physiotherapy's 'hands-on' identity. A hands-off approach requires a change in practice and a change in clinician behaviour. Previous studies have utilised behaviour change theory to explore PTs' delivery of care via VC, but there is no account of the unique Manitoban contextual or jurisdictional factors.

Purpose: The purpose of this study was to explore PTs' experiences and perceptions about the factors influencing the delivery of care via VC to the Manitoban population.

Method: A qualitative description design allowed for an exploration of the lived experiences of Manitoban PTs delivering care via VC. Purposive and snowball sampling resulted in a diverse sample of 20 participants. Semi-structured virtual interviews were conducted between June and August, 2023. Directed content analysis (DCA) was used to analyse the interview data, using the COM-B (Capability, Opportunity, Motivation, and Behaviour) change model.

Results: The majority of factors influencing PTs' delivery of care via VC were categorised in the opportunity components of COM-B and included the internet and technology; patient conditions; and patient expectations. Many PTs gained VC experience during COVID-19, which facilitated clinicians' psychological capability. Participants described a need for 'adaptive expertise'. PTs' motivation to deliver care via VC was limited, predominantly due to the elimination of hands-on care. Conversely, the lack of physical contact was described as a facilitator for PTs who experienced their own physical disabilities or ill health, which limited or prohibited the delivery of care in person.

Conclusion: PTs have mixed perceptions about the delivery of care via VC. A multitude of factors impeded PTs' ability to deliver equitable care via VC. Although the knowledge-to-practice gap has narrowed, it has not closed. A lack of motivation remains a barrier for PTs delivering care via VC. Participants envisioned a hybrid future: a combination of care of delivered via VC and in-person. The barriers and facilitators identified in this study have created a valuable foundation from which to develop targeted solutions to enable PTs to deliver care via VC.

Acknowledgements

Traditional Territory Acknowledgements

The University of Manitoba campuses are located on original lands of Anishinaabeg, Ininewuk, Anisininewuk, Dakota Oyate and Denesuline, and on the homeland of the Red River Métis.

I respect the Treaties that were made on these territories, I acknowledge the harms and mistakes of the past, and I dedicate myself to move forward in partnership with Indigenous communities in a spirit of Reconciliation and collaboration. (Adopted from the land acknowledgement source: <https://umanitoba.ca/indigenous/culture-and-protocols#traditional-territories-acknowledgement>)

As a relative newcomer to Canada, I have had to recognise my lack of knowledge about Indigenous Peoples and about the original lands of the Anishinaabeg, Ininewuk, Anisininewuk, Dakota Oyate and Denesuline, and the homeland of the Red River Métis. I recently started a Foundational Teaching course at the University of Manitoba which includes modules about teaching Indigenous students and content in a good way to improve equity, diversity, and inclusion. I have also enjoyed learning about some of the cultural differences from my advisor, Dr. Moni Fricke, who has conducted research with Indigenous Peoples. The more I learn, the more gratitude and appreciation I have for living, studying, and learning on these lands and I will continue to dedicate myself to developing this knowledge further.

Additional acknowledgements

I would like to acknowledge the tremendous support and guidance from my primary co-advisor, Dr. Moni Fricke. Dr. Fricke first suggested the idea of a master's degree a few years ago, which 'planted the seed'. I cannot thank Dr. Fricke enough for her expertise, guidance, and invaluable knowledge guiding me to completion of this thesis.

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Finally, I would like to thank the University of Manitoba's College of Rehabilitation Sciences (CoRs) Endowment Fund and the CoRs travel award that allowed me to present at the national Canadian Physiotherapy Association Congress in Vancouver, BC, Canada, April 25-27, 2024.

Dedication

This thesis is dedicated to the women and girls in Afghanistan who are banned from gaining an education beyond the age of 11. I acknowledge my profound privilege and gratitude to have the opportunity to learn about a topic I am so passionate about.

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Chapter 1. Introduction

Telerehabilitation (TR) is defined as “the remote provision of rehabilitation services using telecommunication technology” Lawford et al. (2018a, p. 399). TR can be delivered synchronously or asynchronously. This study focuses on the synchronous form of TR, which involves a live or real-time connection between the patient or client¹ and the physiotherapist (PT) at physically distant locations (Russell, 2007). Synchronous TR can be delivered using the telephone or through videoconferencing (VC) platforms. PTs and patients reportedly prefer VC to the telephone when delivering TR due to the added visual component (Hinman et al., 2017; Lawford et al., 2017).

Throughout this study, the terms “TR” and “VC” are utilised. Although these terms are used interchangeably in the literature, this study is focused specifically on VC. TR is the *mode* of delivering care, and the telephone and VC are the *media* to deliver the care. TR will be referred to when the relevant literature has referenced inclusion of the telephone and VC, or if it remains unclear which medium was being (Lee et al., 2020).

Background

The province of Manitoba has a large geographical area (540,310 sq km) and a relatively small population of 1.34 million, which equates to a population density of 2.5 people per square kilometre (Statistics Canada, 2021). Approximately 95% of the Canadian geographical landmass constitutes rural areas (Moazzami, 2015), yet 90% of PTs service urban areas according to the Conference Board of Canada (Sutherland, 2017). Manitoba’s demographics combined with the unequal distribution of physiotherapy services illustrates the limited access to care experienced by individuals living in remote and rural areas.

¹ For the purposes of this paper, the terms “patient”, “client”, “service recipient” and “user” are used synonymously.

Delivering physiotherapy services via VC is a potential solution to this geographical barrier impeding equitable access to care. VC eliminates the need to travel contributing towards planetary health and offers a more time efficient and cost-effective alternative (Alami et al., 2023; Cottrell et al., 2021; Kairy et al., 2013; Tousignant et al., 2015).

The physiotherapy profession uses the best available evidence to inform the development of practice guidelines and treatment decisions (Veras et al., 2016). PTs assess and treat a wide range of patients, which includes but is not limited to, musculoskeletal (MSK); neurological; and cardiorespiratory conditions. The provision of in-person care often involves the use of physical touch, and PTs identify as hands-on professionals (Nicholls & Holmes, 2012). Contrary to this traditional identity, TR presents as a paradoxical alternative that necessitates an entirely hands-off approach. Although a growing body of supportive evidence demonstrates the efficacy and effectiveness of TR (Hartman et al., 2023; Laver et al., 2020; O'Neil, 2023a; Tousignant et al., 2011; Withers et al., 2024), PTs have not fully accepted this novel innovation (Cottrell et al., 2017; Reynolds et al., 2021), evidenced by the historically low uptake rates within the profession (Lee et al., 2020).

In March 2020, VC uptake rates increased dramatically following the onset of the COVID-19 pandemic (Ezzat et al, 2023). Delivering care at a distance through digital means, allowed clinicians to comply with physical distancing requirements while ensuring continuity of patient care (Ezzat et al., 2023, Miller et al., 2022). The pandemic offered a unique opportunity for PTs to gain VC experience. The emergent nature of the pandemic, however, resulted in rushed VC implementation and adoption (Ezzat et al., 2023; Hassani et al., 2021; Rethorn et al., 2021; Saaei & Klappa, 2021) and the utilisation of sub-optimal technology tools and VC platforms (Bennell et al., 2021; Signal et al., 2020). Once physical distancing requirements were lifted, many PTs returned to delivering care in-person (Ezzat et al., 2023; Werneke et al., 2021), questioning the sustainability of VC beyond the pandemic.

Contributing to concerns about the sustainability of VC are reports that clinicians felt unprepared and lacked the knowledge and skills required to deliver care via VC (Buckingham et al., 2023; Davies et al., 2021; Ezzat et al., 2023; Malliaras et al., 2021; Miller et al., 2022). A recent collaborative study between the University of Manitoba and Amsterdam University of Applied Sciences reported that 64.7% of Manitoban therapists (occupational therapists, respiratory therapists and PTs) felt unprepared to deliver virtual care (Giesbrecht et al., 2023). Konttila et al. (2019) explained that inadequately prepared clinicians lead to inconsistencies in the quality and effectiveness of care delivered via VC, as well as concerns regarding patient safety. World Physiotherapy's Digital Physiotherapy Task Force has acknowledged this issue and considers it a key regulatory issue which should concern governing regulatory bodies, colleges, and institutions (Lee et al., 2020). Thus, an urgent need exists to explore Manitoban PTs' VC experiences to ensure that barriers are identified and targeted with tailored solutions.

Prior to 2021, there was uncertainty about the knowledge and skills requirements, specific to physiotherapy when using TR. Since then, two capability frameworks were published to provide PTs with guidance: one specific to VC (Davies et al., 2021) and one specific to the telephone (Davies et al., 2022a). The VC capability framework details the knowledge needed to deliver care via VC across seven domains and 60 capabilities (Davies et al., 2021). These seven domains include compliance; patient privacy and confidentiality; patient safety; technology skills; telehealth delivery; assessment and diagnosis; care planning and management (

[Appendix A – Videoconferencing Capability Framework Domains and This article was published in Davies, L., Hinman, R. S., Russell, T., Lawford, B., Bennell, K., Billings, M., Cooper-Oguz, C., Finnan, K., Gallagher, S., Gilbertson, D. K., Holdsworth, L., Holland, A., Mcalister, J., Miles, D., & Roots, R. \(2021\). An international core capability framework for physiotherapists to deliver quality care](#)

via videoconferencing: a Delphi study. *Journal of Physiotherapy*. <https://doi.org/10.1016/j.jphys.2021.09.001>.

Permission to publish in the thesis was granted via email on October 26, 2023.

Appendix B – Videoconferencing Capability Domains and Capabilities (Davies et al., 2021). The VC capability framework has created a valuable foundation from which to develop pre-licensure curriculum and post-graduate training. However, the development of a capability framework is not enough to guarantee the delivery of care via VC. Greenhalgh et al. (2004, p. 598) explained that “people are not passive recipients of an innovation” and understanding the factors influencing a clinician’s decision to adopt an innovation (e.g., PTs’ delivery of care via VC) requires an in-depth exploration.

The COM-B (Capability, Opportunity, Motivation – Behaviour) model (Appendix C – Capability, Motivation, Opportunity, Behaviour (COM-B) Model) is often used in implementation science and is the hub of the Behaviour Change Wheel (BCW) (Michie et al., 2011). Application of the COM-B model aims to diagnose what needs to change for clinicians to enact a desired behaviour change (delivering care via VC) as opposed to choosing a competing behaviour (e.g., in-person care). Previous studies have utilised behaviour change theory to research PTs’ delivery of TR (Ezzat et al., 2023; Haines et al., 2023; Malliaras et al., 2021). A multi-method, pan-Canadian survey study applied COM-B and examined PTs’ integration of virtual care during the COVID-19 pandemic (Ezzat et al., 2023). While the findings of this nation-wide study reported that clear guidance from regulatory bodies was an enabler, Canadian PTs are governed provincially and therefore, unique jurisdictional characteristics remain unaccounted for. Furthermore, this study was not specific to VC and did not analyse practice trends following the pandemic.

This study addressed the gap in the research and conducted an in-depth exploration of PTs’ experiences and perceptions about the factors influencing the delivery of care via VC during and following the global pandemic, specific to the Manitoba context. Integrating

COM-B and Davies' et al. (2021) VC capability framework provided the conceptual framework (

[Appendix D - Conceptual Framework](#)) and theoretical underpinnings of this study.

The findings provide a valuable foundation of the unique contextual factors influencing PTs' delivery of care via VC in Manitoba.

Purpose and research questions

The purpose of this qualitative study was to explore PTs' experiences and perceptions about the factors influencing the delivery of care via VC, to the Manitoban population.

The study addressed the following questions:

1. How do PTs perceive their ability to deliver care via VC in Manitoba?
2. What are the barriers and facilitators influencing a PT's ability to deliver care via VC?
3. What are the needs of Manitoban PTs delivering care via VC?

Researcher positionality

Consideration of one's positionality within qualitative research is imperative due to the interpretive nature of the research (Ravitch & Carl, 2021). Disclosure and transparency of real and perceived biases and researcher attributes allow for a more accurate representation and interpretation of the findings. The following statements detail the influential factors that piqued my interest to study PTs' delivery of care via VC as well as my own perception of the research questions and analysis of the findings.

I immigrated to Canada in 2009 from Scotland, where geographical barriers to accessing care are rarely a problem. I was astounded at the vast distances that some

Manitobans (remote and rural) had to travel to access healthcare services. I was fortunate enough to gain physiotherapy work experience in two remote northern communities and when I left, I always questioned how much I was helping my patients achieve their goals due to infrequent visits hampering continuity of care. This was also my first opportunity to provide physiotherapy services to Indigenous Peoples and my initial awareness of the inequitable access to care experienced. I am committed to increasing my knowledge of colonization, and to reconciliation along with my appreciation to live, study and work on these traditional lands. Additionally, I have a strong desire to help seek solutions to the health inequities and access barriers experienced by Indigenous Peoples and consider how VC could help contribute towards addressing these problems.

I first discovered VC as a feasible alternative to delivering care in 2017 through the exercise prescription app, Physitrack® (www.physitrack.com). I proceeded to co-found a virtual physiotherapy company, PhysioLinkMB with my business partner, Tara Wolchuk. I experienced many early challenges and frustrations. These included the absence of provincial VC regulatory guidelines, problems with technology and internet connection and adapting the in-person hands-on skills for the digital environment. Gaining experience improved the efficiency and ease of delivering a VC appointment but it left me questioning my ability to deliver effective care via VC. What else did I need to know? What challenges were my physiotherapy colleagues experiencing? How could I optimise the care I was delivering via VC?

After being in private practice for several years, I left PhysioLinkMB and gained a very insightful opportunity to assist with teaching VC to physiotherapy students in a neurorehabilitation clinic run by the University of Manitoba, Department of Physical Therapy in 2023 and 2024. This new perspective was invaluable as it caused me to question my initial assumptions that VC was the perfect solution to address inequitable access to care. For

instance, prior to this opportunity, balance and safety issues were rarely problems with my typical patient population.

The aim of this study is to identify the factors influencing PTs' delivery of care via VC. COVID-19 led to a significant increase in the number of PTs adopting VC to deliver care and valuable lessons can now be learned from these experiences. I acknowledge that my pre-existing VC beliefs and assumptions, based on my experiences and as co-owner of PhysioLinkMB, introduced an element of bias to this qualitative study. I have questioned and challenged these beliefs and used reflexivity throughout the study to reflect on my identity and perspectives. I have strived to accurately convey the findings with the overarching goal of identifying the factors influencing the delivery of care via VC in the province of Manitoba.

Chapter 2. Literature Review

The purpose of this literature review is to explore the relevant studies that contribute towards an understanding of PTs' perceptions about the factors influencing the delivery of care via VC. The development of key concepts and up-to-date foundational knowledge helps to “maximize relevance, originality, generalizability, and impact” (Maggio et al., 2016, p. 298) while funneling towards a more specific contextualised understanding. The literature review begins with a broad scope progressing to more focussed and refined concepts that describe the problem, identify the research gap, and justify the need for this study.

Ability, capability or competency: A note on terminology

Ability describes an individual's physical or mental skills and the state of being able to perform a task (Cambridge Dictionary, n.d.). The terms *capability* and *competency* are often used interchangeably and inconsistently within the literature. Capability has recently gained traction in health professional education; it is more forward looking and describes an individual's full potential, which includes self-esteem and personality traits that allow an individual to function amidst real world challenges (Bromley, 2019; O'Connell et al., 2014). *Competency* is a component of capability (Bromley, 2019; Hanks et al., 2021) and refers to the acquisition of new knowledge and skills to perform a task (Gardner et al., 2007). A *capable* clinician describes one who has the competence combined with the traits and characteristics that allow them to adapt, cope, and surpass the challenges faced in practice (Stephenson & Yorke, 1998). Supporting this further, Cairns and Stephenson (2009) define capability as one that is “central to people being comfortable and able to cope in facing unfamiliar problems in unfamiliar situations’ (p. 5) which may wholly represent the unfamiliarity with eliminating hands-on care that many PTs experience when practicing in

the digital environment. Capability appears to be the more holistic and dominant term in the literature (Bromley et al., 2019; O’Connell et al., 2014; Gardner et al., 2007) and goes above and beyond competency. Therefore, the term *capability* was used in this study when discussing a PT’s capacity or potential to deliver TR.

This study utilised the term capability from the COM-B (Capability, Opportunity, Motivation, Behaviour) model and Davies’ VC capability framework. A brief description is presented to differentiate between the use of “capability” in the COM-B model and Davies’ VC framework throughout this study. *Capability* in COM-B (Michie et al. 2011) has been defined as an “individual’s psychological and physical capacity to engage in the activity concerned” (p. 4), which translates to having the knowledge, skills, and physical capacity to enact a certain behaviour (delivering care via VC). This is different to *capability* in Davies’ et al. (2021) where their capability framework is described as one that “provides physiotherapists with best practice recommendations about the skills and knowledge required for the delivery of care via videoconferencing” (p. 293). The use of *capability* in Davies’ et al. (2021) appears to reflect the definition of a competency more accurately.

Technology and healthcare

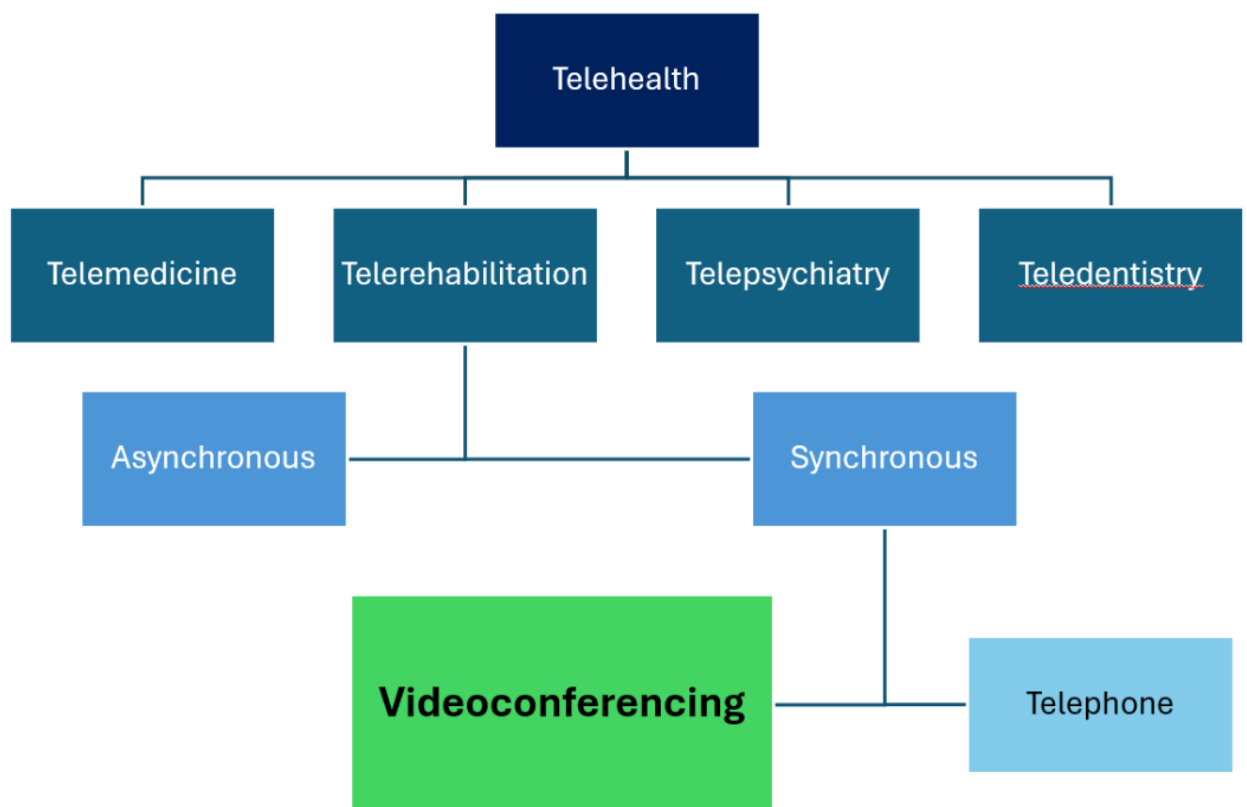
Terminology

The combined concepts of technology and healthcare have garnered a significant number of ubiquitous terms over the years including e-health (electronic-health), digital health, m-health (mobile-health), virtual care, telemedicine, telecare, telehealth and telerehabilitation (Scott & Mars, 2019; Shaw et al., 2017; Showell & Nøhr, 2012; Zonneveld et al., 2020). Digital health and e-health are considered the umbrella terms when referring to

the combination of healthcare and technology and appear to be used synonymously at times (Karnoe et al., 2018).

Telehealth is a component of e-health and can be defined as an alternative mode of delivering healthcare using telecommunication technology (Scott & Mars, 2019). Telehealth is subdivided further into profession-specific terms including telemedicine, telenursing, teledentistry, and telerehabilitation (TR) (Figure 1. Telehealth terminology). The telecommunication media that can be used to deliver synchronous TR include VC or the telephone. The use of the terms ‘telerehabilitation’ and ‘vide Conferencing’ throughout the study are described in more detail in Chapter 1. Introduction.

Figure 1. Telehealth terminology



Technology's integration in healthcare

Technology has significant potential to improve healthcare efficiency and reduce costs (Elbert et al., 2014). However, technological innovations can also increase healthcare spending. It is imperative that careful consideration is given when deciding which innovations are the most cost effective (Bhyat et al., 2021). Barriers to implementing and integrating technology within healthcare are undeniable. Identifying and targeting barriers is essential for future e-health developments and improved efficiency, while also remaining cognisant of the burgeoning healthcare costs.

Many studies have assumed that the younger generation of healthcare professionals will be more adept at using technology ("digital natives") within the clinical environment, but concerns of a generational divide exist (Eckleberry-Hunt & Tucciarone, 2011; Lupton, 2014). Several studies report that although the younger generation is well versed with using technology in their personal lives, this does not reflect their willingness to transfer these technological skills into the clinical environment (Brunner et al., 2018; Saaei & Klappa, 2021). Martin et al. (2021) clarified that new graduates are busy refining their newly acquired clinical skills and building professional experiences and therefore, less willing to learn another set of new skills to transition into the digital environment. Assuming that new graduates and younger clinicians will automatically transfer their digital skills into their professional lives needs to be dispelled with targeted action and adequate education. "Next generation providers will need to be able to deliver next generation medical care, including telehealth" (Papanagnou et al., 2015, p. 1), which means technology utilisation must be fully incorporated into professional degree programs.

E-health has significant potential to improve healthcare efficiency, while also reducing costs (Elbert et al., 2014). E-health aligns well with the Sextuple Aims laid out by the Institute of Healthcare Improvement (Alami et al., 2023). The Institute of Healthcare

Improvement, originally an American initiative, is now a global organisation aiming to improve healthcare worldwide (Farmanova et al., 2016). Using improvement science, the Institute of Healthcare Improvement seeks to advance healthcare globally (Institute of Healthcare Improvement, n.d.). In this pursuit, the Institute of Healthcare Improvement has sequentially recommended changes for healthcare improvement, resulting in the Triple Aim in 2008; the Quadruple Aim in 2014; the Quintuple Aim in 2022; and most recently, the Sextuple Aim in 2023.

The initial three aims of healthcare improvement were developed in 2008 (Berwick et al., 2008). The Triple Aim included reducing the costs of the health care system through improved efficiencies; improving population health; and improving the patient experience. A fourth aim, improved team well-being through increased collaboration, was introduced in 2014 (Bodenheimer & Sinsky, 2014). The Quadruple Aim was intended to address the high rates of clinician burnout because without satisfied, healthy professionals working together, it was concluded that the Triple Aim was unachievable. The Quintuple Aim in 2022 focused on health equity issues after significant disparities in health outcomes were highlighted during the COVID-19 pandemic (Nundy et al., 2022). Finally, environmental sustainability was proposed as the sixth aim (Alami et al., 2023). The Sextuple Aim requires healthcare systems and providers to be environmentally responsible when making healthcare decisions to help lower waste and pollution, thereby contributing towards sustainable planetary health.

Virtual care can assist healthcare systems with achieving the sextuple aims described above. Evidence suggests that virtual care is more time efficient and cost effective, due to the elimination of travel (Cottrell et al., 2021; Del Pino et al., 2022; Kairy et al., 2013; Tousignant et al., 2015), thus, contributing towards the first three aims (system efficiency, reduction of costs and patient satisfaction) and the sextuple aim (lessening the impact on climate). The key driver of virtual care is its potential to improve access to care for

individuals with limited or no access to healthcare services. This aligns well with the quintuple aim, that is, healthcare equity, by improving equal opportunity for everyone to access healthcare services. Contrary to this argument, however, are concerns that virtual care will widen inequitable access to care (Ezzat et al., 2023) unless unique contextual factors are targeted and addressed (Harrison & Graham, 2021), such as access to technology, and high-speed internet connections (Ezzat et al., 2023). Virtual care can also contribute towards healthcare systems aligning with the fourth aim, improved team well-being by addressing clinician burnout by allowing for a more flexible clinical environment and clinician scheduling (Haines et al., 2023).

Technology can help transform much needed change within the healthcare system, helping to promote preventative rather than curative medicine, increased self-management, improved patient autonomy (Babatunde et al., 2021) and ease of access to care. Healthcare professionals must embrace technology and capitalise on the benefits it can provide (Lupton, 2014; McCabe & Timmins, 2016) while ensuring equitable access remains at the forefront so that no individuals or groups of people are left behind.

A ‘hands-on’ profession accepting a hands-off approach

The physiotherapy profession has evolved over time from a need to legitimise massage in the late 1800s (Nicholls & Cheek, 2006) to an evidence-based profession using the best available evidence to inform the development of practice guidelines and treatment decisions (Veras et al., 2016). PTs self-identify as hands-on professionals (Bjorbækmo & Mengshoel, 2016; Nicholls & Holmes, 2012), which might explain the skepticism towards the hands-off approach required to deliver care via VC. Nicholls and Holmes (2012) believe that the traditional use of touch has been defining the profession’s identity for too long and Fraser-Arnott (2019) explains that professional identity is a concept that should change and evolve over time. The profession initially adopted a biomechanical view of the body,

comparing the body to a machine (Nicholls & Gibson, 2010). The Oxford Learner's dictionary definition of a PT aligns with this biomechanical view and describes these professionals as "a person whose job is to treat disease, injury or weakness in the joints or muscles by exercises, massage and the use of light and heat" (Hornby, 2022). This definition could explain why it is difficult for some people to contemplate the idea of 'hands-on' clinicians treating patients at a distance via VC or the telephone. The biomechanical view evolved into a biopsychosocial approach, which takes a much more holistic view, incorporating a variety of contextual factors that influence a patient's experience of health, injury or illness and their ability to function (Nicholls & Gibson, 2010). An alternative definition from the Canadian Physiotherapy Association (CPA) states "physiotherapy is anchored in movement sciences and aims to enhance or restore function of multiple body systems" (Canadian Physiotherapy Association, 2022). The CPA's emphasis on movement and function, allows VC to appear as a more viable mode of delivering hands-off care. The components of education, advice, and exercise are the underpinnings of high-quality MSK physiotherapy (Lin et al., 2020), and these are all deliverable treatment components via VC.

The profession remains hesitant to fully accept this novel innovation as a valuable mode of delivering care (O'Neil et al., 2023; Rausch et al., 2021; Reynolds et al., 2021) and this is due, in part, to the inability to provide hands-on care (Malliaras et al., 2021) and the requirement for an entirely hands-off approach. The idea that PTs must continue practicing what they have learned and what they know to ensure the profession's identity is protected, precludes the potential for evolution. PTs must challenge long held beliefs to ensure the profession continues to evolve in this digital era. Understanding clinician hesitancy and addressing barriers is essential for VC to be fully accepted as an alternative mode of delivering physiotherapy services.

Telerehabilitation

Telerehabilitation (TR) is a branch of telehealth specific to the rehabilitation professions. TR can be delivered asynchronously, which includes the use of wearable devices, emails, and text messaging, whereas synchronous TR involves a live connection between the therapist and patient using VC or the telephone (Tenforde et al., 2020). Although PTs prefer VC (Hinman et al., 2017; Lawford et al., 2017; Lawford et al., 2018a), concerns have been reported about the security and confidentiality of VC (Lawford et al., 2018a) and patients have indicated less confidence using the required technology (Lawford et al., 2018a; Lawford et al., 2018b).

Evidence supporting the efficacy and effectiveness of telerehabilitation

The rate of Canadian telehealth articles published over the last four decades has grown steadily, followed by a sharp increase following the onset of the COVID-19 pandemic (Xie et al., 2022). The first TR study discoverable in the peer-reviewed literature was published in 1998 (Burns et al., 1998). The evidence supports the efficacy and effectiveness of TR as an alternative mode of delivering care to patients with MSK conditions (Hinman et al., 2024; Nelson et al., 2020; Russell et al., 2011; Tousignant et al., 2011; Withers et al., 2024); neurological conditions (Cramer et al., 2019; O’Neil, 2023a); and cardiorespiratory conditions (Cox et al., 2021; Hartman et al., 2023).

A systematic review by Cottrell et al. (2017) investigated and compared the effectiveness of treatment delivered to patients with MSK conditions, via TR and usual care delivered in-person. Thirteen publications were included in this review. The findings indicated a moderate effect in favour of the TR group compared to the in-person group, for physical function and disability outcomes, which used several different subjective outcome

measures (SMD 0.45, 95% CI 0.20-0.70, $I^2 = 56\%$). One randomised controlled trial investigated and compared the outcomes of in-person care and VC delivered to patients with chronic knee pain specifically (Hinman et al., 2024). This study included 394 individuals with chronic knee pain who were assigned to either in-person care or care via VC. The education and exercise prescription delivered to the participants in both groups was similar regardless of group allocation and a total of five appointments were delivered over the course of three months. The primary outcome measures used in this trial were self-reported pain using a numerical rating scale (0-10) (Hawker et al., 2011) and physical function scores, measured using the Western Ontario and McMaster Universities Osteoarthritis Index (Bellamy et al., 1988). Both the VC and in-person groups demonstrated improvements in pain and function at three months. There was no significant difference in pain between the two groups after three months.

Several post-operative orthopedic studies have been published that report positive TR outcomes (Nelson et al., 2020; Russell et al., 2011; Tousignant et al., 2011). The randomised controlled trial by Russell et al. (2011) included 65 participants who were allocated into a control group, which included the delivery of usual care deemed appropriate by the treating PT, and the intervention group, which included the provision of exercises, education, and self-applied therapeutic techniques via VC. Both groups received one session per week for six weeks. Outcome measures were obtained at baseline and six weeks and included the Western Ontario and McMaster Universities Osteoarthritis Index (Angst et al., 2001; Bellamy et al., 1988); Patient Specific Functional Scale (Stratford et al., 1995); the timed up-and-go test (Mathias et al., 1986); knee range of motion; quadriceps muscle strength; limb circumference measurements; and an assessment of gait using the Gait Assessment Rating Scale (Wolfson et al., 1990). The Western Ontario and McMaster Universities Osteoarthritis Index indicated significant and clinically important differences from baseline to six weeks

($p < 0.01$), an improvement of 52.7% for the control group and 67.6% for the VC group; the difference between groups was not significant (F value = 3.11, $p = 0.08$). Non-significant differences were found in all other outcomes, except for the Patient Specific Functional Scale (F value = 4.28, $p < 0.04$) and stiffness sub-scale of Western Ontario and McMaster Universities Osteoarthritis Index (F value = 4.29, $p < 0.04$). The study's sample size was relatively small ($n=65$); the VC group was 3.4 years younger than the group receiving in-person care (66.2 and 69.6 years respectively); and no outcome measures were taken beyond six weeks to determine differences in long term outcomes.

The literature supports the use of TR to deliver care to neurological conditions, such as stroke (Laver et al., 2020); multiple sclerosis (Di Tella et al., 2020) and Parkinson's disease (Vellata et al., 2021). A recent systematic review investigated the effectiveness of TR and compared it to in-person care, and no rehabilitation or usual care for patients following a stroke (Laver et al., 2020). The main outcome measure evaluated patients' ability to perform activities of daily living; there was no statistical difference between the TR group and traditional in-person care. Laver et al. (2020) concluded that TR may not be inferior to in-person care and is an appropriate choice of service delivery for this patient population. Another randomised clinical trial studied the effectiveness of care delivered via TR or in-person on arm function following stroke and used the Fugl-Meyer Score (See et al., 2013) as the primary outcome measure (Cramer et al., 2019). This study included an in-person group ($n=62$), that received 18 supervised physiotherapy sessions and 18 unsupervised sessions (exercises and education booklet for home use), and a TR group ($n=62$) that received 36 sessions and involved exercises, games, and education. The participants in the TR group demonstrated an exercise adherence rate of 98.3%, whereas the in-person group was 93.3%. Cramer et al. (2019) reported that both groups reported significant motor gains with improvements in Fugl-Meyer scores at baseline and 30 days ($p < 0.01$). The adjusted mean

change in Fugl-Meyer score was 0.06 points higher in the TR group (95% CI, -2.14 to 2.26; $p = 0.96$), indicating no significant difference between the groups.

The literature has also demonstrated effectiveness and efficacy of TR for patients with cardiorespiratory conditions such as chronic obstructive pulmonary disease (Cox et al., 2021; Hartman et al., 2023); patients with COVID-19 symptoms (Samper-Pardo et al., 2023); and coronary heart disease (Ramachandran et al., 2022). A Cochrane systematic review that included 15 articles studied the differences between pulmonary rehabilitation delivered to patients with chronic lung conditions via TR, in-person rehabilitation and no rehabilitation (Cox et al., 2021). This review studied the effects on quality of life, exercise capacity, and breathlessness. A difference in the completion of rehabilitation adherence rates was reported whereby the TR group had a 93% (95% CI: 90 to 96%) completion rate whereas the in-person group had a 70% completion rate. There was little to no significant difference reported between the two groups for exercise capacity measured by the six-minute walk test, breathlessness using the chronic respiratory disease questionnaire, or quality of life measured with St George's Respiratory Questionnaire total score. Another systematic review that included 10 studies, evaluated the effects of pulmonary rehabilitation delivered via TR and compared TR to in-person care (Cox et al., 2021). The outcome measures included measurements of the functional exercise capacity using the six-minute walk test and steps per day; dyspnoea and respiratory symptoms using the Modified Medical Research Council and dyspnoea domain from Chronic Respiratory Disease Questionnaire; and quality of life using the Short Form-36 and Short-Form-12. There were no significant differences reported for functional exercise capacity; dyspnoea and respiratory symptoms; and quality of life. One of the secondary outcome measures used in this review investigated rehabilitation adherence rates. Participants were more likely to adhere to and complete their rehabilitation program in

the TR group, 93% (95% CI: 90 to 96%) compared to in-person, which had a 70% completion rate.

Although supportive evidence continues to emerge, systematic reviews have highlighted the need for more robust, high-quality evidence comparing TR with in-person care, along with clarification on the specific patient conditions that are the most amenable to receiving care via VC (Gava et al., 2022; Jansson et al., 2022; Laver et al., 2020; Seron et al., 2021). High quality evidence has also been reported as the most important motivator for healthcare professionals to develop their digital competence (Konttila et al., 2019).

Facilitators and opportunities for TR adoption

The COVID-19 pandemic provided an opportunity for PTs to gain TR experience. During the initial stage of the pandemic, clinics were closed, and in-person care was not an option (Ezzat et al., 2023). The suspension of in-person care facilitated rapid TR adoption to ensure continuity of patient care (Ezzat et al., 2023; Malliaras et al., 2021). However, the easing of public health measures over time meant many PTs chose to return to in-person care, leading to a decline in TR usage (Ezzat et al., 2023; Werneke et al., 2021). TR had become a temporary solution to a temporary problem.

A recent TR study by the University of Amsterdam in partnership with the University of Manitoba, conducted a survey on the use of TR, the facilitators, and the barriers (Giesbrecht et al., 2023). More than 700 responses were received (N=723), 92% of whom were Canadian and 32% were physiotherapists (n=233). Giesbrecht and colleagues reported that 85% of PTs replied yes or maybe, when asked if they planned to use TR post-COVID (Giesbrecht et al., 2023). Another Canadian study reported that 84% of PTs intended to continue offering virtual care post-pandemic (Ezzat et al., 2023). Although these findings provided optimism for the utilisation and sustainability of TR beyond the pandemic, consideration should be given to the timing of data collection: November 2021 to March

2022 (Giesbrecht et al., 2023) and May to October 2020 (Ezzat et al., 2023). These studies collected data when COVID-19 public health measures were still in effect to limit the spread of transmission, thus, potentially influencing participants' responses.

The literature has highlighted TR's potential to improve inequitable access to care for those living in remote and rural locations (Lawford et al., 2017; Malliaras et al., 2021; Quigley et al., 2021). Manitoba's demographics position the province well to benefit from TR. Several studies have reported that the elimination of travel presents TR as a more cost-effective alternative to in-person care (Nelson et al., 2021; Tousignant et al., 2015). A Canadian study conducted an economic analysis as part of a randomised controlled trial for patients having undergone a total knee replacement (Tousignant et al., 2015). The study compared costs between TR and traditional in-person home-based care delivered twice weekly for eight weeks. Results determined that when a patient lived more than a 30-kilometer round trip from the clinic, total costs were in favour of the TR group, with a difference of \$263 over the course of eight weeks.

An Australian study by Cottrell et al. (2021) highlighted the cost savings of TR compared to fly-in fly-out physiotherapy in remote communities. This retrospective audit determined a cost savings of 13% for the TR group compared to a fly-in fly-out model. These findings are relevant to remote communities in Manitoba where fly-in fly-out PTs deliver care to patients living in rural areas with limited access to physiotherapy services.

The elimination of travel when utilising TR also provides patients with a convenient option to connect with a PT from the comfort of home or at their place of work (Ezzat et al., 2023). Lawford et al. (2017) agrees and reported that patients highly value TR's convenience and time efficiency. Although some studies question patients' acceptance of TR (Lawford et al., 2017), a qualitative study by Ezzat et al. (2022) reported that patients who have

experienced TR are more likely to accept this mode of receiving care, which is similar to the findings in a mixed methods study by Bennell et al. (2021).

PT factors that facilitate TR adoption include previous clinical experience and TR experience or exposure (Martin et al., 2021; Bennell et al., 2021; Lawford et al., 2019). Martin et al. (2021) used qualitative methods to study TR preparedness of new graduates. Findings indicated that a lack of clinical experience and pre-existing knowledge and skills negatively impacted a new-graduate's ability to transition to TR. Both Haines et al. (2023) and Miller et al. (2022) supported this finding and reported that PTs' previous clinical experience facilitated the transition to TR. Clinicians' TR exposure or experience has also been reported to improve PT satisfaction and acceptability (Bennell et al., 2021; Lawford et al., 2019). Clinician acceptability has been regarded as a key requirement to facilitate TR uptake and sustainability (Wade et al., 2014).

Although facilitators promote TR uptake, barriers exist that impede TR uptake and sustainability, and these are described in the following section.

Barriers to TR adoption

In response to COVID-19, a rapid transition into the digital environment ensued and many PTs felt unprepared to deliver TR. Many studies have indicated that PTs received limited training prior to delivering TR and lacked the necessary knowledge and skills (Bennell et al., 2021; Giesbrecht et al., 2023; Malliaras et al., 2021). Giesbrecht and colleagues (2023) reported that 28% of Manitoban healthcare providers surveyed received training prior to delivering TR. This was similar to the findings of Malliaras et al. (2021) who reported that 21% of allied health clinicians received training prior to delivering virtual services. Untrained clinicians reported that knowledge and skills were often gained informally from colleagues and internet resources (Davies et al., 2021). Grundstein et al.

(2021) acknowledged the need for a unique virtual skill set to ensure adequate PT preparedness to deliver TR.

The elimination of hands-on care when delivering virtual care has been identified as a barrier to TR adoption (Ezzat et al., 2023; Malliaras et al., 2021). PTs have been taught to assess and treat patients using their hands and must adapt to a hands-off approach. There are concerns that the inability to provide hands-on care challenges PTs' ability to conduct an accurate assessment and limits treatment options (Barton et al., 2022; Malliaras et al., 2021). Patients also expect to receive hands-on care as part of a physiotherapy appointment (Barton et al., 2022; Bennell et al., 2021; Malliaras et al., 2021), limiting acceptance of TR (Bennell et al., 2021; Miller et al., 2022).

A multitude of patient-related factors have been identified in the literature as barriers impeding TR uptake. These include the patient's health condition; patients' access and ability to use technology, with older adults often being described as less technologically proficient; and language barriers limiting communication (Bennell et al., 2021; Ezzat et al., 2023; Haines et al., 2023; Miller et al., 2022). Studies reported that the digital divide will widen unless patient access to technology is addressed (Eddison et al., 2022; Reynolds et al., 2021). Ezzat et al. (2023) reiterated these concerns by explaining that virtual care has the potential to exacerbate rather than improve the existing access to care disparity.

Studies utilising behaviour change theory have also identified environmental factors limiting TR uptake. These factors included access to an appropriate and confidential space; reliable internet connection; and limited socialisation with colleagues (Haines et al., 2023; Miller et al., 2022). Specific to the Canadian context were reports of problems related to technology and poor infrastructure, along with a lack of guidance from governing bodies (Ezzat et al., 2023; Giesbrecht et al., 2023).

Barriers to TR uptake continue to exist, evidenced by the number of clinicians that chose to return to in-person care after COVID-19 restrictions were lifted (Ezzat et al., 2023; Werneke et al., 2021). PT acceptance of TR is regarded as key to sustainability (Wade et al., 2014), indicating that further support and guidance is required for PTs to deliver virtual care.

Regulatory framework

Healthcare providers are mandated to follow specific guidelines and practice standards provided by their regulatory bodies. In Manitoba, professional telehealth guidelines have been developed and implemented relatively recently over the past five to 10 years. PTs are governed by self-regulatory colleges in Canada whose primary purpose is to ensure public safety. Manitoban PTs are regulated provincially by the College of Physiotherapists of Manitoba (CPM) (www.manitobaphysio.org). CPM provides practice directions and standards for physiotherapy practice, including guidelines for TR (The College of Physiotherapists of Manitoba, 2018). Registered Manitoban PTs can currently deliver TR services to residents of Manitoba only. They must obtain registration in another province if they plan to deliver care across a provincial border (unless care originated in the province of Manitoba). The regulatory bodies governing the practices of both medicine and occupational therapy in Manitoba have similar guidelines for telehealth (College of Occupational Therapists of Manitoba, 2020; The College of Physicians & Surgeons Manitoba, 2021)

Regulating a healthcare profession requires acknowledgement of the skills needed for safe practice in the traditional clinical environment but also the digital environment.

Researchers have suggested that combining rapidly evolving technological innovations with heavily regulated, evidence-based healthcare professions will prove challenging (Thimbleby, 2013). However, regulatory bodies cannot be complacent; they must strive to keep up with technological advancements so that end users can reap the benefits and patient safety is optimised.

Currently there are no regulatory or licensure requirements for a PT to demonstrate TR capabilities. Consequently, this could limit motivation for institutions to teach or develop e-health pre-licensure curriculum (Edirippulige et al., 2018), impacting the quality of virtual care being delivered (Lee et al., 2019). An urgent need exists for regulatory bodies and educational institutions to ensure that HCPs have acquired the capabilities needed to deliver consistent, safe, high-quality TR.

At present, CPM provides guidance about how to conduct a TR appointment but there is nothing enforcing a clinician to follow these guidelines. The extent of enforcement by a health professional regulatory body is set out in legislation and the accompanying regulations. Under the current *Physiotherapy Act of Manitoba*, practice guidelines for TR are not enforceable as they are not defined in the legislative regulations. It is anticipated that as physiotherapy practice in Manitoba transitions to the *Regulated Health Professionals Act* over the next year or so, Practice Directions will be enforceable as they will be referred to in the actual regulations. TR must come under a Practice Direction to ensure a more consistent level of care and even more importantly, to ensure the safe delivery of care in the digital environment.

Behaviour change theory

Behaviour change is a gateway leading to the provision of healthcare improvements (Cane et al., 2012). Behaviour change theory is the accumulation of knowledge explaining behaviour change while accounting for distinctive individual and contextual factors (Davis et al., 2015; Ravitch & Carl, 2021).

VC and the elimination of hands-on care require a significant change in practice and change in clinician behaviour and although possible, the process is inherently challenging (Atkins et al., 2017; West & Michie, 2020). Practice change requires an equilibrium shift and

the need for clinicians to step outside of their comfort zone to change behaviours, habits, and routine day-to-day clinical tasks (Gupta et al., 2017). Utilising behaviour change theory for this study allowed for the consideration of a wide range of internal and external factors influencing the desired behaviour change (PTs delivering care via VC), within the context of Manitoba.

Numerous behaviour change theories, frameworks and models exist to explain behaviour change, identify the determinants of behaviour change and evaluate behaviour change outcomes (Michie et al., 2005; Michie et al., 2011; Nilsen, 2015). A theory has been defined as “an abstract description of the relationship between concepts” (Varpio et al., 2020, p. 990) which helps us to understand the world around us (Nilsen, 2015). A model is purely descriptive and is composed of simplified theory with a more refined focus (Nilsen et al., 2015); and a theoretical framework is derived from theory and is constructed by connecting concepts. A theoretical framework is not explanatory but rather, categorises phenomena (Nilsen et al., 2015; Varpio et al., 2020).

Models and frameworks used to identify the barriers and facilitators influencing behaviour change include The Ottawa Model of Research Use (Logan & Graham, 1998), Consolidated Framework for Implementation Research (Damschroder et al., 2009), the Theoretical Domains Framework (Michie et al., 2005) and the COM-B (Capability, Opportunity, Motivation, Behaviour) model (Michie et al., 2011). The Theoretical Domains Framework was developed in 2005 and refined in 2012 (Atkins et al., 2017) and includes 14 domains. It is often used in conjunction with the COM-B to provide a more granular explanation of behaviour change (Cane et al., 2012).

Capability, Opportunity, Motivation, Behaviour (COM-B) model

The COM-B model is at the centre of the behaviour change wheel (Michie et al., 2011) (Appendix C – Capability, Motivation, Opportunity, Behaviour (COM-B) Model). The

application of COM-B aims to diagnose the factors influencing the desired behaviour change. The factors are targeted by strategically selecting options from the intervention functions and policy categories in the behaviour change wheel.

COM-B is a process model that illustrates the theoretical simplification of the components influencing behaviour change (Nilsen, 2015) and aims to guide the process of knowledge translation into practice by closing the evidence-to-practice gap (Michie et al., 2011). COM-B is composed of three components (and two sub-components) that interact to influence behaviour change. The components include capability (“C”) (psychological and physical), opportunity (“O”) (social and physical), and motivation (“M”) (automatic and reflective) (Michie et al., 2011).

Capability refers to internal factors about the individual enacting the behaviour (i.e., the PT delivering care via VC). More specifically, *psychological* capability has been defined as "the capacity to engage in the necessary thought processes - comprehension, reasoning" (Michie et al., 2011 p.5), and requires having the knowledge and psychological skills. *Physical* capability involves having the physical and sensory abilities to perform the behaviour (Michie et al., 2011; West & Michie, 2023).

Opportunity depicts factors external to the individual and provides the context (Michie et al., 2014). *Social* opportunity has been defined as "the cultural milieu that dictates the way that we think about things (e.g., the words and concepts that make up our language)" (Michie et al., 2011, p.5) and *physical* opportunity includes environmental factors such as space, time, and resources (Michie et al., 2011). COVID-19 is an example of a physical opportunity, where the social distancing requirements pushed many PTs into the digital environment to ensure continuity of care.

Motivation is regarded as central to the COM-B model and concerns intrinsic motivation, or motivation from within the individual where inspiration or interest is

stimulated (Virtanen et al., 2021; West & Michie, 2020). Sustaining adoption of an innovation, such as VC, requires intrinsic motivation, which comes from within the individual (Virtanen et al., 2021). Motivation in COM-B considers *automatic* motivation, describing an individual's drive, attitudes, interest, inspiration and willingness, and *reflective* motivation, which includes reactionary elements, practice evaluations and reflection (Michie et al., 2011; West & Michie, 2020). Michie et al. (2011) explained that the consideration of all sub-components, except for reflective motivation, are essential for influencing behaviour change. However, it is suggested that reflective motivational factors should be identified and addressed to achieve the desired behaviour change.

Application of behaviour change theory to telerehabilitation

The application of behaviour change theory allows for the consideration of a multitude of factors beyond knowledge and skills. Research indicates that clinicians' knowledge and skills, which describes the 'C' or capability component of the COM-B model, often receives too much focus when behaviour change theory is lacking (Byrne-Davis et al., 2017). There are a number of TR studies that have utilised behaviour change theory, although none are specific to VC (Ezzat et al., 2023; Haines et al., 2023; Malliaras et al., 2021; Miller et al., 2022). All studies applied the COM-B, except for Haines et al. (2023) who applied the Theoretical Domains Framework. Data collection for all four studies was conducted in 2020 or 2021, during the height of the global pandemic. A predominant finding that limited the delivery of TR in two of these studies was the elimination of hands-on care (Ezzat et al., 2023; Malliaras et al., 2021) and the challenges associated with this.

Haines et al. (2023) conducted a single-site, phenomenological study that investigated the barriers and facilitators PTs experienced while delivering care during the COVID-19 pandemic in Australia. Data were collected between November 2020 and May 2021 using

semi-structured interviews with 19 PTs working with patients with musculoskeletal (MSK) and cardiorespiratory conditions. The Theoretical Domains Framework was applied in order to identify the telehealth barriers and facilitators; data were analysed both deductively and inductively. Results indicated that PTs lack of telehealth knowledge and skills were a barrier for PTs delivering TR while virtual care exposure and experience facilitated PTs' confidence and abilities. Haines' study reported concerns about telehealth potentially widening inequitable access to care for certain populations due to limited access or ability to use technology, or language barriers impeding communication.

Malliaras et al. (2021) used mixed methods to investigate the telehealth views of health clinicians treating persons with MSK conditions during the pandemic. The sample included 827 healthcare professionals (82% PTs); participants were recruited internationally with almost 90% from Australia, New Zealand and Europe. Cross-sectional open-ended survey questions were used for the qualitative component; data were collected between April and June, 2020. The COM-B framework was used to understand the determinants of behaviour change. The physical opportunity component contained the most themes, and this included treatment and management challenges related to the inability to provide hands-on care. Reported barriers included patient expectations and perceptions of telehealth's value; and PTs' beliefs about telehealth's effectiveness (less than half of the PTs in this study perceived telehealth to be as effective as care delivered in-person); and finally, PTs lacked the required telehealth training. There were no themes categorised in the physical capability or automatic motivation categories.

Miller et al. (2022) utilised a cross-sectional study design with quantitative and qualitative components to examine PTs' telehealth use one year into the pandemic, across three out-patient clinics within the same city. Quantitative data were obtained by extracting data from electronic medical records from 8038 physiotherapy sessions. Semi-structured

interviews (n=13) were used to explore and identify the factors that influenced PTs' telehealth delivery. The sample included 13 PTs working in the areas of orthopedics, neurology and general care of older adults and data were collected between March and May, 2021. Directed content analysis was utilised to analyse the qualitative findings, while applying the COM-B model as the coding framework. Of note, Miller and colleagues used only the three main components of the COM-B to categorise the data and not the six sub-components. Most of the data were categorised in the opportunity component of COM-B and although there was no explicit use of the sub-components, the majority of the data reflected the definition of the physical opportunity category. No data in the motivation category appeared to represent the automatic motivation sub-component, which is similar to Malliaras' study (2021). Concerns were highlighted regarding access to care for non-English speakers, individuals with limited health insurance and limited access to affordable technology, comparable to the findings in Haines et al. (2023) and Ezzat et al. (2023). Interestingly, the inability to provide hands-on care was not identified or described as a barrier in Miller et al. (2022).

Ezzat et al., (2023) conducted a pan-Canadian study, which included eight cycles of cross-sectional surveys were used to examine the level of strain on PTs. COM-B was applied to the data obtained from open-ended survey questions to identify and code the barriers and enablers to virtual care, at the PT, patient, and system levels. Participants included Canadian PTs, although no details were provided about their focus of clinical practice. Findings were analysed inductively and then deductively mapped to the COM-B. The COM-B component with the most representative data was the physical opportunity category, which is the same as Malliaras et al. (2021) and Miller et al. (2023). Key barriers identified in this study included the inability to provide hands-on care and PTs not feeling adequately prepared to deliver virtual care. PTs also reported a lack of direction from governing bodies and poor

infrastructure to support the use of virtual care; Ezzat considered this as a factor unique to Canadian PTs. A significant enabler was the rapid acceptance and agreement of third-party payers to reimburse for virtual care during the pandemic. The majority of PTs (84%) in this study reported strong intentions to continue using virtual care beyond the pandemic.

Capability frameworks in telehealth

The development of e-health and telehealth frameworks aims to bridge the know-do gap between researchers and clinicians and help develop and refine professional curriculum (Brunner et al., 2018). Frameworks provide a guide and a platform for further research and curriculum development and clear expectations for HCPs delivering telehealth. Nine telehealth/TR capability frameworks were identified in the literature and are detailed in

Appendix E – Telehealth and Telerehabilitation Capability Frameworks.

A profession-specific framework to guide best practice recommendations and training is important to capture the unique and variable characteristics of a profession (Bromley, 2019; Davies et al., 2021; Nazeha et al., 2020). Appendix E includes four frameworks developed for medicine (Hart et al., 2022; Keswani et al., 2020; Noronha et al., 2022; Sharma et al., 2019); two for nursing (Rutledge et al., 2021; Van Houwelingen et al., 2016); and two for physiotherapy (Davies et al., 2021; Davies et al., 2022a). One telehealth framework was developed for all HCPs (Galpin et al., 2021). A nutrition informatics competency framework was developed for dietitians by Ayres et al. (2012) but is not included in Appendix E because it focuses on the use of technology and computer skills and is not specific to telehealth. Only two out of the nine frameworks were available prior to 2020, indicating just how rapidly the pace of telehealth research has progressed in the last four years.

Davies and colleagues' capability frameworks (2021) and (2022a) are the only telehealth frameworks developed specifically for physiotherapy and include domains to account for the capabilities required for PTs to transition into the digital environment. The VC framework developed by Davies et al. (2021) details the 60 profession- and medium-specific (VC) capabilities across seven domains required by PTs to deliver care in the digital environment ([This article was published in Davies, L., Hinman, R. S., Russell, T., Lawford, B., Bennell, K., Billings, M., Cooper-Oguz, C., Finnan, K., Gallagher, S., Gilbertson, D. K., Holdsworth, L., Holland, A., Mcalister, J., Miles, D., & Roots, R. \(2021\). An international core capability framework for physiotherapists to deliver quality care via videoconferencing: a Delphi study. *Journal of Physiotherapy*. <https://doi.org/10.1016/j.jphys.2021.09.001>. Permission to publish in the thesis was granted via email on October 26, 2023.](#)

Appendix B – Videoconferencing Capability Domains and Capabilities (Davies et al., 2021)). Davies' framework contributed towards the theoretical underpinnings of this study

and was used to create the conceptual framework for this study, along with the COM-B, which will be described in more detail in the following chapter.

Chapter 3. Methodology and methods

This qualitative study aimed to explore PTs' lived experiences delivering care via VC. Many clinicians gained VC experience during emergent times following the onset of the COVID-19 pandemic. Valuable lessons can now be learned to create a solid foundation and understanding about the factors influencing PTs' delivery of care via VC.

This study builds upon pre-existing knowledge, theory, and frameworks and involved the development of a conceptual framework which guided the study from the initial development to completion. Data in this study were co-constructed between the participants who are the knowledge keepers (Ravitch & Carl, 2021), and myself as a key instrument of the study.

Ontology and epistemology

The ontological assumptions of this study situate it within the relativist paradigm. A relativist ontology does not accept an objective, measurable reality but rather multiple realities (Grinnell & Unrau, 2005). It does not seek truth, but rather insight (Sullivan-Bolyai et al., 2005). The researcher is the key instrument in a qualitative research study, with uniqueness and subjectivities that are impossible to eliminate (Ravitch & Carl, 2021). I acknowledge that my personality, background, and experiences can influence and bias a study (Grinnell & Unrau, 2005) (see [Researcher positionality](#) in Chapter 1).

Epistemology concerns knowledge claims and how someone comes to know what is claimed to be known. Epistemologically, this study constructed data through reciprocal interaction between the participants and me (Ravitch & Carl, 2021). This allowed me to become a storyteller of the participants' lived experiences. More specifically, the epistemological approach situates this study within social constructivism. Social

constructivism is similar to cognitive constructivism but with the uniqueness of knowledge discovery through social, collaborative, cultural and peer influences (Hay, 2016; Raskin, 2002; Thomas et al., 2015). Cognitive constructivism, however, is a more personal and individual process of creating knowledge (Powell & Kalina, 2009).

The ontological and epistemological approaches selected for this study align well when the goal is not to seek truth, but rather co-construct knowledge and understanding of the phenomenon through collaboration with PTs who have unique interpretations of individual VC experiences. It is accepted that my experiences and positionality will influence the study findings and although possible to minimise this bias through rigorous reflexivity (Ravitch & Carl, 2021), it must be acknowledged that it is impossible to eliminate entirely. Therefore, this study makes no claims to seek objectivity but rather participant subjectivity of their experiences delivering care via VC.

Study design

Qualitative methods aim to understand the *who*, *what*, and *where* of a particular phenomenon from the perspectives of the participants' lived experiences (Neergaard et al., 2009; Vaismoradi et al., 2013). This aim aligns well with the purpose and objectives of this study which was to capture an in-depth exploration and understanding of PTs' lived experiences and perceptions delivering care via VC. Qualitative research is typically interpretive and inductive in nature (Casula et al., 2021) and is an appropriate choice for an underexplored phenomenon (Ravitch & Carl, 2021). However, relevant TR knowledge, theory and frameworks co-exist (Davies et al., 2021; Ezzat et al., 2023; Malliaras et al., 2021) and a deductive approach allows for this existing theory to be tested in a new context (Elo &

Kyngäs, 2008). Utilising *a priori* knowledge and a deductive approach narrows down the appropriate choice of design of this qualitative study.

Qualitative description (QD) is a flexible study design that can be used with inductive or deductive analysis (Azungah, 2018; Bradshaw et al., 2017). It uses naturalistic inquiry to “produce rich, straight forward descriptions of an experience” (Neergaard et al., 2009, p. 2) and answers the *what* questions when exploring contextual and practice setting issues (Shields & Tajalli, 2006). Sullivan-Bolyai et al. (2005) also support using QD in healthcare research when the aim is to discover knowledge about how to improve practice. This study required a description of the perceived barriers, facilitators and needs of PTs delivering care via VC with the desired ultimate outcome of improving practice, which presents QD as the appropriate choice of study design.

Conceptual framework

This study had originally intended to use Davies et al. (2021) VC capability framework as a theoretical framework. The capabilities in Davies et al.’s framework were described as the knowledge and skills needed to deliver care via VC. However, upon reading the relevant literature, it became clear that PTs needed more than the simple acquisition of new knowledge and skills. The decision was made therefore to integrate the behavioural change model, COM-B (Michie et al. 2011) in this study. A study by Byrne-Davis et al. (2017) stated that insufficient use of behaviour change theory often leads to an over-emphasis on the ‘C’ (capability) component of COM-B (knowledge and skills). Motivation is also considered central to facilitating behaviour change (Virtanen et al., 2021; West & Michie, 2020) and Davies’ capability framework does not fully account for this intrinsic requirement.

The conceptual framework was developed by integrating the 60 capabilities from Davies et al. (2021) VC capability framework with the six sub-components of COM-B (Michie et al. 2011) (

Appendix D - Conceptual Framework). My primary advisor (MF) and I jointly determined which sub-component of COM-B best represented the definition of each of Davies' 60 capabilities; these were then mapped accordingly. This decision was based on the definitions of each COM-B sub-component, detailed in [Table 1. COM-B Categories and definitions](#). COM-B's psychological capability component contained the majority of Davies' capabilities, 39 in total; physical capability contained only one of Davies' capabilities. Social opportunity contained three of Davies' capabilities; physical opportunity contained 15 of Davies' capabilities. In contrast, automatic motivation contained none of Davies' capabilities while reflective motivation contained two of Davies' capabilities.

The utilisation of Davies' capability framework alone would not have sufficed to account for the full scope of factors influencing the required behaviour change. Although the COM-B model provided the overarching theory to guide this study, Davies et al. (2021) VC capability framework provided detail about the profession-specific knowledge and skills requirements. The VC capability framework allowed for a more refined exploration of the study's topic. Incorporating Davies' et al. (2021) with the COM-B model meant that I could more comprehensively address the research questions, compared to utilising either the VC framework or the behavioural change model alone.

Table 1. COM-B Categories and Definitions

Definitions	Main Categories					
	Psychological Capability	Physical Capability	Social Opportunity	Physical Opportunity	Automatic Motivation	Reflective Motivation
<p>Michie et al., (2011); Michie et al., (2014) Definitions - Capability is defined as the individual’s psychological and physical capacity to engage in the activity concerned. It includes having the necessary knowledge and skills”. (2011, p. 5)</p> <p>Opportunity is defined as all the factors that lie outside the individual that make the behaviour possible or prompt it." (2011, p. 5)</p> <p>Motivation is defined as all those brain processes that energize and direct behaviour, not just goals and conscious decision-making. It includes habitual processes, emotional responding, as well as analytical decision-making.” (2011, p.5)</p>	<p>Internal factors - "The capacity to engage in the necessary thought processes - comprehension, reasoning.” (2011, p. 5)</p> <p>Having the knowledge and psychological skills. (2014)</p>	<p>Internal factors – “Having the physical skills, strength or stamina to perform the behaviour.” (2014, p. 5)</p> <p>A person's sensory and physical abilities that are needed for a behaviour or that facilitate it. (West et al., 2023)</p>	<p>External factors - "The cultural milieu that dictates the way that we think about things (e.g., the words and concepts that make up our language)” (2014, p. 5)</p> <p>Interpersonal influences, social cues, and cultural norms. (2014)</p>	<p>External factors - The environment “What the environment allows or facilitates in terms of time, triggers, resources, locations, physical barriers.” (2014, p.5)</p>	<p>Automatic processes involve emotions and impulses that arise from associative learning and/or innate dispositions. (2011)</p> <p>Processes involving wants or needs, desires, impulses, and reflex responses. (2014)</p>	<p>Reflective processes involve evaluations and plans. (2011)</p> <p>Involving self-conscious planning and evaluations (beliefs about what is good or bad). (2014)</p>
<p>Atkins & Michie (2015) Definition According to the model, behaviour is part of an interacting system involving all of these components.</p>	<p>Psychological capability is having the knowledge, psychological</p>	<p>Physical capability is having the physical skills, strength or</p>	<p>Social opportunity includes interpersonal influences, social</p>	<p>Physical opportunity is what the environment allows or</p>	<p>Automatic processes involve emotional reactions, desires, impulses and</p>	<p>Reflective processes involve self-conscious planning and</p>

	skills, strength or stamina to perform the behaviour. (p. 166).	stamina to perform the behaviour. (p. 166)	cues and cultural norms. (p. 166)	facilitates in terms of time, triggers, resources, locations, physical barriers, etc. (p. 166)	reflex responses. (p. 166)	evaluations (p.166)
<p>West & Michie (2020) Definition</p> <p>"Capability is an attribute of a person that together with opportunity makes a behaviour possible or facilitates it.</p> <p>Opportunity is an attribute of an environmental system that together with capability makes a behaviour possible or facilitates it.</p> <p>Motivation is an aggregate of mental processes that energize and direct behaviour.</p> <p>Behaviour is individual human activity that involves coordinated contraction of striated muscles controlled by the brain." (p. 2)</p>	"Psychological capability is capability that involves a person's mental functioning (e.g., understanding and memory)" (p.2)	"Physical capability is capability that involves a person's physique, and musculoskeletal functioning (e.g., balance and dexterity)" (p.2)	"Social opportunity is opportunity that involves other people and organisations (e.g., culture and social norms)" (p.2)	"Physical opportunity is opportunity that involves inanimate parts of the environmental system and time (e.g., financial and material resources)" (p.2)	"Automatic motivation is motivation that involves habitual, instinctive, drive-related, and affective processes (e.g., desires and habits)" (p.2)	Beliefs about what is good or bad
<p>Mapping Theoretical Domains Framework domains/COM-B components</p> <p>Cane et al., (2012); Michie et al., (2014) page 92 for a diagram of mapping</p>	<p>Knowledge</p> <p>Skills</p> <p>Memory</p> <p>Attention</p> <p>Decision Processes</p> <p>Behavioural Regulation</p>	Skills	Social influences	Environmental context and Resources	<p>Social/Professional Role & Identity</p> <p>Optimism</p> <p>Reinforcement</p> <p>Emotion</p>	<p>Social/professional role and identity</p> <p>Beliefs about capabilities</p> <p>Optimism</p> <p>Beliefs about Consequences</p> <p>Intentions</p> <p>Goals</p>

Although it has been determined that the acquisition of knowledge and skills is required to deliver care via VC (Davies et al., 2021), COM-B dictates that the components of opportunity and motivation are also needed to result in a sustainable behaviour change. The opportunity component is also regarded as the context (Michie et al., 2011) and will account for Manitoba's unique provincial characteristics.

Ethical considerations

Research ethics approval was obtained in April 2023 from the Health Research Ethics Board at the University of Manitoba, HS25983 (H2023:141).

Ethical considerations must also be explicitly stated here. I was previously the co-owner of a TR company, PhysioLinkMB, from 2018 - 2022. My experiences and pre-conceived notions were continually reflected upon to avoid any bias during data collection or data analysis. At no time during this study was PhysioLinkMB listed as an exemplar of TR methods or processes. Although the company is now solely owned and operated by my former business partner, there will be no company or personal benefits from the study's findings and no recommendations or advice provided based on my previous TR experiences.

Additionally, I am a practice auditor for the Continuing Competence Program of the College of Physiotherapists of Manitoba, which involves auditing PTs through an interview and chart review to ensure practice standards are being met. Previous auditees who I had assessed, approximately 15 licensed Manitoban PTs in total, were excluded from participating in this study to eliminate any pre-conceived notions a participant may have towards me and the potential influence it could have had on the study's findings. I also worked as a clinical instructor for physiotherapy students. These students were excluded from

participating in this study to eliminate any pre-conceived notions a participant may have towards me.

Participants and recruitment

Purposive sampling was chosen to strategically select participants based on a unique set of characteristics (Ravitch & Carl, 2021). PTs licensed to practice within the province of Manitoba on the active register who had acquired VC experience were deliberately selected to ensure the research questions were addressed.

Maximum variation of the participants was achieved using matrix sampling. Matrix sampling aims to enhance rigour (Reed et al., 1996) and therefore it was used to attempt to achieve an accurate and diverse representation of the Manitoban physiotherapy population with experience delivering care via VC. Diversity in participants was guided by physiotherapist practice characteristics available in the College of Physiotherapists of Manitoba *2022 Annual Report* (College of Physiotherapists, 2022) This included focus of physiotherapy practice; mechanism of remuneration (publicly-funded or private practice); geographical location of workplace (i.e., urban, suburban, rural or remote as defined by Statistics Canada (2016); years of work experience as a physiotherapist (Indeed, 2022); and amount of VC experience ([Table 2. Matrix sampling key](#)).

Table 2. Matrix sampling key

Key				
Clinical focus of physiotherapy practice	Public or Private	Rural/Small Population/Medium population/Large Urban	Years of work experience as a PT	Amount of VC experience
Musculoskeletal - A1	Public – C1	Rural (<1000 people) – D1	Early career (2-10 years) – E1	1-2 appointments – F1
Neurological - A2	Private – C2	Small population (1000-29,999) – D2	Mid-career (11-25 years) - E2	3-30 appointment – F2
Cardiovascular and respiratory – A3	Combination – C3	Medium population (30,000-99,999) – D3	Senior career (26+ years) – E3	31-100 appointments – F3
Skin and related structures – A4		Large Urban (100,000+) - D4		101+ appointments – F4
Mixed – A5				

Inclusion criteria for this study included:

- Practicing physiotherapists on the active register with CPM
- At least two years PT experience. Literature supports that new graduates are often focused on and overwhelmed with developing newly learned clinical skills and clinical reasoning, therefore we limited our sample to those with at least two years of experience (Davies et al., 2022b; Martin et al., 2021)
- Experience delivering at least one VC appointment.

Exclusion criteria included:

- A previous auditee of the student researcher (see ethical considerations above)
- A previous clinical practice student of the student researcher
- Any clinician associated with PhysioLinkMB

Participant recruitment commenced following ethics approval of the study as described above. A recruitment email invitation ([Appendix F – Recruitment Email](#)) and attached infographic ([Appendix G - Infographic](#)) explained the details of the study and requested individuals to contact me directly if they were interested in participating. CPM agreed to assist with participant recruitment and emailed the recruitment material ([Appendix F – Recruitment Email; Appendix G – Infographic](#)) in June 2023, along with one reminder email in July 2023, to all 850 licensed PTs on the active register across Manitoba.

All interested individuals who contacted me were screened via email ([Appendix H – Pre-Screening Email Script](#)) and one via the telephone ([Appendix I – Pre-Screening Phone Script](#)) using the screening questions to determine eligibility. As participant recruitment progressed, sample diversity was monitored using the matrix sampling key ([Table 2. Matrix sampling key](#)). Once deemed eligible, a detailed description of the study’s purpose and details was provided, and the consent form was explained and emailed to the participant. A day and time were then organised for a virtual interview and the completed and signed consent form was returned prior to the virtual interview taking place.

All participants who were chosen for an interview received a \$30 Amazon gift card, except for one participant who declined the gift card. Funding for this expense (\$600.00) was secured from the College of Rehabilitation Sciences Endowment Fund in advance.

Sample size

This study included 20 participants (one of whom was recruited via snowball sampling); the proposed target sample size was between 20 and 25 participants. Although purposive sampling was the intended sampling technique, this study did not include a large enough group of eligible participants. The limited number of eligible participants did not allow for the strategic selection of participants based on the characteristics detailed in **Table 2. Matrix sampling key**. However, matrix sampling was used to recruit one participant via

snowball sampling, which contributed towards diversity within the sample. This estimation was based on recommendations for a qualitative sample size using in-depth interviews by Dworkin (2012) and similar qualitative description studies by Jarva et al. (2022a, 2022b) here the authors investigated digital health competence using a sample size of 20.

Data saturation has been considered historically the gold standard for determining sample size in qualitative health studies, where no new significant data emerges from the interviews (Dworkin, 2012; Sandelowski, 2000). However, Braun and Clarke (2021) question the concept of data saturation, which was originally intended for the development of new theory and not conducive with all forms of qualitative inquiry. The iterative process of qualitative research and data analysis contrasts with the concept of data saturation (Braun & Clarke, 2021). Data saturation has also been referred to as information redundancy, which insinuates that there is a true end point to this process, a misalignment with the iterative nature of qualitative research. An alternative approach to the concept of data saturation is guided by the sufficiency and quality of the data collected, otherwise known as ‘information power’ (Malterud et al., 2016), whereby higher quality data will naturally prompt a lower sample size. The matrix sampling key (Table 2. [Matrix sampling key](#)) also contributed towards determining the sample size by ensuring maximum variation within the sample.

Data collection

Individual semi-structured virtual interviews were used for data collection with an average duration of one hour and 19 minutes. Semi-structured interviews allowed for participants to share their experiences in their own words. The interview guide ([Appendix J – Interview Guide](#)) avoided strict rigidity and instead aimed for flexibility and conversational flow (Dearnley, 2005).

Virtual interviews were selected for data collection, as opposed to in-person interviews. The benefit of virtual interviewing includes increased ease of connecting with participants in distant locations, improved financial efficiency and the advantage of recording and transcription (Keen et al., 2022; Khan & MacEachen, 2022). However, concerns exist about missing non-verbal forms of communication when interviewing virtually, along with challenges associated with technical issues (Lobe et al., 2020; Ravitch & Carl, 2021). The study's inclusion criteria required participants to have VC experience when delivering care which meant participants likely had access and ability to use technology, therefore, it was unlikely that technology accessibility issues would exclude any participants. This study used manifest data only with no requirement for latent data which involves the observation of body language or other non-verbal forms of communication. Virtual interviews were the appropriate choice for this study which aimed to explore PTs' experiences across Manitoba. Manitoban demographics would have limited my ability to conduct in-person interviews in a timely and efficient manner. Virtual interviews provided a significant advantage with ease of connecting with participants in distant locations (Keen et al., 2022).

Zoom (Zoom Communications Inc, version 5.17.2) was used as the virtual interview platform, using the built-in transcription mode; an external digital audio recorder on my cell phone was used for back up. Interview transcripts were verified for accuracy by me (RM) to ensure transparency and fidelity of the participants' words and experiences (Ravitch & Carl, 2021). This familiarisation with the data allowed me to become immediately immersed in the data. All recordings were deleted once data transcript accuracy was verified.

Interview guide development

The conceptual model for this study guided the development of the interview questions, which in turn ensured all research questions were addressed. Relevance and

sequencing of questions and prompts evolved following committee consultation. The interview questions were self-piloted, as well as piloted with two PTs, one of which was a Manitoban PT and one was an international PT, neither of whom were eligible to participate in the study. Piloting the questions ensured questions were understood and would answer the research questions (Ravitch & Carl, 2021). A change that evolved from piloting the questions was ensuring that participants understood that the study aimed to retrieve their VC experience as a PT provider and not as a recipient. The pilot questions also revealed that answers provided were sometimes a generalised opinion of the profession and not specific to their own experience and perception. The decision was made to add the word 'personal' in front of experiences in order to obtain data that was from a PT provider role and specific to the individual. Unfortunately, the self-piloted interview, which was carried out using very early drafted questions and prior to the neurorehabilitation clinic experience, was not recorded and has proved a valuable lesson for me. The piloted PT interviews were recorded which allowed me to listen to them again but not saved because data security and storage had not been approved by ethics at this time.

The interview guide used with the first four participants was composed of five questions which had between two and seven prompts. This was refined following discussions with MF. The prompt asking about VC evidence was removed as participants appeared uncomfortable with this question; they reported uncertainty about the evidence and not having time to review the available literature due to the rapid transition. The interview guide was modified a final time after the 11th interview. Two previous participants had described the benefit of having a rehabilitation assistant at the patient end to facilitate the delivery of care via VC. The interview guide added the inclusion of a rehabilitation aide as a prompt in question four about facilitators. This final interview draft was then used for all remaining participant interviews.

Data storage and security

Organisation and management of the data is a critical step (Ravitch & Carl, 2021) and followed the current recommendations by the University of Manitoba's Human Research Ethic Board. Immediately following verification, transcripts and other sensitive identifiable information including participant names and contact information were password protected and uploaded to Microsoft Teams on the University of Manitoba's secure university server. The University of Manitoba's Data Security document (University of Manitoba, 2020a); Data Sharing and Storage Guidelines (University of Manitoba, 2020b); and personal communication (Ripat, 2022) directed this process. My principal advisor (MF) was then responsible for moving all identifiable data from Microsoft Teams into the University's secure drive for research purposes. Only de-identified data remained on Microsoft® Teams in a password protected folder accessible to the thesis committee.

Data analysis

Previous theory and frameworks led to the creation of a conceptual framework for this study. The conceptual framework was the basis for a categorisation matrix, which was used to deductively analyse the data collected from virtual interviews.

Interview transcription

Immediately following completion of the virtual interview, the Zoom audio recording was uploaded to Microsoft® Word® and the auto transcription option was used to generate a full verbatim transcript. The first read through of transcripts involved de-identification and anonymization, which included the removal of any names, place of work or any other

identifiable information. Following this, incorrect or missing words and grammar were amended to ensure the auto transcription reflected the audio recording. The de-identified transcripts were then uploaded to Teams for further analysis which is described in more detail in the next section, directed content analysis (DCA).

Directed content analysis

Deductive or *a priori* data analysis was the analytical method applied in this study. More specifically, DCA (Assarroudi et al., 2018) was used as a top-down method of analysis in this study, building on previous theory and frameworks. Although Assarroudi et al. (2018) recommends including manifest and latent content in DCA, Kleinheksel et al. (2020) describes how the analysis of manifest content allows the researcher more distance, whereas latent requires more researcher interpretation. I made the decision to exclude latent content from this study and analyse manifest content only, which involves “staying close to the text” (Vaismoradi et al., 2013, p. 128).

Assarroudi and associates outlined a concise and robust 16-step analytical DCA process which was followed during the analysis stage of this study (Assarroudi et al., 2018). The initial stage involves preparation and includes steps one to seven. These steps include developing general research skills including DCA analytical skills; selecting the sampling strategy; deciding whether manifest data will be analysed; developing the interview guide; collecting data (conducting the virtual interviews using Zoom); determining the unit of analysis (transcribed interviews and field notes) and immersing myself within the data. I read each transcript in full to gain an overview of the content and initial immersion within the data. Transcripts were anonymized and de-identified before being uploaded to Teams. The transcript was then read again while highlighting relevant data using Microsoft® Word®. This process prepared the data for the organisational stage.

Stage two is the organisational stage and includes steps eight to 15. This involved the development of a coding matrix and the creation of main categories from previous theory, and for this study it included the six sub-components in the COM-B model (psychological capability, physical capability, social opportunity, physical opportunity, automatic motivation and reflective motivation) (Michie et al., 2011). Although Michie refers to “components”, this study has adopted them as main categories for analytical purposes and will refer to them as categories in the results and analysis section of this study. An unconstrained matrix was used in this study so that I could remain open to using inductive analysis for any data that could not be categorised or coded (Elo & Kyngäs, 2008), however, no new inductive categories were generated for this study.

The six main categories in COM-B were used as the preliminary codes in the coding matrix. The definition of categories in the coding matrix are detailed in [Table 1. COM-B Categories and Definitions](#). They include the original definitions by Michie et al. (2011), augmented by further clarification of the categories in subsequent publications by Michie (2014, 2015 and 2020). Following the definition of categories, the next stage of organisation included the development of coding rules, which provided more structure and clarity to the coding process (Mayring, 2015).

The categorisation matrix was tested using the Manitoban PT pilot interview, resulting in the development and refinement of working definitions and the identification of anchor samples as suggested by Assaroudi et al. (2018) ([Table 3. Data coding, working definitions and anchor samples](#)). Highlighted text from each interview transcript, known as meaning units (Kleinheksel et al., 2020), were coded using Microsoft® Excel®. Twenty individual participant Excel spreadsheets were composed of a categorisation matrix, these were used to categorise and organise the meaning units from the interview transcripts. This initial stage of data analysis and preliminary coding was completed by RM in consultation

with MF. Multiple discussions and meetings were held between RM and MF about data interpretation, clarification and agreement of coding decisions. Additional meetings were held with CB and KS to discuss coding uncertainties and the process of creating generic categories and sub-categories.

A categorisation matrix summary, which used another Microsoft® Excel® spreadsheet, collated the key meaning units from each participant to aid in the development of ‘generic categories’ (Elo & Kyngäs, 2008), which are titled “VC categories” in this study. This process involved identifying connections, similarities and differences (Assarroudi et al., 2018) of individual meaning units from the 20 participant excel spreadsheets. I continued to analyse the categorisation matrix summary data while frequently returning to the individual participant data, which lead to the discovery of novel findings in the physical capability category. Frequent meetings and discussions between RM and MF led to the the development and agreement of the final VC categories.

The initial analytical process resulted in the creation of 27 VC categories and this included eight VC categories nested within the physical opportunity main category. Four of the VC categories in the physical opportunity category included patient environment, PT environment, patient access to technology and PT access to technololgy. These four VC categories were reduced to two VC categories: environment and access to technology. These two VC categories were sub-divided further into sub-categories, patient and PT (**Table 5. Summary of content analysis**), which was guided by the process described by Elo and Kyngäs (2008) . An additional example of refining and reducing the number of VC categories involved the initial development of a COVID-19 category. Similarities and links to the environment category led to the absorption of COVID-19 related factors into patient and PT environment categories. Continuing the process of comparing main categories and generic

categories resulted in further merging of categories where appropriate, reducing the final number of generic categories to 16.

Finally, the reporting stage, which was described as a single step in Assarroudi et al. (2018) is an important step to aid in transparency and trustworthiness of the study (Elo & Kyngäs, 2008). Elo & Kyngäs (2008) explained the value of providing a clear description of the analytical process by providing detail about how the findings of the study were obtained. The writing and reporting of results was an iterative process than involved ongoing analysis of the findings and I continually reflected on the study's aim and research questions. Ravitch & Carl (2021) explained that analysis is an ongoing process of organising and reorganising a description of the data that can be clearly understood by the reader. I found the balance between description and analysis challenging and the initial write up of results included a large number of uninterpretable quotes with little connection or interpretation (Ravitch & Carl, 2021). This balance developed and evolved with the writing process.

Answering question one of the research study (*How do PTs perceive their ability to deliver care via VC?*) involved writing several drafts, while continuing to analyse and re-analyse the data. Question one required consideration of the definition of ability, which has been described as the physical and mental skills needed by an individual to perform a task (Cambridge American Dictionary, n.d). Categorised data that reflected PTs' physical and mental skills was organised and described to answer this research question. This included how PTs perceived their ability during their initial VC experience and how this evolved with repeated exposure. The domains and capabilities detailed in Davies' capability framework (Davies et al., 2021) aided with answering this question by specifying the VC knowledge and skills requirements. Describing PTs' perceived ability was based on participants' reports of their perceived strengths and weaknesses relative to the domains and capabilities described in Davies' study.

Answering question two (*What are the barriers and facilitators influencing a PT's ability to deliver care via VC?*) and question three (*What are the needs of Manitoban PTs delivering care via VC?*) involved a similar process to the organisation of the data in question one. Describing the barriers and facilitators involved considering any terms similar to that of a barrier or a facilitator. These words included the description of anything that was challenging, difficult, prevented or impeded the delivery of care via VC (barrier) and factors that made it easier, enabled, aided, or improved (facilitator). Data that supported or contradicted the barriers and facilitators contributed towards analysis and reporting to allow for a deeper understanding of the factors influencing the delivery of care via VC. Addressing the third research question involved the inclusion of data that considered the needs of PTs delivering care via VC. I reconsidered the barriers in question two and the bigger picture of clinicians' needs to address this question. Initially, I found that a facilitator and a need appeared similar, but further analysis allowed for the discovery of a wider scope of needs beyond what the clinicians themselves had identified. I continually asked what do PTs need to deliver care via VC and this data included patient and system level requirements that would need addressing.

Reporting of results involved analytical processes and a systematic presentation of findings, along with details about how trustworthiness was achieved. This is detailed in Chapter 4. Results.

Table 3. Data coding, working definitions and anchor samples

Main Categories						
	Psychological Capability	Physical Capability	Social Opportunity	Physical Opportunity	Automatic Motivation	Reflective Motivation
Working Definitions	PTs have the knowledge to use technology and can adapt in-person skills to deliver care via VC. PTs have the cognitive, reasoning and communication skills (verbal, visual, listening) and can select appropriate VC patients and ensure patient safety.	PTs have the required physical skills or capacity. This involves use of the musculoskeletal system to be able to position, move or demonstrate exercises or movements to their patients via VC.	The words, behaviours, attitudes and expectations of other individuals or groups/ organisations. This includes culture and social norms (unwritten set of rules, expectations)	Factors external to the physiotherapist. This includes therapist and patient environment or physical factors that allow or facilitate the delivery of care via VC (eg. location, physical barriers, resources/equipment, time, space, patient condition, age, language, rehabilitation aides, COVID-19)	A PT's wants, needs and emotional response(s) to the concept of using VC to deliver care. This includes their interest and desire to use VC, but also their habits (eg, practicing a certain way for many years and how they feel about changing).	This involves PT's views about the advantages and disadvantages of using VC to deliver care. This includes PTs' evaluation of the outcomes and effectiveness of VC and their future plans and intentions for using VC to deliver care.
Anchor samples	P2 - I just had an unfamiliarity about it. 184 P16 - At the beginning it was like I could say the Wild West, but it wasn't really wild, it's just like we just didn't know. 257	P6 - I have to exaggerate what I was demonstrating. 791 P20 - I had to switch like it's just not and it's still like it's even more unsafe for me to return to clinic	P11 - We just have this culture of physiotherapy that we are fixers and in order for physiotherapy to be legitimate, we need to do use the machine, use all	P5 - I was in a closet, literally in a closet. There wasn't enough room for me to move. So I yeah, it was very it was difficult. 767 P8 - Technology at our clinic has been a challenge also, with	P6 - I don't have a passion for it, ok. Like, the video, yeah, it's not a passion for me. 1177 P3 - You can't treat concurrent people, so from a cost. analysis or expenses	P5 - I thinks it is here to stay and it makes me sad a little bit. I just feel like we're losing a big part of our identity. P8 - I'd love for it to continue. I see it as a great tool to help rural

		now than it was like during the pandemic.127	<p>these passive treatments. 834</p> <p>P3 - what my biggest concern was that CPM's memo information. We're always late in the game, we're always trying to get more information trying to push ahead, but we couldn't get the proper backing.864</p>	things like webcams not working, microphones not working. 177	analysis? It's not,it's not that efficient actually. 1276	and remote communities, northern communities if the resources are in place. 1053
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Trustworthiness

Trustworthiness in qualitative research is also referred to as validity, quality or rigour of a study and there are certain methods that a researcher can use to help ensure the trustworthiness of a study (Ravitch & Carl, 2021). These methods help with the credibility, transferability, dependability, and confirmability of the study (Ravitch & Carl, 2021). Credibility was enhanced by using sampling triangulation, that is, participants with diverse contexts of practice and years of experience (Table 2. Matrix sampling key). Member checking was also utilised to ensure study rigor and credibility (Candela, 2019). This study used synthesised member checking which involves presenting synthesised, analysed data from the entire sample to the participants (Birt et al., 2016). A summary of the study's findings was sent to all participants in February, 2024 (Appendix K - Summary of findings). Participants were invited to provide feedback on the synthesised data, aiding in the credibility of the study findings (Birt et al., 2016); no feedback was received. Transferability or generalisability of the findings is not an explicit aim of qualitative research; however, thick description of the findings may improve the relevance of the findings to other contexts or settings (Tracy, 2010). Dependability involves a thorough description of the research plan and methodology while frequently critiquing steps and decisions taken. Dialogic engagement with members of the student's thesis committee augmented this process. Confirmability was ensured through reflexivity, which involved the use of an audit trail and journaling throughout the study (Ravitch & Carl, 2021).

Reflexivity

Reflexivity describes a researcher's critical assessment of their assumptions, judgements, biases and subjectivities, while considering the impact these could have on the

study (Ravitch & Carl, 2021). Reflexivity improves the transparency and trustworthiness of a study, but also addresses the power dynamics that exist between the researcher and the participants being researched (Ravitch & Carl, 2021). Adler (2022) describes transparency as the most important feature of a study's trustworthiness. The following paragraphs provide a detailed description of the reflexive processes conducted throughout this study, aiming for transparency and rigour.

A power imbalance has the potential to influence who agrees to be researched and how they interact, which could significantly impact the findings of a study (Ravitch & Carl, 2021). Although I have no personal or professional stake in the findings of this study, I was aware that some participants might know about my previous co-ownership of PhysioLinkMB and how this might impact participant involvement in the study or answers to interview questions. I remained cognisant of my emotions, interpretations and reactions when interviewing participants, both during and after the process. I used journaling as a method to process each interview and regularly questioned whether a different researcher would obtain different results or interpret them differently.

I also acknowledged my early biases towards the use of VC to deliver care. I re-evaluated these initial assumptions by journaling and re-reading comments which allowed me to see that my views towards VC neutralise over time, or perhaps I developed a more pragmatic view. My time in the University of Manitoba student-led interprofessional neurorehabilitation out-patient clinic helped shift my VC perceptions and I often thought about how my answers to the interview questions would have changed before and after this experience. I became aware of the challenges when working with more complex patient conditions and this experience altered my positionality to some extent.

Memo writing was particularly useful during the analysis when looking for connections, similarities and differences between main categories and generic categories.

This process led to the use of Miro board (Miro, 2024) an online concept mapping tool to help make connections between categories and I referred to it frequently when writing up results. Memo writing allowed me to reflect on some of my earliest thoughts which I had attached to the transcribed interviews.

Finally, frequent dialogic engagement with advisors and committee members allowed me to maintain a reflexive stance throughout the process (Ravitch & Carl, 2021). My committee members challenged my thoughts and assumptions helping uncover my ‘blind spots’ (Olmos-Vega et al., 2023), what I was not seeing, thinking about, or considering. As a student researcher, the unveiling of blind spots also relates to my limited, although developing research knowledge, and my frequent dialogic engagement with advisors and committee members was essential for many reasons.

These reflexive activities enhanced my researcher accountability and the imperative and iterative process of refining the research design and data analyses (Ravitch & Carl, 2021). The iterative process was challenging at times for me to move forward in the research process. I constantly questioned if I had missed something in the data. Dialogic engagement and discussions about findings and analysis helped me acknowledge that it was time to move forward and present results, which are documented in the next chapter.

Chapter 4. Results

Twenty participants met the eligibility criteria and were interviewed for this study between June and August 2023. An overview of the participant characteristics can be found in **Table 4. Participant characteristics** [Appendix L – Individual participant characteristics](#) provides specific characteristics for each participant (Participant (P) #1-20). Just over half of the participants (55%) worked in private practice with a caseload focused on MSK conditions. This is comparable to the current physiotherapy workforce in Manitoba where 46.6% of PTs worked in private practice in 2023 (College of Physiotherapists of Manitoba, 2023). Approximately two thirds of participants (67.5%) worked in large urban populations; and half of the participants were mid-career (11-20 years of clinical experience). One quarter (25%) of participants had VC experience prior to the onset of the COVID-19 pandemic and 35% of participants were continuing or intended to continue with VC post-pandemic.

This study had intended to use matrix sampling to obtain diverse participant characteristics so that the sample was reflective of the Manitoban physiotherapy population. However, only 21 participants were deemed eligible to participate, and one was lost to follow up after having completed the screening process. Two additional PTs volunteered but were ineligible to participate: one had no prior VC experience and one was a previous student PT under my clinical supervision. Although, matrix sampling was used to recruit one participant in the study, a public practice PT working in neurorehabilitation, comprehensive matrix sampling was not possible due to the limited number of eligible participants.

[Table 5. Summary of content analysis](#) provides an overview of the results, which includes the six main categories and 16 generic categories; two of the generic categories were separated further to include two sub-categories each. All characteristics in [Table 2. Matrix sampling key](#) were represented in the participant sample.

Table 4. Participant characteristics

Area of Practice	Number	% (n=20)
Musculoskeletal (MSK)	11	55
Neurology (Neuro)	3	15
Cardiovascular/respiratory (CVResp)	1	5
Mixed	5	25
Public Private		
Public	7	35
Private	12	60
Combination	1	5
Geographic Location		
Remote/Rural	1.5	7.5
Small	3	15
Medium	2	10
Large Urban	13.5	67.5
Years of PT work experience		
Early Career (2-10)	4	20
Mid-Career (11-20)	10	50
Senior Career (21+)	6	30
Amount of VC experience		
1-2 appointments	1	5
3-30 appointments	8	40
31-100 appointments	6	30
100+ appointments	5	25
Started using VC due to COVID-19		
Yes	15	75
No	5	25
Plan to continue with VC post COVID-19		
Yes	7	35
No	13	65

Table 5. Summary of content analysis

Main categories (COM-B sub-components)	Videoconferencing categories	Sub-categories
Psychological Capability	<ol style="list-style-type: none"> 1. Adaptation from hands-on to hands-off care 2. Utilisation of technology 3. Communication skills 	
Physical Capability	<ol style="list-style-type: none"> 1. Physical demands 2. Accessibility & participation 	
Social Opportunity	<ol style="list-style-type: none"> 1. Public considerations 2. Professional acceptance 3. Funding models 	
Physical Opportunity	<ol style="list-style-type: none"> 1. Access to technology (2) 2. Environment (2) 3. Patient characteristics 	<ol style="list-style-type: none"> 1a. Patient 1b. Physiotherapist 2a. Patient 2b. Physiotherapist
Automatic Motivation	<ol style="list-style-type: none"> 1. Clinician preference 2. Incentivisation 	
Reflective Motivation	<ol style="list-style-type: none"> 1. Perceived value of videoconferencing 2. Professional identity 3. A hybrid future 	

Overview of findings

All data fit the categorisation matrix, [Table 3. Data coding, working definitions and anchor samples](#), with no outlying data requiring the development of new categories. That is, all data were categorised into the six sub-components of the COM-B: capability (psychological and physical); opportunity (social and physical); and motivation (automatic and reflective). The results highlight the multitude and complexity of factors influencing PTs' delivery of care via VC.

The physical opportunity category of the COM-B contained the largest amount of data and included three inductively generated categories (details below). Delivering virtual care requires the consideration of two distinct environments, PT and patient, who are at physically distant locations. Therefore, two of physical opportunity's generic categories, access to technology, and environment, were separated and defined further into patient and PT sub-categories. The category with the least amount of data was the physical capability category where all data were coded into two generic categories. Data falling into the psychological capability category of the COM-B were coded into three generic categories; social opportunity data into three categories; automatic motivation data into two categories; and reflective motivation into three categories ([Table 5. Summary of content analysis](#)).

A repeated finding in this study was PTs' inability to provide hands-on care and the impact this had when delivering care via VC. This finding appeared in multiple categories of the COM-B. PTs expressed the need to adapt their traditional hands-on care to a hands-off approach in the virtual environment; that their patients expected hands-on care; that as a profession, they identify as 'hands-on'; and that many of them prefer using their hands-on skills.

Capability

The capability component of COM-B includes factors that are *internal* to the PT. Michie et al. (2011) defined it as “the individual’s psychological and physical capacity to engage in the activity concerned. It includes having the necessary knowledge and skills.” (p. 2) (Table 3. Data coding, working definitions and anchor samples). Capability is distinguished further into two sub-components by Michie, *psychological* capability, which involves having the VC knowledge, reasoning and comprehension, and *physical* capability, which describes a PT’s strength, dexterity and stamina to perform the behaviour (Table 3. Data coding, working definitions and anchor samples).

Psychological capability

Psychological capability describes a PT's cognitive abilities, knowledge, skills, reasoning and comprehension to deliver care via VC. Categorisation of data within the psychological capability category led to the development of three generic categories. These included adapting to hands-off care, utilising technology, and communication skills.

Adaptation from hands-on to hands-off care

Many participants reported initial uncertainty and felt unprepared to deliver care via VC, “*at the beginning it was like, I could say, the Wild West. But it wasn't really wild, it's just like, we just didn't know.*” (P16) An explanation for the uncertainty and lack of preparedness was predominantly due to the elimination of hands-on care, which challenged PTs’ physical assessment, restricted treatment options and prevented the ability to provide physical assistance. “*In neuro, we touch people... I'm always repositioning people, giving them tactile queuing, right? And to not be able to do that, you just feel like your hands are tied behind your back*”. (P16)

Contrary to the above, other participants found it relatively easy to adapt their hands-on skills to hands-off care. Interestingly, these participants all worked with patients with MSK conditions and more specifically, they reported a pre-existing emphasis on hands-off skills when delivering care in-person. *“I was hands off anyways and did a lot of exercise. Like, I’m a very exercise-based physio so that wasn’t out of the realm for me.”* (P11). Another physiotherapy participant explained that the three core components of a physiotherapy appointment did not require hands-on care and are therefore, all deliverable via VC. *“I feel like the future of physio, we call it the three, the three E’s - it’s empathy, it’s exercise and it’s education and you can do all those things virtually.”* (P12)

Although participants managed to adapt to hands-off care with varying degrees of ease, many reported that their pre-licensure education did not adequately prepare them to deliver care via VC, *“we’ve all learned kind of on-the-job you know, and we didn’t grow up with all this.”* (P5) Participants acknowledged the importance of exercise prescription but felt manual therapy skills were the focus during their physiotherapy education. *“I know our school in particular, heavily emphasises hands-on and severely deemphasizes exercise.”* (P20) Addressing this gap in the curriculum was regarded as essential to enable PTs to deliver care via VC, *“I do think that now we do need to include some of that education or practice in, in the entry-level programmes for sure.”* (P10) Previous clinical experience combined with the ability to be creative and adaptable facilitated PTs’ delivery of care via VC. *“As an experienced clinician myself, I think that I was able to think outside the box more, like this is my usual practice, how can I adapt it? I’m already very comfortable.”* (P8) However, this was not easy for all participants, *“I’m not a creative person, so it’s a little hard for me to think outside of the box.”* (P6) Another participant acknowledged that delivering hands-off care presented some hurdles that were impossible to overcome.

“You're applying the same things you learned in school, but you have to do it without any physical push-pull techniques or anything like that. You have to be able to come up with alternate ways of doing almost everything you would normally do in clinics.... I can work around as much as I can work around. But I mean, there's just some things you can't do.” (P20)

Although initial uncertainty was reported, repeated VC exposure and experience provided PTs with the opportunity to consider how to adapt their hands-on skills to hands-off care, *“once you get into it, there's a ton of things you can do on video with the person.” (P3)* Participants highlighted the importance of adequately preparing clinicians at the pre-licensure level by addressing the education gaps. Participants working with individuals with MSK conditions reported more positive perceptions about their ability to adopt an entirely hands-off approach compared to PTs working in other areas of practice. Although participants detailed components of care that can be delivered via VC, they acknowledged limitations and explained that some assessment and treatment techniques required hands-on care.

Utilisation of technology

Delivering care via VC required PTs to manage the available technology, including navigation of the VC platforms and troubleshooting issues as they arose. Participants often described themselves as not having an affinity for technology, *“I am not tech savvy.” (P17)* However, three participants were the exception and they reported good technology-related knowledge, two of whom had previous technology-related jobs, *“I should get like a Geek Squad jacket because I like, I can set up people's Wi-Fi... I'm pretty tech savvy. But like, but not all clinicians are like that, right?” (P9)*

Regardless of how participants perceived their pre-existing technology-related knowledge, most of them reported that it was easy to learn how to use the technology. Participants reported that increased VC exposure and experience over time facilitated their

ability to utilise the required technology, *“I feel way better at it, way better at navigating any tech hiccups that would come up. In fact, tech hiccups are very rare now.”* (P15)

Participants working in public practice reported fewer concerns about knowing whether a platform was safe and secure to use and followed management and the healthcare authority’s decisions and directions.

“It’s a private connection too, right? So it’s all the ‘healthcare authority’ server, so I don’t have to worry about whatever leaking, security wherever, yeah, I don’t have to deal with that stuff, I wouldn’t know how to deal with it.” (P17)

In contrast, participants working in private practice described having more concerns and spent time exploring safe and secure platform options. Although PTs had some knowledge about privacy, security and confidentiality when using technology, it does appear to be inconsistent: Two participants referred to HIPAA (*Health Insurance Portability and Accountability Act* – a Federal Act in the United States), not PIPEDA (*Personal Information Protection and Electronic Documents Act* – Canadian version of HIPAA).

“You know, we’re kind of doing some research on what... what platform do we use because it wasn’t integrated into our EMR (electronic medical record) at that time and the one that we decided on, it was because it was HIPAA compliant and secure.” (P12)

Many participants assumed that older clinicians would be less likely to have the knowledge needed to use the technology, whereas younger clinicians would have no problem, *“now I know that the new grads know, they are very well versed in the technology part of it, now us old ones, us oldies, are not.”* (P5) However, two out of the three late career participants in this study reported good technology-related knowledge contradicting this perspective.

Increased VC experience and exposure facilitated participants' ability to use technology and troubleshoot problems. Participants explained that although they were not 'tech savvy', they managed to learn how to use the technology. However, technology-related privacy and security knowledge gaps are evident, and participants suggested training as a solution to address this problem.

Communication skills

Participants reported that PTs need to have exceptional communication skills to deliver care via VC. Enhanced verbal communication was described as an essential skill for PTs to educate, advise and instruct patients about how to perform movements or exercises. Participants reported that an increased focus on communication skills was needed to account for the loss of information that would typically be gained from hands-on skills.

"You become so dependent on your hands and what you're doing you see, and now you have to be more aware of how you communicate, how you express things. It's not only the visual, the body language, it's also your communication skills... you really need to make sure that the commands are clear." (P14)

In addition to verbal communication, non-verbal communication was also described as an important attribute for PTs delivering care via VC. Non-verbal communication required increased energy and effort, *"your gestures, your facial expression, how you're talking, it all, in my opinion, it all has to be accentuated and exaggerated."* (P3) Verbal communication was also described as more mentally taxing compared to in-person care, due to the amount of talking required and the need to speak clearly and succinctly, *"physios are always talking, but on camera if you're doing it constantly, like I felt by the end of the day I lost my voice or it was very, I felt it was more draining mentally than regular care."* (P3). Another participant explained that certain patient conditions or characteristic emphasised the challenge further,

“literally, I would get headaches from it because to explain how to move, to someone who has a cognitive issue, simply enough but to make it understood, I just, it was so hard.” (P16)

Although participants described the increased demands for clear communication via VC as challenging, they also described some positive implications, *“it really helped me with my listening skills I felt”*. (P6) Others explained that increased VC experience led to improved communication via VC. *“Now I feel better about the communication pieces of it, allowing more pauses for the patients to respond because there’s always a little lag.” (P8)*

The importance of communication skills was emphasised for PTs’ delivering care via VC. The increased focus on communication skills was needed to offset the loss of physical contact and information that would typically be garnered from hands-on tests or techniques. Participants reported cognitive fatigue due to the amount of talking required in a VC appointment; the need for clear, succinct instructions; and the increased effort needed for non-verbal communication.

Physical capability

Physical capability describes a PT’s physical ability, strength, dexterity, and stamina to perform the behaviour (Table 3. Data coding, working definitions and anchor samples). This category contained the least amount of data and contains two generic categories, physical demands and accessibility and participation.

Physical demands

Participants reported that delivering care via VC required different physical demands compared to delivering care in-person. These altered physical demands equated to less movement and physical activity, and sometimes required awkward positioning and exaggerated movements to ensure the patient could see the PT in the camera’s field of vision.

“I literally would grab their band from the department, run into this room, tie to my leg, pull myself away from the camera, have my leg sticking up in the air. Literally, yeah, to demonstrate an exercise because like, I mean, they see this right, but yeah and so it's, it was really weird.” (P16)

During COVID-19, participants often had to find space and resources at home so that they could deliver care via VC. However, the available equipment did not always suffice, and this affected ergonomics, which had physical health implications. *“My back would hurt by the end of the day, because I didn't have like a good chair and like, you know, I'm sitting on an unsupported background rocking ottoman like it wasn't, it wasn't the best.” (P2)* Another participant explained the mental impact of less physical activity when working from home, *“I needed mentally the feeling of going to work every day. I just can't do all my work from home. I don't know why, maybe if you're not, I guess maybe you're not moving much.” (P12)*

Participants described altered physical demands when delivering care via VC. The movements and exercises demonstrated had to be emphasised and required different and sometimes awkward positions to ensure patients could see them. Although COVID-19 provided the opportunity to work from home, poor ergonomic work areas and a lack of physical activity had some negative implications.

Accessibility and participation

Physiotherapy participants with disabilities or ill health reported that VC enabled work accessibility and participation when delivering care in-person was prohibited. These participants all had several years of clinical experience and were in the late stages of their careers.

Two participants explained that the elimination of physical contact with patients was needed for them to continue working. *“My physician was like no, it's too dangerous, just stop (in-person)... I had to switch (to VC) like it's still, like it's even more unsafe for me to return*

to clinic now than it was like during the pandemic.” (P20) The same participant also described how hypermobility and stress on their joints had already led to adaptations of traditional hands-on interventions, which were more amendable to VC. Another participant reported that VC allowed them to continue working while receiving treatment for a health condition. This absence of physical contact enabled some PTs with disabilities or health conditions to continue working when in-person care was prohibited.

In addition to the elimination of physical contact enabling PTs to deliver care via VC, another participant reported that the inclusion of technology was advantageous and facilitated the communication aspect of an appointment. *“I wear a hearing aid, so my hearing aids, I could connect it to the bluetooth so nobody else would be disturbed.”* (P19)

Participants with health conditions or disabilities described VC as an option that enabled work accessibility and participation when in-person care was limited or prohibited. These participants were all in the late stage of their career with significant clinical experience.

Opportunity

Opportunity refers to factors *external* to the PT that influence the delivery of care via VC, whereas capability refers to internal factors. This is divided by Michie et al. (2011) into *social* opportunity, which includes the social norms, words, attitudes and behaviours of others; and *physical* opportunity which describes factors in the environment including space, equipment, resources and time (Table 3. Data coding, working definitions and anchor samples).

Social opportunity

The social opportunity category includes three generic categories and includes public perceptions and considerations; professional acceptance; and funding models.

Public considerations

Participants explained that public perceptions, preferences and cultural needs influenced PTs' delivery of care via VC. COVID-19 led to a dramatic increase in patient demand for VC. However, a few participants reported concerns about the quality and consistency of care delivered during this time when many PTs felt unprepared. There was concern that this may have negatively impacted patients' perceptions of VC.

Once COVID-19 social distancing measures were lifted, no further patients requested VC. An explanation for this was provided as, *"the patient expects you to at least, when it comes to physiotherapy, to like you know, to do some treatment which works like topically, where they are actively engaged with that touch kind of feeling."* (P13)

Participants reported that patients perceive physiotherapy's quality and legitimacy on the hands-on care that they receive, *"a large part of my practice is people believing that my hands do something... people believe my hands are magic, tactile stim is important to patients."* (P6) Participants described the challenge this creates when promoting VC as a feasible and valuable alternative to in-person care, *"it's like a, a battle with patients, convincing them that this is good, this is helpful."* (P8). Another participant corroborated this view about the public's hesitation, *"people were definitely skeptical about the value of what we were going to do."* (P6). Participants reported that the public's perception of physiotherapy as a hands-on profession and preference for hands-on care, limits acceptance of VC. Promotion of VC as a feasible and effective alternative is needed and participants explained that this is the role of the Manitoba Physiotherapy Association as the organization responsible for promoting the profession.

Although most participants reported that patients preferred in-person care and perceived that hands-on care is necessary, one participant held contradictory views. The participant worked with individuals with MSK conditions, was unable to deliver care in-person and had delivered over 100 VC appointments.

“I have so many clients that would prefer virtual over in-person... the clients that I’ve worked with certainly have come to understand that it wasn’t my hands, so the ones that have worked with me now are like definitely, like it’s your exercises that are making me better.” (P20)

In addition to public perceptions and preferences, participants highlighted the importance of considering the cultural needs of Manitobans when delivering care via VC. Participants described the diverse cultures in Manitoba, including Indigenous Peoples and Hutterite communities. One participant explained that Hutterite women have limited access to a cell phone, and they wanted to go to in-person appointments because it was a justifiable reason for them to leave their colony. Participants also contemplated whether Indigenous Peoples would consider VC as an appropriate alternative to in-person care, *“is this appropriate within like, would this be deemed appropriate by clients that are living in these remote First Nation communities?” (P17)*. The issue of trust between Indigenous Peoples and the healthcare provider was also considered,

“I always keep in the back of my mind like, I’m this young white girl that’s coming to the rez, and I don’t know if they’ve had...the big white man in (city name), if there’s been more care or stereotypes or you know? A million percent this impacts trust, 10 million even.” (P7)

A few participants considered the inclusion of a local rehabilitation aide as a solution to address the trust issues that exist between Indigenous Peoples and the PT provider, *“if it was a rehab aide that was of that culture, then now you’re, now it’s gold... it really helps with*

that trust factor.” (P6) Another participant corroborated this idea as a potential solution, *“in an ideal circumstance, it (rehab aide) would be someone locally who's trained so that you know and someone who would, you know, understand the customs.”* (P4)

Participants highlighted the importance of considering individuals’ needs, expectations, and preferences. The cultural diversity within Manitoba requires PTs to consider whether VC is appropriate and acceptable for everyone. Participants reported concerns regarding trust between the clinician and patient when delivering care to Indigenous Peoples. It was suggested that the inclusion of a local rehabilitation aide who understands the local context could address these concerns and facilitate the delivery of care via VC.

Professional acceptance

Many study participants described how the profession’s culture impacts PTs’ acceptance of VC. Professional culture develops from professional socialisation which leads to shared expectations, beliefs and norms that guide behaviour (Skyvell Nilsson et al., 2018). A physiotherapy participant explained these social norms and expectations,

“..the idea that the best kind of physiotherapist is this therapist with the golden hands, who has done all of this specialized work and it leaves kind of other physiotherapists like me going like, so am I a real physio like am I a, less-than physio because I don't do this kind of work?” (P4)

Other participants confirmed this explanation and reported that many patients believe hands-on care is expected and needed to ‘fix’ problems. Participants suggested that some PTs will be reluctant to loosen the grip on hands-on skills and unwilling to change their practice, limiting acceptance of the hands-off approach needed for VC.

“I kind of feel like, if there is gonna be people that really fight against this whole telehealth, like holding on to this magic mountain of manual therapy skills with your

magic hand, and I'm like, I feel like rehab's moving in a different direction. Yeah, you're holding on to archaic kind of thinking.” (P12)

In addition to individual and professional acceptance of VC, participants described the impact of professional bodies on the delivery of care via VC. Participants reported that professional association and regulatory support for VC had been insufficient, which impeded PTs' delivery of care via VC. The implications of inadequate support from the professional regulatory body were explained:

“I always felt like we were pushing the, the leading edge on things without having that backing behind us and just kind of taking a risk that it was going to be fine kind of thing....and then, yeah if your college isn't 100% behind you on things, it is pretty unnerving.” (P3)

These feelings were reiterated with concerns about licensing when attempting to forge ahead with new ideas and innovations.

“They (CPM) have a really important role. I respect what they do, but they seem to be resistant to change.... and then there's resistance when you're trying to do something new and you, you just give up because you don't want to lose your licence. You're scared of getting censored and so then you just don't even go there.” (P8)

Several participants reported that the Canadian Physiotherapy Association (CPA)² and the MPA could facilitate professional acceptance of VC by offering professional development opportunities. A participant described a helpful VC course, *“the private practice division of CPA did a lot of zoom calls for private practice or any physical therapy business and it was all for free and they kind of gave us like, helpful tips and what to do.” (P19)*

² CPA – Canadian Physiotherapy Association – the national organisation supporting and promoting the physiotherapy profession across Canada (www.physiotherapy.ca). MPA, the Manitoba Physiotherapy Association, is its provincial branch.

Participants described how professional acceptance and professional organisations' support influenced the delivery of care via VC.

Participants explained that the physiotherapy profession's perceived value of hands-on care limits the acceptance of VC's hands-off approach. They described this a barrier to the hands-off approach required to deliver care via VC. They highlighted that the physiotherapy profession's perceived value of hands-on care limits the acceptance of VC's hands-off approach. Study participants explained that the professional association (MPA) could contribute towards improving professional acceptance by offering courses. They also reported that the regulatory body (CPM) needs to ensure timely diffusion of detailed information and guidance to encourage the profession's acceptance of this novel innovation.

Funding models

Participants working in private practice reported that funding models influenced the delivery of care via VC in Manitoba. They reported jurisdictional barriers related to privately funded delivery of care using publicly funded spaces and resources. Additionally, third party payers' willingness to cover the costs of VC was identified as a significant enabler for participants working in private practice. A participant indicated that more work is needed to encourage insurance companies to fully accept VC. *"MPA could definitely do a better job of advocating the benefits and efficacy of virtual care towards insurance, third party payers, especially Workers Compensation Board, who do not accept it at all as a thing that exists."* (P20)

Several people reported that income discrepancies across the province will limit who can access and pay for VC. A few private practice participants reported that although individuals living in remote and rural areas could benefit from VC, they stated income was often lower and fewer people had insurance, which limits access to private practice providers. A unique funding model was described by one participant where public resources were used

to deliver private physiotherapy services, thus, presenting as a solution for the public-private healthcare divide that limits the delivery of care via VC in Manitoba.

“My Health Teams in (Manitoban city name)... it's a unique program for people that don't have private insurance... there's a lot of unfunded physio positions at the hospital and so what they do is any of their unfilled physio positions... they take the funding that, that's allotted or budgeted for those physio positions and when their waiting list gets out of hand, they start using that to fund physio in the, in the private clinics.” (P12)

Although this participant described the use of private clinics to address waiting lists in the public healthcare system, another individual highlighted how the public and private healthcare jurisdictional divide creates a barrier for Manitobans accessing care. Participants described the scenario where privately funded clinicians wish to access publicly funded spaces and resources, in order to deliver care. One private practice participant explained that a patient requiring access to an appropriate space and technology could use a nursing station for example. However, this would require the use of publicly funded spaces and government technology systems; a private practice PT would have difficulty accessing these due to the public-private healthcare divide. Challenges related to the public and private practice gap in Manitoba was described further,

“the problem with Manitoba is that there's such a huge division between public and private... they need to figure out the compensation model... and to see that patient in private practice, I would have had to have been in public practice.” (P9)

One participant suggested a solution to address the public-private healthcare gap:

“both CPM and MPA, both of them have the ability to link public and private... Shared Health really needs to step up and kind of link with, link with the private sector in terms of a lot of things I think.” (P9)

The public-private healthcare divide has been identified as a barrier limiting participants working in private practice and delivering care to patients that require the use of publicly funded space, equipment, and the internet. Study participants described solutions to this, which included linking public and private healthcare to facilitate private practice PTs' delivery of care via VC. This would allow the private practice PTs to access public infrastructure in Manitoba.

Physical opportunity

Physical opportunity describes factors that are external to the PT that involve the environment or surroundings (**Table 5. Summary of content analysis**). This category contains three generic categories, two of which (access to technology and the environment) include two additional sub-categories, patient and PT; as well as patient characteristics.

Access to technology

Both the PTs and the patients' technology were reported to influence the delivery of care via VC. VC involves the connection between two separate environments and two distinct sets of technology. These factors are explored separately in two sub-categories below, albeit both from the PTs' perspective as reported over the course of the interviews.

Patients and technology

Physiotherapy participants frequently cited factors related to technology in the patient's environment as having impeded PTs' delivery of care via VC. These factors included the internet connection, access to the required technology and patients' ability to use the technology.

Participants stated that technology related barriers were almost always on the patient end, as opposed to the clinician. Poor internet connections and assisting patients with troubleshooting the technology required time, which was reported to use up a considerable

portion of the appointment duration. Participants reported that some patients did not have the required technology to receive care via VC, which limited access to virtual care services.

“The technology aspect, yeah, I think that a lot of people either don't own it or don't understand it... There are those who don't have a cell phone, don't have that kind of technology available and they just couldn't do this.” (P16)

Poor internet connectivity and bandwidth were significant barriers impacting the quality of the video call, limiting PTs' delivery of care via VC. *“I'm trying to think if I have any schools that have internet consistently throughout? No consistent internet, it's, it's absolutely shocking.” (P18)* Internet connections were predominantly a problem for people living in remote and rural areas. Participants described resorting to the telephone, turning off the video to improve the sound quality or hesitating to offer VC to individuals living in rural areas because of internet connectivity concerns.

Poor internet connectivity for patients living in remote and rural areas of Manitoba presents as a significant barrier for PTs delivering care via VC. The need for improved internet connections, particularly in remote and rural areas of Manitoba was identified by several participants. Two participants were hesitant to scale up the delivery of care via VC into rural Manitoba due to concerns about poor internet connectivity, thus, limiting access to virtual care for these individuals. Participants have identified the need for patient access to technology and high-speed internet connectivity in rural Manitoba.

Physiotherapists and technology

Participants described technology-related factors experienced in the PTs' environment influencing the delivery of care via VC. These factors included equipment such as computer, laptop or tablet, and microphone. Participants reported that technology-related challenges were less impactful compared to patient-related technology factors. Although PTs working in private practice described some challenges related to technology, it was predominantly

participants working in public practice that reported out-dated technology that impeded the delivery of care via VC and challenges related to poor internet connections.

“I think Regional Health lacks with the technology, to be honest... it's not the most friendly technology to work when it comes to the telerehab network... they could have had better computers, better laptop, like laptops, like they take, like, 30 minutes to start and then becomes like a hassle to a physio, to do a videoconference as well.”

(P13)

Public practice participants reported having more support to assist with technology troubleshooting, compared to private practice participants.

“We have an IT department, like if I have a problem, I phone IT and they help me with it and you know, like my computers and all this stuff, they automatically do all the updates and I don't, I don't have to do it any of it.” (P17)

Private practice participants reported resorting to non-compliant Personal Information Protection and Electronic Documents Act (PIPEDA) VC platforms when experiencing challenges, *“a couple of times when the software platform didn't work, I would say, you know, like it's less secure and here's why and they (patient) would say just call me on FaceTime, I don't care.”* (P15) Another private practice participant reported that they provided an explanation to the patient when using a non-compliant VC platform that it was less secure. The participant reported that this security was not important to the patient, their priority was to connect to the call so that they could have their physiotherapy appointment.

Participants reported some challenges related to out-dated or malfunctioning technological equipment, which impeded the delivery of care via VC. Reliable, high-speed internet connections and up-to-date technological equipment were described as essential to facilitate the delivery of care via VC.

Environment

The environment category includes factors such as space, resources, rehabilitation equipment and time. Similar to technology, two separate and distinct environments influenced the delivery of care via VC – that of the patient and that of the PT. Two sub-categories describe PT and patient technology-related factors below.

Patients and their environment

Participants described the factors related to the patients' environment that influenced the delivery of care via VC. These factors included patients' space, background noise, and a lack of rehabilitation equipment typically used in-person. Participants reported that patients did not always have an optimal space with the necessary equipment and *“you have to make sure that their space is safe and comfortable to do the exercise as well, like if they're, if they're set up in a cluttered up room.”* (P3) Some participants reported that the camera and poor lighting sometimes made it hard to see the patient's environment, requiring them to adapt to these fluctuating variables.

Although nursing stations were identified as a space that patients could use if they didn't have an appropriate space at home, a participant described this as an unnatural space that didn't reflect the home environment. Other participants reported that nursing stations were often used by other healthcare providers and therefore, not always free of distractions.

In addition to the challenges related to an appropriate clutter free space, participants described distractions that negatively impacted the delivery of care via VC. These included noise from other family members, children and pets, *“we've got this parrot squawking in the background and they're distracted, right and I'm like ok, I think it should stop now.”* (P16) Although participants understood that some of these distractions were difficult to eliminate in the home environment, communication was more difficult, impeding the delivery of care via VC.

Patients did not always have access to appropriate rehabilitation or exercise equipment in the home, challenging the provision of appropriate exercises. One participant explained that they requested patients purchase small, inexpensive pieces of rehabilitation equipment to aid in their recovery. An alternative approach was the use of household items that were used as rehabilitation equipment. Participants described a variety of household items that were used to facilitate the delivery of exercises via VC.

“So like a lifting assessment, for example, if you were assessing someone’s lifting restriction, we kind of we got very good at knowing what common household items weighed and so we actually went through (therapist name) and we’re like, OK, what does a four liter of milk weigh? And what does a one liter of milk weigh? And what does a can of chicken noodle soup weigh? And so being able to kind of tell those sorts of things.” (P15)

Participants experienced a range of factors related to the patients’ environment that influenced the delivery of care via VC. Patients needed an adequate amount of space with minimal distractions and appropriate household items that could be used as rehabilitation equipment. Participants described the need to be responsive and adaptable to variable and fluctuating patient environments. PTs considered the use of nursing stations for patients that did not have an appropriate space at home, however, this was not always an optimal space to facilitate the delivery of care via VC.

Physiotherapists and their environment

PTs experienced a number of factors related to their own environment that influenced the delivery of care via VC. PTs also differentiated between the delivery of care in the clinic environment and their home environment, the latter of which was often used immediately following the onset of COVID-19. Participants reported environmental factors that influenced their delivery of care via VC and these included COVID-19; a lack of space; disruptions from

colleagues and background noise; challenges with scheduling VC appointments alongside in-person appointments; and time restrictions.

Participants reported that COVID-19 facilitated VC uptake. The pandemic presented as an unprecedented environmental factor that pushed many PTs into the digital environment to ensure continuity of patient care. Although participants proclaimed that adopting VC was not a choice, *“we're forced into telerehab”* (P19), one individual explained that delivering care at a distance alleviated concerns about contracting COVID-19. Participants reported that easing of social distancing and re-opening of clinics led to a decline in patient demand for VC. *“I felt it had its place when the clinic was shut down and everybody was locked at home, yeah. After that I just felt like it lost its need and its demand, and it's, it's real day-to-day usage, I guess.”* (P3)

A lack of space was frequently described as a barrier for PTs delivering care via VC, *“I was in a closet, literally in a closet. There wasn't enough room for me to move. So yeah, it was very, it was difficult.”* (P5). Participants described adequate space as a necessity to enable them to move around comfortably while demonstrating movements and exercises. This requirement included having the space to step back from the camera so that the patient could see the clinician's whole body moving in the camera's field of vision.

In addition to the space requirements, participants stated the importance of minimising background noise to limit distractions. A study participant reported that individual rooms were beneficial, *“I have separate rooms, so it never, it never interfered with the other physios that are in here, so the setup was easy.”* (P19) However, many others explained that colleagues would be working in the background, or the office used for VC appointments was also used as a staff room. This impeded conversational flow at times and made it harder for PTs to focus on the call. Most private practice participants reported a

preference for delivering care via VC from home for this reason, where they had more control over their environment.

The reported duration of a VC appointment varied considerably between participants. Some participants reported that more time was required compared to an in-person appointment, whereas others stated that VC required less time. Staying on time was described as essential because VC necessitated one-on-one uninterrupted time between the patient and PT. One participant described this succinctly, *“the biggest adaptation I made was that if it’s a 30 minute appointment, it’s not 31 minutes, it’s 30 minutes, whereas here in the clinic I could have a 30 minute, I could have a 45.”* (P6) The strict time allotments for VC was difficult to adhere to for PTs who were used to seeing multiple patients at once. Subsequently, this challenged the scheduling of VC appointments alongside in-person appointments. Participants reported that VC appointments were often strategically booked at the beginning or the end of their workday to account for the dedicated time allotment required.

Participants reported that COVID-19 forced PTs to adopt VC to ensure continuity of patient care. They reported that patient demand for VC declined once COVID-19 social distancing measures were lifted. A dedicated space that was large enough for a clinician to move around, enabled PTs’ delivery of care via VC. Minimising background noise and distractions facilitated communication between the PT and patient. The duration of a VC appointment was reported to vary considerably. Scheduling one-on-one VC appointments in a PT caseload that often included the treatment of multiple patients at once, was described as challenging.

Patient characteristics

Participants identified and described a variety of patient characteristics that influenced the delivery of care via VC. These factors included a patient's health condition; language; age; visual or hearing impairment; and their ability to use the required technology.

Participants working with patients with MSK conditions reported uncertainty and contradictory statements at times about which patient conditions were most amenable to the delivery of care via VC. *"I felt as a follow up it was easier especially surgical rehab because for surgical rehab they have their protocols of exercise, so I thought like, that was simple you know."* (P19) Whereas another participant reported the opposite view *"a knee is perfect to see if it is not post-op."* (P17) Participants described upper extremity conditions as being easier to manage via VC compared to lower extremity conditions because the camera did not need to be moved to see the upper extremities. .

The participants working with patients with neurological and cardiorespiratory conditions explained that some patient conditions could be adequately managed via VC. These patients included those who were medically stable and more physically fit with minimal balance and mobility impairments. In contrast, a participant working with patients with cardiorespiratory conditions provided an example of a patient that would be challenging to see via VC.

"..some people are dealing with serious pulmonary fibrosis, interstitial lung diseases. You don't know when their shortness of breath would exacerbate and I cannot expect them to tweak on their oxygen or, you know, call 911 or something like that. So, I think that was also a major concern on the role where I am primarily working... and to load them with technology becomes a little difficult." (P13)

Participants working with neurological conditions voiced concerns about patient safety.

“If somebody has a cognitive impairment or a language impairment, it's really difficult to communicate through videoconference... and then physical impairments like balance can become dangerous or if somebody is very impulsive.” (P8)

Language barriers were also identified as a factor limiting participants' ability to deliver care via VC, requiring extra time for translation. *“I had some people with language barriers, and so I have a family, or you know, interpreting on the side, yeah, that was difficult.”* (P4) One participant described the value of using technology and translation applications, which facilitated their ability to deliver care via VC.

Several participants reported that older adults were less able to use the technology needed to receive care via VC. They explained that older adults were more likely to experience hearing and visual loss compared to younger individuals, thus, further impeding older adults' ability to receive care via VC. Study participants working with individuals with neurological and pulmonary rehabilitation conditions stated that patients' cognition, impulsivity, and medical stability status impacted the delivery of care via VC. Communication barriers and patients' age were also reported as factors negatively impacting patients' ability to use the required technology.

Motivation

Motivation has been described as a mental process that drives behaviour (delivering care via VC) and includes wants, needs, intentions, goals and evaluations (Michie et al., 2011; West & Michie, 2020). This category is separated into *automatic* and *reflective* motivation.

Automatic motivation

Automatic motivation describes a PT's interest, inspiration, wants, needs, habits, and impulses (Table 3. Data coding, working definitions and anchor samples). Two generic

categories were created within automatic motivation, clinician preference and incentivisation (Table 5. Summary of content analysis).

Clinician preference

Almost every participant reported a preference for delivering care in-person. Several participants had an explanation for choosing in-person care over VC, *“one of the things that I love about being a physiotherapist is that I can be next to a person, guide the position, put my hands on.”* (P14) The elimination of hands-on care prohibited the use of tactile communication, which restricted PTs’ desire to use VC. However, there were exceptions to this view, *“it’s so rewarding, it’s so rewarding, that keeps my fire burning with that because you’re like, oh my God, we can help all these people, this is amazing.”* (P7) The increased focus on exercise and self-management techniques as opposed to passive treatments was cited as an advantage of VC.

The majority of participants described feelings of inadequacy as a clinician when delivering care via VC *“I just felt like I was just being a terrible physiotherapist with it... I felt this was sub-standard care.”* (P16) and another participant described similar feelings, *“you don’t really feel like you’ve done a good job, even if you, you know you might have.”* (P5) Interestingly, these participants both worked with patients with neurological conditions. However, a private practice participant corroborated these views and explained that they did not charge for a VC appointment, *“because this is new for me, I’m not charging you guys, and so I did a ‘no charge’ you know, because I thought it was unfair to them, they weren’t getting the full assessment.”* (P19)

Participants primarily described their preference for the physical contact that is possible when delivering care in-person. Participants reported feeling inadequate when delivering care via VC because they could not deliver the full scope of their physiotherapy skill set, which requires hands-on care.

Incentivisation

Participants described the incentives that motivated them to deliver care via VC, these were mainly financial in nature but also included work flexibility. Delivering care via VC did not allow private practice PTs to make as much money, *“as someone who makes commission, I couldn't see as many people, obviously, and like, once they did one appointment, you're not coming in for the same frequency.”* (P2) Corroborating this sentiment, another private practice participant provided further explanation, *“you can't treat concurrent people, so from a cost analysis or expenses analysis, it's not, it's not that efficient actually.”* (P3) These financial implications were not experienced by participants working in public practice who were on a salary-based income, *“I find the public system does a better job of kind of guiding people to self-management, because they're not bound by the financial constraints however many people they see in a day, their paycheck is the same.”* (P11)

VC offered work flexibility and the opportunity to deliver care from different locations, which participants reported as appealing.

“As I'm approaching the other end of my, you know, closer to retirement and so if I can try to be able to be in the clinic at some point and also have my external videoconferencing then that allows me a bit more home and or cottage, I'll say work so right so, so that's, that's where I'm kind of going to.” (P1)

Private practice participants described VC as an alternative delivery mode that is not financially viable compared to delivering care in-person. This was because fewer patients could be seen in a PT's workday. The work flexibility that VC offers was described as an advantage and a few participants acknowledged the benefit of being able to work from different locations.

Reflective motivation

Reflective motivation is different to automatic motivation. Reflective motivation describes PTs' perceptions about the advantages and disadvantages of VC; outcome evaluations; PTs' intentions and plans for continued use of VC (Table 3. Data coding, working definitions and anchor samples). This category contains three generic categories, which include perceived value of VC; professional identity; and a hybrid future (Table 5. Summary of content analysis).

Perceived value of VC

Participants described their perceived value of VC and the advantages and disadvantages it offers compared to delivering care in-person. The advantages of VC included its potential to improve inequitable access to care; the elimination of travel and associated convenience; and improved adherence to exercise programs. The disadvantages included the perception that VC is an inequivalent alternative to in-person care, predominantly due to the loss of a hands-on physical assessment and interventions, and concerns about patient safety.

Many participants reported that VC has the potential to improve inequitable access to care in Manitoba. *"I see it as a great tool to help rural and remote communities, northern communities if the resources are in place"* (P8) One participant expressed their concerns about VC as a panacea for access to care, however, *"I get a little worried about telehealth almost being like a band-aid for inequities... we can't just say we're doing everything virtual."* (P4)

Almost all participants reported that VC eliminates the need to travel and offered patients a convenient alternative to in-person care, particularly for those people who work in a variety of different locations and had limited time. An additional benefit was the ability for patients to connect with a PT with unique clinical expertise not locally available. Although

convenience is often described as an enabler and a significant benefit of VC, one participant questioned whether convenience was the best choice for all patients.

“When I think of like maybe some of your chronic pain patients, they're off work, I think there is value sometimes in making them come into the clinic you know, yeah, kind of the same way they have to get in their car and go to work. It's almost too convenient for them to just flip on the computer and he's going to get, you know, I don't even have to change out of my clothes you know, I'm just gonna lay here on the couch and have my cigarette lit.” (P6)

Many participants described the benefits of VC in eliminating unnecessary travel. One study participant expanded on the positive implications that reduced travel has on planetary health,

“... how can we deliver high quality care in a way that is environmentally conscious? So I think this is a big piece here, this is another area that telerehab could have a big impact on. Am I going to drive to that client's house? Do I need to? Or can I do what I need to do via telehealth? It could reduce carbon emissions, carbon footprint.” (P4)

Although participants described the advantages of VC, disadvantages were also reported. With few exceptions, the majority of study participants deemed VC as an inequivalent alternative to in-person care.

Many participants also reported concerns regarding the safety and effectiveness of care delivered via VC due to the inability to provide physical assistance and accurately measure outcomes. Safety concerns were emphasised when participants worked with patients with impaired balance and mobility, *“is it even safe for me to assess it properly, right, if there's nobody beside them?” (P17)* Participants reported that being adequately prepared and anticipating safety concerns helped reduce the risk of any incidents. The inclusion of family members also alleviated concerns by providing support and physical assistance when needed.

Participants also voiced apprehension about the implications of missing pertinent assessment information, *“I would be scared I would miss something and we all know we are licensed and we report and we, you know, have governing bodies and that might be a little scary if you missed something.”* (P17) A key adaptation to the care delivered via VC, was the provision of less challenging movements and exercises. *“I didn't give them anything harder than I knew that they were going to be safe to do so.”* (P17)

Although concerns were reported about the effectiveness of care delivered via VC, a few private practice participants reported that monitoring of patient outcomes implied that care delivered via VC resulted in similar outcomes to care delivered in-person. *“I keep rough numbers of how I do, you know, gross numbers of how long it takes to get people better in average number of treatments and this kind of stuff that didn't, that didn't seem to change.”* (P6)

In summary, participants recognised VC's potential to improve inequitable access to individuals living in remote and rural areas but described it as an inequivalent alternative to in-person care. Private practice PTs working with patients with MSK conditions reported more positive perceptions about the value of VC compared to public practice participants working with cardiorespiratory and neurological conditions.

Professional identity

The hands-off approach that is required when delivering care via VC conflicts with the profession's traditional hands-on identity. Participants described the emergence of a new consultant-based, virtual role within the physiotherapy profession. Some individuals perceived this as a negative, *“it makes me sad a little bit, I just feel like we're losing a big part of our identity.”* (P5) This statement was exemplified further by a participant working with patients with MSK conditions, *“I mean, I'm not a personal trainer. So, someone is not just coming in, you know, to learn some exercises and leave... I feel that terribly undermines*

my skill set and what I've learned and spent so much time learning.” (P1) Other participants, however, described the positive implications of VC and its potential to extend a clinician’s role and the profession’s scope of practice. One participant explained that an anchored professional identity limits the consideration of new roles,

“The profession is having an identity crisis... physiotherapy is not just MSK, it's not just hands on, it's not just XYZ, but if you think about, what are these other roles that we could have as physiotherapists that we haven't really ventured into because we've been too locked into the idea of what we are?” (P4)

One individual reported that Canadian PTs have a strong emphasis on the importance of hands-on care and their current role challenges the development of the profession’s identity further,

“I think that from an identity perspective we would have much further to go than programmes (United States) where they’re more in that director role, they’re more in that, you know, sort of assessment and then directing treatment and then someone else actually provides the hands on or the supervision...” (P10)

In summary, participants described an emerging consultant-based role for VC.

Participants have mixed feelings about the impact that VC and a hands-off approach will have on professional identity. The concept of a fixed professional identity was described as a barrier impeding acceptance of this virtual role, thus, limiting the delivery of care via VC.

A hybrid future

Many study participants reported that VC is here to stay post-pandemic. The majority of participants described a hybrid future, one that involves a combination of in-person and VC appointments, *“I think to not do it is regressive, you know? Yeah, the world is moving in this way whether we like it or not.”* (P12). This allows for the delivery of care that includes the benefits of VC and in-person care.

Participants described the hybrid model of care as more preferable to VC alone. *“I think, being able to do my initial assessment in-person dramatically improves my follow-up via videoconferencing.”* (P2) Although the benefits of a hybrid model were extolled by some, not all participants agreed. One participant working in public practice with patients with neurological conditions explained, *“a hybrid model didn’t work well with us, but that might be because of how we have been applying it... for us in our situation, the hybrid model has not added value.”* (P8)

Participants envisioned a hybrid future for VC in Manitoba, *“the seed is just planted and who knows where it’s going to go.”* (P1) The reported benefits of a hybrid model included the ability to provide hands-on care when necessary, while alternating with the convenience of VC. A hybrid model was described as preferable and more acceptable compared to VC alone. A few participants reported that discontinuing with VC would be detrimental for the physiotherapy profession.

Summary of results

A key finding that impeded the delivery of care via VC and was categorised in almost all of the main categories, was the inability to provide hands-on care. Many participants gained their first VC experience immediately following the onset of COVID-19. The rapid transition into the digital environment meant that many clinicians had limited psychological capability to deliver care via VC. Participants described adapting their hands-on skills and the need to consider alternative techniques to assess and treat patients. Previous clinical experience was described as an essential pre-requisite that equipped PTs with knowledge and skills that could be adapted to a hands-off approach. The VC exposure and experience gained developed clinicians’ knowledge and skills and facilitated the delivery of care via VC. Although PTs’ psychological capability evolved as they gained VC experience, this study has

highlighted gaps in their VC knowledge and skills. These included uncertainty about conducting a thorough physical assessment, safety concerns and complying with data security requirements.

An unanticipated and novel finding in this study was discovered in the physical capability category. VC provided PTs with the option to continue working when their own physical disabilities or ill health limited or prohibited the delivery of care in-person. These participants were all in the late stages of their careers with significant clinical experience. VC enabled PT work accessibility and participation due to the inclusion of technology and the absence of physical contact.

Most of the data were categorised in the physical and social opportunity categories, which represents factors external to the PT. A large amount of the data reflected patient-related factors that impacted PTs' delivery of care via VC. The physical opportunity category differentiated between the two distinct environments, patient and PT. Participants working with patients with neurological and cardiorespiratory conditions reported more challenges delivering care via VC compared to participants working with patients with MSK conditions. Patient access and ability to use technology was reported as problematic, limiting the delivery of equitable care via VC. Patients without access to high-speed internet connections, a fundamental necessity for virtual care, exacerbated inequitable access to care for Manitobans further and was frequently described as a barrier for PTs' delivering care via VC. A key finding in the reflective motivation category was VC's potential to improve access to physiotherapy services in Manitoba. However, this mode of delivering care was perceived as a lower value alternative compared to in-person care. Findings within the automatic motivation category revealed that participants preferred in-person care because they could use their hands-on skills. VC was not as financially advantageous for PTs working in private practice because they could not treat multiple patients simultaneously. Private practice

participants who treat multiple patients at once are unlikely to choose VC to deliver care because it requires a one-to-one interaction between the PT and patient.

Participants envisioned increasing integration of technology within the profession and abandoning VC all together would reflect a devolving profession. Participants foresaw a hybrid future, where care would involve the combined benefits of in-person and VC. The findings of this study revealed that 25% of participants were delivering care via VC pre-pandemic and 35% were either intending to or were continuing to deliver care via VC post-pandemic.. The results of this study indicated that barriers influencing the delivery of care via VC persisted post pandemic, and many PTs returned to clinics to deliver care in-person once public health measures were lifted.

These findings will be discussed in the following section, Chapter 5. Discussion. The research questions will be answered along with an explanation about how this study contributes towards an advancement in the understanding of the research problem.

Chapter 5. Discussion

The purpose of this study was to explore Manitoban PTs' experiences and perceptions about the factors influencing the delivery of care via VC. The application of behaviour change theory allowed for the consideration of a multitude of internal and external factors influencing PTs' delivery of care via VC. The physiotherapy population with VC experience increased dramatically following the onset of the COVID-19 pandemic. PTs working with patients with MSK conditions described more optimistic experiences and perceived the value of VC more positively compared to PTs working with neurological and pulmonary rehabilitation patients.

This study aimed to learn valuable lessons from these experiences by identifying the barriers, facilitators and needs of PTs delivering care via VC. This section of the thesis will discuss and answer the research questions detailed in Chapter 1.

Application of the COM-B model

This study applied the COM-B model and utilised the six sub-components as main categories for the coding process in deductive analysis. A process of interpretation led to the development of 16 generic categories, which are titled videoconferencing categories in this study. This is comparable to the 12 categories generated in Miller et al. (2022) who used COM-B's three main components (capability, opportunity and motivation) but not the sub-components. Although Miller et al. (2022) used deductive analysis to categorise the data into the three main components of COM-B, no data was explicitly reported in the physical capability or automatic motivation sub-components. Similar studies did not report any findings in the physical capability and automatic motivation sub-components (Ezzat et al., 2023; Malliaras et al., 2021).

Using COM-B's six sub-components to analyse the data deductively in this study, allowed for the discovery of factors within all six sub-components. Although the physical capability category included the least amount of data, it contained novel and unanticipated findings in this study, which will be discussed in more detail in the following section. The category that contained the largest amount of data was the physical opportunity category. Virtual care includes two distinct environments, and this could explain, in part, for the large amount of data categorised in the physical opportunity category. Similar TR studies also reported that the physical opportunity component contained the largest amount of data (Ezzat et al., 2023; Malliaras et al., 2021).

The physical opportunity sub-component appears to be an extensive net to capture all of the external, environmental factors. This was perhaps magnified in this study with the inclusion of two separate, distinct environments, patient and PT. Dividing the physical opportunity sub-component into patient and PT categories could allow for clearer representation and understanding of the relevant factors in these two environments.

Although this study included a large amount of data in the reflective motivation category, Michie et al. (2011) explained that reflective motivation was the one sub-component of COM-B that is not necessary for behaviour change. In fact, Marks (2020) described motivation in COM-B as an individual's 'need' to perform the desired behaviour change and that the 'want' to enact a behaviour is vital but absent from COM-B. Although, factors were included in the automatic motivation category in this study, a comprehensive understanding of why PTs 'want' to deliver care via VC was beyond the scope of this study.

The behavioural change model, COM-B provided the foundation for understanding the factors influencing PTs' delivery of care via VC. The following section describes how PTs perceived their ability to deliver care via VC.

Research Question 1: How do PTs perceive their ability to deliver care via VC in Manitoba?

Ability describes the physical and mental skills needed by an individual to perform a task (Cambridge Dictionary, n.d). Ability in this study describes a PT who has the necessary skills and capabilities to deliver care via VC. The capabilities required by PTs delivering care via VC are detailed in Davies et al. (2021) VC capability framework and include compliance; patient privacy and confidentiality; patient safety; technology skills; telehealth delivery; assessment and diagnosis; care planning and management (

Appendix A – Videoconferencing Capability Framework Domains and This article was published in Davies, L., Hinman, R. S., Russell, T., Lawford, B., Bennell, K., Billings, M., Cooper-Oguz, C., Finnan, K., Gallagher, S., Gilbertson, D. K., Holdsworth, L., Holland, A., Mcalister, J., Miles, D., & Roots, R. (2021). An international core capability framework for physiotherapists to deliver quality care via videoconferencing: a Delphi study. *Journal of Physiotherapy*. <https://doi.org/10.1016/j.jphys.2021.09.001>. Permission to publish in the thesis was granted via email on October 26, 2023.

Appendix B – Videoconferencing Capability Domains and Capabilities (Davies et al., 2021).

Immediately following the onset of COVID-19, PTs felt unprepared and perceived their ability to deliver care via VC as limited, similar to the findings of previous studies (Ezzat et al., 2023; Haines et al. 2023). As the pandemic progressed and PTs gained VC experience, clinicians described an increased ability to deliver care via VC, a finding reflective of the results in Haines et al. (2023). However, a key difference between Haines et al. (2023) and this study, is that Haines and colleagues reported closure of PTs' telehealth knowledge-to-practice gap. In contrast, this study found that the knowledge-to-practice gap did indeed narrow but did not close completely. Utilisation of Davies et al. (2021) VC capability framework also allowed for the discovery of specific gaps in knowledge and skills that impacted PTs' ability to deliver care via VC. Participants in this study described challenges that are reflected in the capabilities within Davies et al. domain two, patient privacy and confidentiality; domain three, patient safety; and domain six, assessment and diagnosis. These specific gaps in knowledge and skills indicate the areas that are needing to be addressed to enable Manitoban PTs' ability to confidently and efficiently deliver care via VC.

PTs reported patient safety concerns in this study, which aligns with the findings in previous telehealth studies (Bennell et al. 2021; Giesbrecht et al. 2023). Patient safety concerns limited PTs' ability to observe or prescribe challenging exercises or movements,

and this led to doubts about the effectiveness of the care delivered. However, concerns regarding the effectiveness of TR is contradicted by a growing body of supportive evidence when delivering care to patients with MSK conditions, post-operative, neurological and cardiovascular conditions (Azma et al., 2018; Hinman et al., 2024; Nelson et al., 2020; Russell et al., 2011; Tsang et al., 2022; Van Egmond et al., 2018).

Patient safety is regarded as a key component in the World Health Organisations' Telehealth Quality of Care Tool (World Health Organisation, 2024). A study that investigated PTs' perceptions and willingness to deliver TR to patients with hip or knee osteoarthritis reported that over a third of PTs did not believe safe care could be delivered to this patient population (Lawford et al., 2018a). Patient safety concerns were explored in a more recent study involving patients with physical disabilities and movement impairments (Buckingham et al., 2023). Clinicians were particularly concerned about patient safety when conducting the physical assessment with these patients and expressed a need for family support for physical assistance. Patient safety is a priority when delivering care in-person or via VC. Study participants reported that concerns about patient safety led to the delivery of less challenging exercises, similar to the findings in previous studies (Barton et al., 2022; Malliaras et al., 2021). Subsequently, participants reported that this restricted their ability to deliver effective care to limit the risk of falls or injuries. PTs need to have their concerns about patient safety addressed, otherwise it is unlikely that they will choose VC to deliver care. Further research is warranted to study patient safety when care is delivered via VC, that can account for different patient conditions, characteristics and environments.

PTs perceived that obtaining an accurate assessment and diagnosis via VC was challenging. PTs described the physical assessment as particularly demanding due to the elimination of hands-on care, which is reflected in the findings of previous studies (Ezzat et al., 2023; Giesbrecht et al., 2023; Malliaras et al., 2021). Cottrell and Russell (2020)

acknowledged that a virtual physical assessment was limited and reported good validity for observational assessments but not for assessments that require physical hands-on. Zischke et al. (2021) reported similar findings, with the exception of validity for spinal and scar observational assessments, that is, virtual spinal and scar observational assessments were not valid. PTs would benefit from knowledge and guidance about alternative hands-off assessment techniques that allow for an accurate diagnosis when delivering care via VC. Education at both the pre- and post-licensure stages could help address this gap in knowledge and skills in virtual assessments.

PTs reported some inaccurate information regarding privacy and confidentiality when utilising technology and described the use of insecure platforms. Public practice participants tended to assume that privacy and confidentiality were the responsibility of management and the healthcare authority. Some PTs referred to HIPAA (*Health Insurance Portability and Accountability Act* – a Federal Act in the United States), as opposed to PIPEDA (*Personal Information Protection and Electronic Documents Act* – Canadian version of HIPAA) and used the legislative terms incorrectly.

A variety of factors limiting access to virtual care were reported by participants, which ultimately impacted PTs' ability to deliver care via VC to all Manitobans. People that experienced limited access to virtual care included those without access to an appropriate space or the required technology, and individuals with health conditions that were not amenable to receiving care via VC without additional supports or assistance. The literature often refers to telehealth as a solution for inequitable access to care (Bennell et al., 2021; Bezuidenhout et al., 2022). Telehealth can only be considered a solution if substantively similar care is deliverable and accessible by all. If not, telehealth would reflect the description used by one participant in this study, 'a band-aid' solution. Although Davies et al. (2021) VC framework detailed the specific VC knowledge and skills requirements for PTs, it did not

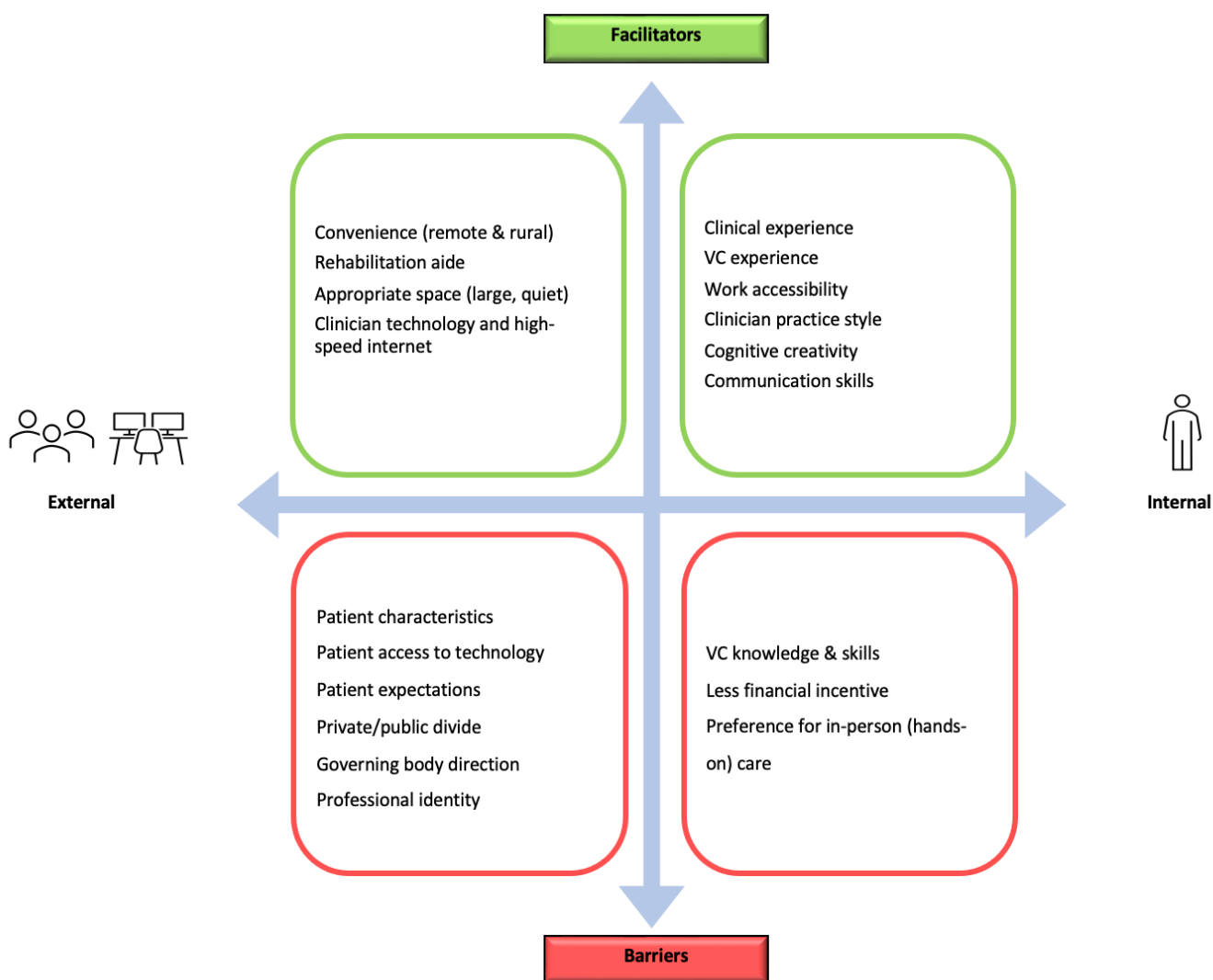
include an equitable access to care domain, which were included in three other telehealth capability frameworks (Galpin et al., 2021; Noronha et al., 2022; Rutledge et al., 2021). This modification to the Davies et al. framework (2021) would provide PTs with the necessary prompt to advocate for more equitable access including access to digital technology to facilitate care via VC.

Safe, effective and equitable care are three of the Canadian Physiotherapy Association's dimensions of quality care described in STEEEP (safe, timely, effective, efficient, equitable and patient-centered) (Lauzon, 2022). The participants in this study identified these three independent dimensions (safe, effective and equitable) of physiotherapy quality care as influencing their delivery of VC. While their perceived VC knowledge and skills were limited at the outset, they reported improved proficiency with increased exposure. A multitude of barriers and facilitators were reported that influenced PTs' ability to deliver care via VC, which are discussed in the next section.

Research Question 2: What are the barriers and facilitators influencing a PT's ability to deliver care via VC?

PTs' perceptions about the barriers and facilitators influencing the delivery of care via VC are discussed below and represented in Figure 2. Barriers and facilitators. The barriers and facilitators are separated into internal factors, which refer to the individual (PT) delivering care via VC (e.g., clinician knowledge; skills; wants; desires; perceived benefits of VC) and external factors, which describes the factors outside of the control of the PT delivering care via VC (e.g., patients, physiotherapy colleagues, equipment, and the environment).

Figure 2. Barriers and facilitators



Internal barriers and facilitators

Physiotherapy participants frequently reported feeling unprepared and lacked the knowledge and skills needed to deliver care via VC. Many of the participants described having to ‘learn on the fly’ or ‘on the job’ to acquire VC knowledge, which is similar to the findings of Malliaras et al. (2021) and a Canadian study by Ezzat et al. (2023). A recent collaboration between researchers at the University of Manitoba and Amsterdam University of Applied Sciences reported that 28.1% of allied health clinicians received TR training prior

to delivering virtual care (Giesbrecht et al., 2023). This is proportionately greater than the 21% of trained allied health professionals reported by Malliaras et al. (2021).

A key finding in this study that impeded PTs' delivery of care via VC was the elimination of hands-on care. The absence of physical contact challenged PTs' perceived ability to accurately assess patients, limited the available treatment options and resulted in patient safety concerns. These findings are reflected in the results of similar studies (Barton et al., 2022; Ezzat et al., 2023; Malliaras et al., 2021) with one exception (Miller et al., 2022). The inability to provide hands-on care was not reported as a barrier in Miller et al., (2022) and this might be explained by the hybrid model of care (combination of TR and in-person appointments) used in this single site study. A hybrid model of care allowed for the provision of hands-on care during initial assessments, facilitating PTs' subsequent delivery of care via VC. The findings in this study support this explanation for the absence of the elimination of hands-on care as a barrier reported by Miller et al. (2022). PTs reported that a hybrid model of care would be more acceptable and feasible because the provision of hands-on care is an option when necessary while also maintaining the benefits of VC.

Although physiotherapy participants described themselves as not 'tech savvy', the majority described learning how to use the technology relatively straight forward. This is different to the findings in Giesbrecht et al. (2023) who reported that clinicians' ability to use technology was a key barrier, as measured by the Telehealth Usability Questionnaire and the modified Technology Acceptance Model. Technology utilisation and acceptance was at the forefront and focus of Giesbrecht's study, which could explain some of the key findings in my study. Giesbrecht and colleagues' study also included allied health clinicians (occupational therapy, physiotherapy and respiratory therapists) and data was collected November 2021 – March 2022. The timing of data collection meant the participants in Giesbrecht et al. (2023) also had had less time to learn the technology compared to

participants in this study. Giesbrecht and colleagues reported that that the elimination of physical contact was more problematic for PTs compared to occupational therapists and respiratory therapists, indicating PTs' technology literacy was less impactful as a barrier compared to the inability to provide hands-on care.

PTs explained in this study that adapting from hands-on care to an entirely hands-off approach required creativity and necessitated the ability to 'think outside the box'. Possessing these qualities facilitated the delivery of care via VC. This echoes the findings in Miller et al. (2022) who explained that PTs need to be flexible and adaptable to consider new ideas and alternative options for a hands-off environment. Clinicians have previously reported a preference for in-person hands-on care, especially when conducting an initial assessment (Ezzat et al., 2023; Malliaras et al., 2021). These reports were corroborated in the results of this study. Many PTs voiced their inclination towards the delivery of care in-person instead of the provision of entirely hands-off care when delivering care solely via VC. PTs explained that an in-person assessment allows for the provision of hands-on care, enhancing their ability to conduct an in-depth assessment and diagnose more accurately. Cottrell and Russell (2020) acknowledged that a virtual physical assessment is limited and although good validity of observational assessments was reported, this was not the case for assessments requiring manual tests and skills.

Although the elimination of hands-on care was reported as a barrier in this study, the lack of physical contact was also reported as an enabler for PTs with their own physical disabilities or ill health that prohibited the delivery of in-person care. The participants who reported that VC enabled their ability to work were in the late stages of their careers with significant clinical experience. The TR literature frequently reports on the impact of patients' health conditions when delivering care (Seron et al., 2021), but the influence of clinicians' health status was a novel and unanticipated finding in this study.

Increased VC exposure and experience alleviated clinicians' initial uncertainty with this novel mode of delivering care. The percentage of participants in this study with VC experience prior to the COVID-19 pandemic was 25%, which contrasts with 62.5% of PTs in another Canadian study (O'Neil et al., 2023b). The physiotherapy participants in O'Neil's study were recruited from across Canada and worked in complex care and the majority of them (69%) worked with patients with neurological conditions. The study by Giesbrecht et al. (2023) reported more comparable findings to this study, reporting that 24.1% of PTs had VC experience pre-pandemic. Study participants explained that VC experience facilitated PTs' ability to deliver care via VC, leading to increased comfort and confidence, along with an improved ability to navigate the technology related challenges. Haines et al. (2023) reported that PTs moved from "fear to triumph" (p.14) as they gained telehealth experience. Although the findings in this study indicated that some participants working with patients with MSK conditions reached a level of success, or triumph, delivering patient education and hands-off techniques, this was not the case for participants working with patients with neurological and cardiorespiratory conditions. This could be explained by the higher demand for physical assistance and hands-on care needed for patients with the complexities of neurological and cardiorespiratory conditions.

In addition to VC experience, study participants reported that previous clinical experience facilitated PTs' delivery of care via VC. Haines et al. (2023) explained that experienced PTs could more easily adapt their clinical skills for a digital environment. Martin et al. (2021) similarly reported that new-graduate PTs did not have well developed clinical experience, which was described as an essential requirement for PTs delivering care via VC. An Australian study (Davies et al., 2022b) investigated self-reported confidence levels of final year physiotherapy students and new graduates delivering care via VC utilising the Davies et al. (2021) VC capability framework. The findings indicated that PT students and

new graduates experienced the least confidence in domain 1, compliance, and domain 4, technology. The lack of confidence in the technology domain could be considered surprising when the younger generation are considered ‘digital natives’ (Judd, 2018). Martin et al. (2021) explained this finding by suggesting that new graduates are busy refining their newly acquired clinical skills and building professional experiences and therefore, less willing to learn another set of new skills to transition into the digital environment.

In summary, PTs in this study described the internal factors that influenced their ability to deliver care via VC. Internal factors were impacted by the experience gained during COVID-19, although barriers remain, including knowledge gaps and a preference for in-person care. The next section will discuss the external factors that influenced PTs’ ability to deliver care via VC.

External barriers and facilitators

The findings suggest that the external factors influencing PTs’ delivery of care via VC appear to be predominantly patient-related. Participants reported factors that included patient characteristics and conditions; patient expectations and acceptance of VC; access to an appropriate space and technology; and patients’ ability to use the technology. Non-patient related factors included professional identity and culture; COVID-19; and funding models that limit private practice PTs’ delivery of care via VC in Manitoba.

Study participants reported patient-related factors that impeded the delivery of care via VC. These included culture and language, access to an appropriate space and technology and patients’ ability to use technology. Private practice PTs also described financial implications and how this limited patients’ access to private physiotherapy via VC. O’Neil et al. (2023) described similar factors that impacted equitable access to virtual care for Canadians. O’Neil’s study reported that patients’ ability to use technology might become obsolete over time once people become more comfortable with using technology. Ezzat et al.

(2023) and Haines et al. (2023) also acknowledged and described the importance of addressing service recipients' needs to ensure VC does not widen the access to healthcare disparity.

Participants frequently described poor high-speed internet connections that impacted the delivery of care via VC. A lack of high-speed internet availability was predominantly patient-related and more problematic for individuals living in remote and rural areas. Although people residing in remote and rural locations are well positioned to gain from the benefits of virtual care, some study participants reported that they were hesitant to offer care via VC to people living in these areas due to a lack of high-speed internet. A 2023 report, *Connectivity in Rural and Remote Areas*, by the Auditor General of Canada (2023) confirmed the existence of a digital divide and reported that individuals living in remote and rural locations including First Nations reserves, experienced much lower levels of access to high-speed internet connections. In 2021, the percentages of rural and remote areas in Canada with access to high-speed internet connections of 50/10 megabits per second was 59.5%, while on First Nations reserves it was 42.9% (Government of Canada, 2024). These figures were significantly lower than the 99.3% of urban areas with access to high-speed internet (Government of Canada, 2024). Canada has a target of 100% of households with access to high-speed internet by 2030 (Government of Canada, 2024). Individuals without access to high-speed internet are limited from accessing virtual care services and this remains a significant barrier for physiotherapy participants delivering care via VC.

Study participants described limited patient acceptance of VC and expectations for hands-on care. This contradicts the findings of some previous studies that investigated patient perspectives and acceptance of TR (Bennell et al., 2021; Hinman et al., 2017). Bennell et al. (2021) published a nationwide Australian study that included patients in urban (77%); sub-urban (24%) and remote areas (1%). This study reported that 47% of patients were likely to

choose VC post-pandemic for individual appointments and 68% of patients were likely to choose VC for group physiotherapy appointments. These findings contradict the reports of many participants in this study who explained that there was limited patient demand for VC post-pandemic due to patients' expectations and preferences for hands-on care. However, it is important to note that this study only included PTs' perceptions of patients' expectations and preferences, rather than the views and opinion directly from the patients themselves.

COVID-19 presented as an unprecedented external factor that resulted in a rapid surge in VC uptake. Study participants frequently reported that they were forced into the digital world to account for social distancing measures and ensure continuity of patient care. Ezzat et al. (2023) reported a decline in virtual care once COVID-19 public health measures were lifted. Ezzat et al. (2023) went on to report that 84% of Canadian physiotherapy participants intended to continue with TR post-pandemic, similar to 85% of PTs in another Canadian study by Giesbrecht et al. (2023) and 81% of Australian PTs in Bennell et al. (2021). This study discovered that 35% of PTs either are continuing to deliver care via VC or intended to continue with VC post-pandemic. These findings are significantly lower than similar studies. An explanation for this could be the timing of data collection, which was after COVID-19 and social distancing measures had been lifted, indicating that many PTs had settled back into clinics to deliver care in-person. The sample size in this study was also comparatively small (n=20) and had qualitative objectives as opposed to quantitative. Ultimately, however, this study has revealed that 65% of PTs have abandoned VC to deliver care after their VC experiences during COVID-19. These findings reflect some persistent negative perceptions about the use of VC to deliver care and the existence of barriers experienced by Manitoban PTs that continues to impede the delivery of care.

Research Question 3: What are the needs of Manitoban PTs delivering care via VC?

The needs of Manitoban PTs must be addressed to enable and support the delivery of safe, effective and equitable care via VC. Physiotherapists demonstrated the ability to deliver care via VC during emergent times, however, participants voiced safety concerns and were skeptical about the equity and effectiveness of care delivered. A *Virtual Care in Canada* report has recommended that healthcare professionals attain the competency to deliver equitable virtual care (Voisin & Cascadden, 2021). However, equitable healthcare is only possible with the provision of quality care (Dzau et al., 2022). Therefore, PTs need further guidance and support to ensure that quality care is delivered via VC.

Many TR studies have reported that education and training are necessary to adequately prepare PTs to deliver care via VC (Barton et al., 2022; Davies et al., 2022b; Ezzat et al., 2023; Malliaras et al., 2021). This study has highlighted the gaps in knowledge and skills unique to the Manitoban PT population and are reflected in Davies et al. domain 2, patient safety; domain 3, privacy and confidentiality and domain 6, assessment and diagnosis. PTs need to acquire the relevant knowledge and address these gaps identified in this study. Clinicians also need further guidance about which patient conditions are most amenable to receiving care via VC, a similar finding to previous studies (Barton et al., 2022; Cottrell et al., 2017; Seron et al., 2021). Providing clarity about the selection of appropriate patients should also help alleviate safety concerns and improve clinicians' ability to assess and diagnose.

Physiotherapy participants in this study described the need for flexibility and creativity, similar to the findings in Ezzat et al. (2023) and Miller et al. (2022). A creative clinician with the ability to 'think outside the box' aligns well with the concept of 'adaptive

expertise' (Cupido et al., 2023). Adaptive expertise encourages clinician development and requires abstract thinking to consider new ideas. PTs must be responsive and practice efficiently and effectively when encountering new problems in fluctuating environments (Cupido et al., 2023). The digital environment presents PTs with unique challenges including variability in patients' environments and available equipment, the rapid development of technology and the need to adapt skills to a hands-off approach. A shift is required from the simple acquisition of knowledge, known as routine expertise to adaptive expertise which allows for the generation of new knowledge (Cupido et al., 2023). This will equip PTs with the ability to adapt in a fluid and fluctuating digital environment and thus, cope with the uncertainty of an evolving profession.

The University of Manitoba and the Manitoba Physiotherapy Association could help address knowledge gaps and encourage adaptive expertise by expanding the TR curriculum in the pre-licensure level and the development and promotion of post-graduate TR courses. However, Merolli et al. (2024) reported that virtual care competency expectations for PTs are lacking. This means there is no requirement for clinicians to prove competency when delivering virtual care and this could limit PTs' motivation to acquire new knowledge and skills and limit the expansion of TR education. The College of Physiotherapists of Manitoba could consider requesting that PTs demonstrate competency when delivering TR. This could lead to more consistent virtual care, alleviating safety concerns as described by Konttila et al. (2019). The College of Physiotherapists of Manitoba (2018) TR guidelines lack adequate guidance for PTs about technology-related confidentiality and privacy information. The College of British Columbia Physical Therapists (2024) TR guidelines includes a link to a privacy toolkit which is absent in the College of Physiotherapists of Manitoba's 2018 TR guidelines. It is recommended that the College of Physiotherapists of Manitoba guidelines are

revised and updated to provide similar details. This will assist PTs with their ability to adhere to privacy and confidentiality requirements when delivering care via VC in Manitoba.

Perhaps the most urgent external need is the requirement for high-speed internet connections for patients and clinicians across Manitoba. Technology infrastructure is lacking in Manitoba and remote and rural communities are particularly underserved with high-speed internet connections (Government of Canada, 2021). High-speed internet is regarded as an essential service in our developing digital economy and Canada has a target of 100% of households with access to high-speed internet by 2030. Internet advocacy was highlighted as a priority in a Canadian study by O’Neil et al. (2023). There is an inherent need to focus on increasing the provision of high-speed internet to individuals living in rural and remote areas of Manitoba, otherwise there is a risk of exacerbating inequitable access to care further.

Physiotherapy professional identity and culture were reported as barriers for the acceptance of VC as an alternative to deliver care. Previous studies reported that the profession remains hesitant to fully accept this novel innovation as a valuable mode of delivering care (O’Neil et al., 2023b; Rausch et al., 2021; Reynolds et al., 2021). Wade et al. (2014) explained that clinician acceptance is a predominant factor impacting telehealth uptake and sustainability. Promoting the benefits of virtual care is needed to encourage professional acceptance.

Study participants explained that having ‘golden hands’ or ‘magic hands’ is often viewed as the epitome of a good PT. The literature indicated that PTs believe that hands-on care is not only a cornerstone of the profession’s identity but also a patient expectation (Malliaras et al., 2021; Nicholls & Holmes, 2012). However, Jones and Green (2006) described professional identities as a concept that cannot adhere to “traditional moral anchoring of lifetime workplace identities” (p. 929). The idea that PTs must continue practicing what they have learned and what they know to ensure the profession’s identity is

protected, precludes the potential for evolution. A system composed of a workforce that is content with the status quo and an anchored professional identity will limit the profession's advancement and result in a stagnant system with little change (Fraser-Arnott, 2019).

Evolution, change and innovation need to be encouraged if the evidence determines an improvement in outcomes, efficiency, workload, and reduced costs. Encouraging enthusiastic, motivated and innovative healthcare professionals that are delivering evidence-based care is essential for the profession to advance. VC has the potential to disrupt the physiotherapy profession and the profession's traditional hands-on identity. Therefore, perhaps it is understandable why some clinicians perceive VC as an external threat to the profession (Walton, 2020).

Private practice participants described a private-public healthcare divide, which limited their ability to deliver care via VC to Manitobans. Participants considered the use of nursing stations to provide access to the required space and technology for individuals without. However, there was uncertainty about how private practice participants could connect with patients using publicly funded spaces and technology. The Manitoba Government implemented its first Social Impact Bond in 2022, representing a link between public and private healthcare where private investors financed a social service project (Government of Manitoba, 2022). Social Impact Bonds could offer a solution to the public-private healthcare divide experienced by participants in this study, facilitating the delivery of care via VC for private practice PTs.

An article by Chodos and MacLeod (2004) examined the debate surrounding private sector integration within the public healthcare system. The *Kirby Report* (2001, as cited in Chodos & McLeod, 2004) purported that service-based funding would allow for the delivery of private healthcare services within the public system. Chodos & MacLeod (2004) reported that arguments against this proposition were a lack of competition; the shift of publicly

funded healthcare providers to the private sector; insufficient healthcare providers in remote and rural areas; and contravention of the *Canada Health Act* (Government of Canada, 1985). Alternatively, individuals living in remote and rural areas could access healthcare providers with diverse expertise across the province, which challenges the opposing views about service-based funding. Private practice participants voiced frustrations at being unable to deliver care, and in some cases unique expertise to remote and rural Manitobans due to the private-public healthcare divide. Virtual care appears to have reignited the public-private healthcare debate.

TR has been described as another tool in the physiotherapy toolkit (Wittmeier et al., 2022). However, TR is an alternative mode of delivering care and not an additional treatment option or tool. Grundstein et al. (2021) described the importance of viewing TR as its own, unique service and not traditional physiotherapy through a screen. Currently TR is viewed as inferior when compared to traditional in-person care. Grundstein's study (2021) proposed that PTs need to view TR as a different service with its own unique benefits and not traditional physiotherapy without the provision of hands-on care. Perhaps then, TR will be more acceptable and used more appropriately.

This section has discussed PTs' perceived ability, the barriers, facilitators and needs to deliver care via VC. The following sections will describe the significance of the study, unanticipated findings, limitations, considerations for future research, knowledge translation and finally, a conclusion.

Significance of the study

This study has created a valuable foundation of the factors influencing PTs' delivery of care via VC, specific to the context of Manitoba. Manitoba is a province well positioned to

reap the rewards of virtual care due to the vast distances that some individuals living in remote and rural areas have to travel for physiotherapy services. The barriers described in this study can be targeted with strategic solutions to facilitate further uptake and sustainability of VC beyond the pandemic.

Unanticipated findings

An unanticipated finding in this study included the percentage of PTs with VC experience prior to COVID-19 (25%). This was higher than expected and could be explained by volunteer bias, that is, the study's topic attracting clinicians who were interested in VC. A surprisingly low number of PTs reported that they were continuing with or intending to continue with VC to deliver care post-pandemic (35%), as opposed to Giesbrecht et al. (2023) who reported that 90.1% of clinicians intended to continue with VC post-pandemic. An explanation for this could be due to the timing of data collection in this study, which was between June and August 2023 compared to the data collection period in Giesbrecht's study which was between November 2021 and March 2022. Data collected in this study was carried out after social distancing restrictions were lifted and PTs were settled back into clinic delivering care in-person and patient demand for VC declined. An additional unanticipated finding was that VC facilitated PTs' work accessibility and participation when their own disability or ill health limited or prevented in-person care. Perhaps unsurprisingly, any focus on disability and ill health relates to the patients in previous studies and to the best of our knowledge, this is the first study reporting on the impact of providers' disabilities.

Study limitations

This study described PTs' perceptions about the factors influencing the delivery of care via VC and included patient-related determinants such as patients' acceptance of VC, preferences, and expectations. The patient-related factors are all from the PTs' perspective and may not accurately reflect patients' perceptions. Another limitation that must be considered is the potential non-participation of PTs who had negative experiences using VC to deliver care or prefer not to use VC to deliver care and therefore, no interest in exploring this topic further or being involved in this study. Participants could have disregarded the participant recruitment notice based on the title of the study alone. The exclusion of exam candidates and PTs with less than two years work experience could be considered a limitation of this study with the findings not being reflective of all practicing PTs in Manitoba. This category of PTs is in the early stage of their careers where they are just beginning to develop their clinical reasoning skills compared to more experienced PTs on the active register. Finally, the findings of this study are not intended to be generalised beyond Manitoban PTs. The local context, geography, population, regulations and jurisdictional issues experienced in this setting will be different in other provinces and countries and across different healthcare professions.

Considerations for future research

This study explored PTs' perspectives about the factors influencing the delivery of care via VC. Although patient-related factors were included, these were obtained from the clinicians' perspective. Research is needed to address this gap and explore patients' views and acceptance of TR as a feasible mode of delivering care.

PTs gained real-life VC experience prior to feeling adequately prepared. VC knowledge and skills developed with VC exposure and experience, but the results of this study have revealed specific gaps, which are reflected in Davies' VC capability framework (Davies et al. 2021). More high-quality evidence is also needed to provide clarification to PTs about which patient conditions are most amenable to receiving care via VC. Future research could aid in the development of a post-graduate VC course to address these gaps and an evaluative study could determine the effectiveness of the education or training provided.

VC is being heralded as a solution to improving inequitable access to care in Manitoba, although there is concern that limited access to technology could widen this disparity further. More research is essential to discover the specific needs of individuals and communities at risk of being unable to access care via VC. This includes individuals requiring access to an appropriate space and technology, which could require access to a hosted site such as a local healthcare centre, and patients with complex healthcare needs who need support or physical assistance. Once these needs have been identified, they must be targeted and addressed to ensure VC does not widen the existing inequitable access to care gap.

PTs demonstrated the ability to deliver care via VC but reported concerns about patient safety and the effectiveness of care delivered. Further exploration is required to discover how PTs' patient safety concerns can be alleviated when delivering care via VC. The inclusion of a local rehabilitation aide was described as beneficial for ensuring patient safety when physical assistance was required. Research is needed to support or refute the value of including a rehabilitation aide with patients when care is delivered via VC.

Research has indicated that virtual care is more cost-effective compared to delivering care in-person. A Canadian study by Tousignant et al. (2015) compared costs of care delivered to total knee replacement patients via TR and in-person at the patient's home. This

study is almost 10 years old and involved the delivery of care to some patients that were living within a 30-kilometer round trip from the clinic. Manitoban demographics warrant further investigation to study cost efficiency of virtual care, while focusing on communities and individuals that have limited or no access to physiotherapy services.

A novel finding in this study was the lack of physical contact, which enabled PTs with their own ill health or disabilities to continue working when in-person care was limited or prohibited. Further research could expand on this finding by conducting a pan-Canadian or global study that explores this in more detail.

Finally, this study utilised COM-B, the hub of the behaviour change wheel to discover PTs' perceptions about the factors influencing the delivery of care via VC. Further research using the intervention functions and policy categories of the behaviour change wheel would allow for the strategic selection of solutions to target the barriers and facilitators described in this study.

Although Davies et al. (2021) published a capability framework for PTs to deliver quality care via VC, the exploration of quality care *per se* was beyond the scope of this study. Grimmer et al. (2014) developed a quality care framework for allied health professionals, which could be applied to the provision of virtual care. A Telehealth Quality of Care Tool (World Health Organisation, 2024) was developed in 2024, but uncertainty remains about the definition of quality of care delivered via TR, or more specifically VC.

Knowledge Translation

Implementation science (IS) is a rapidly developing area of research that studies the translation of evidence into practice (Harrison & Graham, 2021). Unfortunately, effective knowledge translation is an on-going problem with many researchers failing to adequately plan the implementation process resulting in an evidence-to-practice gap or know-do gap

(Grimshaw et al., 2012). To ensure the know-do gap is addressed for this developmental, exploratory or pre-implementation study (Harrison & Graham, 2021), a detailed dissemination plan is described below.

The dissemination goal for this study includes presenting the findings and publication of the findings in a peer-reviewed journal. I presented the findings in a virtual oral presentation in the Prairie Rehabilitation Conference, in November 2023; produced a poster, which was presented in Vancouver at the Canadian Physiotherapy Association's annual Congress, in April 2024; and delivered the results at a podium presentation at the University of Manitoba's Annual Research Day on June 4, 2024. The pre-licensure physiotherapy program at the University of Manitoba currently provides a blended learning approach to TR preparation of its learners. This includes four hours of classroom-based lecture, simulation and small group learning; TR role-playing in a two-hour communication lab; a small group tutorial case study; as well as a national on-line module required of all student physiotherapists prior to their first clinical rotation. The findings of this study will be integrated into the current teaching and learning activities.

A summary of this study's findings will be shared with the Department of Physical Therapy faculty highlighting the educational needs of Manitoban PTs to help guide and support the need for future curriculum development and evaluation. Following dissemination of the results, consideration for expansion of TR education and training development sessions will be explored. A recommendation will also be presented to the College of Physiotherapists of Manitoba to refine the technology-related privacy and confidentiality information in the TR guidelines used by Manitoba PTs.

Post-study reflection

Post-study reflections have allowed me to appreciate the changes from my initial and perhaps overly optimistic opinions about the delivery of physiotherapy care and services via VC. I remain optimistic when VC is used appropriately and believe there is ‘a time and a place’ for it. I have a more refined view of VC’s benefits and a greater awareness of the challenges faced by many PTs - barriers that go far beyond the healthcare provider themselves.

On a personal level I feel reassured that other PTs experienced the same uncertainties and difficulties. On a professional level I feel more confident about my ability to select appropriate patients and provide my patients with clearer expectations. VC is not suitable for everyone and there are limitations when delivering care at a distance via VC. My experience working in a neurorehabilitation clinic with patients with mobility and balance impairments awakened my perceptions. This patient population challenged my ability to deliver safe and effective care via VC.

Although delivering physiotherapy via VC presents many benefits, primarily improved access to care, I have a new awareness of VC’s potential to widen inequitable access to care without careful consideration of the barriers faced by many Manitobans. Pre-study I believed that VC was a solution for inequitable access to care. These beliefs have evolved considerably, and it is now apparent that inequitable access to care cannot be addressed with an alternative delivery mode that offers sub-par physiotherapy care. Quality care must be deliverable via VC if used to address inequities and lack of access to in-person care.

Finally, I have reflected on one of the main findings from this study: PTs lack the motivation to deliver care via VC. This appears to be predominantly due to the loss of physical contact and the inability to provide hands-on care. I have questioned my own

motivations and biases towards VC, a mode of delivering care which aligns well with my hands-off practice style, my pre-licensure education, and the post-graduate courses I have undertaken. Perhaps an even more important factor, is that VC presents the physiotherapy profession with a new adventure and new opportunities to explore. This is exciting and I look forward to seeing how VC contributes towards an evolving physiotherapy profession.

Chapter 6. Conclusion

The purpose of this thesis was to explore PTs' experiences and perceptions about the factors influencing the delivery of care via VC. Participants working with patients with MSK conditions perceived VC more positively compared to participants working with patients with neurological or cardiorespiratory conditions. The majority of participants in this study had no intention of continuing with VC post-pandemic, indicating significant barriers remain that impede PTs' delivery of care via VC.

Physiotherapists demonstrated the ability to deliver care via VC during emergent times, however, many reported feeling unprepared. A dominant finding in this study was the elimination of hands-on care that challenged a VC assessment and provision of treatment. Participants also reported concerns regarding patient safety, equity and effectiveness of care, indicating gaps in the quality of care delivered.

Although VC has been heralded as a solution to address inequitable access to care in Manitoba, study participants described a multitude of factors that could perpetuate the risk of widening this disparity further. People living in remote and rural areas experience inequitable access to healthcare services. Although they are well positioned to gain from the delivery of care via VC, they appear to be most disadvantaged with regards to having access to high-speed internet connections. There is an urgent need to address technology infrastructure across this province.

In summary, PTs envisioned a future that includes a hybrid model of care that combines the benefits of in-person care and VC. Although many PTs have discontinued with VC post-pandemic, many reported that abandoning VC would be regressive in a rapidly progressing technological world.

References

- Adler, R. (2022). Trustworthiness in qualitative research. *Journal of Human Lactation*, 38(4), 598-602. <https://doi.org/DOI: 10.1177/08903344221116620>
- Alami, H., Lehoux, P., Miller, F. A., Shaw, S. E., & Fortin, J.-P. (2023). An urgent call for the environmental sustainability of health systems: A ‘sextuple aim’ to care for patients, costs, providers, population equity and the planet. *The International Journal of Health Planning and Management*, 38(2), 289-295. <https://doi.org/https://doi.org/10.1002/hpm.3616>
- Angst, F., Aeschlimann, A., Steiner, W., & Stucki, G. (2001). Responsiveness of the WOMAC osteoarthritis index as compared with the SF-36 in patients with osteoarthritis of the legs undergoing a comprehensive rehabilitation intervention. *Annals of the rheumatic diseases*, 60(9), 834–840.
- Assarroudi, A., Heshmati Nabavi, F., Armat, M. R., Ebadi, A., & Vaismoradi, M. (2018). Directed qualitative content analysis: The description and elaboration of its underpinning methods and data analysis process. *Journal of Research in Nursing*, 23(1), 42-55. <https://doi.org/10.1177/1744987117741667>
- Atkins, L., Francis, J., Islam, R., O’Connor, D., Patey, A., Ivers, N., Foy, R., Duncan, E. M., Colquhoun, H., Grimshaw, J. M., Lawton, R., & Michie, S. (2017). A guide to using the Theoretical Domains Framework of behaviour change to investigate implementation problems. *Implementation Science*, 12(1). <https://doi.org/10.1186/s13012-017-0605-9>
- Auditor General of Canada (2023). *Connectivity in remote and rural areas, report 2. _Reports of the Auditor General of Canada to the Parliament of Canada* https://www.oagbvg.gc.ca/internet/docs/parl_oag_202303_02_e.pdf

- Ayres, E. J., Greer-Carney, J. L., Fatzinger Mcshane, P. E., Miller, A., & Turner, P. (2012). Nutrition informatics competencies across all levels of practice: a national delphi study. *Journal of the Academy of Nutrition and Dietetics*, *112*(12), 2042-2053. <https://doi.org/10.1016/j.jand.2012.09.025>
- Azma, K., Rezasoltani, Z., Rezaeimoghaddam, F., Dadarkhah, A., & Mohsenolhosseini, S. (2018). Efficacy of tele-rehabilitation compared with office-based physical therapy in patients with knee osteoarthritis: A randomized clinical trial. *Journal of Telemedicine and Telecare*, *24*(8), 560-565. <https://doi.org/10.1177/1357633x17723368>
- Azungah, T. (2018). Qualitative research: deductive and inductive approaches to data analysis. *18*(4), 383-400. *Qualitative Research Journal*, *18*(4), 383-400. <https://doi.org/https://doi.org/10.1108/QRJ-D-18-00035>
- Babatunde, A. O., Shobanke, H. A., Akinade, A. A., Michael, A. J., Osadare, M. O., Akanbi, O. K., Favour, O. C., & Adebisi, Y. A. (2021). Enhancing preventive medicine over curative medicine Role of telemedicine. *Public Health in Practice*, *2*, 1-2. <https://doi.org/https://doi.org/10.1016/j.puhip.2021.100130>
- Barton, C. J., Ezzat, A. M., Merolli, M., Williams, C. M., Haines, T., Mehta, N., & Malliaras, P. (2022). "It's second best": A mixed-methods evaluation of the experiences and attitudes of people with musculoskeletal pain towards physiotherapist delivered telehealth during the COVID-19 pandemic. *Musculoskeletal Science and Practice*, *58*, 102500. <https://doi.org/10.1016/j.msksp.2021.102500>
- Bellamy, N., Buchanan, W. W., Goldsmith, C. H., Campbell, J., & Stitt, L. W. (1988). Validation study of WOMAC: a health status instrument for measuring clinically important patient relevant outcomes to antirheumatic drug therapy in patients with osteoarthritis of the hip or knee. *Journal of Rheumatology*, *15*(12), 1833-1840.

- Bennell, K. L., Lawford, B. J., Metcalf, B., Mackenzie, D., Russell, T., Van Den Berg, M., Finnin, K., Crowther, S., Aiken, J., Fleming, J., & Hinman, R. S. (2021). Physiotherapists and patients report positive experiences overall with telehealth during the COVID-19 pandemic: a mixed-methods study. *Journal of Physiotherapy*, 67(3), 201-209. <https://doi.org/10.1016/j.jphys.2021.06.009>
- Berwick, D. M., Nolan, T. W., & Whittington, J. (2008). The triple aim: care, health, and cost. *Health Aff (Millwood)*, 27(3), 759-769. <https://doi.org/10.1377/hlthaff.27.3.759>
- Bezuidenhout, L., Joseph, C., Thurston, C., Rhoda, A., English, C., & Conradsson, D. M. (2022). Telerehabilitation during the COVID-19 pandemic in Sweden: a survey of use and perceptions among physiotherapists treating people with neurological diseases or older adults. *BMC Health Services Research*, 22(1). <https://doi.org/10.1186/s12913-022-07968-6>
- Bhyat, R., Hagens, S., Bryski, K., & Kohlmaier, J. F. (2021). Digital health value realization through active change efforts. *Front Public Health*, 9, 741424. <https://doi.org/10.3389/fpubh.2021.741424>
- Birt, L., Scott, S., Cavers, D., Campbell, C., & Walter, F. (2016). Member checking: A tool to enhance trustworthiness or merely a nod to validation? *Qualitative Health Research*, 26(13), 1802-1811. <https://doi.org/doi:10.1177/1049732316654870>
- Bjorbækmo, W. S., & Mengshoel, A. M. (2016). “A touch of physiotherapy” — the significance and meaning of touch in the practice of physiotherapy. *Physiotherapy Theory and Practice*, 32(1), 10–19. <https://doi.org/10.3109/09593985.2015.1071449>
- Bodenheimer, T., & Sinsky, C. (2014). From triple to quadruple aim: Care of the patient requires care of the provider. *The Annals of Family Medicine*, 12(6), 573-576. <https://doi.org/10.1370/afm.1713>

- Bradshaw, C., Atkinson, S., & Doody, O. (2017). Employing a qualitative description approach in health care research. *Global Qualitative Nursing Research, 4*, 233339361774228. <https://doi.org/10.1177/2333393617742282>
- Braun, V., & Clarke, V. (2021). To saturate or not to saturate? Questioning data saturation as a useful concept for thematic analysis and sample-size rationales. *Qualitative Research in Sport, Exercise and Health, 13*(2), 201-216. <https://doi.org/10.1080/2159676x.2019.1704846>
- Bromley, P. (2019). A paradigm shift from competence to capability in neonatal nursing. *Journal of Neonatal Nursing, 25*(6), 268-271. <https://doi.org/https://doi.org/10.1016/j.jnn.2019.04.003>
- Brunner, M., Mcgregor, D., Keep, M., Janssen, A., Spallek, H., Quinn, D., Jones, A., Tseris, E., Yeung, W., Togher, L., Solman, A., & Shaw, T. (2018). An eHealth capabilities framework for graduates and health professionals: mixed-methods study. *Journal of Medical Internet Research, 20*(5), e10229. <https://doi.org/10.2196/10229>
- Buckingham, S., Anil, K., Demain, S., Gunn, H., Jones, R. B., Kent, B., Logan, A., Marsden, J., Playford, E. D., & Freeman, J. (2023). Telerehabilitation for people with physical disabilities and movement impairment: development and evaluation of an online toolkit for practitioners and patients. *Disability and Rehabilitation, 45*(11), 1885–1892. <https://doi.org/10.1080/09638288.2022.2074549>
- Burns, R. B., Crislip, D., Daviou, P., Temkin, A., Vesmarovich, S., Anshutz, J., Furbish, C., & Jones, M. L. (1998). Using telerehabilitation to support assistive technology. *Assistive Technology, 10*, 126-133. <https://doi.org/https://doi.org/10.1080/10400435.1998.10131970>

- Byrne-Davis, L. M. T., Bull, E. R., Burton, A., Dharni, N., Gillison, F., Maltinsky, W., Mason, C., Sharma, N., Armitage, C. J., Johnston, M., Byrne, G. J., & Hart, J. K. (2017). How behavioural science can contribute to health partnerships: the case of The Change Exchange. *Globalization and Health*, 13(1).
<https://doi.org/10.1186/s12992-017-0254-4>
- Cairns, L., & Stephenson, J. (2009). *Capable workplace learning*. Brill.
- Cambridge Dictionary (n.d.) Ability. In Cambridge Dictionary online. Retrieved June 2, 2024, from <https://dictionary.cambridge.org/dictionary/english/ability>
- Canadian Physiotherapy Association (2022) *Description of Physiotherapy*. Retrieved July 10, 2023, from <https://physiotherapy.ca/description-of-physiotherapy/>
- Candela, A. (2019). Exploring the function of member checking. *The Qualitative Report*, 24(3), 619-628. <https://doi.org/https://doi.org/10.46743/2160-3715/2019.3726>
- Cane, J., O'Connor, D., & Michie, S. (2012). Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Science*, 7(1), 37. <https://doi.org/10.1186/1748-5908-7-37>
- Casula, M., Rangarajan, N., & Shields, P. (2021). The potential of working hypotheses for deductive exploratory research. *Quality & Quantity*, 55(5), 1703-1725.
<https://doi.org/10.1007/s11135-020-01072-9>
- Chodos, H., & MacLeod, J. J. (2004). Romanow and Kirby on the public/private divide in healthcare: demystifying the debate. *Healthcare Papers*, 4(4), 10–25.
<https://doi.org/10.12927/hcpap..16849>
- College of British Columbia Physical Therapists (2024). *Telerehabilitation guide*. Retrieved June 4, 2024, from https://cptbc.org/wp-content/uploads/2024/05/CPTBC_Telerehabilitation-Guide_May8_2024.

- College of Occupational Therapists of Manitoba (2020). *A guidance document for occupational therapists in Manitoba regarding telepractice*. College of Occupational Therapists of Manitoba. https://cotm.ca/upload/Telepractice_Guidance_Document.pdf
- College of Physicians & Surgeons Manitoba (2021) *Virtual medicine*. The College of Physicians & Surgeons Manitoba. <https://cpsm.mb.ca/assets/Standards%20of%20Practice/Standard%20of%20Practice%20Virtual%20Medicine.pdf>
- College of Physiotherapists of Manitoba (2018). *Telerehabilitation guidelines*. College of Physiotherapists of Manitoba. https://manitobaphysio.com/wp-content/uploads/2022/11/Telerehabilitation_Manitoba-version.pdf
- College of Physiotherapists of Manitoba (2022). *Annual report*. College of Physiotherapists of Manitoba. <https://manitobaphysio.com/wp-content/uploads/2023/04/2022-Annual-Report.pdf>
- College of Physiotherapists of Manitoba (2023). *Annual report*. College of Physiotherapists of Manitoba. <https://www.manitobaphysio.com/wp-content/uploads/2023-Annual-Report.pdf>
- Cottrell, Galea, O. A., O’Leary, S. P., Hill, A. J., & Russell, T. G. (2017). Real-time telerehabilitation for the treatment of musculoskeletal conditions is effective and comparable to standard practice: a systematic review and meta-analysis. *Clinical Rehabilitation*, 31(5), 625-638. <https://doi.org/10.1177/0269215516645148>
- Cottrell, M., Judd, P., Comans, T., Easton, P., & Chang, A. T. (2021). Comparing fly-in fly-out and telehealth models for delivering advanced-practice physiotherapy services in regional Queensland: An audit of outcomes and costs. *Journal of Telemedicine and Telecare*, 27(1), 32-38. <https://doi.org/10.1177/1357633x19858036>

- Cottrell, M. A., & Russell, T. G. (2020). Telehealth for musculoskeletal physiotherapy. *Musculoskeletal Science and Practice*, 48, 102193.
<https://doi.org/10.1016/j.msksp.2020.102193>
- Cox, N. S., Dal Corso, S., Hansen, H., McDonald, C. F., Hill, C. J., Zanaboni, P., Alison, J. A., O'Halloran, P., Macdonald, H., & Holland, A. E. (2021). Telerehabilitation for chronic respiratory disease. *Cochrane Database of Systematic Reviews*(1).
<https://doi.org/10.1002/14651858.CD013040.pub2>
- Cramer, S. C., Dodakian, L., Le, V., See, J., Augsburger, R., Mckenzie, A., Zhou, R. J., Chiu, N. L., Heckhausen, J., Cassidy, J. M., Scacchi, W., Smith, M. T., Barrett, A. M., Knutson, J., Edwards, D., Putrino, D., Agrawal, K., Ngo, K., Roth, E. J., . . . Janis, S. (2019). Efficacy of home-based telerehabilitation vs in-clinic therapy for adults after stroke. *JAMA Neurology*, 76(9), 1079. <https://doi.org/10.1001/jamaneurol.2019.1604>
- Cupido, N., Fowler, N., Sonnenberg, L. K., Karwowska, A., Richardson, D., Snell, L., Thoma, B., & Mylopoulos, M. (2023). Adaptive expertise in CanMEDS 2025. *Can Med Educ J*, 14(1), 18-21. <https://doi.org/10.36834/cmej.75445>
- Damschroder, L. J., Aron, D. C., Keith, R. E., Kirsh, S. R., Alexander, J. A., & Lowery, J. C. (2009). Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implementation Science*, 4(50), 1-15. <https://doi.org/https://doi.org/10.1186/1748-5908-4-50>
- Davies, L., Hinman, R. S., Russell, T., Lawford, B., & Bennell, K. (2022a). An international core capability framework for physiotherapists delivering telephone-based care. *Journal of Physiotherapy*. <https://doi.org/10.1016/j.jphys.2022.02.002>

- Davies, L., Hinman, R. S., Russell, T., Lawford, B., Bennell, K., Billings, M., Cooper-Oguz, C., Finnan, K., Gallagher, S., Gilbertson, D. K., Holdsworth, L., Holland, A., Mcalister, J., Miles, D., & Roots, R. (2021). An international core capability framework for physiotherapists to deliver quality care via videoconferencing: a Delphi study. *Journal of Physiotherapy*. <https://doi.org/10.1016/j.jphys.2021.09.001>
- Davies, L., Hinman, R. S., Russell, T., Lawford, B., Merolli, M., & Bennell, K. L. (2022b). Self-reported confidence of final year Australian physiotherapy entry-to-practice students and recent graduates in their capability to deliver care via videoconferencing. *European Journal of Physiotherapy*, 1-6.
<https://doi.org/10.1080/21679169.2022.2100928>
- Davis, R., Campbell, R., Hildon, Z., Hobbs, L., & Michie, S. (2015). Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review. *Health Psychology Review*, 9(3), 323-344.
<https://doi.org/10.1080/17437199.2014.941722>
- Dearnley, C. (2005). A reflection on the use of semi-structured interviews. *Nurse Researcher*, 13(1), 19-28. <https://doi.org/10.7748/nr2005.07.13.1.19.c5997>
- Del Pino, R., Díez-Cirarda, M., Ustarroz-Aguirre, I., Gonzalez-Larragan, S., Caprino, M., Busnatu, S., Gand, K., Schlieter, H., Gabilondo, I., & Gómez-Esteban, J. C. (2022). Costs and effects of telerehabilitation in neurological and cardiological diseases: A systematic review. *Frontiers in Medicine*, 9(832229), 1-14.
<https://doi.org/https://doi.org/10.3389/fmed.2022.832229>
- Di Tella, S., Pagliari, C., Blasi, V., Mendozzi, L., Rovaris, M., & Baglio, F. (2020). Integrated telerehabilitation approach in multiple sclerosis: A systematic review and meta-analysis. *Journal of Telemedicine and Telecare*, 26(7-8), 385-399.
<https://doi.org/10.1177/1357633x19850381>

- Dworkin, S. L. (2012). Sample size policy for qualitative studies using in-depth interviews. *Archives of Sexual Behavior*, 41(6), 1319-1320. <https://doi.org/10.1007/s10508-012-0016-6>
- Dzau, V. J., Mate, K., & O’Kane, M. (2022). Equity and quality—improving health care delivery requires both. *JAMA: The Journal of the American Medical Association*, 327(6), 519–520. <https://doi.org/10.1001/jama.2022.0283>
- Eckleberry-Hunt, J., & Tucciarone, J. (2011). The challenges and opportunities of teaching “generation Y”. *Journal of Graduate Medical Education*, 3(4), 458-461. <https://doi.org/10.4300/jgme-03-04-15>
- Eddison, N., Leone, E., Healy, A., Royle, C., & Chockalingam, N. (2022). The potential impact of allied health professional telehealth consultations on health inequities and the burden of treatment. *International Journal for Equity in Health*, 21(1). <https://doi.org/10.1186/s12939-022-01689-2>
- Edirippulige, S., Brooks, P., Carati, C., Wade, V. A., Smith, A. C., Wickramasinghe, S., & Armfield, N. R. (2018). It’s important, but not important enough: eHealth as a curriculum priority in medical education in Australia. *Journal of Telemedicine and Telecare*, 24(10), 697-702. <https://doi.org/10.1177/1357633x18793282>
- Elbert, N. J., Van Os-Medendorp, H., Van Renselaar, W., Ekeland, A. G., Hakkaart-Van Roijen, L., Raat, H., Nijsten, T. E., & Pasmans, S. G. (2014). Effectiveness and cost-effectiveness of eHealth interventions in somatic diseases: A systematic review of systematic reviews and meta-analyses. *Journal of Medical Internet Research*, 16(4), e110. <https://doi.org/10.2196/jmir.2790>
- Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62(1), 107-115. <https://doi.org/10.1111/j.1365-2648.2007.04569.x>

- Ezzat, A. M., Bell, E., Kemp, J. L., O'Halloran, P., Russell, T., Wallis, J., & Barton, C. J. (2022). "Much better than I thought it was going to be": Telehealth delivered group-based education and exercise was perceived as acceptable among people with knee osteoarthritis. *Osteoarthritis and Cartilage Open*, 4(3), 1-8. <https://doi.org/https://doi.org/10.1016/j.ocarto.2022.100271>.
- Ezzat, A. M., Esculier, J. F., Ferguson, S. L., Napier, C., & Wong, S. T. (2023). Canadian physiotherapists integrate virtual care during the COVID-19 pandemic. *Physiotherapy Canada*, 75(2). <https://doi.org/https://doi.org/10.3138/ptc-2022-0092>
- Farmanova, E., Kirvan, C., Verma, J., Mukerji, G., Akunov, N., Phillips, K., & Samis, S. (2016). Triple Aim in Canada: developing capacity to lead to better health, care and cost. *International Journal for Quality in Health Care*, 28(6), 830–837. <https://doi.org/10.1093/intqhc/mzw118>
- Fraser-Arnott, M. A. (2019). Evolving practices and professional identity: How the new ways we work can reshape us as professionals and a profession. *International Federation of Library Associations and Institutions Journal*, 45(2), 114-126. <https://doi.org/10.1177/0340035218810960>
- Galpin, K., Sikka, N., King, S. L., Horvath, K. A., Shipman, S. A., & AAMC Telehealth Advisory Committee (2021). Expert Consensus: Telehealth Skills for Health Care Professionals. *Telemedicine journal and e-health : the official journal of the American Telemedicine Association*, 27(7), 820–824. <https://doi.org/10.1089/tmj.2020.0420>
- Gardner, A., Hase, S., Gardner, G., Dunn, S. V., & Carryer, J. (2007). From competence to capability: a study of nurse practitioners in clinical practice. *Journal of Clinical Nursing*, 0(0), 070621074500036. <https://doi.org/10.1111/j.1365-2702.2006.01880.x>

- Gava, V., Ribeiro, L. P., Barreto, R. P. G., & Camargo, P. R. (2022). Effectiveness of physical therapy given by telerehabilitation on pain and disability of individuals with shoulder pain: A systematic review. *Clinical Rehabilitation*, 36(6), 715-725. <https://doi.org/10.1177/02692155221083496>
- Giesbrecht, E., Major, M. E., Fricke, M., Wener, P., van Egmond, M., Aarden, J. J., Brown, C. L., Pol, M., & van der Schaaf, M. (2023). Telerehabilitation delivery in Canada and the Netherlands: Results of a survey study. *JMIR Rehabilitation & Assistive Technologies*, 10, e45448. <https://doi.org/10.2196/45448>
- Government of Canada (1985). *Canada Health Act*. Retrieved online June 4, 2024 from <https://laws-lois.justice.gc.ca/PDF/C-6.pdf>
- Voisin & Cascadden (2021). *Report from the task team for equitable access to virtual care*. Government of Canada. Retrieved on June 3, 2024 from https://publications.gc.ca/collections/collection_2021/sc-hc/H22-4-25-2021-eng.pdf
- Government of Canada (2024). *Current trends – high-speed broadband*. Retrieved from Canadian radio-television and telecommunications division on May 4, 2024 from <https://crtc.gc.ca/eng/publications/reports/PolicyMonitoring/ban.htm>
- Government of Manitoba (2022, April 1). Social impact bond created to help Manitobans [Press release]. <https://news.gov.mb.ca/news/index.html?item=54041>
- Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic review and recommendations. *The Milbank Quarterly*, 82(4), 581-629. <https://doi.org/10.1111/j.0887-378x.2004.00325.x>
- Grimmer, K., Lizarondo, L., Kumar, S., Bell, E., Buist, M., & Weinstein, P. (2014). An evidence-based framework to measure quality of allied health care. *Health Research Policy and Systems*, 12(1), 10. <https://doi.org/10.1186/1478-4505-12-10>

- Grinnell, R. M., & Unrau, Y. A. (2005). *Social work research and evaluation: quantitative and qualitative approaches*. (7th ed.). Oxford University Press.
- Grundstein, M. J., Fisher, C., Titmuss, M., & Cioppa-Mosca, J. (2021). The role of virtual physical therapy in a post-pandemic world: Pearls, pitfalls, challenges, and adaptations. *Physical Therapy, 101*(9). <https://doi.org/10.1093/ptj/pzab145>
- Gupta, D. M., Boland, R. J., & Aron, D. C. (2017). The physician's experience of changing clinical practice: a struggle to unlearn. *Implementation Science, 12*(1). <https://doi.org/10.1186/s13012-017-0555-2>
- Haines, K. J., Sawyer, A., Mckinnon, C., Donovan, A., Michael, C., Cimoli, C., Gregory, M., Berney, S., & Berlowitz, D. J. (2023). Barriers and enablers to telehealth use by physiotherapists during the COVID-19 pandemic. *Physiotherapy, 118*, 12-19. <https://doi.org/10.1016/j.physio.2022.09.003>
- Hanks, S., Neve, H., & Gale, T. (2021). Preparing health profession students for practice in complex real world settings: How do educators respond to a model of capability? *International Journal of Practice-based Learning in Health and Social Care, 9*(1), 50-63. <https://doi.org/10.18552/ijpblhsc.v9i1.749>
- Hart, R., D., Sarin, R., Mechanic, O., Hertelendy, A. J., Larson, D., Rhone, K., Sidel, K., Voskanyan, A., & Ciottone, G. R. (2022). Developing telemedicine curriculum competencies for graduate medical education: Outcomes of a modified delphi process. *Academic Medicine, 97*(4), 577-585. <https://doi.org/https://doi.org/10.1097/ACM.0000000000004463>

- Hartman, M., Mináriková, J., Batalik, L., Pepera, G., Su, J. J., Formiga, M. F., Cahalin, L., & Dosbaba, F. (2023). Effects of home-based training with internet telehealth guidance in COPD patients entering pulmonary rehabilitation: A systematic review. *International Journal of Chronic Obstructive Pulmonary Disease*, *18*, 2305–2319. <https://doi.org/https://doi.org/10.2147/COPD.S425218>
- Hassani, K., McElroy, T., Coop, M., Pellegrin, J., Wu, W. L., Janke, R. D., & Johnson, L. (2021). Rapid implementation and evaluation of virtual health training in a subspecialty hospital in British Columbia, in response to the COVID-19 pandemic. *Frontiers in Pediatrics*, *9*(638070), 1-8. <https://doi.org/https://doi.org/10.3389/fped.2021.638070>
- Hawker, G. A., Mian, S., Kendzerska, T., & French, M. (2011). Measures of adult pain: visual analog scale for pain (VAS Pain), numeric rating scale for pain (NRS pain), McGill pain questionnaire (MPQ), short-form McGill pain questionnaire (SF-MPQ), chronic pain grade scale (CPGS), short form-36 bodily pain scale (SF-36 BPS), and measure of intermittent and constant osteoarthritis pain (ICOAP). *Arthritis Care & Research*, *63*(S11). <https://doi.org/https://doi.org/10.1002/acr.20543>
- Hinman, R. S., Campbell, P. K., Kimp, A. J., Russell, T., Foster, N. E., Kasza, J., Harris, A., & Bennell, K. L. (2024). Telerehabilitation consultations with a physiotherapist for chronic knee pain versus in-person consultations in Australia: the PEAK non-inferiority randomised controlled trial. *The Lancet (British edition)*. [https://doi.org/10.1016/S0140-6736\(23\)02630-2](https://doi.org/10.1016/S0140-6736(23)02630-2)
- Hinman, R. S., Nelligan, R. K., Bennell, K. L., & Delany, C. (2017). “Sounds a bit crazy, but It was almost more personal:” A qualitative study of patient and clinician experiences of physical therapist-prescribed exercise for knee osteoarthritis via skype. *Arthritis Care & Research*, *69*(12), 1834-1844. <https://doi.org/10.1002/acr.23218>

Hornby (2022) Physiotherapy. *Oxford Advanced Learners Dictionary*. Retrieved July 15, 2023 from <https://www.oxfordlearnersdictionaries.com/definition/english/physical-therapy>

Jansson, M. M., Rantala, A., Miettunen, J., Puhto, A.-P., & Pikkarainen, M. (2022). The effects and safety of telerehabilitation in patients with lower-limb joint replacement: A systematic review and narrative synthesis. *Journal of Telemedicine and Telecare*, 28(2), 96-114. <https://doi.org/10.1177/1357633x20917868>

Indeed (2022) *Everything you need to know about being mid-career*. Indeed.

<https://www.indeed.com/career-advice/finding-a-job/mid-career>

Institute of Healthcare Improvement (n.d.). *Driving healthcare forward with insights and innovations*. <https://www.ihl.org>

Jarva, E., Mikkonen, K., Andersson, J., Tuomikoski, A.-M., Kääriäinen, M., Meriläinen, M., & Oikarinen, A. (2022b). Aspects associated with health care professionals' digital health competence development – a qualitative study. *Finnish Journal of eHealth and eWelfare*, 14(1), 79-91. <https://doi.org/10.23996/fjhw.111771>

Jarva, E., Oikarinen, A., Andersson, J., Tuomikoski, A. M., Kääriäinen, M., Meriläinen, M., & Mikkonen, K. (2022a). Healthcare professionals' perceptions of digital health competence: A qualitative descriptive study. *Nursing Open*, 9(2), 1379-1393. <https://doi.org/10.1002/nop2.1184>

Jones, L., & Green, J. (2006). Shifting discourses of professionalism: A case study of general practitioners in the United Kingdom. *Sociology of Health and Illness*, 0(0), 060926022052003. <https://doi.org/10.1111/j.1467-9566.2006.00513.x>

Judd, T. (2018). The rise and fall (?) of the digital natives. *Australasian Journal of Educational Technology*, 34(5), 99–119. <https://doi.org/10.14742/ajet.3821>

- Kairy, D., Tousignant, M., Leclerc, N., Côté, A.-M., Levasseur, M., & Researchers, T. (2013). The patient's perspective of in-home telerehabilitation physiotherapy services following total knee arthroplasty. *International Journal of Environmental Research and Public Health*, *10*(9), 3998-4011.
<https://doi.org/10.3390/ijerph10093998>
- Karnoe, A., Furstrand, D., Christensen, K. B., Norgaard, O., & Kayser, L. (2018). Assessing competencies needed to engage with digital health services: Development of the eHealth literacy assessment toolkit. *Journal of Medical Internet Research*, *20*(5), e178. <https://doi.org/10.2196/jmir.8347>
- Keen, S., Lomeli-Rodriguez, M., & Joffe, H. (2022). From change to opportunity: virtual qualitative research during COVID-19 & beyond. *International Journal of Qualitative Methods*, *21*, 160940692211050. <https://doi.org/10.1177/16094069221105075>
- Keswani, A., Brooks, J. P., & Khoury, P. (2020). The future of telehealth in allergy and immunology training. *The Journal of Allergy and Clinical Immunology: In Practice*, *8*(7), 2135-2141. <https://doi.org/10.1016/j.jaip.2020.05.009>
- Khan, T. H., & MacEachen, E. (2022). An alternative method of interviewing: critical reflections on videoconference interviews for qualitative data collection. *International Journal of Qualitative Methods*, *21*, 160940692210900.
<https://doi.org/10.1177/16094069221090063>
- Kleinheksel, A. J., Rockich-Winston, N., Tawfik, H., & Wyatt, T. R. (2020). Demystifying content analysis. *American Journal of Pharmaceutical Education*, *84*(1), 7113.
<https://doi.org/10.5688/ajpe7113>

- Konttila, J., Siira, H., Kyngäs, H., Lahtinen, M., Elo, S., Kääriäinen, M., Kaakinen, P., Oikarinen, A., Yamakawa, M., Fukui, S., Utsumi, M., Higami, Y., Higuchi, A., & Mikkonen, K. (2019). Healthcare professionals' competence in digitalisation: A systematic review. *Journal of Clinical Nursing*, 28(5-6), 745-761.
<https://doi.org/10.1111/jocn.14710>
- Lauzon, C. (2022, August 4). *Quality physiotherapy*. Canadian Physiotherapy Association. Retrieved January 23, 2023, from <https://physiotherapy.ca/quality-physiotherapy/>
- Laver, K. E., Adey-Wakeling, Z., Crotty, M., Lannin, N. A., George, S., & Sherrington, C. (2020). Telerehabilitation services for stroke. *Cochrane Database of Systematic Reviews*, 2020(1). <https://doi.org/10.1002/14651858.cd010255.pub3>
- Lawford, B. J., Bennell, K. L., & Hinman, R. S. (2017). Consumer perceptions of and willingness to use remotely delivered service models for exercise management of knee and hip osteoarthritis: A cross-Sectional survey. *Arthritis Care & Research*, 69(5), 667-676. <https://doi.org/10.1002/acr.23122>
- Lawford, B. J., Bennell, K. L., Kasza, J., & Hinman, R. S. (2018a). Physical therapists' perceptions of telephone- and internet video-mediated service models for exercise management of people with osteoarthritis. *Arthritis Care & Research*, 70(3), 398-408. <https://doi.org/10.1002/acr.23260>
- Lawford, B. J., Delany, C., Bennell, K. L., & Hinman, R. S. (2018b). "I was really sceptical...But it worked really well": A qualitative study of patient perceptions of telephone-delivered exercise therapy by physiotherapists for people with knee osteoarthritis. *Osteoarthritis and Cartilage*, 26(6), 741-750. <https://doi.org/10.1016/j.joca.2018.02.909>

- Lawford, B. J., Delany, C., Bennell, K. L., & Hinman, R. S. (2019). "I Was Really Pleasantly Surprised": Firsthand Experience and Shifts in Physical Therapist Perceptions of Telephone-Delivered Exercise Therapy for Knee Osteoarthritis—A Qualitative Study. *Arthritis Care & Research*, *71*(4), 545-557. <https://doi.org/10.1002/acr.23618>
- Lee, A., Finnin, K., Holdsworth, L., Millette, D., & Peterson, C. (2020). *Report of the WCPT/INPTRA digital physical therapy practice task force*. W. Physiotherapy. <https://world.physio/sites/default/files/2020-06/WCPT-INPTRA-Digital-Physical-Therapy-Practice-Task-force-March2020.pdf>
- Lin, I., Wiles, L., Waller, R., Goucke, R., Nagree, Y., Gibberd, M., Straker, L., Maher, C. G., & O'Sullivan, P. P. B. (2020). What does best practice care for musculoskeletal pain look like? Eleven consistent recommendations from high-quality clinical practice guidelines: systematic review. *British Journal of Sports Medicine*, *54*(2), 79–86. <https://doi.org/10.1136/bjsports-2018-099878>
- Lobe, B., Morgan, D., & Hoffman, K. A. (2020). Qualitative data collection in an era of social distancing. *International Journal of Qualitative Methods*, *19*, 1609406920937875. <https://doi.org/10.1177/1609406920937875>
- Logan, J. O., & Graham, I. D. (1998). Toward a Comprehensive interdisciplinary model of health care research use. *Science Communication*, *20*(2), 227-246. <https://doi.org/10.1177/1075547098020002004>
- Lupton, D. (2014). Critical perspectives on digital health technologies. *Sociology Compass*, *8*(12), 1344-1359. <https://doi.org/10.1111/soc4.12226>
- Maggio, L. A., Sewell, J. L., & Artino, A. R. (2016). The literature review: A foundation for high-quality medical education research. *Journal of Graduate Medical Education*, *8*(3), 297-303. <https://doi.org/10.4300/jgme-d-16-00175.1>

- Malliaras, P., Merolli, M., Williams, C. M., Caneiro, J. P., Haines, T., & Barton, C. (2021). 'It's not hands-on therapy, so it's very limited': Telehealth use and views among allied health clinicians during the coronavirus pandemic. *Musculoskeletal Science and Practice*, 52, 102340. <https://doi.org/10.1016/j.msksp.2021.102340>
- Malterud, K., Dirk Siersma, V., & Dorrit Guassora, A. (2016). Sample size in qualitative interview studies: Guided by information power. *Qualitative Health Research*, 26(13), 1753-1760.
- Marks, D. F. (2020). The COM-B System of behaviour change: properties, problems and prospects. *Qeios*. <https://doi.org/10.32388/u5mttb.2>
- Martin, R., Mandrusiak, A., Russell, T., & Forbes, R. (2022). New-graduate physiotherapists' training needs and readiness for telehealth. *Physiotherapy Theory and Practice*, 38(13), 2788–2797. <https://doi.org/10.1080/09593985.2021.1955423>
- Mathias, S., Nayak, U. S., & Isaacs, B. (1986). Balance in elderly patients: the "get-up and go" test. *Archives of Physical Medicine and Rehabilitation*, 67(6), 387-389.
- Mayring, P. (2015). *Qualitative Content Analysis: Theoretical Background and Procedures*. Springer Netherlands. https://doi.org/10.1007/978-94-017-9181-6_13
- McCabe, C., & Timmins, F. (2016). Embracing healthcare technology – What is the way forward for nurse education? *Nurse Education in Practice*, 21, 104–106. <https://doi.org/10.1016/j.nepr.2016.10.007>
- Merolli, M., Ahmed, O., McCreesh, K., Remedios, L., & Butler-Henderson, K. (2024). Are physiotherapists expected to be competent in digital health practice? Meta-synthesis of international physiotherapy practice competency standards. *Physiotherapy Theory and Practice*, 1–12. <https://doi.org/10.1080/09593985.2023.2299202>
- Michie, S., Atkins, L., & West, R. (2014). *The behaviour change wheel: A guide to designing interventions*. Silverback Publishing.

- Michie, S., Johnston, M., Abraham, C., Lawton, R., Parker, D., & Walker, A. (2005). Making psychological theory useful for implementing evidence based practice: A consensus approach. *Quality and Safety in Health Care*, *14*(1), 26-33.
<https://doi.org/10.1136/qshc.2004.011155>
- Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, *6*(1), 42. <https://doi.org/10.1186/1748-5908-6-42>
- Miller, P., S. S., Keller, D. R., Gustavson, A. M., & Barnes, D. E. (2022). Physical Therapist Telehealth Delivery at 1 Year Into COVID-19. *Physical Therapy & Rehabilitation Journal*, *102*(11), 1-9. <https://doi.org/https://doi.org/10.1093/ptj/pzac121>
- Miro (2024). Miro online whiteboard. (no version provided). RealTimeBoard Inc.
<http://www.miro.com/>
- Moazzami, B. (2015). *Strengthening rural Canada. Fewer & older: Population and demographic challenges across rural Canada*. Government of Canada. Retrieved on June 3, 2024 from <https://www.strengtheningruralcanada.ca/file/Fewer-Older-Population-and-Demographic-Challenges-Across-Rural-Canada.pdf>
- Nazeha, N., Pavagadhi, D., Kyaw, B. M., Car, J., Jimenez, G., & Tudor Car, L. (2020). A digitally competent health workforce: Scoping review of educational frameworks. *Journal of Medical Internet Research*, *22*(11), e22706. <https://doi.org/10.2196/22706>
- Neergaard, M. A., Olesen, F., Andersen, R. S., & Sondergaard, J. (2009). Qualitative description – the poor cousin of health research? *BMC Medical Research Methodology*, *9*(1), 52. <https://doi.org/10.1186/1471-2288-9-52>

- Nelson, M., Bourke, M., Crossley, K., & Russell, T. (2020). Telerehabilitation is non-inferior to usual care following total hip replacement — a randomized controlled non-inferiority trial. *Physiotherapy*, *107*, 19-27.
<https://doi.org/10.1016/j.physio.2019.06.006>
- Nelson, M., Russell, T., Crossley, K., Bourke, M., & Mcphail, S. (2021). Cost-effectiveness of telerehabilitation versus traditional care after total hip replacement: A trial-based economic evaluation. *Journal of Telemedicine and Telecare*, *27*(6), 359-366.
<https://doi.org/10.1177/1357633x19869796>
- Nicholls, D.A., & Cheek J. (2006) Physiotherapy and the shadow of prostitution: The Society of Trained Masseuses and the massage scandals of 1894. *Social Science & Medicine*, *62*(9), 2336-2348. <https://doi.org/10.1016/j.socscimed.2005.09.010>
- Nicholls, D.A., & Gibson, B. E. (201) The body and physiotherapy. *Physiotherapy Theory and Practice*, *26* (8), 497-509. <https://doi.org/10.3109/09593981003710316>
- Nicholls, D. A., & Holmes, D. (2012). Discipline, desire, and transgression in physiotherapy practice. *Physiotherapy Theory and Practice*, *28*(6), 454-465.
<https://doi.org/10.3109/09593985.2012.676940>
- Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implementation Science*, *10*(1). <https://doi.org/10.1186/s13012-015-0242-0>
- Noronha, C., Lo, M. C., Nikiforova, T., Jones, D., Nandiwada, D. R., Leung, T. I., Smith, J. E., & Lee, W. W. (2022). Telehealth competencies in medical education: New frontiers in faculty development and learner assessments. *Journal of General Internal Medicine*. <https://doi.org/10.1007/s11606-022-07564-8>
- Nundy, S., Cooper, L. A., & Mate, K. S. (2022). The quintuple aim for health care improvement. *JAMA*, *327*(6), 521. <https://doi.org/10.1001/jama.2021.25181>

- O'Connell, J., Gardner, G., & Coyer, F. (2014). Beyond competencies: using a capability framework in developing practice standards for advanced practice nursing. *Journal of Advanced Nursing*, 70(12), 2728-2735. <https://doi.org/10.1111/jan.12475>
- O'Neil, J., Egan, M., Marshall, S., Bilodeau, M., Pelletier, L., & Sveistrup, H. (2023a). Remotely supervised exercise programmes to improve balance, mobility, and activity among people with moderate to severe traumatic brain injury: Description and feasibility. *Physiotherapy Canada*, 75(2), 146–155. <https://doi.org/https://doi.org/10.3138/ptc-2021-0039>
- O'Neil, J., van Ierssel, J., King, J., & Sveistrup, H. (2023b). Telerehabilitation implementation: Perspectives from physiotherapists working in complex care. *University of Toronto Press*. <https://doi.org/doi:10.3138/ptc-2022-0072>
- Olmos-Vega, F. M., Stalmeijer, R. E., Varpio, L., & Kahlke, R. (2023). A practical guide to reflexivity in qualitative research: AMEE Guide No. 149. *Medical Teacher*, 45(3), 241-251. <https://doi.org/10.1080/0142159X.2022.2057287>
- Papanagnou, D., Sicks, S., & Hollander, J. E. (2015). Training the next generation of care providers: Focus on telehealth. *Healthcare Transformation*, 1(1), 52-63. <https://doi.org/10.1089/heat.2015.29001-psh>
- Powell, K. C., & Kalina, C. J. E., 130(2), 241-250 Kalina. (2009). Cognitive and social constructivism: Developing tools for an effective classroom. *Education*, 130(2), 241-250.
- Quigley, A., Johnson, H., & McArthur, C. (2021). Transforming the provision of physiotherapy in the time of COVID-19: a call to action for telerehabilitation. *Physiotherapy Canada*, 73(1), 1-2. <https://doi.org/10.3138/ptc-2020-0031-gee>

- Ramachandran, H. J., Jiang, Y., Tam, W. W. S., Yeo, T. J., & Wang, W. (2022). Effectiveness of home-based cardiac telerehabilitation as an alternative to Phase 2 cardiac rehabilitation of coronary heart disease: A systematic review and meta-analysis. *European Journal of Preventive Cardiology*, 29, 1017–1043. <https://doi.org/https://doi.org/10.1093/eurjpc/zwab106>
- Rausch, A.-K., Baur, H., Reicherzer, L., Wirz, M., Keller, F., Opsommer, E., Schoeb, V., Vercelli, S., & Barbero, M. (2021). Physiotherapists' use and perceptions of digital remote physiotherapy during COVID-19 lockdown in Switzerland: An online cross-sectional survey. *Archives of Physiotherapy*, 11(1). <https://doi.org/10.1186/s40945-021-00112-3>
- Ravitch, S. M., & Carl, N. M. (2021). *Qualitative research: Bridging the conceptual, theoretical and methodological* (Second ed.). SAGE.
- Reed, J., Procter, S., & Murray, S. (1996). A sampling strategy for qualitative research. *Nurse Researcher*, 3(4), 52–68. <https://doi.org/10.7748/nr.3.4.52.s6>
- Rethorn, Z. D., Lee, A. C., & Rethorn, T. J. (2021). Connecting at the Webside: Rapid Telehealth Implementation for Musculoskeletal Clinicians. *Journal of Orthopaedic & Sports Physical Therapy*, 51(1), 8-11. <https://doi.org/10.2519/jospt.2021.9902>
- Reynolds, A., Awan, N., & Gallagher, P. (2021). Physiotherapists' perspective of telehealth during the Covid-19 pandemic. *International Journal of Medical Informatics*, 156, 104613. <https://doi.org/10.1016/j.ijmedinf.2021.104613>
- Ripat, J. (2022, September 29) *Personal communication [email]*. University of Manitoba.
- Romanow (2002) *Building on Values: The Future of Health Care in Canada*. Government of Canada. Retrieved online June 4, 2024 from <https://publications.gc.ca/collections/Collection/CP32-85-2002E.pdf>

- Russell, T., Buttrum, P., Wootton, R., & Jull, G. A. (2011). Internet-based outpatient telerehabilitation for patients following total knee arthroplasty. *The Journal of Bone and Joint Medicine*, 93(2), 113-120. <https://doi.org/10.2106/JBJS.I.01375>
- Russell, T. G. (2007). Physical rehabilitation using telemedicine. *Journal of Telemedicine and Telecare*, 13(5), 217-220. <https://doi.org/doi:10.1258/135763307781458886>
- Rutledge, O'Rourke, J., Mason, A. M., Chike-Harris, K., Behnke, L., Melhado, L., Downes, L., & Gustin, T. (2021). Telehealth competencies for nursing education and practice: The four P's of telehealth. *Nurse Education*, 46(5), 300-305. <https://doi.org/DOI:10.1097/NNE.0000000000000988>
- Saaei, F., & Klappa, S. G. (2021). Rethinking telerehabilitation: attitudes of physical therapists and patients. *Journal of Patient Experience*, 8, 237437352110343. <https://doi.org/10.1177/23743735211034335>
- Samper-Pardo, M., León-Herrera, S., Oliván-Blázquez, B., Méndez-López, F., Domínguez-García, M., & Sánchez-Recio, R. (2023). Effectiveness of a telerehabilitation intervention using ReCOVery APP of long COVID patients: A randomized, 3-month follow-up clinical trial. *Scientific Reports*, 13(1), 7943. <https://doi.org/10.1038/s41598-023-35058-y>
- Sandelowski, M. (2000). Whatever happened to qualitative description? *Research in Nursing & Health*, 23(4), 334-340. [https://doi.org/10.1002/1098-240x\(200008\)23:4<334::aid-nur9>3.0.co;2-g](https://doi.org/10.1002/1098-240x(200008)23:4<334::aid-nur9>3.0.co;2-g)
- Scott, R. E., & Mars, M. (2019). Here we go again - digital health. *Journal for the Interenation Society for Telemedicine and eHealth*, 7, 1-2.

- See, J., Dodakian, L., Chou, C., Chan, V., McKenzie, A., Reinkensmeyer, D. J., & Cramer, S. C. (2013). A standardized approach to the fugl-meyer assessment and its implications for clinical trials. *Neurorehabilitation and Neural Repair*, *27*(8), 732-741.
<https://doi.org/10.1177/1545968313491000>
- Seron, P., Oliveros, M.-J., Gutierrez-Arias, R., Fuentes-Aspe, R., Torres-Castro, R. C., Merino-Osorio, C., Nahuelhual, P., Inostroza, J., Jalil, Y., Solano, R., Marzuca-Nassr, G. N., Aguilera-Eguía, R., Lavados-Romo, P., Soto-Rodríguez, F. J., Sabelle, C., Villarroel-Silva, G., Gomolán, P., Huaiquilaf, S., & Sanchez, P. (2021). Effectiveness of telerehabilitation in physical therapy: A rapid overview. *Physical Therapy*, *101*(6).
<https://doi.org/10.1093/ptj/pzab053>
- Sharma, R., Nachum, S., Davidson, K. W., & Nochomovitz, M. (2019). It's not just FaceTime: Core competencies for the medical virtualist. *International Journal of Emergency Medicine*, *12*(1). <https://doi.org/10.1186/s12245-019-0226-y>
- Shaw, T., McGregor, D., Brunner, M., Keep, M., Janssen, A., & Barnett, S. (2017). What is eHealth (6)? Development of a conceptual model for eHealth: Qualitative study with key informants. *J Med Internet Res*, *19*(10), e324. <https://doi.org/10.2196/jmir.8106>
- Shields, P. M., & Tajalli, H. (2006). Intermediate theory: The missing link in successful student scholarship. *Journal of Public Affairs Education*, *12*(3), 313-334.
<https://doi.org/10.1080/15236803.2006.12001438>
- Showell, C., & Nøhr, C. (2012). How should we define eHealth, and does the definition matter? *Studies in Health Technologies Informatics*, *180*, 881-884.
<https://doi.org/doi:10.3233/978-1-61499-101-4-881>

- Signal, N., Martin, T., Leys, A., Maloney, R., & Bright, F. (2020). Implementation of telerehabilitation in response to COVID-19: lessons learnt from neurorehabilitation clinical practice and education. *New Zealand Journal of Physiotherapy*, 48, 117-126. <https://doi.org/10.15619/NZJP/48.3.03>
- Skyvell Nilsson, M., Törner, M., & Pousette, A. (2018). Professional culture, information security and healthcare quality—an interview study of physicians' and nurses' perspectives on value conflicts in the use of electronic medical records. *Safety in Health*, 4(1), 11. <https://doi.org/10.1186/s40886-018-0078-9>
- Statistics Canada (2016). *Population centre and rural area classification 2016*. Statistics Canada. <https://www.statcan.gc.ca/en/subjects/standard/pcrac/2016/introduction>
- Statistics Canada. (2021). *Census profile, 2021 census of population - Manitoba* [Data table]. <https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/details/page.cfm?Lang=E&SearchText=Manitoba&DGUIDlist=2021A000246&GENDERlist=1,2,3&STATISTIClist=1,4&HEADERlist=0>
- Stephenson, J., & Yorke, M. (1998). *The concept of capability and its importance in higher education*. Kogan Page.
- Sutherland, G. (2017). *The market profile of physiotherapists in Canada*. The Conference Board of Canada. https://physiotherapy.ca/app/uploads/2022/08/8695profile-of-physiotherapists-in-canada_br.pdf
- Stratford, P. W., Gill, C., Westaway, M. D., & Binkley, J. M. (1995). Assessing disability and change on individual patients: A report of a patient specific measure. *Physiotherapy Canada*, 47, 258-263.
- Sullivan-Bolyai, S., Bova, C., & Harper, D. (2005). Developing and refining interventions in persons with health disparities: the use of qualitative description. *Nurs Outlook*, 53(3), 127-133. <https://doi.org/10.1016/j.outlook.2005.03.005>

- Tenforde, A. S., Borgstrom, H., Polich, G., Steere, H., Davis, I. S., Cotton, K., O'Donnell, M., & Silver, J. K. (2020). Outpatient physical, occupational, and speech therapy synchronous telemedicine: A survey study of patient satisfaction with virtual visits during the COVID-19 pandemic. *American Journal of Physical Medicine & Rehabilitation*, 99(11), 977-981. <https://doi.org/10.1097/phm.0000000000001571>
- Thimbleby, H. (2013). Technology and the future of healthcare. *Journal of Public Health Research*, 2(3), jphr.2013.e2028. <https://doi.org/10.4081/jphr.2013.e28>
- Tousignant, M., Moffet, H., Boissy, P., Corriveau, H., Cabana, F., & Marquis, F. (2011). A randomized controlled trial of home telerehabilitation for post-knee arthroplasty. *Journal of Telemedicine and Telecare*, 17(4), 195-198. <https://doi.org/10.1258/jtt.2010.100602>
- Tousignant, M., Moffet, H., Nadeau, S., Mérette, C., Boissy, P., Corriveau, H., Marquis, F., Cabana, F., Ranger, P., Belzile, É. L., & Dimentberg, R. (2015). Cost analysis of home telerehabilitation for post-knee arthroplasty. *Journal of Medical Internet Research*, 17(3), e83. <https://doi.org/10.2196/jmir.3844>
- Tracy, S. J. (2010). Qualitative quality: Eight “big-tent” criteria for excellent qualitative research. *Qualitative Enquiry*, 16(10), 837-851. <https://doi.org/https://doi.org/10.1177/1077800410383121>
- Tsang, M. P., Man, G. C. W., Xin, H., Chong, Y. C., Ong, M. T.-Y., & Yung, P. S.-H. (2022). The effectiveness of telerehabilitation in patients after total knee replacement: A systematic review and meta-analysis of randomized controlled trials. *Journal of Telemedicine and Telecare*, 1357633X2210974. <https://doi.org/10.1177/1357633x221097469>

- University of Manitoba (2020a). *Data Security*. <https://umanitoba.ca/access-and-privacy/sites/access-and-privacy/files/2022-12/Data%20Classification%20Scheme%202020%20Final.pdf>
- University of Manitoba (2020b). *Data Sharing and Storage Guidelines*. https://umanitoba.ca/access-and-privacy/sites/access-and-privacy/files/2022-12/Data%20Storage%20Guidelines%20for%20University%20Records%20Nov%202022_1.pdf
- Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & Health Sciences, 15*(3), 398-405. <https://doi.org/10.1111/nhs.12048>
- Van Egmond, M. A., Van Der Schaaf, M., Vredeveld, T., Vollenbroek-Hutten, M. M. R., Van Berge Henegouwen, M. I., Klinkenbijn, J. H. G., & Engelbert, R. H. H. (2018). Effectiveness of physiotherapy with telerehabilitation in surgical patients: A systematic review and meta-analysis. *Physiotherapy, 104*(3), 277-298. <https://doi.org/10.1016/j.physio.2018.04.004>
- Van Houwelingen, C. T. M., Moerman, A. H., Ettema, R. G. A., Kort, H. S. M., & Ten Cate, O. (2016). Competencies required for nursing telehealth activities: A Delphi-study. *Nurse Education Today, 39*, 50-62. <https://doi.org/10.1016/j.nedt.2015.12.025>
- Varpio, P., E., Uijtdehaage, S., & Young, M. (2020). The distinctions between theory, theoretical framework, and conceptual framework. *Academic Medicine, 95*(7), 989-994. <https://doi.org/https://doi.org/10.1097/acm>.
- Vellata, C., Belli, S., Balsamo, F., Giordano, A., Colombo, R., & Maggioni, G. (2021). Effectiveness of telerehabilitation on motor impairments, non-motor symptoms and compliance in patients with Parkinson's disease: A systematic review. *Frontiers in Neurology, 12*, 1-18. <https://doi.org/https://doi.org/10.3389/fneur.2021.627999>

- Veras, M., Kairy, D., & Paquet, N. (2016). What is evidence-based physiotherapy?
Physiotherapy Canada, 68(2), 95-98.
<https://doi.org/https://doi.org/10.3138/ptc.68.2.GEE>
- Virtanen, L., Kaihlanen, A.-M., Laukka, E., Gluschkoff, K., & Heponiemi, T. (2021).
Behavior change techniques to promote healthcare professionals' eHealth
competency: A systematic review of interventions. *International Journal of Medical
Informatics*, 149, 104432. <https://doi.org/10.1016/j.ijmedinf.2021.104432>
- Wade, V. A., Elliott, J. A., & Hiller, J. E. (2014). Clinician acceptance is the key factor for
sustainable telehealth services. *Qualitative Health Research*, 24(5), 682-694.
<https://doi.org/10.1177/1049732314528809>
- Walton, D. (2020). Physiotherapy's place in a rapidly changing world A pan-Canadian
perspective of threats facing practice from the physio moves Canada project, part 2.
Physiotherapy Canada.
- Werneke, M. W., Deutscher, D., Grigsby, D., Tucker, C. A., Mioduski, J. E., & Hayes, D.
(2021). Telerehabilitation during the COVID-19 pandemic in outpatient rehabilitation
settings: A descriptive study. *Physical Therapy*, 101(7).
<https://doi.org/10.1093/ptj/pzab110>
- West, R., & Michie, S. (2020). A brief introduction to the COM-B Model of behaviour and
the PRIME Theory of motivation. *Qeios*. <https://doi.org/10.32388/ww04e6.2>
- West, R., & Michie, S. (2023). Why are there different versions of the COM-B model
diagram? *Qeios*. <https://doi.org/10.32388/awanwg>
- World Health Organisation (2024). *Telehealth quality of care tool*. World Health
Organisation, European Region.
<https://iris.who.int/bitstream/handle/10665/376258/WHO-EURO-2024-9475-49247-73556-eng.pdf?sequence=2>

- Wilson, R., & Rourke, J. (2023). Report card on access to rural health care in Canada. *Rural and remote health*, 23, 1, 8108. <https://doi.org/https://doi.org/10.22605/RRH8108>
- Withers, H. G., Glinsky, J. V., Chu, J., Jennings, M. D., Starkey, I., Parmeter, R., Boulos, M., Cruwys, J. J., Duong, K., Jordan, I., Wong, D., Trang, S., Duong, M., Liu, H., Hayes, A. J., Lambert, T. E., Zadro, J. R., Sherrington, C., Maher, C., . . . Harvey, L. A. (2024). Remotely delivered physiotherapy is as effective as face-to-face physiotherapy for musculoskeletal conditions (REFORM): A randomised trial. *Journal of Physiotherapy*, 70(2), 124-133. <https://doi.org/https://doi.org/10.1016/j.jphys.2024.02.016>.
- Wittmeier, K. D. M., Hammond, E., Tymko, K., Burnham, K., Janssen, T., Pablo, A. J., Russell, K., Pierce, S., Costello, C., & Protudjer, J. L. P. (2022). “Another Tool in Your Toolkit”: Pediatric Occupational and Physical Therapists’ Perspectives of Initiating Telehealth during the COVID-19 Pandemic. *Physical & Occupational Therapy In Pediatrics*, 42(5), 465-481. <https://doi.org/10.1080/01942638.2022.2065898>
- Wolfson, L. M., Whipple, R. H., Amerman, P., & Tobin, J. N. (1990). Gait assessment in the elderly: a gait abnormality rating scale and its relation to falls. *Journal of gerontology*, 45 1, M12-19.
- Xie, J. S., Nanji, K., Khan, M., Khalid, M. F., Garg, S. J., Thabane, L., Sivaprasad, S., & Chaudhary, V. (2022). Publication trends in telemedicine research originating from Canada. *Healthcare Management Forum*. 35, 153-160. <https://doi.org/https://doi.org/10.1177/08404704211070240>
- Zischke, C., Simas, V., Hing, W., Milne, N., Spittle, A., & Pope, R. (2021). The utility of physiotherapy assessments delivered by telehealth: A systematic review. *J Glob Health*, 11, 04072. <https://doi.org/10.7189/jogh.11.04072>

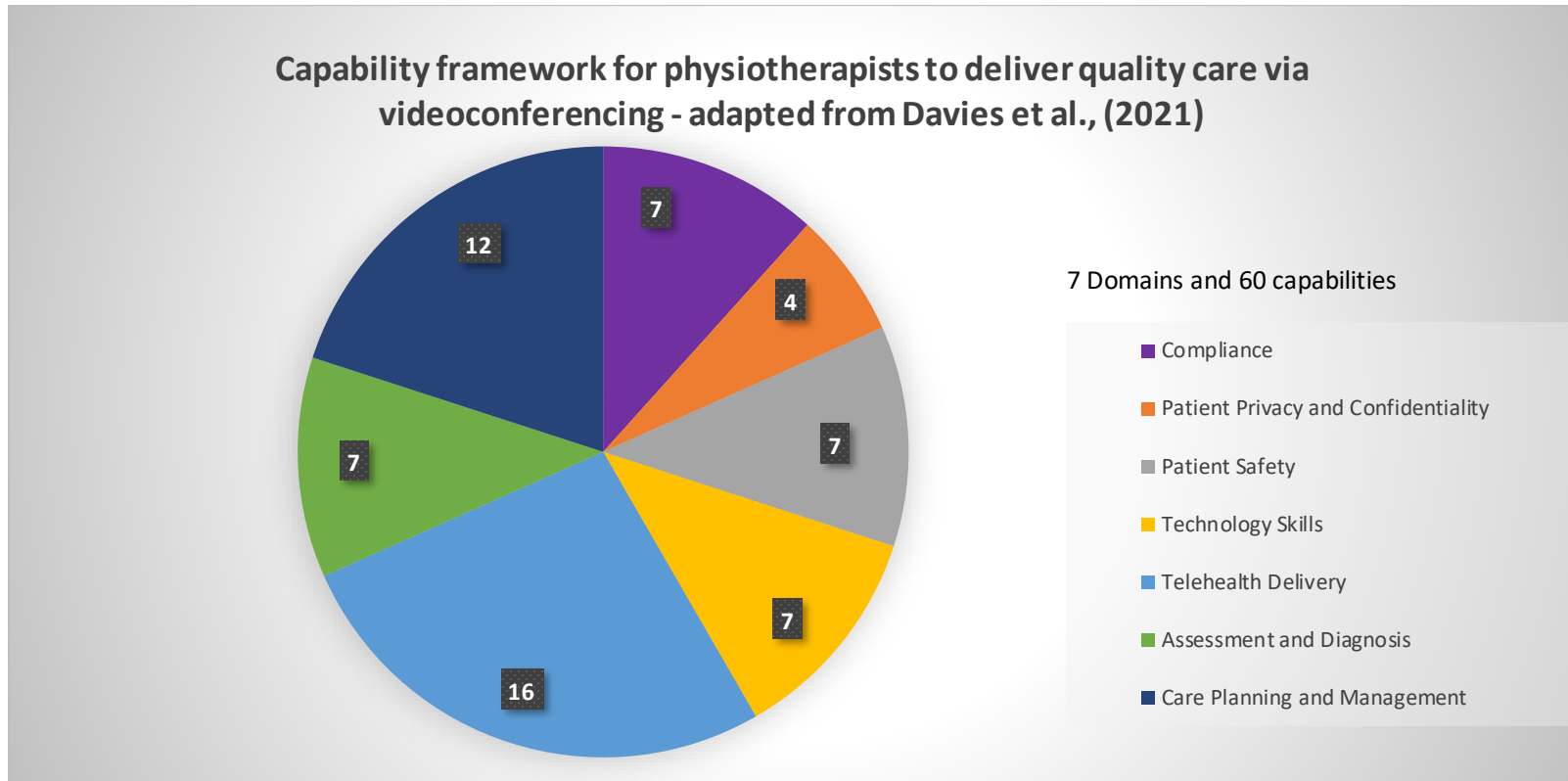
Zonneveld, M., Patomella, A. H., Asaba, E., & Guidetti, S. (2020). The use of information and communication technology in healthcare to improve participation in everyday life: a scoping review. *Disabil Rehabil*, 42(23), 3416-3423.

<https://doi.org/10.1080/09638288.2019.1592246>

Zoom Video Communications, Inc. (2020). *ZOOM cloud meetings* (Version 5.17.2) App

Store. <https://apps.apple.com/us/app/zoom-cloud-meetings/id546505307>

Appendix A – Videoconferencing Capability Framework Domains



Numbers indicate the capabilities in each of the seven domains

³ This article was published in Davies, L., Hinman, R. S., Russell, T., Lawford, B., Bennell, K., Billings, M., Cooper-Oguz, C., Finnan, K., Gallagher, S., Gilbertson, D. K., Holdsworth, L., Holland, A., Mcalister, J., Miles, D., & Roots, R. (2021). An international core capability framework for physiotherapists to deliver quality care via

videoconferencing: a Delphi study. *Journal of Physiotherapy*. <https://doi.org/10.1016/j.jphys.2021.09.001>. Permission to publish in the thesis was granted via email on October 26, 2023.

Appendix B – Videoconferencing Capability Domains and Capabilities (Davies et al., 2021)⁴

Domain	Capabilities
Compliance	<ul style="list-style-type: none"> i. Identify any limitation to their individual scope of telehealth (videoconferencing) practice as dictated by relevant laws, registration requirements, organizational regulation, and/or the funding/reimbursement model relevant to the patient ii. Comply with the regulatory requirements associated with practising as a physiotherapist in the practitioners' geographical location, the geographical restrictions associated with their professional registration and the geographical location(s) of the patient iii. Have professional indemnity insurance that covers the intended scope of telehealth (videoconferencing) practice iv. Determine a patient's eligibility for receiving care via telehealth in accordance with federal and state regulations and/or the funding/reimbursement model relevant to the individual patient v. Obtain and document informed consent from the patient and/or helper that is appropriate for the intended telehealth (videoconferencing) interactions vi. Align practice with relevant organizational telehealth procedures and protocols vii. Record and manage clinical documentation about telehealth (videoconferencing) interactions in accordance with professional association standards, state/federal regulations and medico-legal requirements
Patient privacy and confidentiality	<ul style="list-style-type: none"> i. Set up their and the patient's physical environment in order to maintain patient privacy ii. obtain informed consent from the patient if videos or photos are taken during the telehealth (videoconferencing) interaction (such as for assessment purposes), and explain how these will be used and stored iii. Inform the patient/caregiver that physiotherapist consent is required for them to take photos/videos of the consultation iv. Comply with the data security requirements of telehealth (videoconferencing) practice, platforms, storage and transmission (including sharing information with other health professionals) as dictated by bodies such as federal/state/professional and/or employer organization (eg, for USA physiotherapists, The Health Insurance Portability and Accountability Act requires technical, physical and administrative safeguards; for Australia, the Australian Privacy Principles; and for Europe, the General Data Protection Regulation).

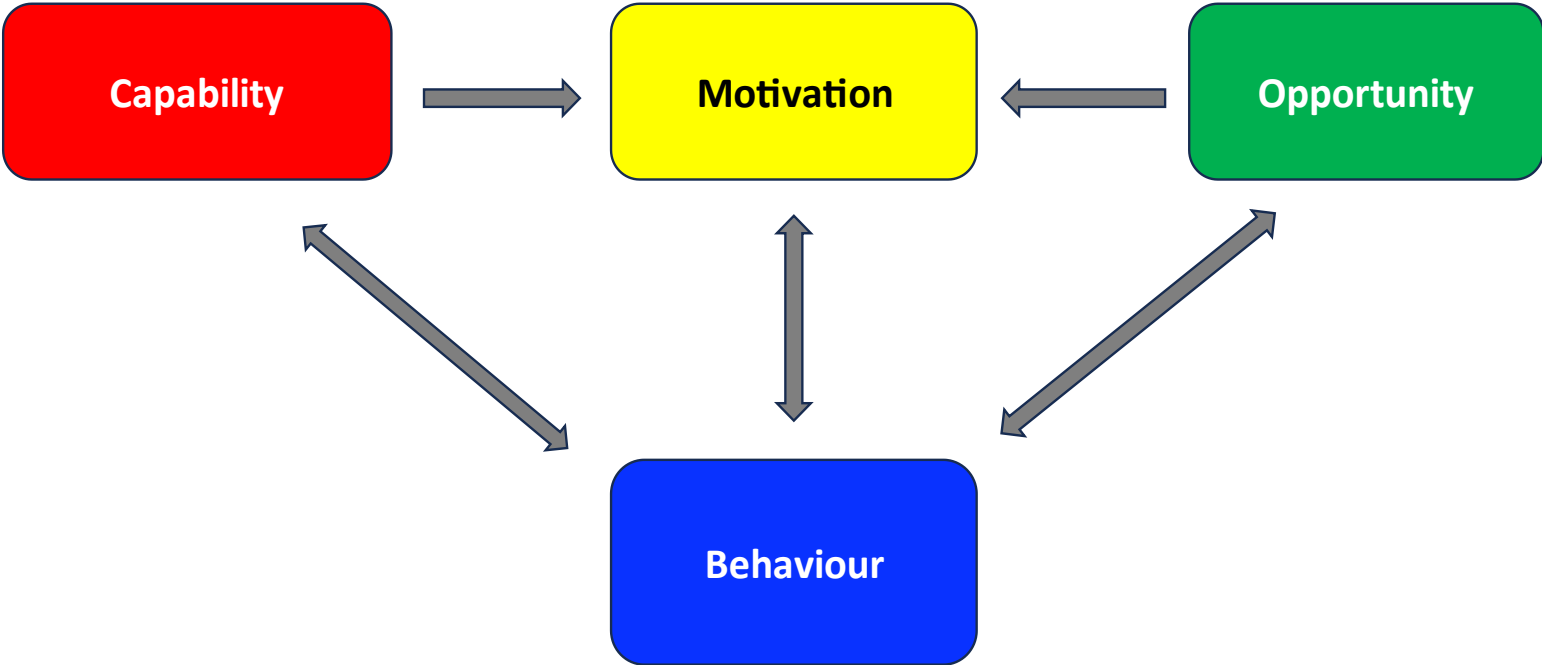
⁴ This article was published in Davies, L., Hinman, R. S., Russell, T., Lawford, B., Bennell, K., Billings, M., Cooper-Oguz, C., Finnan, K., Gallagher, S., Gilbertson, D. K., Holdsworth, L., Holland, A., Mcalister, J., Miles, D., & Roots, R. (2021). An international core capability framework for physiotherapists to deliver quality care via videoconferencing: a Delphi study. *Journal of Physiotherapy*. <https://doi.org/10.1016/j.jphys.2021.09.001>. Permission to publish in the thesis was granted via email on October 26, 2023.

Domain	Capabilities
Patient safety	<ul style="list-style-type: none"> i. Determine whether a patient is safe to receive care via telehealth (videoconferencing), taking into consideration a patient's health and physical environment ii. Inform the patient of potential risks, benefits and limitations associated with the delivery of telehealth (videoconferencing) iii. Describe a documented procedure in the case of a patient incident during the telehealth (videoconferencing) consultation, including being able to provide a patient's address to emergency services if required and/or notify the patient's emergency contact iv. Confirm the geographical address of the patient at the beginning of each consultation in case emergency services need to be called v. Identify safety hazards related to remote care where the therapist is not in the same room as the patient vi. Enlist the assistance of a patient caregiver to assist with physical assessment and management tasks in order to ensure patient safety when required vii. Instruct the patient to set up the physical environment in a manner that is safe for performing the intended assessment and management tasks.
Technology Skills	<ul style="list-style-type: none"> i. Assess the digital literacy of the patient and suitability for a telehealth (videoconferencing) interaction ii. Determine if the patient has appropriate IT hardware (eg, laptop, tablet device, smart phone) to enable the delivery of the telehealth (videoconferencing) consultation iii. Select appropriate fit-for-purpose telehealth (videoconferencing) technology that is compliant with data security requirements iv. Select (if possible) a telehealth (videoconferencing) platform that is suitable for the intended assessment and management task v. Competently use relevant functions of the telehealth (videoconferencing) platform to optimize delivery of care vi. Instruct the patient on how to use the key features of the telehealth (videoconferencing) platform vii. Understand and identify the potential problems and/or technical issues likely to be encountered by the patient when using the telehealth (videoconferencing) platform, and be able to assist the patient to deal with such problems

Domain	Capabilities
Telehealth delivery	<ul style="list-style-type: none"> i. Instruct the patient on how to connect to the telehealth (videoconferencing) consultation, including information about time of appointment, contact details of the physiotherapist, and provision of information for setting up technology prior to first consultation ii. Enact an appropriate procedure for alternative mode of contact with the patient in the event of technical/communication disruption iii. Set up their own physical environment ensuring optimal lighting, so the therapist is clearly visible to the patient iv. Set up their own physical environment ensuring optimal acoustics, including silencing and electronic notifications on the device used v. Set up the camera angle so that the therapist is in centre frame with the head and shoulders visible, allowing for eye contact with the patient vi. Adjust their own camera angle to include the whole body or all equipment and/or props for demonstration purposes vii. Instruct the patient how to set up the physical environment, ensuring optimal lighting and an uncluttered neutral background (if possible), so he/she is clearly visible to the therapist viii. Instruct the patient how to set up the physical environment to optimize acoustics ix. Instruct the patient to set up the camera angle so that he/she is in centre frame with the head and shoulders visible, allowing for eye contact x. Instruct the patient to set up the camera angle to visualize other patient assessment and treatment tasks appropriately (eg, walking, exercise performance) as required xi. Demonstrate telehealth (videoconferencing) etiquette when speaking, such as turn taking to optimize conversational flow xii. Modulate communication style, including clear enunciation, slower pace and lengthened pauses to reduce overlap xiii. Utilize other means of instructions outside of verbal, such as use of hands to demonstrate angles of movements, other props to help convey the instructions xiv. Provide written or digital information to the patient, as required, to support delivery of care xv. Encourage patient positive beliefs about telehealth to maximize adherence to treatment xvi. Use the findings of evaluation to continuously improve the telehealth (videoconferencing) service
Assessment and diagnosis	<ul style="list-style-type: none"> i. Follow a structured process to ensure patient appropriateness for telehealth (videoconferencing) for the individual patient ii. Follow a structured process to identify risk of falls or other safety considerations prior to consultation iii. Recognize the limitations of telehealth (videoconferencing) in assessment and diagnosis iv. Adapt assessment processes (if required) to appropriately assess the patient via telehealth (videoconferencing) v. Instruct and/or demonstrate the patient and/or helper (using videos and/or images where appropriate) on how to perform modified special tests for assessment and diagnosis if required vi. Determine the elements of care suitable for delivery via telehealth (videoconferencing) for the individual patient vii. Recognize when an in-person consultation and/or other investigations are required to supplement the telehealth assessment and/or diagnosis

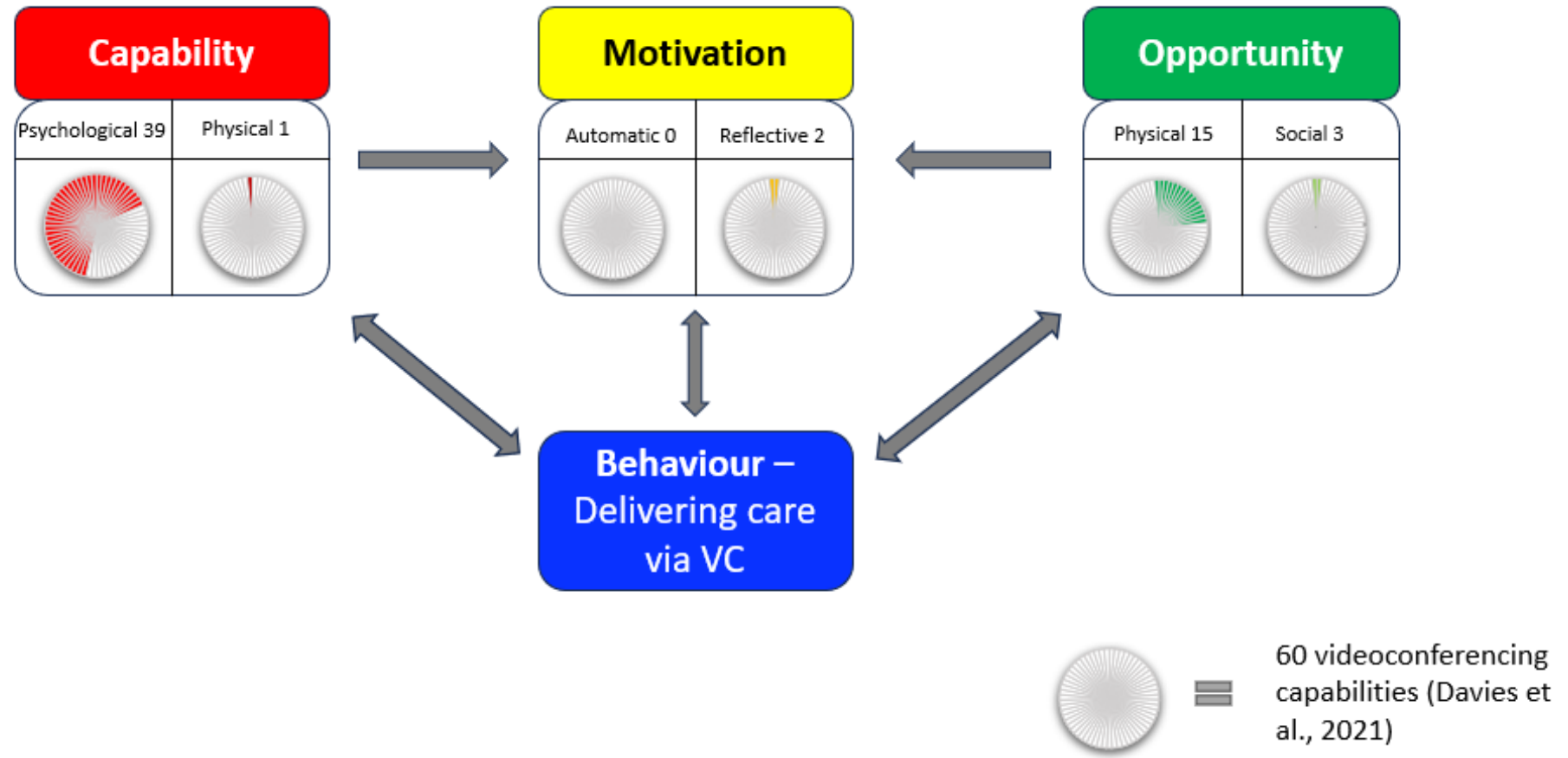
Domain	Capabilities
Care planning and management	<ul style="list-style-type: none"> i. Identify and interpret the evidence for physiotherapy via telehealth (videoconferencing) ii. Facilitate patient choice in choosing telehealth (videoconferencing or telephone) or in-person consultation iii. Use the existing evidence base to deliver treatments that have been shown to have equivalence to in-person treatment iv. Critically apply relevant clinical practice guidelines and other best available evidence on telehealth (videoconferencing) care and service delivery, identifying where local modifications may be required v. Effectively and safely adapt (if required) and deliver treatment approaches using telehealth (videoconferencing) vi. Develop a patient-centred management plan, which considers the digital literacy of the individual and whether a blended approach combining telehealth (videoconferencing or telephone) and in-person delivery of care is needed vii. Consider and use, as appropriate, written and digital resources to enhance information, sharing with the patient to increase knowledge about the condition, management options and prognosis viii. Proficiently use the relevant features of the chosen telehealth (videoconferencing) platform and other supporting digital tools, as appropriate, to provide effective telehealth treatment for the patient ix. Adapt (to the patient's environment) and implement relevant outcome measures to monitor treatment progress to guide ongoing telehealth (videoconferencing) management x. Identify opportunities for and engage in interprofessional care and collaboration via technology, where possible xi. Adhere to privacy, security legislative requirements when using digital mechanisms to communicate with other healthcare professionals about a patient xii. Provide an alternative treatment if the person is not appropriate for care delivered via telehealth (videoconferencing)

Appendix C – Capability, Motivation, Opportunity, Behaviour (COM-B) Model



Michie et al., (2011)

Appendix D - Conceptual Framework



Davies et al., (2021) ; Michie et al., (2011)

Appendix E – Telehealth and Telerehabilitation Capability Frameworks

Author/Year/Title	Telehealth term & delivery mode	Profession	Number of Domains	Domains
CPM TR resource guide (2018) Manitoba, Canada	TR	Physiotherapy	7 domains or guidance sections	<ul style="list-style-type: none"> • General performance expectations • Informed consent • Privacy and security • Safety considerations • Competence • Documentation • Additional requirements (quality improvement and evaluation, fees and billing, supervision, or unregulated HCPs)
(Davies et al. 2021) Australia An international core capability framework for physiotherapists to deliver quality care via videoconferencing: a Delphi study	TR Video-mediated	Physiotherapy	7 Domains 60 capabilities	<ul style="list-style-type: none"> • Compliance • Patient privacy and confidentiality • Patient safety • Technology skills • Telehealth delivery • Assessment and diagnosis • Care planning and management
(Davies 2022a) Australia An international core capability framework for physiotherapists delivering telephone-based care	TR Telephone	Physiotherapy	6 Domains 44 capabilities	<ul style="list-style-type: none"> • Compliance • Patient privacy and confidentiality • Patient safety • Telehealth delivery • Assessment and diagnosis • Care planning and management
(Galpin et al., 2021) United States	Telehealth	All HCPs	9 Domains 41 skills	<ul style="list-style-type: none"> • Using Telehealth: Patient and Practice Readiness and Impact

Author/Year/Title	Telehealth term & delivery mode	Profession	Number of Domains	Domains
<p>Expert Consensus: Telehealth Skills for Health Care Professionals</p>				<ul style="list-style-type: none"> • Remote Clinical Evaluation and Care • Communication Using Telehealth • Professionalism • Information technology • Privacy and legal • Ethics • Patient safety • Access and equity
<p>(Hart et al., 2022) United States</p> <p>Developing Telemedicine Curriculum Competencies for Graduate Medical Education: Outcomes of a Modified Delphi Process</p>	Telemedicine	Physician	<p>10 overarching telemedicine domains</p> <p>34 competencies, mapped to 6 Accreditation Council for Graduate Medical Education (ACGME) competencies</p>	<p>Overarching telemedicine domains -</p> <ul style="list-style-type: none"> • Ethical performance of telemedicine (5) • Standards of professionalism (5) • Specific telemedicine medical skills (5) • Patient care (4) • Coordination of care (3) • Documentation and billing (3) • Management of emergencies (3) • Systems of care (3) • Technical skills in telemedicine (2) • Telemedical care (1)
<p>(Keswani et al., 2020) United States</p> <p>The Future of Telehealth in Allergy and Immunology Training</p>	Telemedicine	Physician (allergy-immunology)	<p>6 telemedicine competencies</p> <p>Mapped to ACGME competencies</p>	<ul style="list-style-type: none"> • Medical knowledge - recognises limitations of telemedicine • Patient care - conducts appropriate remote physical examination and performs allergy home visit/assessment • Practice based learning and improvement - evaluates gaps in performance

Author/Year/Title	Telehealth term & delivery mode	Profession	Number of Domains	Domains
				<ul style="list-style-type: none"> • Interpersonal communication skills-telemedicine • Professionalism-professional web presence manner and ensures appropriate type of telemedicine encounter is used, all aspects of encounter captured and documented • Systems based practice - advocates for appropriate use of telemedicine and understands licensing, billing, and legal considerations
<p>(Noronha et al., 2022) United States</p> <p>Telehealth Competencies in Medical Education: New Frontiers in Faculty Development and Learner Assessments</p>	Telehealth	Physician	6 Domains	<ul style="list-style-type: none"> • Patient safety and appropriate use of telehealth • Access and equity in telehealth • Communication via telehealth • Data collection and assessment via telehealth • Technology for telehealth • Ethical practices and legal requirements for telehealth
<p>(Rutledge et al., 2021) United States</p> <p>Telehealth Competencies for Nursing Education and Practice: The Four P's of Telehealth</p>	Telehealth	Nursing	4 Domains (under the 4 P's of telehealth framework)	<ul style="list-style-type: none"> • <i>Planning</i> for the implementation of a telehealth program • The <i>process</i> of readying for telehealth implementation • <i>Providing</i>/delivering/conducting telehealth services • <i>Performance</i> evaluation. Evaluating the impact and outcomes of the telehealth

Author/Year/Title	Telehealth term & delivery mode	Profession	Number of Domains	Domains
				program. Discusses access and equity and the importance of evaluation using the National Quality Forum's framework
<p>(Sharma et al., 2019) United States</p> <p>It's not just FaceTime: core competencies for the Medical Virtualist</p>	Telehealth	Physician	3 Domains	<ul style="list-style-type: none"> • Digital communication and webside manner • Scope and standards of care • Virtual clinical interactions
<p>(Van Houwelingen et al., 2016) Netherlands</p> <p>Competencies required for nursing telehealth activities: A Delphi-study</p>	Telehealth	Nursing	14 nursing telehealth activities and 52 competencies	<ul style="list-style-type: none"> • Supporting patients in the use of technology • Training patients in the use of technology to strengthen their social network • Providing health promotion remotely • Triaging incoming calls and alarms • Analysing and interpreting incoming data derived from (automatic) devices for self-measurement • Monitoring body functions and lifestyle • Providing psychosocial support • Encouraging patients to undertake health promotion activities • Instructing patients and family care givers in self-care • Assessing patient capacity to use telehealth • Evaluating and adjusting the patient care plan

Author/Year/Title	Telehealth term & delivery mode	Profession	Number of Domains	Domains
				<ul style="list-style-type: none"> • Coordination of care with the use of telehealth technology • Independent double-check of high-risk medication • Guidance and peer consultation

Appendix F – Recruitment Email

Dear physiotherapy registrants,

I am writing to invite you to participate in a research study that aims to explore physiotherapists' experiences and perceptions influencing the delivery of care via videoconferencing to the Manitoban population. Your input is being sought so that you may share your experience(s) delivering care via videoconferencing. It is our hope that the findings of this study identify the factors influencing the delivery of care via videoconferencing and identify the needs of PTs to deliver care via videoconferencing.

Screening questions will be asked (via your preference of email or phone) to determine your recruitment eligibility for this study and to ensure diversity in the sample to ensure the findings more accurately represent the Manitoban physiotherapy population. If you are selected to participate in this study, an interview will be used for data collection purposes. The interviews will take place virtually using Zoom, following completion of informed consent to participate.

Remember, this is completely voluntary. You can choose to be in the study or not. If you are selected to participate in this study, you will be provided with a \$30 Amazon gift card as compensation for your time and participation. If you would like to participate or have any questions about the study, in the interest of confidentiality, please contact Rhona McWilliam, student researcher, directly at mcwillir@myumanitoba.ca.

Thank you. Sincerely,

Rhona McWilliam BSc (Hons) PT,
MSc Student, University of Manitoba

cc. Dr. Dean Kriellaars, MSc Program Chair

Appendix G - Infographic

TELEREHABILITATION

**ARE YOU A
PHYSIOTHERAPIST
LICENSED TO
PRACTICE IN
MANITOBA?**



**ARE YOU
ON THE
ACTIVE
REGISTER?**

**HAVE YOU EVER
DELIVERED AT
LEAST ONE
APPOINTMENT VIA
VIDEO-
CONFERENCING?**



**IF YES, WE
WANT TO
HEAR
FROM
YOU!**

**FOR MORE INFORMATION PLEASE CONTACT
RHONA MCWILLIAM
MCWILLIR@MYUMANITOBA.CA PHONE:204-
230-0437**

**ALL PARTICIPANTS SELECTED FOR INTERVIEW WILL
RECEIVE A \$30 AMAZON GIFT CARD**

Appendix H – Pre-Screening Email Script

To (name),

Thank you for your interest in participating in this telerehabilitation study. I am a second-year student in the Masters of Rehabilitation Science program at the University of Manitoba and I am a student researcher for this telerehabilitation study. My co-advisors for this research study are Dr. Moni Fricke and Dr. Sandra Webber. All selected participants will receive a \$30 Amazon gift card.

The purpose of this qualitative study is to explore physiotherapists' experiences and perceptions about the factors influencing the delivery of care via videoconferencing, to the Manitoban population. Your input is being sought so that you may share your experience(s) delivering care via videoconferencing. It is our hope that the findings of this study identify the factors influencing the delivery of care via videoconferencing and identify the needs of PTs to deliver care via videoconferencing. Physiotherapists and patients have stated a preference for videoconferencing compared to the telephone, and so this study is focused specifically on videoconferencing as the medium for delivering care.

In order to determine your edibility and ensure diversity in the sample so that findings more accurately represent the Manitoban physiotherapy population, it would be much appreciated if you could answer the screening questions below.

Please copy and paste the questions below, along with your answers to the following questions:

1. Are you licensed to practice physiotherapy in the province of Manitoba and are you on the College of Physiotherapy of Manitoba's active register?
2. Do you have any experience delivering care via videoconferencing, at least once?
3. Do you work in public or private practice, or combination?
4. Do you work in a rural (<1000 population), small population (1000-29,999), medium population (30,000-99,999) or large urban setting (100,000+)?
5. How many years have you been working as a physiotherapist: Early career 2-10 years, mid-career 11-25 years, or senior career 26+ years?
6. How many videoconferencing appointments have you delivered over the course of your career? 1-2 appointments, 3-30 appointments, 31-100 appointments or 101+ appointments?

Once we have determined your eligibility for this study, we will inform you within one week via email about whether you have been selected to participate in this study. If you are

selected to participate in this study your informed consent is required prior to your enrollment. More information, along with the informed consent form will be sent at this time.

Thank you once again, for your consideration to participate in this research study.

Best Regards,

Rhona McWilliam

BSc (Hons) PT, MSc Student

University of Manitoba

Appendix I – Pre-Screening Phone Script

1. Introduction: Student researcher will state their name and role in the Study: *“My name is Rhona McWilliam, I am a graduate student in the Masters of Rehabilitation Science program at the University of Manitoba and I am a student researcher for this telerehabilitation study. My co-advisors for this research study are Dr. Moni Fricke and Dr. Sandra Webber.*
2. *“I will need to tell you a little bit about our study and ask you a few questions to determine your eligibility”. All selected participants will receive a \$30 Amazon gift card upon completion of the interview.*
3. *“I recommend that you indicate if you appear to be eligible **only** after all information has been provided”.*
4. *“This phone call may take from 10-15 minutes, do you have time right now”? if they say “Yes”, then,*
5. Before we begin *“are you licensed to practice physiotherapy in the province of Manitoba, on the active register and have delivered care at least once via videoconferencing”? If they say yes, then proceed to next item. If not, then “At this time, you are not eligible for our study and we thank you for your time.”*
6. *The purpose of this qualitative study is to explore PTs’ experiences and perceptions about the factors influencing the delivery of care via videoconferencing, to the Manitoban population. Your input is being sought so that you may share your experience(s) delivering care via videoconferencing. It is our hope that the findings of this study identify the factors influencing PTs’ delivery of care via videoconferencing and the needs of PTs to deliver care via videoconferencing. Physiotherapists and patients have stated a preference for videoconferencing compared to the telephone, and so this study is focused specifically on videoconferencing as the medium for delivering care.*
7. *The method of data collection for this study will be individual virtual interviews using Zoom. The interview will last approximately 60-90 minutes.*
8. *Do you have any questions for me?”*
9. Question: Do you work in public or private practice or a combination?
10. Question: *Do you work in a rural (<1000 population), small population (1000-29,999), medium population (30,000-99,999) or large urban setting (100,000+)?*
11. Question: How many years have you been working as a physiotherapist? Are you early career 2-10 years, mid-career 11-25 years, or senior career 26+ years?
12. Question: *How many videoconferencing appointments have you delivered over the course of your career? 1-2 appointments, 3-30 appointments, 31-100 appointments or 101+ appointments?*
13. If they say “Yes” to all questions, go on to next item below. *“It appears that you are eligible for our study. However, this is currently the screening stage for the study, which aims for diversity in the sample to ensure it represents the Manitoban physiotherapy population as closely as possible. Is it ok for us to contact you via email within one week to let you know if you have been selected for participation in this study? Are you ok with this time frame? Please let me know if you would prefer a phone call. If they say “No” to any question, “at this time, you are not eligible for our study and we thank you for your time.”*
14. *“Your informed consent is required prior to your enrollment in our study. With your permission, I will send you a consent form through email. Which email address should I send it to?”*

15. *“Please take your time to review this consent form and discuss any questions you may have with me, your friends, or family before you make your decision. This consent form may contain words that you do not understand. Please call or email me back to explain any words or information that you do not clearly understand. Do I have your permission to send you the consent form?”*
16. *“Should you be willing to do so, please read and sign the consent form and then scan or photograph the form and email it back to me.*
17. *Do you have any other questions?*
18. *Thank you.”*

Appendix J - Interview Guide

1. Can you tell me about your personal experience delivering care via videoconferencing (or video or VC)?

Prompt: may need to clarify how often and how (assessment or follow-up) they are still using telerehabilitation (TR) (based on your screening questions)

Prompt: How do you think your experiences have influenced your opinion of VC?

Sub-prompt: You've mentioned (positive or negative) views towards VC. What about the alternative? (positive or negative)

Prompt: How are you using VC now?

If a participant raises the issue of using the telephone, re-direct to videoconferencing (VC) for the purpose of this study.

2. How do you feel about your ability to deliver care via VC?

Prompt: How do you feel about your ability to ensure patient privacy and confidentiality (compliance with PHIPEDA (*domain 2*)?)

Prompt: How do you feel about your ability to ensure patient safety (*domain 3*)?

Prompt: How do you feel about your ability to plan and manage patient care via VC (for example interpret the VC evidence, selection of appropriate patients, collaborate with other healthcare professionals) (*domain 7*)?

3. What do you think are the main challenges influencing your ability to deliver care via VC?

Prompt: Can you describe any difficulties related to the use of technology? For example, sound, internet connection, and your camera. (*domain 4*)

Prompt: What about your ability to communicate via VC? For example, developing patient rapport and patient education. (*domain 5*)

Prompt: How does concern for patient safety impact your decision to use VC? (*domain 3*)

Prompt: What are the challenges you've experienced ensuring patient privacy and confidentiality? (*domain 2*)

Prompt: Can you think of anything that has hindered your ability to assess and diagnose patients via VC (*domain 6*)?

Prompt: Have you had any challenges related to support and/or guidance from the CPM (College of Physiotherapists of Manitoba) and/or MPA (the Manitoba Physiotherapy Association)? (example - complying with regulatory requirements, practice directions, consent, and documentation)?

Prompt: What about third-party payers?

4. Can you think of anything that would enable (or help) you to deliver care via VC?

Prompt: For example, physical space in your workplace, technology and equipment (*Domain 4, 5*) (*physical opportunity*)?

Prompt: How about colleague/managerial support, CPM (College of Physiotherapists of Manitoba) and/or MPA (the Manitoba Physiotherapy Association), third-party payers (e.g., MPI, WCB) (*Domain 1*) (*social opportunity*)?

Prompt: In the last question (4) you mentioned that you found *** challenging. How do you feel this could be addressed?

Prompt: Can you think of anything else that you can't currently access consistently that you would need as a Manitoban physiotherapist to deliver care via VC (*physical opportunity/context*)?

5. Can you think of anything that would impact your interest or motivation (positive or negative) to utilise and deliver care via VC?

Prompt: Why do you think that would motivate or demotivate you to deliver care via VC?

Prompt: How do you think evaluating and reflecting on VC patient outcomes would impact your interest or motivation? (*Domain 4*)

Prompt: How do you think the telerehabilitation/VC evidence would impact your interest and motivation (*domain 7*)?

6. Is there anything we have not covered or anything else that you would like to share that has impacted your ability to deliver care via VC?

Prompt: You haven't mentioned anything related to *** (*whatever domain hasn't been mentioned or discussed*). Is there anything additional you can think of that would influence your delivery of care via VC?

Prompt: Any experiences with collaborating with other healthcare professionals in VC? (*Domain 7*)

Prompt: Are there any other things that would help you deliver care via VC? This could include such areas as continuing education, technology, CPM guidelines, or supports from your employer?

Prompt: How do you see the use of TR in physiotherapy in the future?

Prompt: Any ideas on how our profession could navigate our role in telerehabilitation, when our profession was historically built from a hands-on approach?

Appendix K - Summary of findings



Exploring physiotherapists' experiences and perceptions about the factors influencing the delivery of care via videoconferencing

A study conducted in 2023-2024 by Rhona McWilliam
as a component of a Master's Degree in Rehabilitation Sciences

The purpose of this study was to explore the experiences and perceptions of physiotherapists delivering care via videoconferencing in Manitoba. A qualitative study design was used to gain insight into the lived experiences of 20 physiotherapists from across the province who agreed to participate in this study. An overview of the participants is provided below.

Summary of Findings

- 25% (5/20) of participants had some experience using videoconferencing prior to COVID-19.
- 35% (7/20) of participants intend to, or are continuing to use, videoconferencing post-COVID.

Barriers

- Many participants reported a steep learning curve following the rapid transition to videoconferencing, and the need to be creative and “think outside the box”.
- Most participants described themselves as “not tech savvy” but did not find learning the technology too difficult.
- The inability to provide hands-on care is a significant barrier for physiotherapists which limits the assessment, diagnosis, treatment options, and ability to develop rapport in some cases.
- Funding models have been identified as a barrier, including the public/private healthcare divide.
- Jurisdictional boundaries limit physiotherapists' ability to deliver care via videoconferencing outside of Manitoba.
- Most participants had safety concerns about delivering care via videoconferencing to older adults and those with impaired balance, due to the lack of physical presence and being unable to assist.
- There is “a time and a place” for videoconferencing to deliver care but how we do it is important to ensure equitable access.
- Participants reported that they erred on the side of caution and did not challenge patients as much as if they were in person to ensure their safety, questioning the effectiveness of the care delivered.

- Participants reported that patient-related barriers such as patients' access and inability to use technology, language barriers and appropriate patient environment all need to be considered. Poor internet connection (at the patient's end) is a barrier and participants voiced feelings of frustration and hesitation to scale up the delivery of care via videoconferencing in remote and rural areas.

Facilitators

- Participants became more comfortable with videoconferencing as they gained experience.
- Participants felt that videoconferencing can improve access to care in Manitoba and provides a convenient alternative, especially for individuals living in remote and rural locations.
- Videoconferencing allows for continuity of care if patients cannot attend clinic due to storms and inaccessible roads or if patients are too unwell to attend clinic.
- Videoconferencing offers physiotherapists an alternative option to continue working when their own health conditions or disabilities prevent or make it difficult to work in-person.
- A few participants reported that videoconferencing allows for patients to easily access their unique skill set and clinical expertise.
- Participants reported that it is easier delivering care via videoconferencing for upper body conditions compared to lower body conditions, due to camera positioning.
- Appropriate patient selection is key. Most neuromusculoskeletal physiotherapists felt that post-operative patients with protocols to follow, can be managed well via videoconferencing.
- Three participants working in neurorehabilitation found their patients with mobility, cognitive and impulsivity issues were challenging to assess and treat via videoconferencing. Higher functioning patients were easier to treat via videoconferencing.
- Videoconferencing is focused on education, advice and exercise prescription and it has the potential to improve physiotherapists' communication and listening skills.
- Many participants suggested that a videoconferencing room or community centre in remote and rural locations would be helpful, where patients could access the technological equipment, resources, equipment, and assistance to connect to a call.
- Videoconferencing allows participants to see a patient's home environment, which can be beneficial.

Participant reflections

- Although most participants felt that the delivery of care via videoconferencing is not equivalent to in-person care, they agree that there is a future for videoconferencing to deliver physiotherapy care and that it would be regressive if the profession did not continue to utilize it.
- Many participants feel that a hybrid model of care would have some value, that is, a combination of videoconferencing and in-person appointments.
- Participants felt that a new 'consultative' role will emerge with videoconferencing.

Conclusion

In conclusion, most participants gained experience delivering care via videoconferencing, following the onset of the COVID-19 pandemic. Participants agreed that videoconferencing allows for convenient access to care but also access to physiotherapists with unique expertise. Some patient conditions were far more amenable to manage via videoconferencing than others. However, in general, participants did not view the delivery of care via videoconferencing as equivalent to in-person care. The inability to provide hands-on care leads to concerns about assessment and diagnosis accuracy, limits the treatment options and limits a physiotherapist's ability to challenge patients due to safety concerns, questioning the effectiveness of care. A poor internet connection at the patient's end continues to present as a significant barrier. Although videoconferencing has the potential to improve access to care in Manitoba, there is a 'time and a place' for it.

Addendum. Study participant demographics

Area of Practice	Number	%
Musculoskeletal	11	55
Neurology	3	15
Cardiovascular/respiratory	1	5
Mixed	5	25
Public or Private		
Public	7	35
Private	12	60
Combination	1	5
Geographic Location		
Remote/Rural	1.5	7.5
Small	3	15
Medium	2	10
Large Urban	13.5	67.5
Years of PT work experience		
Early Career (2-10 years)	4	20
Mid-Career (11-20 years)	10	50
Late Career (>21 years)	6	30
Amount of VC experience		
1-2 appointments	1	5
3-30 appointments	8	40
31-100 appointments	6	30
100+ appointments	5	25
Started using VC due to COVID-19		
Yes	15	75
No	5	25
Plan to continue with VC post COVID-19		
Yes	7	35
No	13	65

Appendix L – Individual participant characteristics

Participant #	Area of Practice	Public/Private	Geographic location	Years of PT work experience	Amount of VC experience	Duration of interview	Started using VC due to COVID-19	Continuing with VC post COVID-19
P #1	A5	C2	D4	E3	F2	1:19:52	Y	Y
P #2	A1	C2	D4	E2	F3	1:23:25	Y	Y
P #3	A1	C2	D4	E3	F4	1:28:22	Y	N
P #4	A5	C1	D4	E1	F2	1:35:01	Y	N
P #6	A1	C2	D2	E2	F4	1:15:24	Y	N
P #5	A2	C1	D4	E3	F3	1:10:40	Y	Y
P #7	A1	C2	D1 & D2	E1	F4	1:13:51	N	N
P #8	A2	C1	D4	E2	F2	1:21:43	Y	N
P #9	A1	C2	D4	E2	F3	1:20:44	N	N
P #10	A1	C2	D4	E3	F1	1:14:30	Y	N
P #11	A5	C3	D3	E2	F3	1:24:15	Y	Y
P #12	A1	C2	D3	E3	F4	1:35:17	Y	N
P# 13	A3	C1	D4	E1	F2	58:41	N	N
P# 14	A1	C2	D2 & D4	E2	F2	1:18:26	N	Y
P #15	A1	C2	D4	E2	F3	57:52	Y	N
P #16	A2	C1	D4	E3	F3	1:23:16	N	N
P #17	A5	C1	D2	E2	F2	1:03:58	Y	N
P # 18	A5	C1	D1	E1	F2	1:14:01	Y	N
P # 19	A1	C2	D4	E2	F2	1:19:20	Y	Y
P# 20	A1	C2	D4	E2	F4	1:59:18	Y	Y
Totals	MSK - 11 Neuro - 3 CVResp- 1 Mixed - 5	7 - Public 12 – Private 1 -Combination	Rural – 1.5 Small – 3 Medium – 2 Large Urban – 13.5	Early - 4 Mid - 10 Senior - 6	1-2 appts – 1 3-30 appts - 8 31-100 appts - 6 101+ appts - 5	Average – 1:19:53	15 – Yes 5 - No	7 – Yes 13 -No

Legend for appendix L

Key				
Clinical focus of physiotherapy practice	Public or Private	Rural/Small Population/Medium population/Large Urban	Years of work experience as a PT	Amount of VC experience
Musculoskeletal (MSK) - A1	Public – C1	Rural (<1000 people) – D1	Early career (2-10 years) – E1	1-2 appointments – F1
Neurological (Neuro) -A2	Private – C2	Small population (1000-29,999) – D2	Mid-career (11-25 years) - E2	3-30 appointment – F2
Cardiovascular and respiratory (CVresp) – A3	Combination – C3	Medium population (30,000-99,999) – D3	Senior career (26+ years) – E3	31-100 appointments – F3
Skin and related structures – A4		Large Urban (100,000+) - D4		101+ appointments – F4
Mixed – A5				