Measurement of Therapeutic Relationship in Physiotherapy

by

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Abstract

The ‘therapeutic relationship’ refers to the relationship between a patient and their healthcare provider, which is assumed to be therapeutic when the quality of the relationship affects the well-being and clinical outcomes of treatment. In physiotherapy, therapeutic relationship can be thought of as encompassing the conditions established by the physiotherapist and patient through their intentions towards treatment, the patient and physiotherapist’s ways of connecting during clinical encounters, and the bond that develops between physiotherapist and patient. There is mounting physiotherapy evidence showing that therapeutic relationships can impact the degree to which the patient engages in treatment, as well as biomedical and psychosocial health outcomes such as self-efficacy, physical functioning, pain, satisfaction with treatment, depression, and general health status. Physiotherapy studies to date have used measures borrowed from psychotherapy. This is a problem because the relationship between a physiotherapist and patient differs from that in psychotherapy. The overall purpose of this dissertation is to develop a patient-reported measure of therapeutic relationship, based on a theoretical framework of therapeutic relationship in physiotherapy.

This dissertation is comprised of a series of four papers, each building on the next, culminating in the evaluation of a physiotherapy-specific measure of therapeutic relationship – the Physiotherapy Therapeutic RElationship Measure (P-TREM). The first paper is a scoping review of the measures of therapeutic relationship and related constructs that have been used in research for patients with hemophilia. The second paper explores measurement theory in relation to therapeutic relationship in physiotherapy and summarized various approaches to measuring this complex, abstract phenomenon. The third paper outlines a study for the early development of the P-TREM, which included item generation, expert review, a content validation study and

cognitive interviews. The fourth paper describes an evaluation of the validity of the P-TREM and optimizes its length. The end product is a 30-item version of the P-TREM which shows good concurrent and convergent validity, as well as internal consistency.

Preface

This thesis is an original work by Erin McCabe under the supervision of Douglas P. Gross, Professor in the Department of Physical Therapy at the University of Alberta; Dr. Maxi Miciak, Associate Adjunct Professor in the Faculty of Rehabilitation at the University of Alberta, Dr. Mary Roduta Roberts, Associate Professor in the Department of Occupational Therapy at the University of Alberta; and Dr. Linda Sun, Assistant Professor in the Department of Internal Medicine, Division of Hematology at the University of Alberta.

The University of Alberta's Health Research Ethics Board approved the research studies in Chapter 4 and 6 (Study ID Pro00086206). The study in Chapter 2 was published in *Health Expectations* Journal. The study in Chapter 3 was published in *Physiotherapy Theory and Practice*. The studies in Chapter 4 and Chapter 5 were published in the *European Journal of Physiotherapy*.

Dedication

This dissertation is dedicated to my family.

Trevor – You are always willing to help me out. I could not have done this without your love and support. You bring me new perspectives on life that have helped me tremendously in moving through this PhD journey.

To my girls - your patience with my never-ending “I just have to finish one more thing...” made it possible for me to complete this work. Finley – your enthusiasm for daycare; and Maeva - your ability to take long daytime naps - made it easier for me to finish my PhD while you were both so small.

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CHAPTER 1: Introduction

Clinical vignette

A physiotherapist with 10 + years of experience is the owner of a private physiotherapy practice. Most of her patients attain their goals for rehabilitation, but there is a proportion that doesn't progress. She notices those individuals are the same ones with whom she has trouble connecting. It feels like they aren't on the same page, like they aren't receptive to one another's ideas and suggestions, and that perhaps they haven't gained one another's trust.

It seems that the patients with whom she has better relationships also have better outcomes. Being a scholarly practitioner, she has also read evidence that a good 'therapeutic relationship' may help physiotherapy decrease a patient's pain intensity and improve physical function and overall well-being. She suspects that building better relationships with patients she finds challenging to connect with would lead to better outcomes overall. Unfortunately, though there is some evidence that good therapeutic relationships result in better outcomes, there are many knowledge gaps in this area. She believes a better understanding of 'how' therapeutic relationship influences outcomes would improve the effectiveness of her physiotherapy interventions. She is also aware of post-graduate education focusing on teaching relational skills to physiotherapists. Before she enrolls in any courses, she wonders about the effectiveness of a relational skills training program for improving a physiotherapist's therapeutic relationships in practice. Finally, since she values therapeutic relationships as part of provider patient-centered care, she would also like to be able to monitor her own therapeutic relationships and those of the employees in her clinic.

Although a variety of approaches could be used to answer this physiotherapist's questions, measurement would be an efficient way of gathering data about therapeutic

relationships in a large clinic. It would also allow the use of statistical techniques to investigate intervention effectiveness and various relationships between variables.

Background

The 'therapeutic relationship' refers to the relationship between a patient and their healthcare provider, which is assumed to be therapeutic when the quality of the relationship affects the well-being and clinical outcomes of treatment. In physiotherapy, therapeutic relationship can be thought of as encompassing the *conditions* established by the physiotherapist and patient through their intentions towards treatment, the patient and physiotherapist's *ways of connecting* during clinical encounters, and the *bond* that develops between physiotherapist and patient.[1] There is mounting physiotherapy evidence showing that therapeutic relationships can impact the degree to which the patient engages in treatment, as well as biomedical and psychosocial health outcomes such as self-efficacy, physical functioning, pain, satisfaction with treatment, depression, and general health status.[1–7]

Conceptualizations of Therapeutic Relationship in Physiotherapy

Bordin's tripartite model of working alliance in psychotherapy is the most commonly used framework for research in physiotherapy.[6] Bordin describes the working alliance as having three components: mutually agreed-upon outcomes ('goals') and in-session behaviours and cognitions ('tasks'); as well as a complex network of personal attachments ('bonds').[8] While similar, the concept of working alliance is different than therapeutic relationship, as it is primarily focused on the working collaboration between therapist and patient, that is, the work that is done as part of therapy. The theory of therapeutic relationship in psychotherapy has been evolving. Gelso suggested that Bordin's concept of working alliance could be incorporated into a more comprehensive three-part model of therapeutic relationship, with a personal and genuine part

('the real relationship'), carry-over from other relationships ('transference'), and the part that does the work together in therapy ('working alliance').[8]

Syntheses of existing literature have furthered our understanding of the main components that comprise therapeutic alliance or relationship in physiotherapy.[2,9–11] Sodena et. al. performed a concept analysis to provide conceptual clarity of the concept of therapeutic alliance within physiotherapy.[11] Their findings highlight five attribute themes relating to therapeutic alliance: "Seeing the person", "Sharing the journey", "Communication", "Therapeutic space", "Fostering Autonomy". Their paper also highlights differences between the therapeutic alliance in physiotherapy and psychotherapy, namely, 'Therapeutic touch' and what they termed 'Legitimising the biological', which involved the physiotherapist acknowledging the patient's beliefs about their physical condition and helping them further their understanding of it.[10]

Miciak (2015) used interpretive description to develop a theoretical framework that gives structure to the complex phenomenon of therapeutic relationship in physiotherapy.[11] Data were gathered through semi-structured interviews with 11 physiotherapists working in the context of community private practice and 7 patients with musculoskeletal disorders. The triangulation of data between patients' and physiotherapists' perspectives and the rich, experiential accounts from participants' experiences are strengths of the study. Full methods and results have been described elsewhere.[11-13] The result was a comprehensive and detailed description of the main components and common themes of the therapeutic relationship between the patient and physiotherapist. The three main components are: (1) *Ways of Establishing Connections* (i.e., the actions they "do" together that are part of the relationship); (2) *Conditions of Engagement* (i.e., the way they "are" together) and (3) *Elements of the Bond* (i.e., the feelings that exist between them).[11–13] The common themes, which are present across all components, express *mutuality*, the

personal and professional, and *body is central.*[11] Miciak's framework contains features that are different from psychotherapy. These relate to the patient's body or physical condition being the vehicle through which the patient and physiotherapist connect (e.g., discussion of how the physical condition impacts the patient, educating about the condition)[13], also including physical contact, i.e., touch, which is generally not part of psychotherapy.

Measurement of Therapeutic Relationship

Research on the physiotherapy therapeutic relationship has mostly been conducted using measures adapted from psychotherapy.[2,14,15] The most commonly used measure is Horvath's Working Alliance Inventory-Short Form Revised (WAI-SR).[16,17] The WAI-SR has also been adapted to suit a rehabilitation context.[18–20] The WAI has three domains based on Bordin's tripartite model of working alliance: Goals, Tasks and Bond. The content validity of these measures for use in physiotherapy practice is debatable, given the unique features of therapeutic relationship in physiotherapy that are not captured by these measures. Additionally, studies of their measurement properties often show issues with content validity, ceiling effects and construct validity.[1,15,20–23]

The Person-Centered Therapeutic Relationship in Physiotherapy Scale (PCTR-PT) is a newly developed, Spanish language measure of therapeutic relationship developed based on physiotherapy-specific theory. An English translation has been provided, but a major limitation is that all validation research was conducted using the Spanish version. Validity for use in English-speaking contexts is unknown. The PCTR-PT has 15 items with a 5 point agreement-type scale, and a four-dimensional structure: Relational Bond, Individualized Partnership, Therapeutic Communication and Professional Empowerment.[24,25] It contains one item that references the patient's body or condition and no items that assess the quality of physical contact between patient and physiotherapist.

Problem Statement

Therapeutic relationships are increasingly being recognized as an important part of the physiotherapeutic process. Multiple conceptualizations of therapeutic relationship in physiotherapy have been proposed and there is consensus that aspects of physiotherapy therapeutic relationship differ from those in psychotherapy. Measures currently used in physiotherapy research are adapted from psychotherapy measures based on psychotherapy models, consequently, validity is questionable as the content may not be fully representative of therapeutic relationships in physiotherapy. Therefore, there is a need for a physiotherapy-specific measure for capturing therapeutic relationship. A high-quality measure of therapeutic relationship will allow researchers to carry out rigorous quantitative research into the processes and mechanisms by which therapeutic relationships impact health outcomes. It may also be used to evaluate the effectiveness of training programs aimed at improving therapeutic relationships and monitoring the quality of therapeutic relationships in clinical practice.

Dissertation Purpose

The overall purpose of this dissertation was to develop a measurement instrument that quantifies the strength (i.e., magnitude) and quality (i.e., positive or negative) of the therapeutic relationship in the physiotherapy care of patients with conditions affecting the musculoskeletal system.

There are four papers in this dissertation. The first is scoping review of the measures used to capture therapeutic relationship in the care of patients with hemophilia, a bleeding disorder that manifests mainly in bleeding in the joints and soft tissue. This review looked at measures broadly across the healthcare disciplines, mapping the content of those measures to Miciak's framework of therapeutic relationship to evaluate how comprehensively therapeutic relationship might be captured. The second paper explores measurement theory in relation to capturing a

complex, interpersonal phenomenon such as therapeutic relationship. It discusses Miciak's framework as the conceptual foundation for new measures using various approaches (e.g., patient-reported, physiotherapist-reported, behaviour-coding systems), and considers challenges and potential solutions in measuring therapeutic relationship. The third and fourth papers describe the process of developing and evaluating a new patient-reported measure, the Physiotherapy Therapeutic RElationship Measure (P-TREM), with Miciak's theoretical framework informing the content of the measure.

Patient Populations

This dissertation focused on patients with conditions affecting the musculoskeletal system, where physiotherapy is often included as part of management. There are two chronic conditions (hemophilia and inflammatory arthritis) and a third, more general musculoskeletal population (patients with musculoskeletal concerns treated in a general physiotherapy practice). These populations are described below.

Hemophilia and inherited bleeding disorders

Inherited bleeding disorders include hemophilia and von Willebrand disease (VWD). Hemophilia is a genetic condition characterized by a life-long risk of recurrent bleeding into joints and muscles, often resulting in chronic impairment of musculoskeletal structures and function.[26] A priority in the care of patients with hemophilia is prevention and management of musculoskeletal complications.[27] Physiotherapists are an integral part of the interdisciplinary team because of their skills in assessing and managing musculoskeletal disorders.[28] The physiotherapist typically monitors the individual's musculoskeletal function, activity, and participation at annual assessment clinics, which occurs over the lifetime of the patient. They have a role in preventing long-term consequences of hemophilia through education, promoting physical activity and encouraging appropriate use of factor replacement treatment.[28]

Physiotherapists are involved in the assessment and rehabilitation of acute bleeding and injuries, and after orthopaedic surgery.[27] Physiotherapists also work together with patients who have permanent musculoskeletal impairment to manage pain and achieve their activity and participation goals.[28] Although less common, people with VWD and other, more rare bleeding disorders may also experience musculoskeletal bleeding and require the care of a physiotherapist.[28]

In hemophilia, a number of authors have highlighted the significance of therapeutic relationship in patient care.[29–32] Therapeutic relationship has been the topic of expert narrative reviews exploring the evolution of patient-provider relationships and patient autonomy, and ideas about therapeutic relationship in contemporary hemophilia care.[33–37] Findings from qualitative studies suggest that patients and health-care providers consider aspects of patient-provider relationship to be a key component of hemophilia care. Preliminary evidence suggests significant associations between patients' degree of adherence to factor replacement therapy and aspects of therapeutic relationship.[38,39] Further, adherence to therapy is linked to improved outcomes of pain, physical functioning, and quality of life in patients with hemophilia.[40,41]

Therapeutic relationships are particularly important in hemophilia care because it is a rare disease, complex and chronic in nature. It requires continual, life-long treatment and monitoring, ideally in specialized interdisciplinary clinics for successful management.[42] These clinics are located in larger urban settings, serving large geographic catchment areas and therefore patients rarely have a choice in their treatment providers. Therefore, healthcare providers in these clinics must be adept at establishing, strengthening, and maintaining their therapeutic relationships with patients. Poor relationships between patients and healthcare providers can lead to disastrous outcomes for patients with hemophilia.[43] Finally, patients with hemophilia may have an inherent

mistrust of healthcare providers. This may be due to experiences with healthcare providers unfamiliar with the condition (e.g., in the emergency room), or because they were affected (either directly or indirectly through family members) by the tainted blood scandal, where nearly half of people with hemophilia in Canada were infected with HIV and more with Hepatitis C because they were treated with blood products infected with the viruses. For healthcare providers caring for these patients, a more deliberate effort at building a strong therapeutic relationship is necessary.

Inflammatory arthritis

Inflammatory arthritis is an umbrella term for a group of autoimmune conditions that effect the joints and musculoskeletal system.[44] These include rheumatoid arthritis, ankylosing spondylitis and psoriatic arthritis, among others, which often result in swelling, pain and stiffness in the joints. They may also lead to severe joint damage and disability.[44] It is recommended that physiotherapy be part of a multi-disciplinary team approach to managing inflammatory arthritis.[44] Physiotherapists assess health status focusing on activity limitations and participation restrictions, and body impairment and environmental factors as they relate to these limitations and restrictions. There is strong evidence for the benefits of exercise therapy and therapeutic education provided by physiotherapists in the management of rheumatoid arthritis.[45] Therapeutic relationship and related concepts (communication, relational skills) have been a topic of interest in the care of patients with rheumatoid arthritis. Motivational interviewing, a relational strategy for changing behaviour, has been used effectively in increasing physical activity and adherence to medication in patients with rheumatoid arthritis.[46] Communicative tone has also been reported as associated with improved medication usage in patients with rheumatoid arthritis.[47]

Similarities between Hemophilia and Inflammatory Arthritic Conditions

The physiotherapy care of hemophilia and inflammatory arthritis patient populations is similar. Both are optimally treated using a multi-disciplinary health care team approach, and patients require long-term monitoring and adaptation of treatment. Patients with severe forms of the diseases must be actively involved in the control of their disease (i.e., taking medications, reporting symptoms and physical status). As well, patients with hemophilia and the inflammatory arthritic conditions continue to experience symptoms throughout their lives despite advances in pharmacological therapies in both conditions. Finally, adherence to medication and engagement in management can be a problem for some patients in both populations[38,46], with both associated with the quality of the relationship between healthcare provider and patient.[36,47,48] Therefore, a measure of therapeutic relationship would be useful in research about therapeutic relationship as a vehicle to improve adherence and outcomes for patients in both populations.

Patients with general musculoskeletal concerns

The third population included in the development of the P-TREM was of individuals seeking care for musculoskeletal conditions in general physiotherapy practice (community settings). This population closely reflects the patient population in Miciak's original research to develop the theoretical framework of therapeutic relationship.[49] Since this study extends Miciak's framework of therapeutic relationship to the physiotherapy care of patients with chronic musculoskeletal conditions, it is prudent to explore the functioning of the measurement instrument in patients with chronic conditions (i.e., hemophilia, inflammatory arthritis) in comparison with patients with other musculoskeletal concerns in general physiotherapy practice. This will provide information about the generalizability of the framework beyond the original study population. In addition, much of the current research about the associations between therapeutic relationship

and physiotherapy treatment outcomes has been conducted in patients with general musculoskeletal issues, therefore, there is a specific need in this population for a new measure.

Conceptualization of Validity in this Study

Validity is the most fundamental consideration in developing and evaluating measures. The concept of validity varies by discipline and has changed over time.[50] In this study, we have adopted the *Standards for Educational and Psychological Testing* (herein, *Standards*) conceptualization of validity.[51] In the *Standards*, validation can be thought of as a three-step process: (1) State the purpose of measurement; (2) State the inferences and assumptions made when the instrument is used; (3) Evaluate the evidence to support those inferences. Figure 1.1 illustrates the organizing framework behind this conception of validation and applies it to the construct of interest in this dissertation, therapeutic relationship.

Developing a measurement instrument should begin with a clear statement of the purpose of the measure.[52] This involves describing the *interpretations* that will be made based on the scores, the intended users (researchers, clinicians) and uses (e.g. evaluating an outcome, predicting a future event), the construct of interest, the target population and the format for measurement. The measure developer should then clearly state the inferences being made when the measure is used to make interpretations. Kane (2013) calls this the Interpretation/Use Argument.[53] These inferences are evaluated to identify where more evidence is needed to support them. To acquire the required evidence, validation studies are planned and undertaken. Finally, the evidence to support the validity of the instrument is synthesized and organized into a coherent argument, which Kane called the "Validity Argument".[53]

Conceptualizing validation as a process of evaluating the evidence for the validity of an instrument allows professional judgment to guide decisions regarding the specific forms of evidence that can best support the intended interpretation and use.[53] This is opposed to the

traditional view where certain forms of validity (i.e., concurrent, convergent validity) were considered essential (and adequate) for "validating" a measurement tool. Rather than prescribing a particular study design or statistical analysis, the Standards describe five sources of evidence that a researcher can consider when designing a validation study. They are evidence based on: content (e.g., measure grounded in theory, expert review of the relevance of items); response process (e.g., cognitive interviewing), internal structure (e.g., factor analysis); relations to other variables (e.g., correlate scores with a related instrument); consequences associated with measure use (e.g., feasibility of implementing the measure).

Figure 1.1 Conceptualization of validity in this dissertation with an illustrating example.

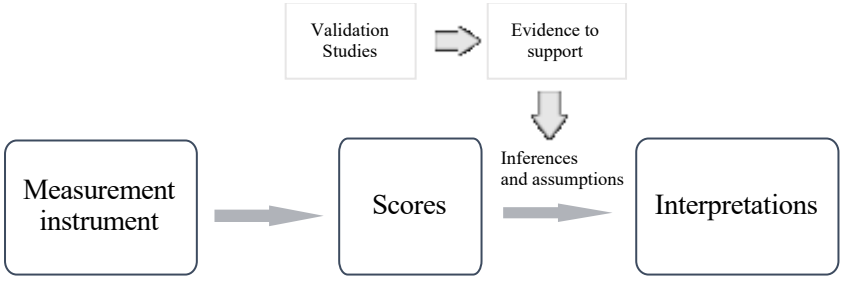

Figure 1.1a. A validation framework. This figure illustrates the links between a measurement instrument, the scores it produces and the interpretations that are made based on the scores.

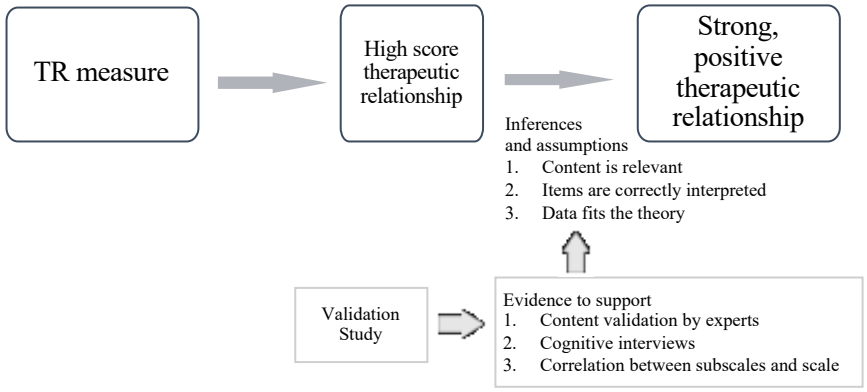

Figure 1.1b. An example using therapeutic relationship, our construct of interest, is given to help clarify the framework.

Validity Framework for this Dissertation

The validation framework for the P-TREM helped identify where there are gaps in evidence to support the validity of the P-TREM. It informed the validation process and the study design in papers 3 and 4.

Purpose of measurement

The P-TREM was designed to be used to assess the quality of a therapeutic relationship for individuals with conditions affecting the musculoskeletal system. Specifically, therapeutic relationship between a single patient and their physiotherapist, developed over multiple encounters in outpatient physiotherapy settings. The sum total score from the P-TREM should be interpreted as representing the strength of a therapeutic relationship (i.e., how 'good' the relationship is). The intended users are clinical researchers using quantitative methodologies to study therapeutic relationship in physiotherapy. This dissertation provides evidence for its validity for the purpose of discrimination (i.e., to distinguish between different levels of therapeutic relationship quality).

Inferences and sources of evidence

Table 1.1 links the inferences and assumptions made during the use of the P-TREM with the source of evidence and the design element from the studies in Paper 3 and 4 that provide that evidence.

Hypotheses investigated

To provide evidence to support the validity of the P-TREM, we formulated and tested the following hypotheses in Paper 4:

1) Therapeutic relationship, as measured by the P-TREM, is a unidimensional construct.

2) The items within the measure are moderately correlated with the corrected item-total of the scale, and moderately correlated with the other items in the measure (internal consistency).
3) If a factor analysis in the validation study supports the existence of subscales, then:
    a) The items in a component subscale are more correlated with the corrected item-total subscale it belongs to and less correlated with the total of other subscales.
    b) The factor structure aligns with the structure we expect based on Miciak's framework.
4) Patient's global rating of therapeutic relationship is highly correlated with the total score (concurrent validity).
5) There is a low to moderate correlation between the total score of the P-TREM and the patient's degree of trust in healthcare providers in general (convergent validity).

Table 1.1 Inferences, assumptions and evidence for the P-TREM.

Inferences and assumptions	**Evidence source**	**Validation study design element**
The items are representative of the components of therapeutic relationship (no under-representation) and within the boundaries of the definitions (no over-representation).	Content	Paper 3, measurement framework development, content validation study, review by experts Paper 4, item non-response rates
Respondents interpret and respond to items in the way that was intended.	Response process	Paper 3, cognitive interviews
Using a sum total score is an appropriate scoring method for the P-TREM.	Internal structure	Paper 4, confirmatory factor analysis
The dimensions within the P-TREM align with what is expected based on current knowledge and theory.	Internal structure	Paper 4, exploratory factor analysis
The relationships between P-TREM scores and external variables align with what is expected based on current knowledge and theory.	Relationship with external variables	Paper 4, convergent validation
The score on the P-TREM accurately represents the quality of the therapeutic relationship in the "real world".	Relationship with external variables	Paper 4, concurrent validation
The same patterns of relationships with external variables holds across patient subgroup populations.	Relationship with external variables	Paper 4, concurrent and convergent validation by subgroup

The scores on the P-TREM are consistent across applications. That is, therapeutic relationships of the same quality result in the same score.	Reliability evidence	Not investigated

Research Objectives

The four papers in this dissertation build on one another. The main objectives of the dissertation are as follows:

1) Describe the measures currently used to capture therapeutic relationship in the care of people with hemophilia and the adequacy of their measurement properties (Paper 1).
2) Describe how measurement theory applies to therapeutic relationship in physiotherapy (Paper 2).
3) Develop a physiotherapy specific, patient-reported measure of therapeutic relationship (Paper 3).
4) Evaluate the measurement properties of P-TREM in a population of patients with conditions affecting the musculoskeletal system (Paper 4).

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CHAPTER 2: Measuring therapeutic relationship in the care of patients with haemophilia: a scoping review

McCabe, E, Miciak, M, Dennett, L, Manns, T, Guptill, C, Hall, J, Gross, D. (2018). Measuring therapeutic relationship in the care of patients with haemophilia: a scoping review. *Health Expectations*. (2018) Vol 21, Issue 6, p 1208-1230. doi: 10.1111/hex.12827

Abstract

Objective We conducted a scoping review of the tools used to measure therapeutic relationship in patients with haemophilia.

Background Haemophilia is an inherited bleeding disorder caused by a deficiency of a clotting factor in the blood. Therapeutic relationship is foundational to the management of patients with chronic diseases like haemophilia. A reliable and valid measurement tool for assessing therapeutic relationship is needed to evaluate the quality of care received by these patients, and to rigorously study association between therapeutic relationship and the outcomes of treatment.

Methods We adopted the Arksey and O'Malley framework for scoping studies. The following electronic databases were searched for studies that measured a construct related to therapeutic relationships in haemophilia care: MEDLINE, EMBASE, CINAHL, PsycINFO and Scopus. We inventoried these studies, identified the measurement tools used, and described each tool by purpose, content, measurement properties, and target population. We identified gaps in the current evidence and directions for future research.

Results There were 253 unique records retrieved in the search, and twenty studies were deemed relevant. Ten measurement tools were identified. None of the tools measured therapeutic relationship as a single entity, however six tools measured constructs considered part of patient-provider relationship (e.g. trust, communication, working alliance). There has been little validation testing of these tools in haemophilia patient populations.

Conclusions There is a need for a validated tool for measuring therapeutic relationship in the care of patients with haemophilia. This review provides a foundation for future research in this area.

Introduction

Haemophilia is an inherited bleeding disorder caused by a deficiency of a clotting factor in the blood. Patients are at a lifelong risk of bleeding into joints and muscles. Recurrent bleeding often results in chronic impairment of musculoskeletal structures and function, leading to pain and disability.[1] Prevention of this process is a priority in the improvement of health and quality of life of patients with haemophilia. This is accomplished through regular encounters and monitoring by an interdisciplinary haemophilia treatment clinic (HTC), which consists of physicians, nurses, physical therapists and social workers.[2] Successful management of haemophilia requires that patients actively participate in their care with the HTC. This purposeful partnership of patient and healthcare providers from the HTC is described as the 'therapeutic relationship'.

Therapeutic relationship has been consistently associated with treatment outcomes in health research.[3–6] Kelley et al conducted a systematic review and meta-analysis of randomized controlled trials examining the effect of manipulating patient-clinician relationships on medical outcomes.[4] A significant effect in favour of the enhanced patient-provider relationships group was found in the meta-analysis. The review included studies of populations of patients with complex chronic conditions (e.g., diabetes, asthma, hypertension, oncology, obesity), which requiring ongoing management similar to haemophilia. In the care of patients with haemophilia, therapeutic relationship is widely acknowledged as a fundamental part of providing care.[7] It has been suggested that a close partnership between patient and healthcare providers facilitates the dynamic management of haemophilia throughout life through tailored treatment and personalized therapeutic goals.[8] A number of authors have highlighted the significance of therapeutic relationship in the care of patients with haemophilia. Therapeutic relationship has been the topic of expert narrative reviews exploring the evolution of patient-provider relationships and patient

autonomy, and ideas about therapeutic relationship in contemporary haemophilia care.[9-13] Findings from qualitative studies suggest that patients and healthcare providers consider aspects of patient-provider relationship to be a key component of haemophilia treatment.[12,14–17]

At present, there is an emphasis in haemophilia research on understanding the factors that influence patient's degree of adherence to treatment, which is important because patient adherence to treatment is linked with positive outcomes such as reduced pain and improved joint health.[18,19] Further, preliminary research suggests significant associations between patients' degree of adherence to factor replacement therapy and certain dimensions of therapeutic relationship.[20] Specifically, patients reporting a higher degree of trust in their haemophilia physician have higher rates of adherence to treatment.[20] Similarly, a good relationship with a haemophilia healthcare provider has been positively correlated with adherence levels.[21]

As interest in this area of haemophilia research grows, it becomes important to establish a validated and standardized approach to measuring therapeutic relationship. A high-quality measurement tool will improve the validity of research into the processes and mechanisms by which therapeutic relationships impact outcomes such as pain, joint health, and quality of life for patients with haemophilia. A standardized approach to measurement will also facilitate comparisons between studies of interventions aimed at improving therapeutic relationship.

Given the importance of a validated tool, and the relevance of studying therapeutic relationship in this population, we conducted a scoping review to provide a comprehensive overview of the research in the area of measurement of therapeutic relationship in the care of patients with haemophilia. Although we focus on research applications of measurement, this review also has implications for evaluating quality of care and assessing the patient's experience of care.

The objectives of our scoping study were to:

1. Locate and inventory the studies that assess therapeutic relationship in haemophilia, and describe the nature and extent of this evidence.
2. Identify the measurement tools that were used, and examine the literature associated with each tool.
3. Summarize the characteristics of the tools that are relevant to researchers when selecting an appropriate measure of therapeutic relationship.
4. Identify knowledge gaps in this area and directions for future research.

Methods

Design

We adopted the Arksey and O'Malley framework for scoping studies.[22] There are five stages in the framework: 1) Identifying the research question; 2) Identifying relevant studies; 3) Selecting studies for analysis; 4) Charting the data; 5) Collating, summarizing and reporting results.[22] We complemented these stages with the recommendations of Levac et al.[23] Briefly, Levac et al. emphasize the need for an iterative and team approach to study design, establishing inclusion and exclusion criteria, searching and selecting relevant articles, and identifying key variables for data extraction. We incorporated these recommendations into the methods of this study.

Search strategy

We identified studies that were relevant to our research question through online searches of relevant health databases from their inception to April 2017. These searches were performed with the assistance of an experienced health research librarian at the University of Alberta. The following electronic databases were searched: MEDLINE (Ovid), EMBASE (Ovid), CINAHL

(EBSCOhost), PsycINFO (Ovid), and Scopus. Each search strategy was adapted to the various databases as required, and we did not apply any search limits.

There were three concepts in our search strategy: 1) the relationship between a healthcare provider and patient, 2) haemophilia, and 3) measurement. For each concept, we included multiple synonyms and key words. Additionally, we searched the reference lists of the articles selected for inclusion, and hand searched one key clinical journal, *Haemophilia,* from 1998 to April 2017. During this stage, as the researchers became familiar with the literature, the selection criteria were established. An example of the search strategy is included as Appendix 2.1. The full search strategy is available upon request from the corresponding author.

Study selection

Two members of the research team independently screened the titles and abstracts of the publications retrieved in the database search. Full texts of the potentially relevant articles were acquired and appraised in reference to our study selection criteria. We included peer-reviewed articles that described the development, testing, or use of a measurement tool in a research study to assess or measure therapeutic relationship or related construct, focusing on a population of patients with inherited bleeding disorders and the healthcare providers (from any discipline) involved in their treatment. We included an article if it measured a subcomponent of therapeutic relationship (e.g., trust, empathy, communication) or a construct that may be considered to contribute to therapeutic relationship (e.g., patient-centredness, satisfaction with care, shared decision-making). We included self-report questionnaires (patient or healthcare provider perspective), observer-rated scales, and coding schemes, all modes of administration (e.g., paper-and-pencil, computerized, or interview). Any discrepancies between reviewers that arose during

the review process were resolved through discussion. We used a Kappa co-efficient to quantify inter-rater reliability between reviewers.

As the reviewers became familiar with the literature, they noticed that therapeutic relationship was often conflated with other constructs related to clinical encounters and that authors often did not clearly define the construct being assessed. This made it difficult to determine the content of the measurement tools. To address the issue, we added an item content analysis step to our methods (described in the 'Data analysis' section below), similar to methods used by Eveleigh et al.[24] This iterative approach to methods is an advantage of scoping study methodology for an emerging research areas like therapeutic relationship, where little is known about the literature prior to starting the study.[23]

A second challenge encountered during study selection related to the definition of "patient satisfaction with care". This term might refer to patient satisfaction with interpersonal aspects of care, satisfaction with the specific intervention, or satisfaction with the outcomes of treatment. We addressed this challenge through discussion within the research team, which resulted in a clearer definition and common understanding to only include studies assessing satisfaction with interpersonal aspects of care.

Charting the data

A single reviewer extracted relevant study features, which were determined based on our research question and objectives. We obtained a copy of each measurement tool that was identified.

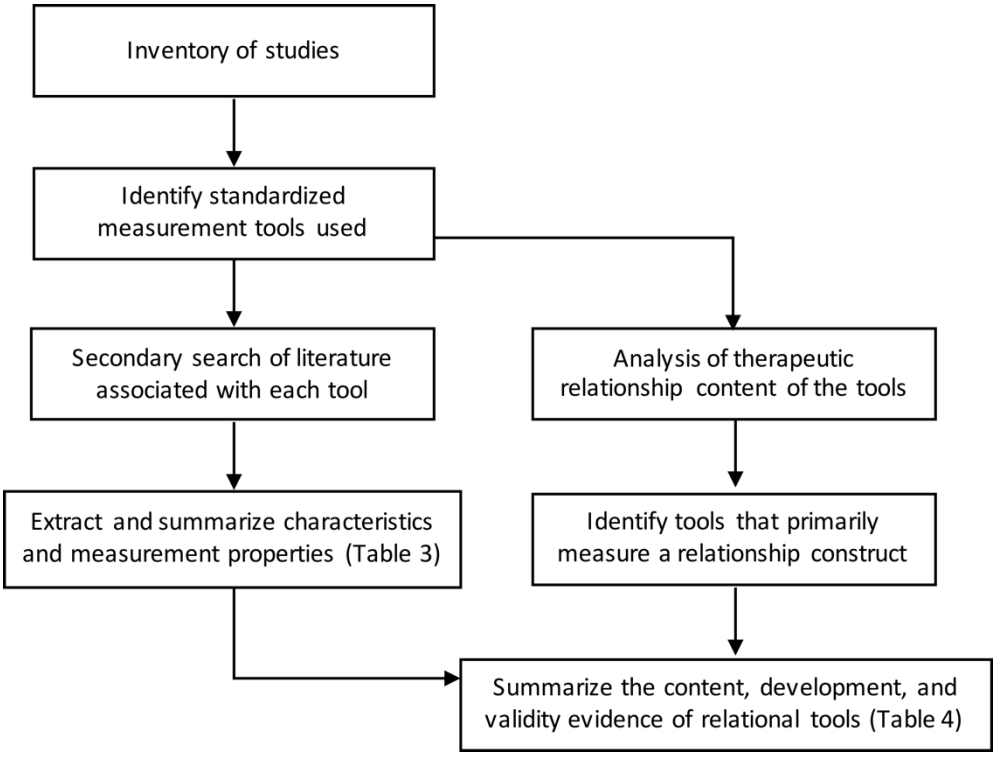
Data Analysis

To describe the nature and extent of the evidence, we calculated descriptive statistics (frequencies and percentages) for the key characteristics of the studies included in the review. Figure 2.1 shows the flow of the methods of data analysis.

Measurement properties

A useful measurement tool should meet two standards of comprehensiveness.[25] First, a tool should be accurate and precise through the full range of the variable being measured (e.g., from poor to strong therapeutic relationships) within the target patient population. It is therefore important to examine the evidence concerning the tool's measurement properties,

Figure 2.1 Flow chart of the methods used for data analysis.



that is, reliability and validity, in the context of the intended target population.[25] Second, the content of the tool should adequately represent all the multiple dimensions or components of a health construct.[25] Therefore, we conducted a second search of the literature to find all published work associated with each measurement tool identified. We searched reference lists, MEDLINE, and the search engine Google, using the name of the tool, any known synonym, and abbreviations. We extracted information related to the development and testing of the tool, the measurement properties reported, and the theoretical basis of the tools from the articles retrieved in the second search. We examined the extent of the validity evidence for each of the measurement tools identified. We used the COSMIN[26] (COnsensus-based Standards for the selection of health status Measurement Instruments) taxonomy and definitions for measurement properties as a guide. We summarized the characteristics of the tools in table form.

Content analysis

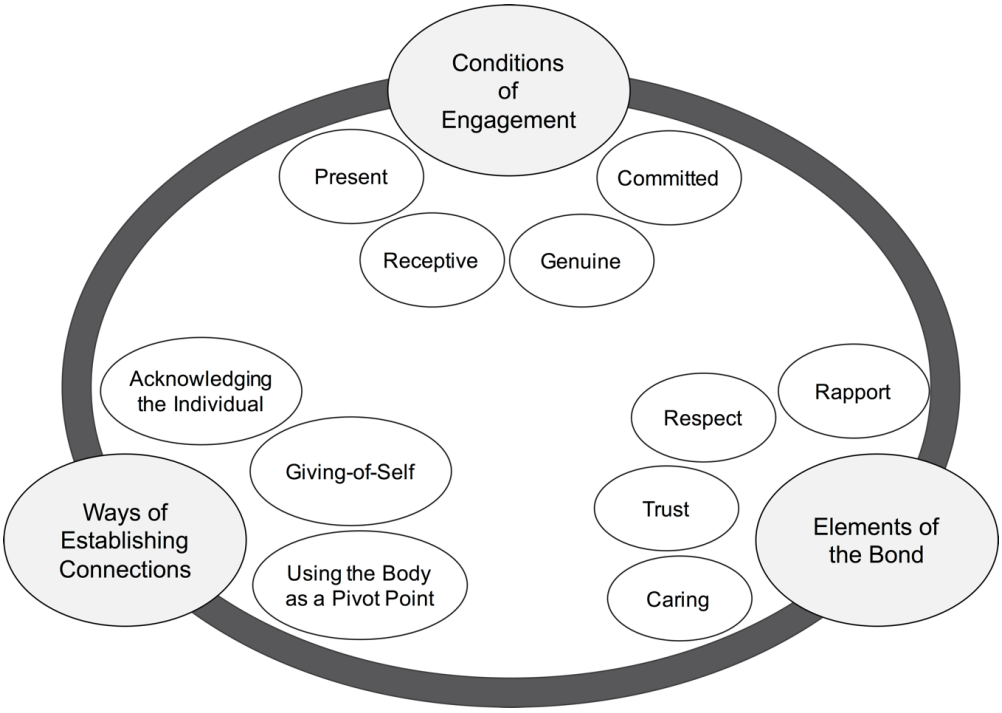
The content of the tools was analyzed using the framework of therapeutic relationship in physiotherapy developed by Miciak.[27] Therapeutic relationship has not been conceptualized in the haemophilia literature, and Miciak's framework has qualities that made it appealing for use in this study. The framework was developed using rigorous qualitative methods, it is comprehensive in scope, and is sufficiently detailed to provide a clear understanding of the fundamental components of the therapeutic relationship.[27]

The three components of therapeutic relationship are: (a) *The conditions of engagement*, (b) *Ways of establishing connections*, and (c) *Elements of the bond* (Figure 2).[27] Further, each component is comprised of subcomponents that describe its nature. *The conditions of engagement* are the attitudes and intentions of the patient and healthcare provider that contribute

to ‘ways of being’ – that is, how the patient and healthcare provider ‘are’ together. The *conditions of engagement* are: committed, genuine, receptive, and present.[28] The *ways of establishing connections* describe the actions and behaviours of the healthcare provider and patient within a clinical encounter. *Connections* involve using the body as a pivot point (i.e. healthcare provider and patient connecting through the patient’s body, physiological health condition, or physical symptoms), giving-of-self, and acknowledging the individual (i.e. validating, individualizing treatment).[29] The *elements of the bond* - caring, trust, respect, and nature of the rapport - describe the emotional or affective resonance between the patient and provider.[27] Further, Miciak et al. identified three themes that should be reflected in the content of a tool intended to measure therapeutic relationship: (1) *Therapeutic relationships are a mutual endeavor* - patients and healthcare providers contribute to the process; (2) *Body is central to the therapeutic relationship* - the patient’s experiences with the physiological impact of the health condition (i.e. body) is the common ground between providers and patients; (3) *Therapeutic relationship is ‘personal’ and ‘professional’* - positions the therapeutic relationship as part of the healthcare provider’s professional responsibilities, while acknowledging the potential for the healthcare provider and patient to have interest and care about the other beyond the clinical reasons for the interaction.[27]

We used the themes and the components in the therapeutic relationship framework to describe the content of the tools, and to systematically distinguish the tools that primarily measure a component or subcomponent of therapeutic relationship. We termed these ‘relational tools’, which we operationally define as a measurement tool that assesses attitudes, intentions, behaviours, or feelings between a healthcare provider and a patient. A general patient

Figure 2.2 The theoretical framework of therapeutic relationship. There are 3 components in the framework, each with subcomponents which further describe its nature.



satisfaction questionnaire is not a 'relational tool' as we have defined it. Although it may contain a small proportion of items that address patient-provider relationship, patient satisfaction questionnaires also typically assess organizational or system-level health services and processes. We examined the content of a tool using the items as the unit of analysis. We coded each item in reference to the component of therapeutic relationship that it measured (if any). Items that did not fit the therapeutic relationship framework were coded as either 'satisfaction with care', or 'not interpersonal'. Examples of the item appraisal are included as Appendix 2.2. For each tool, we calculated the proportion of items in each category (i.e., relationship, satisfaction or not interpersonal). We distinguished the relational tools based on the proportion of items that measured therapeutic relationship. Finally, we checked whether the tool addressed each of the

three themes Miciak identified in therapeutic relationship (personal and professional, body-as-central, and mutuality). Appendix 2.3 contains the findings of the content analysis. One member of the research team conducted item analysis and a second member reviewed the results, with any discrepancies resolved through discussion. We summarized the content, function and validity evidence of each relational tool to provide a comprehensive overview of the relational tools used in haemophilia for researchers selecting a measurement tool.

Patient and Public Involvement and Engagement

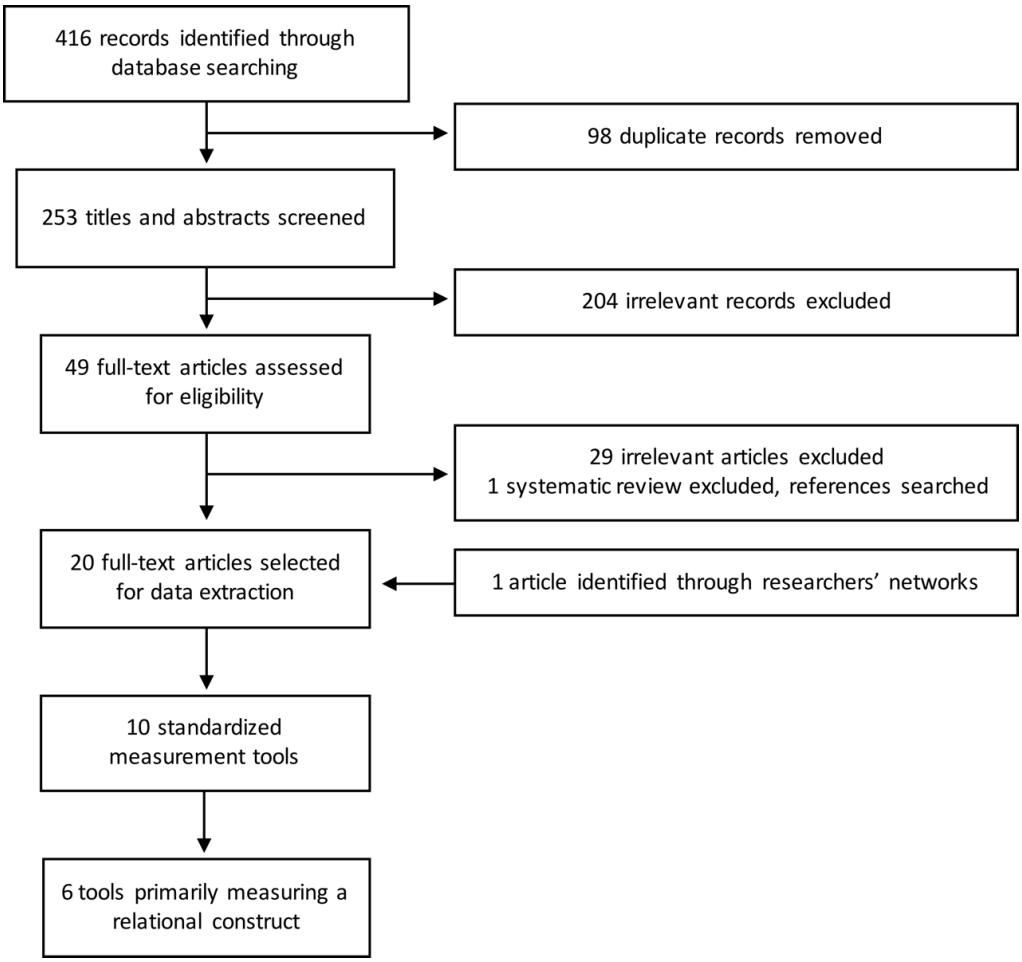
The aim of patient and public involvement and engagement (PPIE) in this study was to plan, conduct, and interpret findings of the research in a manner that was meaningful to patients and their healthcare providers. One patient partner was involved throughout the study as a member of the study team (JH). He is a person with haemophilia and a Master's student at the University of Alberta. He helped design the study, refine the research question and scope, interpret results, and critically review written reports. This was accomplished through meetings with the lead researcher, electronic communications, and informal conversations at related scientific gatherings. Healthcare providers were also consulted during project planning and after the literature search.

Results

The search and selection process are summarized in Figure 2.3. The initial search of electronic databases returned 416 records. After 163 duplicates records were removed, two reviewers screened 253 titles and abstracts for potential inclusion. Inter-rater reliability between reviewers was high in the screening process (Kappa =0.81). Forty-nine articles were retrieved for full text appraisal. Thirty articles did not fit the criteria for inclusion. One of the articles was a systematic

review, which was excluded from further analysis after a search of its reference list for relevant publications. Subsequent to the search, one article was located through the professional networks of the research team. Twenty articles were selected for inclusion, and inter-rater reliability was good (Kappa = 0.76).

Figure 2.3 Flow chart of the article search and selection stages.



General description of the included studies

The main characteristics of the included articles are summarized in Table 2.1. The majority of studies (95%) originated in Western Europe or North America. A large proportion of the studies (40%) were published in the last 2 years (2016-2017). The earliest article was published in 1995. A variety of study designs and target populations were used.

Table 2.1 Descriptive characteristics of the studies included in the review.

Characteristic		Number of articles	Percentage of studies
Geographic region			
	Canada	1	5%
	United States	5	25%
	Germany	2	10%
	Italy	2	10%
	Spain	4	20%
	The Netherlands	3	15%
	Finland	1	5%
	European (multi-national)	1	5%
	Republic of Georgia	1	5%
Date of publication			
	2016-2017	8	40%
	2011-2015	3	15%
	2006-2010	2	10%
	2001-2005	4	20%
	2000 or before	3	15%
Study Purpose			
	Characterize the haemophilia population	6	32%
	Evaluate health services	4	16%
	Evaluative an intervention	4	21%
	Develop a measurement tool	6	26%
Study design			
	Cross-sectional	12	60%
	Prospective cohort study	2	10%
	Methodological	6	30%
Types of relational constructs assessed			
	Working Alliance	1	5%
	Socio-emotional element	7	35%
	Communication behaviour	4	20%
	Satisfaction with health services	8	40%
Study population diagnosis			
	Haemophilia	15	75%
	Mixed inherited bleeding disorders	3	15%
	Mixed haematological conditions	1	5%
	Haemophilia carriers	1	5%
Study population ages			
	Adults	5	25%
	Adult and pediatric patients	8	40%
	Pediatrics patients and parents	3	15%
	All ages, and parents/caregivers	4	20%
Disciplines assessed			
	Physician	8	40%
	Nurse	5	25%
	Physical Therapist	3	15%
	Social Worker	3	15%
	Non-specific haemophilia healthcare providers	10	50%
	Other services	2	10%

With regards to the relationship construct measured in each study, there were no articles that measured therapeutic relationship as a single entity. One study assessed working alliance – a concept originating in the psychotherapy literature.[30] Seven studies assessed socio-emotional elements in therapeutic relationship, for instance, patient trust in the physician, empowerment, collaboration, or provider receptiveness. Task-focused communication –communicative 'acts' of the patient or provider - was assessed in four studies. Eight studies evaluated patient satisfaction with health services (n=8). Six of these articles assessed satisfaction with the services of an HTC, and two assessed satisfaction with other health services (genetic testing, pain therapy). Table 2.2 contains an inventory of the studies included in this review.

The aims of the studies were grouped into three categories: (1) seeking to explain interpersonal phenomena in patient care, (2) evaluating an intervention, and (3) describing health services. Six studies were assigned to category 1, and these explored the associations between patient and provider characteristics, environmental factors, and outcomes of treatment. The four studies in category 2 sought to evaluate an intervention, for example, a new application of a technology or service delivery model. Finally, the four studies in category three aimed to describe health services for patients with haemophilia. The remaining six studies aimed to develop a measurement tool. We identified shared decision-making and adherence to treatment as two topics that were frequently studied relative to subcomponents of therapeutic relationship. Five studies were conducted for the purpose of understanding elements of shared decision-making. Four studies were aimed at understanding the factors related to adherence to treatment in haemophilia.

Table 2.2 Inventory of the studies included in the review.

Brief citation	Title	Description of study purpose and design	Study population characteristics	Description of relationship construct	Relationship outcome measure(s) used	Measurement properties tested†
Ely 1995 [42]	The Working Alliance in Pediatric Chronic Disease Management: A pilot study of instrument reliability and feasibility.	A pilot study of aiming to test reliability, interpretability and usability of a measure of patient-provider relationship adapted from the Working Alliance Inventory [60].	Children (7-14 years old)), adolescents (15 – 20 years old), their parents or guardian, physicians and nurse practitioners from a haematology clinic.	Quality of the relationship between healthcare providers and their patients.	Working Alliance Inventory for Chronic Conditions	Internal consistency, test-retest reliability, construct validity
Carl 1995 [61]	HealthDesk for haemophilia: an interactive computer and communications system for chronic illness self-management.	A pilot study of the implementation of a computer software program for home self-management. Patient satisfaction with the program, patient-provider communication, and user confidence in self-management were assessed. Cross-sectional design.	Male patients ages 9-39 years old with severe haemophilia on home infusion program (n=8).	Ease of communication with HTC using the software	Not a standardized measurement tool	None
Jacobson 2016 [41]	Telehealth videoconferencing for children with haemophilia and their families: A clinical project	Descriptive study of implementing teleconferencing for evaluating bleeds in children with haemophilia. Data collected regarding bleeds, and user satisfaction. Cross-sectional design.	Male patients (2-18 years old) with severe haemophilia in New Mexico and Texas, USA (n=12)	Satisfaction with teleconferencing in terms of communication with haemophilia treatment centre	Not a standardized measurement tool	None
Lock 2016 [62]	Optimization of home treatment in haemophilia: effects of transmural support by a haemophilia nurse on adherence and quality of life.	A prospective cohort study of the effects of transmural support (home visits) on adherence, quality of life and self-efficacy for patients with haemophilia.	Pediatric patients (mean 9.4 years) with haemophilia A or B, any disease severity, on home infusions (n=46).	Behaviour of patient in communicating with haemophilia treatment centre	Communication subscale of the Veritas-PRO	Interpretability
Miesbach 2016 [63]	Adherence to prophylactic treatment in patients with haemophilia in Germany	Cross-sectional survey of German patients to explore associations between adherence to treatment and patient characteristics such as age, severity of disease, home treatment, pain level, co-morbidities, on adherence.	Patients with moderate or severe haemophilia A or B, from Germany (n=397).	Behaviour of patient in communicating with haemophilia treatment centre	Communication subscale of the Veritas-PRO	None
de Moerloose 2008 [21]	A survey of adherence to haemophilia therapy in six European countries: results and recommendations.	A descriptive correlational study using structured interviews with patients and healthcare providers. Explored factors that influence adherence, including treatment regimen, environment, patient attitudes, and knowledge of treatment, experiences and preferences.	Patients with severe haemophilia A, any age, from six European countries: France, Germany, Italy, Spain, Sweden, and the UK (n=180).	Patient perception of the degree of collaboration between, and relationship with, haemophilia care providers	Not a standardized measurement tool	None
del Río-Lanza 2016 [36]	Information provision and attentive listening as determinants of patient perceptions of shared decision-making around chronic illnesses.	A cross-sectional survey design, authors used structural equation modeling to describe the pathways of influence of multiple patient-provider communication variables on patient perceptions of shared decision-making.	Respondents were adult patients with haemophilia A and B, using regular factor replacement therapy and parents of pediatric patients (n=181).	Healthcare provider and patient relational communication characteristics, and patient perception of shared decision-making	University of Oviedo Survey‡	Validity, reliability, interpretability

Lamiani 2017 [39]	Applying a deliberation model to the analysis of consultations in haemophilia: Implications for doctor-patient communication	Researchers report on the development of an interaction analysis coding scheme using on the Theoretical Model of Deliberation Dialogues. The tool was used to analyze shared decision-making during a physician encounter.	Patients with haemophilia A over the age of 12, using prophylaxis or on demand therapy (n=30).	Shared decision-making dialogue	Theoretical Model of Deliberation Dialogues Coding Scheme	None
Lock 2012 [38]	The group medical appointment (GMA) in haemophilia and von Willebrand's disease: A new development in outpatient paediatric care.	A prospective cohort study of the implementation of a 'group medical appointment' care model. Parents or patients' expectations and experiences of the encounter were collected using a self-report questionnaire.	Families with children (mean age of 8 years), mixed inherited bleeding disorders patients in the Netherlands (n=53).	Patient expectations and perceptions of healthcare provider communication before and after a health encounter	QUOTE-Communication Questionnaire	None
Suarez-Vazquez 2016 [37]	Empower Me? Yes, Please, But in My Way: Different Patterns of Experiencing Empowerment in Patients with Chronic Conditions. Health Communication, 0(0), 1–6.	A cross-sectional survey design, studying the associations between patient and provider communication variables and patients' self-perception of empowerment were analyzed using mixed multiple linear regression modelling.	Respondents were adult patients with haemophilia A and B, using regular factor replacement therapy and parents of pediatric patients (n=181).	Healthcare provider and patient relational communication characteristics, and patient empowerment experience	University of Oviedo Survey	Validity, reliability, interpretability
Tran 2016 [20]	Physician trust and depression influence adherence to factor replacement: a single-centre cross-sectional study.	The aim of the study was to explore associations between patient's adherence to factor replacement therapy and demographic, socioeconomic, psychosocial (trust in physician) and health literacy and numeracy variables.	Adult patients with moderate or severe haemophilia A or B (n=91).	Patient's trust in their physician	Wake Forest Trust in Physician Scale	Interpretability
Triemstra 1998 [35]	Well-being of haemophilia patients: A model for direct and indirect effects of medical parameters on the physical and psychosocial functioning.	The development and evaluation of a structural equation model for establishing the patient characteristics that impact well-being in patients with haemophilia.	Patients with haemophilia A or B in the Netherlands, aged 15 years or older (n=980).	Health locus of control, that is, the extent to which individuals perceive healthcare providers to be responsible for their health	Multi-dimensional health locus of control scale (Dutch adaptation)	Reliability
Arranz 2004 [33]	Development of a new disease-specific quality-of-life questionnaire to adults living with haemophilia.	Early stages of the development and testing of a haemophilia-specific quality-of-life questionnaire. 75 items were pilot tested, and reduced to 44 items after expert review and pilot-testing.	Pilot testing of a new questionnaire in adult patients with moderate or severe haemophilia A and B (n=35).	Patient satisfaction with treatment as a subscale of a disease specific health-related quality of life	Hemofilia-QoL	Validity, reliability, interpretability
Hacker 2006 [34]	A patient satisfaction survey for haemophilia treatment centres.	The authors describe the development and testing of a patient-reported questionnaire to measure satisfaction with the services of their clinic.	Paediatric and adults patients with an inherited bleeding disorder from one haemophilia clinic in the United States (n=271).	Satisfaction with health services including interpersonal skills and quality of care	Mountain States Regional Patient Satisfaction Survey	Validity, reliability, interpretability
Jarvinen 1999 [64]	Carrier testing of children for two X-linked diseases: A retrospective evaluation of experience and satisfaction of	The authors used a recall questionnaire to study the experiences of young women who underwent genetic testing as children.	Young females from families affected by haemophilia, and Duchenne's muscular dystrophy in Finland (n=23).	Patient perception of their satisfaction and degree of participation in medical decision making	Not a standardized measurement tool	Interpretability

	subjects and their mothers.					
Kalnins 2015 [65]	Pain therapy in haemophilia in Germany.	A descriptive study based on a questionnaire survey to assess patient's perceptions of pain, and pain management.	Paediatric and adults patients with haemophilia A or B in Germany (n=685).	Satisfaction with pain therapy services	Not a standardized measurement tool	None
Kirtava 2005 [66]	National haemophilia programme development in the Republic of Georgia.	Description of the development of a comprehensive clinic in the Republic of Georgia.	Patients with haemophilia A or B from a haemophilia clinic in the Republic of Georgia (n=104).	Satisfaction with haemophilia treatment centre services	Not a standardized measurement tool	None
Page 2016 [67]	Penny wise, pound foolish: an assessment of Canadian haemophilia/inherited bleeding disorder comprehensive care program services and resources.	A report on a national survey of Canadian Comprehensive care inherited bleeding disorder programs and services. Data were collected through interviews with clinicians from haemophilia treatment clinics, and a satisfaction with services survey of Canadian patients.	Families and adult patients with any inherited bleeding disorder in Canada (n=347).	Patient satisfaction with their relationship with their haemophilia treatment centre staff	Not a standardized measurement tool	None
Remor 2005 [68]	Psychometric field study of the new haemophilia quality of life questionnaire for adults: The 'Hemofilia-QoL'.	A psychometric field study of a newly developed health-related quality of life questionnaire. The 44-item draft questionnaire was reduced to 36 items after psychometric evaluation.	Patients with haemophilia A and B, mild to severe disease in Spain (n=121).	Patient satisfaction with treatment as a subscale of a disease specific health-related quality of life	Hemofilia-QoL	Validity, reliability, interpretability
von Mackenson 2013 [31]	Cross-cultural adaptation and linguistic validation of age-group-specific haemophilia patient-reported outcome (PRO) instruments for patients and parents.	A paper describing the process of translation, and cross-cultural validation of 3 disease specific questionnaires, including one for satisfaction with haemophilia treatment, the Hemo-SAT.	No patients were involved in the language translation study.	Satisfaction with haemophilia nurses and specialist services, as a subscale of satisfaction with haemophilia treatment	Hemo-SAT	Validity, reliability, interpretability

†The measurement properties of the tool which were tested in the study.
‡This tool was not named in the studies, therefore in this paper we have referred to it by the institution at which it was developed.

Description of measurement tools

Thirteen of the twenty articles described a standardized measurement tool. Ten unique tools were identified: the 'Specialist/Nurses' subscale of *Hemo-SAT*[31]; the 'treatment satisfaction' domain of *Hemofilia-QoL*[32,33]; *Mountain States Regional Haemophilia and Thrombosis Center Patient Satisfaction Survey*[34]; *Multi-dimensional Health Locus of Control Scale*[35]; *University of Oviedo Survey* (UOvS)[36,37]; *QUOTE-Communication Questionnaire* (QUOTE) [38]; *Theoretical Model of Deliberation Dialogues* (TMDD)[39]; the 'Communication' subscale of the *Veritas-PRO*[40,41]; the *Wake Forest Trust in Physician Scale* (WFTPS)[20]; and the *Working Alliance Inventory for Chronic Conditions* (WAI-CC)[42].

An additional 27 articles were found that reported on a tool's development or testing. Within the associated literature, we found evidence for all tools regarding content validity and interpretability. Additionally, we found that internal consistency (coefficient alpha) had been reported for all the self-report questionnaires. The measurement properties of six tools were tested in a haemophilia patient population. Key characteristics of the tools and their associated literature are described in Table 2.3.

Table 2.3 Description of the measurement tools identified from studies involving patients with haemophilia.

Measurement Tool	Description	Discipline†	Measurement construct‡	Subscales or domains	Number of items and response scale
Hemofilia-QoL [32,33]	A disease specific quality of life questionnaire, with a 'treatment satisfaction' subscale.	Haemophilia healthcare providers	2 item subscale measuring satisfaction with care	Eight domains: physical health, physical role, joint damage, pain, treatment satisfaction, emotional functioning, mental health and social support.	2 items, 5 point Likert scale
Hemo-SAT specialist/nurses subscale[31]	The Hemo-SAT was developed to assess patient satisfaction with haemophilia treatment. It contains a subscale, "satisfaction with specialist/nurses"	Physicians and nurses	Satisfaction with care from haemophilia specialists and nurse	Seven domains: ease/convenience, efficacy, burden, side-effects, specialist/nurse, centre/hospital, general satisfaction.	7 items, 5 point Likert scale
Mountain States Patient Satisfaction Survey[34]	A questionnaire survey designed to measure patient satisfaction with the care provided by a haemophilia treatment centre.	Haemophilia healthcare providers	Patient satisfaction services of a haemophilia treatment centre	Four domains: technical competence, interpersonal skills, quality of care and access	37 items, 5 point Likert scale
Multi-dimensional health locus of control scale[35]	Measures the degree to which a person perceives others (healthcare professionals) to have control over their health own health.	Physician	Patient's health locus of control	Three dimensions: self, others, luck; "Other" measures the extent to which an individual perceives others to be responsible for his or her health	18 items, 6 point Likert scale
QUOTE-Communication Questionnaire[38]	A patient-reported satisfaction questionnaire, based on the theory that patient satisfaction is a function of patient expectations and experiences.	Healthcare providers	Patient satisfaction with communication during a healthcare encounter.	Two subscales (pre-visit and post-visit) each with two domains (biomedical and psychosocial)	2 sets of 10 items, 5 point Likert scale
Theoretical Model of Deliberation Dialogues coding scheme[39]	An observer-rated coding scheme to analyze shared decision-making between patient and physician during a consultation.	Physicians	Patient and physician interactions	Codes based on three stages in shared decision making: Opening stage (topic or problem introduced), Argumentation stage (solutions proposed, arguments for or against a proposal), Closing stage (explicit agreement by one or both participants).	A rating scale of Complete or Incomplete; codes describe qualities of an incomplete dialogue.
University of Oviedo Survey[36,37]	A patient-reported questionnaire developed for the purpose of developing statistical models to describe relationships between patient provider communication variables.	Haemophilia healthcare providers	Patient provider communication, patient perceptions of shared decision-making and empowerment experiences.	Eight subscales: patient participation, patient impact, meaning, health care professionals' information provision, emotional support, attentive listening, trust;' patients' collaboration.	29 items, 5 point Likert scale
Veritas-PRO communication subscale[62,63]	A patient-reported questionnaire to assess patient adherence to prophylaxis regiment. It includes six subscales, one of which is 'communication'.	Haemophilia healthcare providers	Communication behaviours of the patient and their haemophilia treatment centre	6 subscales: time, dose, plan, remember, skip, communicate	4 items, 5 point Likert scale

Wake Forest Trust in Physician Scale[20]	A patient-reported questionnaire to assess trust in physician.	Physicians	Interpersonal Trust	Four domains: fidelity, competance, honesty, global trust	10 items, 5 point Likert scale
Working Alliance Inventory – Chronic Conditions[42]	A tool to assess patient-provider relationships in pediatric hematology. 20 forms were designed to assess from the perspective of adolescents, children, their parents, the physician and nurse practitioner.	Physicians, Nurse Practitioners	Working Alliance	Three subscales: bonds, goals, tasks.	36 items, 7 point Likert (adolescent and parent) 12 items, 5 point Likert scale (child)

Table 2.3 (continued) Description of the measurement tools identified from studies involving patients with haemophilia

Measurement Tool	Related Literature	Theoretical foundation of the tool	Internal consistency	Reliability	Measurement Error	Content validity	Structural validity	Hypothesis testing	Cross-cultural validity	Criterion Validity	Responsive-ness	Interpret-ability
Hemofilia-QoL[32,33]	von Mackensen[69]	Based on the results of qualitative research on the factors that are considered important in quality of life.	x	x		x	x	x			x	x
Hemo-SAT specialist/nurses subscale[31]	von Mackensen [70,71], Gringeri[72]	Based on the definition of Weave[73]r: Treatment satisfaction as the individual rating of important attributes of the process and outcomes of his treatment experience.	x			x			x			x
Mountain States Patient Satisfaction Survey[34]	NA	Four domains of interest based on literature review of patient satisfaction.	x			x						x
Multi-dimensional health locus of control scale[35]	Wallston [74]	Based on the theory that a person's locus of control has three dimensions, which are independent of one another: Internal, external, and luck or chance.	x			x						x
QUOTE-Communication Questionnaire[38]	Sixma[75], van den Brink-Muinen[76], Valorie[77]	Based on the conceptual framework for patient satisfaction of Sixma et al. [75]. This scale included items from the 'Patient Requests Form' of Valorie et al. [77].	x			x	x	x	x			x
Theoretical Model of Deliberation Dialogues coding scheme[39]	Bigi [47]	The 3 stages in the 'Theoretical Model of Deliberation Dialogues' - opening stage (topic or problem introduced); argumentation stage (solutions proposed, arguments for or against a proposal), closing stage (explicit agreement by one or both participants).		x		x						x
University of Oviedo Survey[36,37]	Chen[78], Lee & Lin[79], Warren-Findlow[80], Fassaert[81], Briggs[82], Kriston[83]	Authors considered relational dimensions of communication to design the survey, using items from validated measurement tools: 'Diabetes Empowerment Process Scale' [78], 'Trust in Physician Scale' [79,84], 'Active Listening Observation Scale' [78,81], 'Health Literacy Measurement Scale' [82], '9-item Shared Decision Making Questionnaire' [83].	x	x		x	x	x				x
Veritas-PRO communication subscale[62,63]	Duncan[85], Lock[86], Rubén[87], Tran[20]	Development was informed by data gathered from healthcare providers and patient focus groups.	x	x		x	x	x	x			x
Wake Forest Trust in Physician Scale[20]	Muller[88], Hall[89], Bachinger[90], Donnelly[91]	Hall et al. [89] conceptualized model focused on interpersonal trust from a patient to a known primary care provider based on a review of theoretical and empirical literature from medical and nonmedical settings.	x	x		x	x	x	x			x
Working Alliance Inventory – Chronic Conditions[42]	Besley[45], Hall[43], Burns[44], Morris[46], Horvath and Greenberg[60]	This tool was adapted from the 'Working Alliance Inventory' in collaboration with its author. The original tool was developed using Bordin's Theory of Working Alliance in psychotherapy, which has three constituent components: bonds (feelings between), goals (valuing the outcomes that are targeted), and tasks (behaviours within the clinical encounter).	x	x	x	x	x	x	x		x	x

Content comparison of the tools

We did not identify any tools that comprehensively measured the full scope of therapeutic relationship. Based on item content analysis, we distinguished six tools that measure a relationship construct as a primary domain: WAI-CC, WFTPS, QUOTE, Veritas-PRO, TMDD, UOvS. Three of the four other tools measured satisfaction with care.

The results of our item content analysis showed the WAI-CC most comprehensively covers the components of therapeutic relationship framework, with 9 of 11 subcomponents represented, missing the subcomponents of 'body as a pivot point' and 'present'. The scope of the UOvS content was broad as well, capturing 7 of the 11 subcomponents. The WFTPS measured *elements of the bond* (trust, caring), and the *conditions of engagement* (receptive, genuine, committed). The items in the Veritas-PRO, TMDD, and QUOTE tools measured subcomponents of *ways of establishing connections*.

In terms of the three themes of therapeutic relationship, five of the six tools addressed the relationship as a mutual endeavor, and four of six tools addressed the body-is-central theme. A single tool attended to the personal aspect of therapeutic relationship (UOvS), while all tools examined professional aspects of therapeutic relationship. We compare the six relational tools in terms of functionality, content, and measurement properties in Table 4.

Outcomes of PPIE

PPIE impacted the study in two specific ways: 1) deciding to use the framework of therapeutic relationship; and 2) informing decisions about the scope of the study. In the design stage, the patient partner considered his experiences during clinical encounters to help us establish the applicability of a framework developed from research in a different patient population to patient-

Table 2.4 A comparison of the relational tools from the haemophilia literature.

Measurement tool	Target population	Purpose of the tool	Content of the tool †	Measurement properties ‡	Language
QUOTE-Communication	Adult and pediatric patients before and after healthcare encounter	To evaluate patient satisfaction with relational communication during an encounter with a healthcare provider, by comparing patient communication expectations and experiences during encounter.	'Establishing connections' (acknowledging the individual, body as a pivot point). Themes covered: professional dimension, and body-is-central	Measurement properties have not been reported for a haemophilia population. Evidence of content and construct validity in medical outpatient populations.	Dutch, French, Spanish, Flemish, German, English
Theoretical model of deliberation dialogues	Adult patients with haemophilia and healthcare providers	To describe shared decision making during an encounter between a healthcare provider and patient, using an interaction analysis coding scheme.	'Establishing connections' (acknowledging the individual). Themes covered: mutuality, professional	Content validity, inter-rater reliability testing, coding scheme was developed in the haemophilia population.	Italian
University of Oviedo Survey	Adult patients with haemophilia and healthcare providers	To discriminate between groups of patients with varying levels of different factors related to patient-provider communication, shared decision-making, and empowerment experience.	'Establishing connections' (body as a pivot point, giving-of-self, acknowledging the individual), 'elements of the bond' (trust), and 'conditions of engagement' (receptive, committed). Themes covered: mutuality, professional, personal, body is central.	Developed and tested in a haemophilia population. Shows evidence of reliability, content and construct validity.	Spanish, English (translation not tested)
Veritas-PRO – 'Communication' subscale	Adult and pediatric patients with haemophilia on prophylaxis factor replacement therapy.	To evaluate patient-reported communication behaviours with respect to haemophilia treatment and quantify change in adherence over time.	'Establishing connections' (body as a pivot point). Themes covered: body-is-central.	Developed and tested in a haemophilia population. Evidence of internal consistency, reliability and content validity.	English, Dutch, German, Spanish
Wake Forest Trust in physician	Adult patients in medical outpatient and primary care settings and known healthcare provider	To discriminate between patients with varying levels of interpersonal trust towards a known healthcare provider.	'Elements of the bond' (trust, caring), and 'conditions of engagement' (receptive, genuine, committed). Themes covered: mutuality, professional, body is central.	Measurement properties have not been reported for a haemophilia population. Internal consistency, reliability, content and construct validity have been tested in outpatient settings.	English, Dutch, German, Spanish
Working Alliance Inventory – Chronic Conditions§	Pediatric patients with chronic hematological conditions	To discriminate between patients with varying quality of working alliance with a known physician or nurse practitioner.	'Establishing connections' (giving-of-self, acknowledging the individual), 'Elements of the bond' (trust, caring, respect, rapport), and 'conditions of engagement' (receptive, committed, authentic). Themes covered: mutuality, professional.	The reliability and usability of this tool was tested in a general pediatric hematology clinic. The measurement properties of the original tool have been tested in the care of adults with diabetes and chronic low back pain.	English

† Component(s) of the framework of therapeutic relationship measured by the items in the tool and the themes of therapeutic relationship covered by the tool; ‡ Measurement properties tested and reported in the literature associated with the tool; § Content analysis was carried out on the original Working Alliance Inventory – long form because the adapted version was not available.

provider relationships in haemophilia. Also, in early stages, the patient partner was involved in determining the scope of the study. The patient partner actively contributed to writing the project proposal as well as the final manuscript. He supported knowledge dissemination activities by attending scientific conferences where the project was presented and through discussions with

peers in his network regarding the project. The patient partner also connected the researchers with other relevant healthcare providers in the community, creating opportunities for future collaboration.

The conception and design of the study, and the scope of our research question was guided by informal discussions with healthcare providers working in HTCs. As well, a peer-review panel consisting mainly of clinicians from HTCs reviewed the project at the proposal stage, and we incorporated their feedback into the project design.

Discussion

The purpose of this study was to provide an overview of the measurement of therapeutic relationship in the care of patients with haemophilia. We did not find any studies that measured the full scope of therapeutic relationship. From this, we concluded that no tool for the measurement of therapeutic relationship has been validated in this population.

Knowledge of the performance of a tool in the population of interest is necessary to inform the selection of outcome measures for research applications. The six tools identified in this review show promise as tools to measure subcomponents of therapeutic relationship in haemophilia. However, there is little evidence of the tools' measurement properties from haemophilia patient populations; therefore, further validation of these tools will be required to ensure the results from studies using these tools are valid.

We identified six tools that measure constructs that are part of therapeutic relationship. The features of each tool must be considered when selecting a tool for use in research. The WFTPS may be useful to researchers seeking to measure patient trust in their healthcare provider. It has performed well in studies in outpatient medical settings, in both English and

Dutch. Similarly, the QUOTE-communication questionnaire could be used to measure patient satisfaction in studies of relationship-focused models of care.

The WAI-CC may be a useful tool to quantify working alliance between healthcare providers and patients with haemophilia. It has been used in the original form in studies of patients with chronic conditions such as low back pain and diabetes.[43–46] However, we identified two areas where the content of the tool is incomplete with respect to therapeutic relationship. The first relates to how patients and healthcare providers connect over the body – for example, how physical symptoms are assessed or addressed. This gap in the content of the tool may have significant implications in the care of patients with haemophilia, since a primary concern of patients and healthcare providers is to manage the musculoskeletal manifestations of the condition. The second gap in the content of the WAI-CC relates to the 'personal' theme in therapeutic relationship. The study of Vegni et al revealed a deep personal and professional involvement of haemophilia physicians with their patients, suggesting that the WAI, which does not address the personal dimensions of therapeutic relationship, may not adequately capture therapeutic relationship in haemophilia.[15] Researchers studying the content of the WAI in physical medicine and rehabilitation have also identified these two limitations.[43,45]

The items in the UOvS have the potential to be useful in a comprehensive measure of therapeutic relationship. The content of the UOvS subscales is broad, and their measurement properties have been tested in the haemophilia population in Spain. Additionally, there are English and Mandarin translations of most items, which have been tested in populations with chronic conditions. Further measurement studies are needed to adapt the tool to assess therapeutic relationship quality or evaluate change over time.

The reliability and validity of the Veritas-PRO has been tested in populations of patients with haemophilia. The usefulness of the communication subscale as a measure of therapeutic relationship is uncertain, in part because of the narrow focus of the four items in the scale.

There was one observer-rating scale identified in this review, a coding schema based on the Theoretic Model of Deliberation Dialogues.[47] Lamiani et al. reported on the early development and testing stages of an interaction analysis coding for shared decision-making communication between patients and physicians.[39] The authors anticipate using the tool in a study of factors influencing adherence to treatment in haemophilia.[39] The coding scheme may be useful in future studies requiring an objective measure of shared decision-making during clinical encounters.

Gaps in knowledge and directions for future research

With this scoping review, we identified a need for a valid measure of therapeutic relationship in haemophilia. The first step will be to establish an understanding of the main elements of therapeutic relationship (i.e., a conceptual model) in the care of patients with haemophilia. This would provide a clear definition and scope of the relational construct being measured by a tool and would provide a basis for deciding to use an existing tool, from another patient population (i.e., if the content of an existing tool adequately represents the conceptualization of therapeutic relationship). If an existing tool is not available, the conceptual model would provide a foundation for the development of a new tool.

There are measurement tools developed in other patient populations that could be useful in research with patients with haemophilia. A well-known tool is the Caring and Relational Empathy (CARE) measure, a 10-item measure developed for the evaluation of the "human aspects" of the quality of consultations (i.e., the ability of the healthcare provider to

communicate an understanding of the patient's world and to act on that understanding in a therapeutic way).[48] It has shown good measurement properties in various outpatient settings[49]. The Healing Encounters and Attitudes Lists (HEAL) is a 57-item measure of the "patient-provider connection".[50] The HEAL measure has the advantage of being developed using Item Response Theory, which offers greater flexibility and efficiency of measurement.[50] Eveleigh et al provide an overview of 19 measurement tools that have been used to measure doctor-patient relationships, but none of these have been tested in patients with haemophilia.[24]

Other considerations for future research include increasing efforts to test and report measurement properties in patients with haemophilia and studying therapeutic relationship in developing countries. Researchers could make a more informed selection of measurement tools if measurement properties of existing relational tools used in haemophilia populations were known. Also, given the majority of studies we identified were completed in Western Europe and North America, studying therapeutic relationship in developing countries should be considered.

This work is important because a validated measurement tool will improve research quality into the processes and mechanisms by which aspects of therapeutic relationship impact outcomes such as pain, joint health, and quality of life for patients with haemophilia. Given that therapeutic relationship is associated with adherence to treatment in haemophilia, and that adherence impacts outcomes such as pain and joint health, this a potential area of inquiry that could meaningfully improve the outcomes of care for patients with haemophilia.[19,51]

Strengths and limitations of this study

We presented a robust overview of research and measurement tools and situate measurement of therapeutic relationship within the broader context of health service research in haemophilia. Also, we identified the knowledge gaps and directions for future research. Some key strengths

of our study are that we used a systematic and reproducible search and selection strategy, and we assembled a research team with content and methodological expertise. Further, we clearly reported our approach to data analysis using a robust theoretical framework of therapeutic relationship.

There were two main advantages to using the framework. First, it added structure and transparency to the analysis of the tools' content. The framework was justified given the rigorous methods with which the framework was developed, and that therapeutic relationship has not been conceptualized in the care of patients with haemophilia. Second, the framework helped identify a clear distinction between patient-reported relationship scales and patient satisfaction scales. In an effort to include all available evidence of evaluation of therapeutic relationship, we included patient satisfaction with care as a measurement construct in this scoping study. It was important that we used a method that could distinguish the two constructs, because the use of patient satisfaction questionnaires to evaluate the quality of therapeutic relationships is generally not supported.[52] In part, this is because general satisfaction questionnaires often fail to include items that assess emotional constructs in the proportions that reflect patients' true priorities in their care.[52]

A potential limitation of the study is that the framework of therapeutic relationship was developed in the context of physiotherapy for patients with musculoskeletal impairments, and the generalizability of the framework from physiotherapy to other healthcare disciplines has not been established. Physiotherapists typically focus on the body and physical condition, and parts of the framework might be more pertinent to physiotherapists (e.g., 'body as pivot point'). However, haemophilia is a hematologic condition that often manifests in the musculoskeletal system. During clinical encounters, healthcare providers from all disciplines will be concerned with

asking about physical symptoms, addressing issues related to the physical condition (e.g., experience of pain, joint bleeding), and how the patient experiences and is impacted by these physical problems. Therefore, the therapeutic relationship framework used is likely relevant to the care of patients with haemophilia by healthcare providers from all disciplines. Furthermore, the framework converges with the therapeutic relationship literature in haemophilia. Qualitative studies in haemophilia addressing a patient-centred care model, and haematologists' internal representations of difficult encounters with patients mirror Miciak's relationship components, as well as the framework's personal and professional theme.[12,15,27]

Another potential limitation is the method of appraisal of the content of the items. The process involved the subjective judgement of the researchers and it is possible that items in each measure would be classified differently by a different set of researchers. As well, the choice of therapeutic relationship framework could impact the results of the content analysis of the measurement tools. Therapeutic relationship is a complex construct that can be conceptualized and organized differently, thereby impacting the classification of tools as relational. For instance, some frameworks are focused on concepts such as bonding[53], empathy , trust[55], or communication[56], and working alliance[30], while others are more broad, including contextual factors such as the healthcare environment[57], patient or healthcare provider factors such as the pre-requisite knowledge and qualities of the healthcare provider, or patient expectations for care.[30,33,53, 56-59] Despite these limitations, the results of the content analysis suggest that our method was suitable since there was a clear delineation between the tools classified as relational (proportion of relational items was 0.84 and above) and non-relational tools (0.38 or lower). A final limitation is that one single researcher conducted the data extraction and content analysis steps, however, these were verified by another researcher.

Reflections on PPIE

The degree of PPIE in health research can range from a consultation-type involvement to research that is completely led by the public. We engaged a single patient-partner who is a graduate student at our institution, who was involved in the early stages (conception, design) and late stages (dissemination). The study could have been enriched by partnering with patients that represent a diversity of backgrounds and experiences or by involving patient-partners at all stages of the research process. Despite this limitation, PPIE was an important component of this project, informing principal aspects and leading to a positive learning experience for all involved. The researchers had supportive and open attitudes towards partnering with a patient, however, were not experienced in the implementation of PPI in practice. We attribute part of the success of PPI in this project to the patient-partner's familiarity with research processes, which likely facilitated collaboration. The researchers recognize that a formal mentorship relationship between our research team and a patient-oriented research organization would be useful in designing and conducting future projects. The aim of the mentorship would be to add structure to the involvement of patient partners, allowing patients who are not already part of the research community to be fully involved in research and to ensure the experience is meaningful for all involved.

Conclusions

In this scoping review, we sought to answer the question: "What validated measurement tool(s) exist for measuring the therapeutic relationship in the care of patients with haemophilia?" We did not find any measurement tools that have sufficient validity evidence to be used to measure therapeutic relationship in haemophilia care. We identified six tools that were used to measure aspects of therapeutic relationship but were not comprehensive in scope. There is a need for a

conceptually sound measurement tool of the therapeutic relationship to be validated in the care of patients with haemophilia.

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CHAPTER 3: Measuring Therapeutic Relationship in Physiotherapy: Conceptual Foundations

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Abstract

The “therapeutic relationship” in physiotherapy refers to the beneficial or healing relationship between the patient and physiotherapist. Interest in researching therapeutic relationships in physiotherapy is growing and there is a need for a measure of therapeutic relationship with a strong conceptual foundation. We begin with a general discussion of the state of therapeutic relationship measurement in physiotherapy research – notably, how current research is based on measures borrowed and adapted from psychotherapy. Then, we introduce Miciak’s physiotherapy therapeutic relationship framework, discuss why it offers a solid foundation for measurement development, and describe the key concepts in the framework. We then discuss various approaches to measuring therapeutic relationship, illustrating how Miciak’s framework could be used to inform their development. We end by discussing current challenges in measuring therapeutic relationship and how these could be addressed.

Keywords: therapeutic relationship; therapeutic alliance; physiotherapy; assessment; patient-provider relationship; measurement

Introduction

The "therapeutic relationship" in physiotherapy encompasses *conditions* established by the patient and physiotherapist through their intentions towards treatment, *ways of connecting* during clinical encounters, and the *bond* that develops between patient and physiotherapist.[1] The patient-physiotherapist relationship is assumed to be "therapeutic" because the quality of the relationship can affect well-being and clinical outcomes from treatment.[2]

Therapeutic relationship is increasingly recognized as an important aspect of the physiotherapeutic process. There is mounting evidence showing that therapeutic relationships can impact the degree to which the patient engages in physiotherapy treatment, as well as biomedical and psychosocial health outcomes such as self-efficacy, adherence to treatment, physical functioning, pain intensity, satisfaction with treatment, depression, and general health status.[3–7]

Research on the therapeutic relationship in physiotherapy has mostly been conducted using measures borrowed or adapted from psychotherapy.[3,5,8] This was a good strategy when researchers were beginning to explore the impact and role of therapeutic relationship in physiotherapy. It allowed researchers to determine the significance of therapeutic relationship to physiotherapy practice, whether therapeutic relationship affects outcomes, and identify factors that may influence therapeutic relationship quality. It was also a good strategy prior to having therapeutic relationship thoroughly described in physiotherapy or a physiotherapy-specific understanding of therapeutic relationship.

There has been growing interest in understanding the key concepts of therapeutic relationship in physiotherapy. Syntheses of existing literature have produced lists of themes or components that comprise therapeutic relationship.[3,8–10] There has also been qualitative research to describe therapeutic relationship as part of patient-centered physiotherapy care.[11,12]

Additionally, Miciak (2015) used qualitative methods to provide an in-depth description of the key components of therapeutic relationship, organized within a theoretical framework.[1,13,14]

While there are several similarities, it has become clear that therapeutic relationship in physiotherapy differs from therapeutic relationship in psychotherapy. One key difference in physiotherapy therapeutic relationships is that patients and physiotherapists often connect through the body.[13] This includes connecting or relating through person-to-person physical contact (touch), which does not often occur in psychotherapy. These differences threaten the validity of using measures developed in psychotherapy for physiotherapy research. Additionally, a number of clinimetric studies have identified problems with content validity and other measurement properties (e.g. ceiling effects) of psychotherapy instruments applied in physiotherapy research.[15–17] Using a measure with questionable measurement properties produces poor data, which brings into question the validity of research results using that measure. Important consequences could include missing a significant relationship between two variables or incorrectly estimating the magnitude of therapeutic relationship's effect on outcomes.

Physiotherapy practitioners and researchers are only beginning to understand the nature and importance of therapeutic relationship in physiotherapy after decades of research in psychotherapy and other disciplines. This is in part because therapeutic relationship is a theoretical construct or a phenomenon that we believe exists based on our understanding of the world, but cannot directly observe.[18,19] In order to advance the study of therapeutic relationship, physiotherapy researchers require a high-quality measure that is informed by a comprehensive, discipline-specific theoretical framework such as the one developed by Miciak (2015).

Measures of Therapeutic Relationship

With the growing interest in understanding how patient-provider relational elements influence patients' experience of care and outcomes, a number of measures have been developed and used in physiotherapy research over the past 15 years. These measures are based on a variety of frameworks describing the constructs of interest. Most common in rehabilitation are measurement instruments adapted from the short form of Horvath's Working Alliance Inventory (WAI)[20]. The WAI is based on Bordin's tripartite model of working alliance in psychotherapy: mutually agreed-upon outcomes ("goals"), a complex network of personal attachments ("bonds"), and in-session behaviors and cognitions ("tasks").[21] Examples are: the Flemish-WAI[22], the WAI-Rehabilitation Dutch version[17], the WAI-Brazilian Portuguese[15], , the Patient Rehabilitation Expectations-Working Alliance Subscale[23], Working Alliance Theory of Change Inventory (WATOCI).[24] While related, the concept of working alliance is not synonymous with therapeutic relationship, as it is primarily focused on the working collaboration between patient and physiotherapist, that is, the work that is done as part of physiotherapy. The personal aspects of therapeutic relationship (i.e., aspects of the patient and physiotherapist's relationship that exist outside of "doing the work" of rehabilitation) are not adequately accounted for in the WAI. Also, notably missing in versions of the WAI are items that assess the patient and physiotherapist connecting through the body, (e.g., touch or assessment of the physical body).[25]

More recently, a new, Spanish language, physiotherapy-specific measurement instrument, called the Person-Centered Therapeutic Relationship in Physiotherapy scale (PCTR-PT) has been developed.[26,27] Rodriguez Nogueira et al. developed the PCTR-PT's conceptual framework based on the work of Morera-Balaguer et al.[11,12] to describe person-centered therapeutic relationships in physiotherapy.[11,12,26] It is comprised of 7 domains and 29 subdomains: personal characteristics of the professional, communication capacities of the professional, professional aspects, relational

aspects, personalized therapy, partnership, and environment.[26] In the PCTR-PT scale, two content areas that have been shown to be part of the physiotherapy therapeutic relationship are not represented. This includes the physiotherapist's use of touch, as well as the patient's body as the main point of connection between physiotherapist and patient. Additionally, factors that are often conceptualized as influencing the therapeutic relationship rather than part of the relationship itself, such as the clinical environment and personal qualities of the physiotherapist, are included in the PCTR-PT scale.[26]

Measures have been used in physiotherapy research that capture constructs assumed to be related to therapeutic relationship (e.g., patient-provider communication, relational empathy) for different measurement purposes. The ''Communication Preferences of Patients with Chronic Illness'' questionnaire (KOPRA questionnaire, KOPRA stands for ''Kommunikationspraeferenzen'', in German) assesses the discrepancy between the communication preferences of patients with chronic illness and the communication behaviors of their healthcare professionals.[28,29] The Consultation and Relational Empathy (CARE) measure is a tool that has been shown to have validity in rehabilitation practice.[30] Its items overlap with some of the concepts known to be part of therapeutic relationship in physiotherapy, however it was designed as a brief measure to capture quality of care in physician's general practice, and therefore lacks the specificity of a physiotherapy-specific measure.[31] Overall, these measures could be useful for particular measurement purposes (e.g., program evaluation, studies on communication), but would not be adequate for comprehensively capturing therapeutic relationship in research.

Characteristics of a high-quality measurement instrument

A high-quality measurement instrument for therapeutic relationship should accurately capture the key concepts of therapeutic relationship and be able to distinguish between differing levels of relationship quality.[32] That is, the measure should demonstrate evidence of both validity and reliability. To be considered reliable, it should produce scores that differentiate different levels of the construct of interest (e.g., poor vs moderate therapeutic relationship) and are reproducible.[33,34] To have sufficient evidence of validity, it should meet standards of: (1) reliability, as reliability is a prerequisite for validity; (2) content validity, or the items reflect the key concepts in the construct of interest (i.e., what the measure is aiming to capture); (3) construct validity, or scores relate to other variables in a way that is consistent with research and theory; and (4) internal structure, or the instrument items group together in a way that aligns with what would be expected based on what is known about the construct of interest.[18,33,34]

To meet these criteria, measurement developers require a *sound conceptual understanding* of the construct of interest and how it relates to other constructs and/or theory in the field. This can be articulated as a *conceptual measurement framework* and it should be grounded in existing theory and current research on the topic in physiotherapy.[18,19] The conceptual measurement framework should include: (a) a definition of the construct of interest, (b) identification of key concepts that are described in detail, (c) description of the relationships between the concepts and the construct of interest.[18,19]

The measurement framework guides the systematic development of a measurement instrument. The key concepts in the framework are operationalized through developing items that serve as individual indicators for each concept. The measurement framework is fundamental to supporting the measurement instrument's validity.[19] It also provides users of the instrument with a comprehensive picture of what it aims to measure (the construct of interest). This is

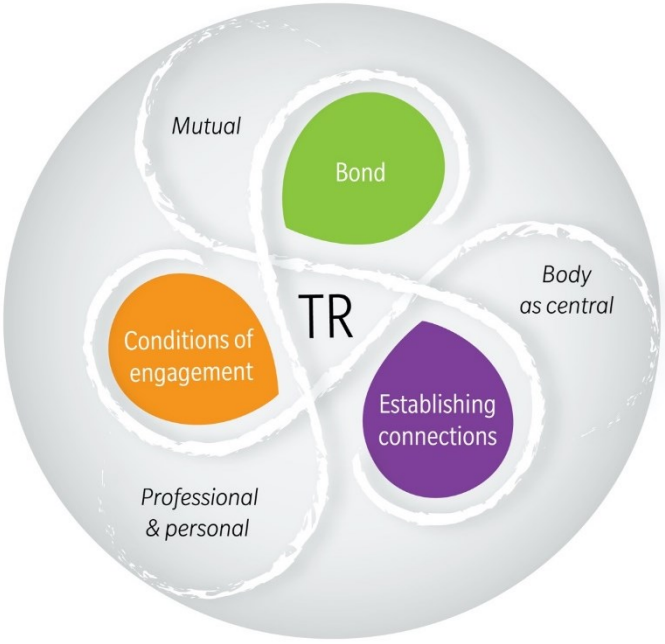
especially important with a theoretical construct such as therapeutic relationship in physiotherapy, a complex, inter-subjective phenomenon, which has been conceptualized in different ways.[10]

Miciak's Therapeutic Relationship Framework

Miciak (2015) developed a theoretical framework that gives structure to the complex phenomenon of therapeutic relationship in physiotherapy.[1] Figure 3.1 shows an illustration of Miciak's therapeutic relationship framework. The framework provides an excellent foundation for a measurement instrument due to the rigor with which it was developed, the discipline-specific approach, and that it is comprehensive and detailed.

1) Rigor. Miciak (2015) used interpretive description to identify and provide in-depth descriptions of the components of the physiotherapy therapeutic relationship. Data were gathered through semi-structured interviews with 11 physiotherapists working in the context

Figure 3.1 Miciak's framework of therapeutic relationship in physiotherapy.



of community private practice and 7 patients with musculoskeletal disorders. The triangulation of data between patients' and physiotherapists' perspectives and the rich, experiential accounts provided by participants are strengths of the study. Full methods and results have been described[1,13,14]. It should be noted that the Miciak framework has a narrow context (outpatient musculoskeletal practice) and setting (a single Canadian city) of development, and the generalizability or transferability of the framework to other clinical settings has not been established.

2) Discipline specific approach. Miciak's therapeutic relationship framework was developed using an inductive approach, with the framework and component descriptions generated using data from physiotherapy without borrowing theory from other disciplines (e.g., psychotherapy theories like Bordin's working alliance).

3) Comprehensive and detailed. The framework is comprehensive in scope in that it covers all key concepts in the therapeutic relationship and also offers in-depth, detailed descriptions of each. This provides measurement developers with a thorough understanding of the key concepts in the construct of interest, which supports its content validity.

All of these qualities make Miciak's framework a suitable foundation on which to build the content of a therapeutic relationship measure.

Description of Miciak's Therapeutic Relationship Framework

Components

The therapeutic relationship between a patient and a physiotherapist can be described as having three dimensions: (1) the way they "are" together; (2) the actions they "do" together that are part of the relationship; and (3) the feelings that exist between them. In Miciak's therapeutic relationship framework, these three dimensions are called *components*.[1] Each component has

subcomponents that further describe its nature. The three therapeutic relationship components are described in detail in prior publications, but briefly they are:

1) The conditions of engagement – being present, being receptive, being genuine, and being committed are the circumstances or therapeutic, relational "space" between physiotherapist and patient that fosters the relationship;

2) Ways of establishing connections – acknowledging the individual, using the body as a pivot point, and giving-of-self refer to actions of the physiotherapist and patient that bring them together within the interaction;

3) Elements of the bond – caring, trust, respect, and rapport describe the emotional or affective resonance between the patient and physiotherapist.[1,13,14]

Themes

Miciak (2015) identified three themes underlying therapeutic relationship that provide an over-arching understanding of its characteristics and how therapeutic relationship is enacted in physiotherapy practice.[1] They provide an understanding of what therapeutic relationship "is like" in physiotherapy.

1) The therapeutic relationship is a "mutual endeavor". The patient and physiotherapist both contribute to the processes of therapeutic relationship. The relationship requires that the patient and physiotherapist be open to giving and receiving in order to share an affective attachment.

2) Body is central to the therapeutic relationship. The patient's physical body is the common ground between patients and physiotherapists. It is assumed that a physical challenge is the primary reason patients seek care from a physiotherapist, making the physical body a common and recurring point of connection. Connecting within the relationship is a function of the patient's experiences with the physiological impact of the health condition (i.e., body).

3) Therapeutic relationship is "personal" and "professional". The relationship has both professional aspects (e.g., working relationship) and personal aspects (parts of the relationship that are more like a friendship). *Professional* refers to the professional responsibility of physiotherapists to understand and act to help patients with their rehabilitation goals (i.e., the 'duty of care'). It is considered an essential part of therapeutic relationship in physiotherapy. *Personal* is characterized by the patient and physiotherapist taking an interest in, or caring about, one another in ways that are outside of the specific tasks and goals of rehabilitation. Highlighting the personal and professional dimensions of therapeutic relationship is a feature of Miciak's definition and framework that makes it distinct from other conceptualizations of therapeutic relationship in physiotherapy.

Table 3.1 provides an overview of the framework's components, subcomponents, and indicators. The indicators are examples of how the components manifest in physiotherapy practice. The indicators make the components more concrete and could form the basis of the content of any new measure of therapeutic relationship.

Table 3.1 Components, subcomponents, and indicators from Miciak's therapeutic relationship framework

Component	Subcomponent	Additional descriptors	Indicators
Ways of Establishing Connections	Acknowledging the individual	Individualizing the treatment approach	– The physiotherapist taking into account the patient's life outside of rehabilitation when designing the treatment plan – Physiotherapist considering the patient's unique needs and treatment goals – Being conscious of individual psychosocial factors impacting treatment – Refining or adapting treatment to changes in the patient's status – Tailoring treatment instructions to the individual

		Meeting as an equal	– Physiotherapist collaboration with patient – Physiotherapist sharing responsibility with the patient – Physiotherapist demonstrating that they value patient perceptions – Physiotherapist taking actions to reduce power imbalance – Physiotherapist takes steps to create a sense of equality with patient
		Validating the patient's experiences	– Physiotherapist listening to and actively affirming the patient's physical experiences or difficult emotions – Physiotherapist promising to support the patient in their rehabilitation – Physiotherapist providing hope to the patient through words and actions – Physiotherapist conveying a belief in the patient's ability to recover
	Using the body as a pivot point	Clarifying physical problems and solutions	– Physiotherapist asking about patient's physical concerns – Physiotherapist clearly explaining the clinical problem to the patient – Physiotherapist offering a solution to address the problem
		Facilitating the patient's connection to the body	– Physiotherapist enhances the patient's knowledge and awareness of their clinical problem – Physiotherapist helps the patient take note about aspects of their clinical problem – Physiotherapist assists the patient to take an active role in their rehabilitation (self-manage)
		Using touch to bridge a gap	– Physiotherapist adjusting their touch to the patient's needs – Physiotherapist building the patient's trust through the use of skillful touch – Physiotherapist conveying caring for the patient through their use of touch – Physiotherapist invoking relaxation in the patient through touch
	Giving-of-self	Giving inside the interaction	– Physiotherapist takes an action that requires an extra investment of energy during the interaction – Physiotherapist using personal disclosure for therapeutic purposes (e.g., revealing their own history of injury) – Physiotherapist invests energy in doing something for the patient outside of the interaction (e.g., consulting another healthcare provider, researching the patient's condition).
Necessary Conditions of Engagement	Present	Being present	– Patient remaining 'in-the-moment' during clinical encounters – Physiotherapist remaining 'in-the-moment' during clinical encounters – Physiotherapist is not rushed during the interaction

	Receptive	Open attitude	– Patient open to physiotherapist's suggestions – Physiotherapist is willing to listen openly without pre-conceived ideas
		Focused receptivity	– Physiotherapist being actively attentive to the needs of the patient – Physiotherapist noticing non-verbal cues – Patient paying attention to the physiotherapist
	Committed	Being committed to understanding	– Patient committed to understanding their condition – Physiotherapist committed to understanding the patient's clinical problem – Physiotherapist committed to fully understanding the patient's situation
		Being committed to action	– Physiotherapist committed to helping the patient in rehabilitation – Patient committed to being an active participant in their rehabilitation – Patient takes responsibility for their progress in physiotherapy
	Genuine	Being yourself	– Patient being themself in the relationship – Physiotherapist being themself in the relationship – Having an attitude of acceptance towards each other and/or others
		Being honest	– Directness in communication – Transparency in communication – Patient being honest – Physiotherapist being honest with patient about their prognosis
		Investing in the personal	– Patient taking an interest in the physiotherapist beyond the clinical interaction (e.g., hobbies, family, pets) – Physiotherapist's investment in knowing the patient as a person – Physiotherapist's willingness to disclose about self – Patient's willingness to provide more intimate or personal details
Elements of the Bond	Caring		– Physiotherapist's emotional investment in the patient's health – Physiotherapist wanting the patient's health to improve – Physiotherapist cares about the patient as a person – Patient cares about the physiotherapist as a person (e.g., like a friend)

	Nature of the Rapport		– Physiotherapist's professional responsibility to direct the interaction – Professionalism in how physiotherapists approach clinical interactions – The friendly quality to the relationship – Getting along with one another – Ease of interacting between the patient and physiotherapist – Professionalism in how physios would approach clinical interactions – Friendliness based on personality and social commonalities
	Respect		– Recognition of a person's inherent worth or value – Patient's respect for the knowledge and skills of the physiotherapist – Patient's respect for the physiotherapist's personal characteristics – Physiotherapist respect for the patient's personal characteristics – Physiotherapist upholding the dignity of the patient – Physiotherapist's respect for the patient's experience
	Trust		– Patient's trust in the physiotherapist's intent to help them – Patient's trust in the physiotherapist's professional credibility – Patient's trust in the physiotherapist's use of touch in treatment – Patient's trust in the physiotherapist as a person – Patient's trust in the physiotherapist to be accepting (non-judgmental) – Physiotherapist's trust in the patient to be honest – Physiotherapist's trust in the patient's intentions for rehabilitation

Hypothetical relationships between components

A theory is a set of interrelated concepts, definitions, or propositions that specifies relationships among concepts.[35] Theories are created out of a need to organize and give meaning to a complex collection of individual observations and empirical findings.[35] A theory of therapeutic relationship should clearly define key concepts, the relationships between those concepts, and help make sense of this complex phenomenon. Miciak's therapeutic relationship framework is

not a fully formed theory as it does not specify relationships between components. Nevertheless, it provides a credible starting point for hypothesizing relationships between these constructs.

Miciak's therapeutic relationship framework suggests there are bi-directional relationships between the main components.[1] That is, each component has the potential to influence the others to some degree. It is also likely that the individual subcomponents influence one another. These relationships may be one-way (causal) or reciprocal, and this may depend on the situation or context. Some examples of proposed relationships are:

(1) Strong *conditions* (present and receptive) are a prerequisite for a strong therapeutic relationship.

(2) *Ways of connecting* are driven (in part) by the *conditions*. For example, consider a physiotherapist who listens attentively (*is being receptive, present*). Their active listening could enhance their understanding of the patient's experience and allow them to successfully establish a connection by *validating the patient's experience of their physical concern*.

(3) Taking actions to connect with a patient could strengthen the *conditions* (safety) of the relationship and the *bond*. For example, the physiotherapist taking an action such as carefully touching a patient's injured body part (body as a pivot point) could help the patient *be present* in the moment, and the careful touch of the physiotherapist may deepen the patient's *trust* in the physiotherapist.

The *bond* may influence *conditions* or *connections.* When a patient comes to a physiotherapist for the first time based on a recommendation from a friend or neighbor, they may already have *trust* and *respect* for the physiotherapist. This may influence their ability to be *committed* to their rehabilitation (condition). Or, a physiotherapist's *respect for their patient* may

be a prerequisite for the physiotherapist and patient to *meet as equals* in the therapeutic relationship.

Approaches to measuring therapeutic relationship

The therapeutic relationship can be measured in multiple different ways, depending on the objectives and assumptions of the measurement user. Street and Mazor (2017) provide a framework for different approaches to measurement of patient-healthcare provider communication.[36] Although communication and therapeutic relationship are different constructs, they are similar in that both are complex, subjective phenomena occurring between two individuals (the patient and physiotherapist). Street and Mazor categorize measures in two ways. The first is by who is doing the reporting, which could be participants in the relationship (i.e. the patient, their family or the healthcare provider) or observers of the interactions. Observers could be independent of the therapeutic relationship (e.g., watching in-person or viewing a media recording of the interaction) or a proxy to the patient such as a family member.

Measures of therapeutic relationship can also be described by the aim of measurement, that is, what exactly is being assessed.[36] There are two main aims of measurement: (1) behavior observation measures, which aim to identify certain relational behaviors during or after a patient-healthcare provider interaction; and (2) judgement measures, which ask the rater to judge the meaning, quality or outcome of an interaction.[36] Behavior observation measures often include a behavior coding system (also called interaction analysis) such as the Roter Interaction Analysis System.[37] Raters are asked to report the presence or frequency of relational behaviors of participants that occur during an interaction. They are useful when the goal is determining what participants *do* during interactions and may be considered more "objective" than judgement measures.[38] It should be noted however, at least with respect to communication in medical

encounters and the psychotherapeutic relationship, that behavioral measures have been shown to be poor predictors of the participant's perceptions of an interaction.[39,40] Judgement measures are useful for understanding how a participant interpreted or evaluated a clinical interaction, for example, when interested in the patient's experience of the clinical interaction.[36] An example of a judgement measure is the commonly used Working Alliance Inventory, which has patient, therapist and observer-report versions.[20] Judgement measures are often used in quality improvement initiatives and as measures of predictor variables in research.[36] Although judgement measures have been criticized as being prone to cognitive biases, they appear to be better predictors of outcomes important to patients.[36]

Using Miciak's Therapeutic Relationship Framework in Measurement

Miciak's therapeutic relationship framework can be used to guide the content of any measurement instruments using the approaches described above. In this section, we illustrate how Miciak's framework can be used as the conceptual basis of three approaches to measurement.

Patient-reported measure

Patient-reported measures are considered valuable sources of information for evaluating health service quality, establishing treatment effectiveness, and for informing clinical decision-making.[41] Although there is little direct evidence about the predictive validity of patient-reported measures of therapeutic relationship, patient-reported measures of other relational constructs, such as shared decision-making, have been shown to be better predictors of health outcomes than either observer or healthcare provider ratings.[42]

Figure 3.2 illustrates how the conceptual framework is translated into a framework for measurement. For this patient-reported measure, a total scale score (sum total of subscale scores) and separate subscales are constructed in order to separate the components of therapeutic relationship. This gives measurement users the ability to separately quantify the components of the physiotherapy therapeutic relationship, enabling researchers to examine relationships between components within therapeutic relationship as well as relationships between components and other variables (e.g., outcomes of clinical interventions, contextual factors).

Items in a patient-reported, judgement measure would reflect the *patient's perspective* of the components and subcomponents (i.e., key concepts) of Miciak's framework of therapeutic relationship in physiotherapy. The three subscales would be:

1) Conditions of engagement – The indicators for the *conditions of engagement* component are the patient's self-reported contribution to the *conditions* (i.e., their intentions and attitudes towards engaging in treatment), and the patient's *interpretation of the actions/behaviors* of the physiotherapist that signal the underlying intentions or attitudes of the physiotherapist.

2) Ways of establishing connections – The *ways of establishing connections* relate to the *patient's recall and perception of the physiotherapist's actions. Connections* items require the least amount of interpretation on the part of the patient because they are reporting on an observable action or behavior of the physiotherapist.

3) Elements of the Bond – Similar to the *conditions* component, indicators for *elements of the bond* include the patient's *self-reported feelings* towards the physiotherapist and the patient's *interpretation* of the actions/behaviors of the physiotherapist that indicate their underlying feelings towards the patient.

The themes in the framework will be represented in the content of items across all subscales. This includes the patient's perception of their contribution and the physiotherapist's contribution to the therapeutic relationship *(mutuality),* the patient's experiences with the physiological impact of the health condition (*body*), and the patient's perception of the *professional* or *personal* aspects of the relationship.

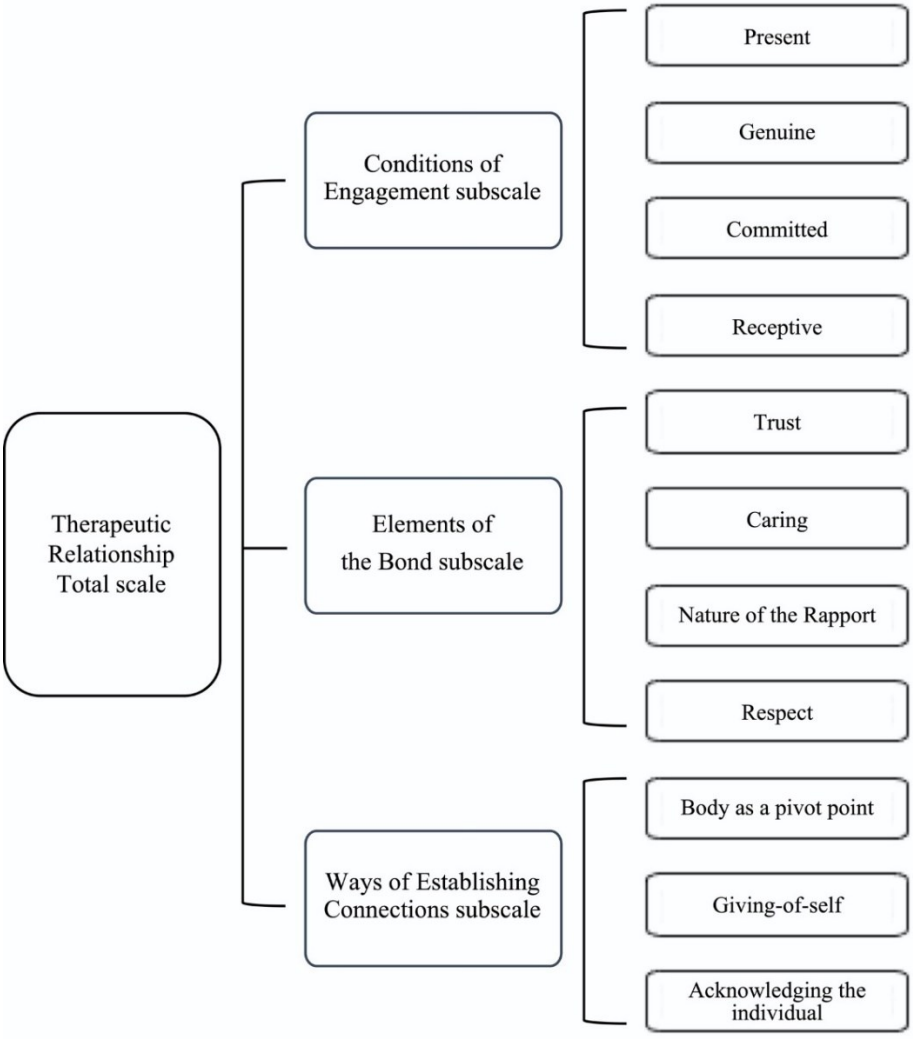
Therapist-reported measure

To develop a physiotherapist-reported judgement measure of therapeutic relationship quality, the same instrument scaling structure as the patient-reported version could be used. The content of the physiotherapist version would also be similar. The physiotherapist would be asked to respond to items about their own actions and behaviors (*establishing connections*) and feelings (*bond*) towards the patient. They would also be asked to report on the feelings and attitudes of the patient within the therapeutic relationship, by *interpreting the patient's actions and behaviors*. It would be necessary to conduct careful validation testing if a physiotherapist version were adapted from a patient version, because there is evidence from psychotherapy that the indicators of the quality of therapeutic relationship differ between patients and physiotherapists.[43]

Behavior observation coding system

Miciak's framework would also be appropriate as the foundation of a behavior observation coding system. The indicators from Table 3.1 could be translated into observable behaviors of the patient and physiotherapist, which would function as the "codes". *Establishing connections* would lend itself most readily to this type of translation because it describes the actions and behaviors of the physiotherapist during an interaction. For example, the rater could be asked to

Figure 3.2. Miciak's therapeutic relationship framework as a conceptual measurement framework for the development of a patient-reported measurement instrument.



count the number of times the physiotherapist verbally affirms the patient's physical symptoms, an indicator for *validating the patient's experiences*. It would be possible to develop codes that represent the *conditions* and *bond* components as well. For example, the physiotherapist could display behaviors such as nodding, or listening without interruption, which could be signals for *receptivity*. However, careful evaluation of the validity of these representative behaviors would be required.

Special Considerations for Measuring Therapeutic Relationship

There are gaps in our knowledge of how to measure the complex therapeutic relationship phenomenon. These are areas that should be carefully investigated in validation studies.

The first gap is that it is not clear which of the key concepts will be helpful in differentiating the quality of therapeutic relationship. The performance of all items based on each concept from the framework should be tested in a large scale validation study. This would help determine which concepts are the best indicators of therapeutic relationship quality, and also which items should be removed. Furthermore, as discussed above, the indicators of the quality of a relationship will likely be different depending on who is doing the reporting.

Second, there are constructs which are difficult to capture from the perspective of a single participant in the relationship or an observer. For example, while a patient can determine whether they perceive themself as trustworthy, it would require considerable speculation for patients or an observer to judge the physiotherapist's trust in them. Also, constructs that are more mutual will be difficult to accurately assess. For example, *respect* is a construction between a patient-physiotherapist dyad, and the magnitude or quality of respect cannot accurately be assessed based on one person's perception of it.

Additionally, once key concepts are operationalized as items, some of the distinctiveness between key concepts may be lost. For example, in a patient-reported measure, *being receptive* operationalized as an item such as "listens carefully to what I am saying about my injury" could also represent *being present* ("listens carefully") or *body as a pivot point* (i.e., clarifying physical problems), which is a way of *establishing a connection*. This may or may not be a problem depending on the intended use of the measure. For example, if a unidimensional scale (produces an overall score of therapeutic relationship) were being developed, this would be less of an issue.

Finally, measurement developers are often faced with the challenge of overcoming *ceiling effects*, typically defined as when 15% or more of respondents achieve the highest possible total score on a measure, when measuring constructs like therapeutic relationship, working alliance and patient satisfaction.[3,44,45] Ceiling effects are a problem in measurement because they reflect a reduced discriminative ability in the higher ranges of a construct and hinder a measure's ability to capture change.[32] They may be present because the content of a measurement scale is not comprehensive for the construct of interest.[46] This suggests that using a discipline-specific and detailed framework, such as Miciak's framework, may help to overcome the challenge of ceiling effects. Another approach that could potentially address the challenge of ceiling effects is to include items that directly assess negative experiences within the relationship (e.g., disagreement, tension or deterioration). These events occur within physiotherapy therapeutic relationships, but it has been suggested that they could be underrecognized in physiotherapy – similar to psychotherapy - due to a lack of awareness or perhaps an uneasiness with acknowledging tensions or conflict within relationships.[47–49] By explicitly including items that assess negative experiences, a measure could capture a broader range of therapeutic relationship quality, which would help to reduce ceiling effects. A final strategy for reducing ceiling effects would be to use item response theory methods when developing measures. Using analyses based on item response theory allows developers to select items that improve the ability of a measure to distinguish individuals in the higher ranges of therapeutic relationship quality.[50]

Conclusions

In this paper, we have reviewed the current state of physiotherapy therapeutic relationship research and measurement. We introduced Miciak's framework – a discipline specific, comprehensive theoretical framework that includes rich descriptions of the components of the

physiotherapy therapeutic relationship – as an excellent conceptual basis for newly developed measures of therapeutic relationship. We also discussed measurement theory as it relates to the challenge of capturing therapeutic relationship and its various measurement approaches.

We are beginning to develop an understanding of therapeutic relationship in physiotherapy. We are now at a point in physiotherapy research where it is essential to capture therapeutic relationship as accurately and precisely as possible. A high-quality measure of therapeutic relationship, based on a robust theory of therapeutic relationship, will advance research in this area. It will allow researchers to rigorously examine relationships between therapeutic relationship and outcomes (e.g., pain, physical function), to compare the effectiveness of interventions aimed at improving therapeutic relationships, and to understand the relative importance of different components of therapeutic relationship (e.g., trust, individualized treatment, receptivity) in influencing outcomes. A measure of therapeutic relationship could also be useful in clinical practice and educational assessment.

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Disclosure of interest

The authors of this manuscript report no potential conflicts of interest.

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CHAPTER 4: Development of the Physiotherapy Therapeutic Relationship Measure

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Abstract

Purpose: To describe the development of a new measure of therapeutic relationship for use in physiotherapy – the Physiotherapy Therapeutic RElationship Measure (P-TREM).

Methods: We adopted the methodology of Devellis in *Scale Development: Theory and Applications* for constructing the P-TREM. We developed a measurement framework based on Miciak's Physiotherapy Therapeutic Relationship Conceptual Framework. We generated a pool of items by extracting items from existing measures and writing new items. These were reviewed by a panel of experts and then formatted into a draft measurement instrument. The draft instrument was tested for relevancy and comprehensibility in potential respondents from our target populations using cognitive interview techniques. Finally, we pilot tested the full administration of the P-TREM.

Results and conclusions: We systematically constructed the P-TREM with 49 items in 3 subscales. Our rigorous instrument development approach ensures its content validity, which was also demonstrated in the cognitive interviews and pilot testing. The quality of the items and construct validity will be assessed in a subsequent validation study.

Keywords: therapeutic relationship; therapeutic alliance; working alliance, physiotherapy; assessment; patient-provider relationship; measurement; validation

Introduction

The relationship between a patient and their physiotherapist can be described as "therapeutic" if a product of the relationship is an improvement in the patient's well-being. Miciak described 'therapeutic relationship' in physiotherapy as encompassing *conditions* established by the physiotherapist and patient through their intentions towards treatment, *ways of connecting* during clinical encounters, and the *bond* that develops between physiotherapist and patient.[1]

Research on the therapeutic relationship in physiotherapy has mostly been conducted using measurement instruments borrowed or adapted from psychotherapy.[2-4] This allowed researchers to identify associations between therapeutic relationships and intermediate outcomes such as the degree to which the patient engages in physiotherapy treatment, self-efficacy, patient adherence to treatment, as well as biomedical and psychosocial health outcomes such as physical functioning, pain intensity, satisfaction with treatment, depression, and general health status.[2,4-7] Researchers seeking to describe the therapeutic relationship in physiotherapy have found that while there are similarities with therapeutic relationship in psychotherapy, there are aspects unique to physiotherapy.[8] Specifically, in physiotherapy, the patient and physiotherapist often connect or relate through the patient's physical body, including connecting through physical contact (i.e., touch).[9]

A number of validation studies in physiotherapy have identified problems with the measurement properties of these instruments – notably, issues with content validity.[4,10–13] This suggests a need for a discipline-specific measure capturing the elements of therapeutic relationship unique to physiotherapy. Using a measure in physiotherapy research with sound measurement properties, such as content validity, construct validity and reliability, will produce more accurate data. This would also lead to a more precise estimate of therapeutic relationship's effect on outcomes and improve the validity of research uncovering significant relationships

between therapeutic relationship and other variables. Therapeutic relationship is an important aspect of physiotherapy practice. To move research in this area forward, researchers require a high-quality measure of therapeutic relationship, one that is developed based on current knowledge and theory from physiotherapy.

Rigorous instrument development starts with ensuring the content validity of a measure by defining the construct and mapping items to a comprehensive and detailed theoretical measurement framework.[14] Measurement items are constructed carefully so they are comprehensible to potential respondents, interpreted as intended, and relevant to respondent's experiences of the construct of interest. The COSMIN group describes these concepts as the main criteria of content validity, which is considered the most fundamental consideration in the development of health measures.[15,16] Subsequent phases of instrument development involve administering the instrument to samples of potential respondents to evaluate item quality, construct validity (e.g., structural and convergent validity), reliability and other measurement properties depending on the intended use of the measure.[14,16] This paper describes the initial instrument development process for a new measure of therapeutic relationship: The Physiotherapy Therapeutic RElationship Measure (P-TREM).

Objective

Our objective was to develop a new patient-reported measure of therapeutic relationship for use in populations of patients with musculoskeletal conditions in outpatient physiotherapy settings.

Methods

We adopted the methodology of Devellis as described in *Scale Development: Theory and Applications* for development of the P-TREM: (1) Determine what you intend to measure; (2)

Generate a pool of items; (3) Define the format for measurement; (4) Expert review of items; (5) Consider the inclusion of validation items; (6) Administer items to a development sample; (7) Evaluate the items; and (8) Optimize the scale.[16] This 8-step process for measurement scale development was designed for measuring abstract, multifaceted concepts - such as therapeutic relationship.[16] This paper describes the first 4 steps of Develliss's methods, with Figure 4.1 showing a flowchart outlining our procedures. Steps 5-8 will be completed in a subsequent study. This study was approved by the University of Alberta's Health Research Ethics Board (Study ID Pro00086206).

Step 1) Determine what you intend to measure

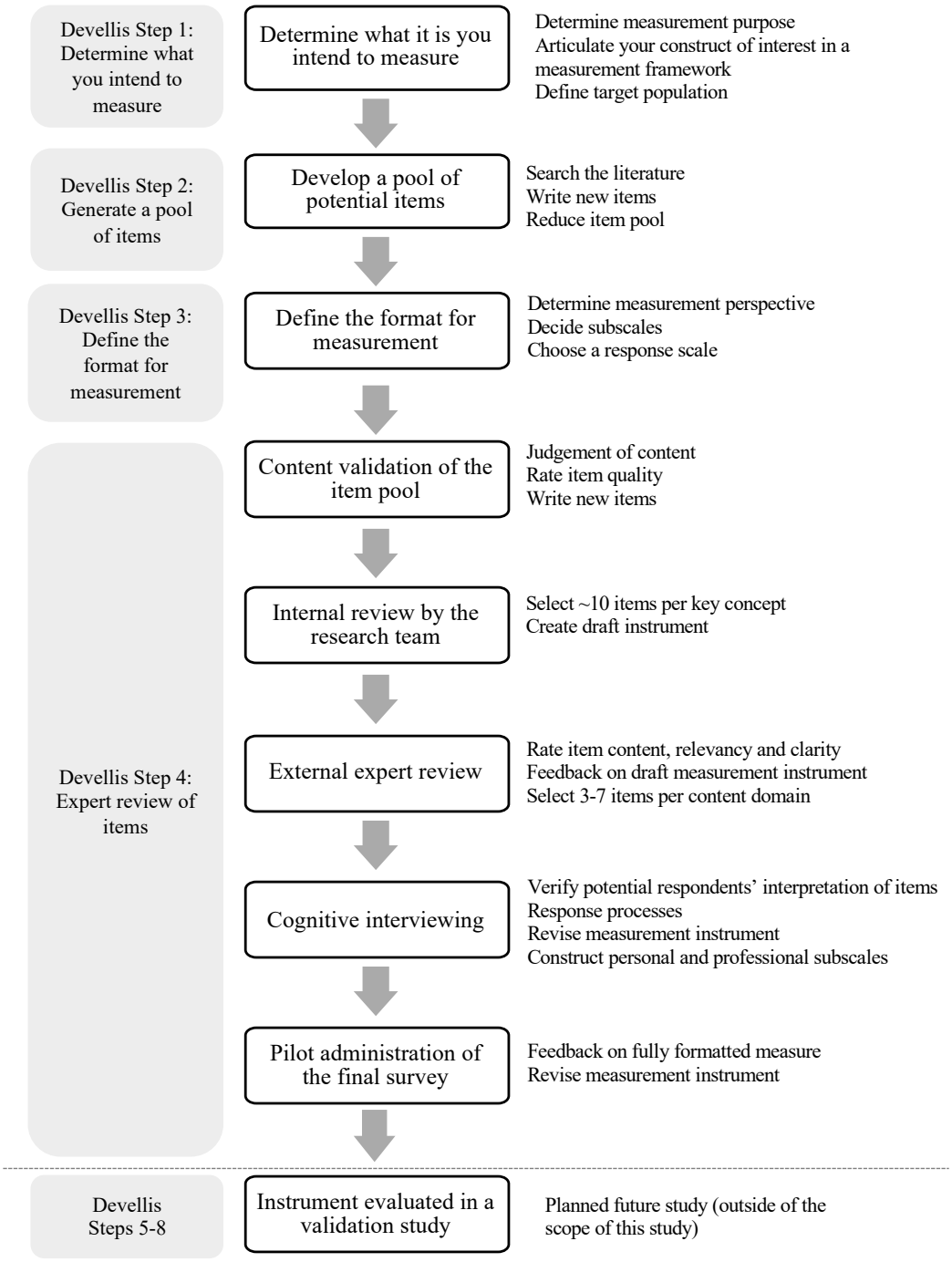
Measurement purpose, intended users, and uses

The P-TREM was developed to capture the strength (i.e., magnitude) and quality (positive or negative) of a therapeutic relationship between a patient and a specific physiotherapist, as developed over multiple encounters in the context of outpatient physiotherapy. The intended users of the P-TREM will be clinical researchers using quantitative methodologies to study therapeutic relationship in physiotherapy for the purposes of discrimination (i.e., to distinguish between different levels of therapeutic relationship quality) and evaluation (i.e., to evaluate change in a therapeutic relationship).

Construct of interest

The construct of interest, therapeutic relationship, was articulated as a *conceptual measurement framework*. The measurement framework guides the systematic development of a measurement instrument.[16] The key concepts in the framework are operationalized through developing

Figure 4.1 Procedures for the P-TREM development process.



items that serve as individual indicators for each concept. We have described the conceptual measurement framework for the P-TREM in detail elsewhere.[17] Briefly, the conceptual

foundation of the P-TREM is based on Miciak's *Physiotherapy Therapeutic Relationship Framework.*[1] Miciak described the physiotherapy therapeutic relationship as having three main components, each with subcomponents that help to further describe it. The *conditions of engagement* - being present, being receptive, being genuine, and being committed - describe the way that the physiotherapist and patient "are" together.[18] *Ways of establishing connections* are the actions the physiotherapist and patient "do" together that are part of the relationship and include acknowledging the individual, using the body as a pivot point (i.e., physiotherapist and patient connecting through the patient's body, physiological health condition, or physical symptoms), and giving-of-self.[9] Caring, trust, respect and nature of the rapport make up the *Elements of the bond*, which are the feelings that exist between the physiotherapist and patient.[1] These components and subcomponents make up the 11 key concepts in the conceptual measurement framework for the P-TREM.

Miciak also identifies personal and professional aspects that underlie all components of the therapeutic relationship.[1] The professional aspects of the therapeutic relationship refer to the main "work" of physiotherapy, in other words the purpose of the interaction (i.e., rehabilitation) and physiotherapist's professional role and responsibilities in carrying out rehabilitation.[1] The "personal" aspects of therapeutic relationship refer to the physiotherapist and patient taking an interest in, or caring about, one another in ways that are outside of the specific tasks and goals of rehabilitation.[1]

Target population

Adult, English-speaking patients with a condition affecting the musculoskeletal system seen in an outpatient setting (e.g., hospital outpatient, community and private practice clinics).

Step 2) Generate a pool of items

We generated a pool of potential items by searching the current evidence base for existing measurement instruments with potentially relevant items for measuring content domains in our measurement framework. We combined the search results with measurement tools that members of the research team had in their personal collections. The research team's personal collections included instruments developed for use clinically (e.g., for program evaluation), and some instruments used in research but not published in peer-reviewed literature or which were not located in our search of the literature. Using existing items allowed us to capitalize on work done by previous health measurement researchers in developing and testing high-quality items.[19,20] As recommended by various authors, we also wrote new items to maximize the content coverage of our initial pool of potential items, knowing that the majority of these items would be eliminated in later stages of instrument development.[16,20,21]

Literature search and item extraction

The search strategy was developed with the assistance of an experienced health research librarian at the University of Alberta. The search combined two concepts: 1) patient-provider relationship; and 2) measurement. For each concept, we included multiple synonyms and did not apply any search limits. We adapted the search strategy to each database as required, also adding limits or additional concepts to maximize the specificity of the search. Our full search strategy is included as an appendix (Appendix 4.1).

One member of the research team (EM) reviewed the citations retrieved in the search and appraised them for relevance. This was done by first screening by title and abstract, then reviewing full texts. A second reviewer was available for consultation when relevance was unclear (MM). An article was considered relevant if it contained a measurement instrument for

our construct of interest or a related term (e.g., therapeutic alliance, trust, empathy, communication, working alliance), if it was a self-report measure developed or tested for use in an adult, English speaking patient population, with any type of healthcare provider (e.g. psychotherapy, allied health, nursing), in clinical practice, research or health service evaluation. Although there are differences across disciplines, there is also significant overlap, so measures from all disciplines and measures of related constructs were included. We thought these measures may contain individual items that are relevant to the physiotherapy therapeutic relationship. Articles were excluded if they described a measure for a paediatric population, or if the instrument was a behaviour coding system, an observer rating scale, or an interview system.

The full versions of each measurement instrument identified in the relevant articles were retrieved. One researcher (EM) extracted the items from the search and researcher's collections into an item database. We then added the newly written items to the database of potential items.

Reducing the item database

The item database was reviewed by one researcher (EM). The number of items in the item database was reduced by removing items that were: (1) not relevant to the construct of interest, (2) semantically redundant with other items, and/or (3) poorly written (i.e., not comprehensible, contained more than one concept, ambiguous interpretability). Items were also rewritten during this process so that they were standardized in terms of perspective (patient-reported, first person), response format (6-point agreement scale), verb tense (present), and linguistic style. Then, the content of the remaining items was coded in NVivo 12 software using 43 pre-determined codes based on the indicators from the measurement framework.[22] The codes were used to group items by content area, allowing us to more closely examine each content grouping for relevancy of the item to the content area, and to identify redundancies between items. We

also identified gaps in content coverage during this process and wrote new items to help fill those gaps.

Step 3) Define the format for measurement

The P-TREM was developed with the intent of having 3 subscales, each reflecting a component in Miciak's Framework (i.e., *conditions*, *connections*, *bond*). Additionally, through the item review process, a set of items was determined to be "personal" and another set of items was intended to measure the "professional". We thought it was important to capture the personal versus professional aspects of therapeutic relationship because these concepts have not been explicitly studied in physiotherapy research. The items have a 6-point ordinal response scale (Likert-type) ranging from strongly disagree to strongly agree. In order for each key concept to be fully represented in the measure, each key concept has 3-7 items.

Step 4) Expert review of items

The item review process was iterative – that is, as the review process unfolded, we cycled between collecting and analyzing data from reviewers, revising the items, and modifying the format and organization of the P-TREM. This has been shown to increase the efficiency of collecting new data from subsequent reviewers.[15] For example, we made changes to the items based on responses from 2 reviewers prior to sending the items to subsequent reviewers. There were 5 cycles of expert review which are outlined in Figure 4.1: (1) content validation of the item pool; (2) internal review by the research team; (3) external expert review; (4) cognitive interviewing; and (5) pilot administration of the final survey. Throughout analysis, we took care to preserve the content coverage of the items.

1. Content validation of the item pool

The main purpose of this step was to verify the content that the items represent. A secondary aim was to refine the item pool by identifying and then either eliminating or rewriting poorly worded or irrelevant items. Four clinical researchers (herein, "judges") - all licenced physiotherapists - who were familiar with Miciak's Framework performed the content validation. Judges received items that were grouped by content area (i.e., by concept from the measurement framework). They rated the relevancy of the items to that concept using a 4-point rating scale (with anchors: 1 = "Not at all relevant", to 4 = "Very relevant"), rated the clarity of each item (clear/unclear), identified the items they considered redundant within the grouping, and to write new items to cover concepts they felt were missing. Judges also judged each item as either assessing a "personal" or "professional" aspect of therapeutic relationship, which contributed to the creation of the professional and personal subscales in the P-TREM.

One researcher (EM) collated data from the content validation forms by item and refined the item pool. Items were eliminated if they were considered redundant by 2 or more judges. Items with a low relevancy rating (1-2 on the 4-point scale) or with a recommendation to eliminate by 2 or more judges were either re-categorized to a more appropriate content area or eliminated. If there was a lack of consensus among judges, the item was retained for review by the full research team.

2. Internal review by the research team

Four members of the research team reviewed the item pool after the content validation with the aim of selecting the most appropriate items and drafting the P-TREM questionnaire. Two researchers (EM, MM) independently ranked the items in each content area by considering relevancy and comprehensibility of each item. Next, they collaboratively used their item

rankings and comments from the content judges to select the best 5-10 items per concept for the first draft of the measure. In selecting items, the first priority was to preserve the content coverage of the concept. The third researcher (MRR) reviewed their work. Similar to content judges, the three members of the research team judged an item as either "personal" or "professional". The selected items were formatted into the first draft of the P-TREM, which was reviewed by the fourth researcher (HS).

3. External expert review

The purpose of the expert review process was to have subject matter experts external to the research team (clinicians, patients, clinical researchers) review the items in the draft P-TREM. Expert reviewers were recruited through the professional networks of the research team and through a patient advocacy group. In a process similar to the internal review, external reviewers were asked to rate and/or comment on each P-TREM item with respect to: 1) relevancy to their experience of the physiotherapy therapeutic relationship, 2) clarity, 3) redundancy with other items. They were also asked 3 questions designed to assess the comprehensiveness of the content overall (i.e., were there any items missing), the clarity of the instructions for completing the questionnaire, and the structure and flow of the questionnaire.

The median and mean item relevancy rating and the proportion of 'not easy to understand' were calculated for each item. This information, in addition to the review comments on items, was considered when revising the P-TREM draft. Items with a low relevancy score (below 3.6 out of 4) were eliminated (or modified if the item was necessary to maintain content coverage), and items rated by one or more reviewers as "not easy to understand" but with a high relevancy score (3.6+) were modified to improve clarity. If items were identified as redundant

by 2 or more reviewers, we eliminated the item with the lowest relevancy score, or if relevancy score was the same, the items with the simpler wording was retained.

4. Cognitive interviewing

We used cognitive interviewing to verify that the items in the P-TREM were relevant, easily understood and answerable, and that the questionnaire instructions were easy to interpret and follow.[23]

We recruited participants through the research team and expert reviewers' networks, from three patient populations: inherited bleeding disorders (e.g., haemophilia), inflammatory arthritis (e.g., rheumatoid arthritis, ankylosing spondylitis), and individuals seeking physiotherapy care in private practice for any musculoskeletal condition. These populations were chosen based on the intended use of the instrument in future research. Individuals were eligible for participation if they were 16 years of age or older and had at least 3 encounters with the same physiotherapist in the past 3 years in an ambulatory setting.

We aimed for representation in our sample by recruiting a cross-section of our target population, in order to identify a wide range of problems in the items.[23] We focused on representing variability in age, gender, education level, diagnosis, and individuals whose first language was not English.

Interview procedures. As recommended by Willis[23] the interviewer used a "mixed approach" including 'Think-Aloud' (i.e., participant vocalizes their thoughts while reading and responding to the item) and verbal probing (i.e., interviewer asks follow-up questions based on observations of specific behaviours or to further examine respondent's thinking processes.[23] A debriefing question was used to elicit opinions about the measure.[23]

The lead researcher (EM) conducted the cognitive interviews in-person or using teleconferencing technology. Interviews lasted 35-55 minutes. The interviewer took notes throughout the interview, wrote field notes after the interview, and all interviews were audio recorded and transcribed. Recruitment continued until no new information was forthcoming.

Analysis of interview data

After each interview, the transcripts and notes were reviewed, and participants' comments were collated by item. New findings were compared to the data from previous participants. When it became clear that an item was not functioning well, (i.e., being misinterpreted, difficult to answer, or redundant), the item was eliminated or rewritten/replaced with another item assessing the same content. When items were identified as redundant, the decision on which item to eliminate was based on discussion between two members of the research team.

Constructing personal and professional subscales in the P-TREM

At the content validation and internal review stages, 7 reviewers were asked to judge the content of each item as "personal" or "professional". Data from the reviewers were analyzed for the 49 items in the final version of the P-TREM. An item was included in the personal or professional item subset if 85% or more of reviewers judged it as personal/professional. These items do not represent unique content, rather they overlap with the items representing the key concepts in the physiotherapy therapeutic relationship framework.

5. Pilot administration of the final survey

The purpose of this step was to test a fully operational survey (online and paper-pencil versions) that would be used in a subsequent validation study. Participants for the pilot administration were recruited in the same way as those participating in the cognitive interviews. Participants

completed the survey as if they were participants in a research study. We solicited written feedback on each set of questions, and on the survey as a whole (focusing on clarity of the instructions, layout of the questions, length of the survey, and usability of the online system or paper form). Iterative changes were made to the item wording, layout, format, and organization of the items as feedback was received. The survey was pilot tested until no new revisions were suggested.

Results

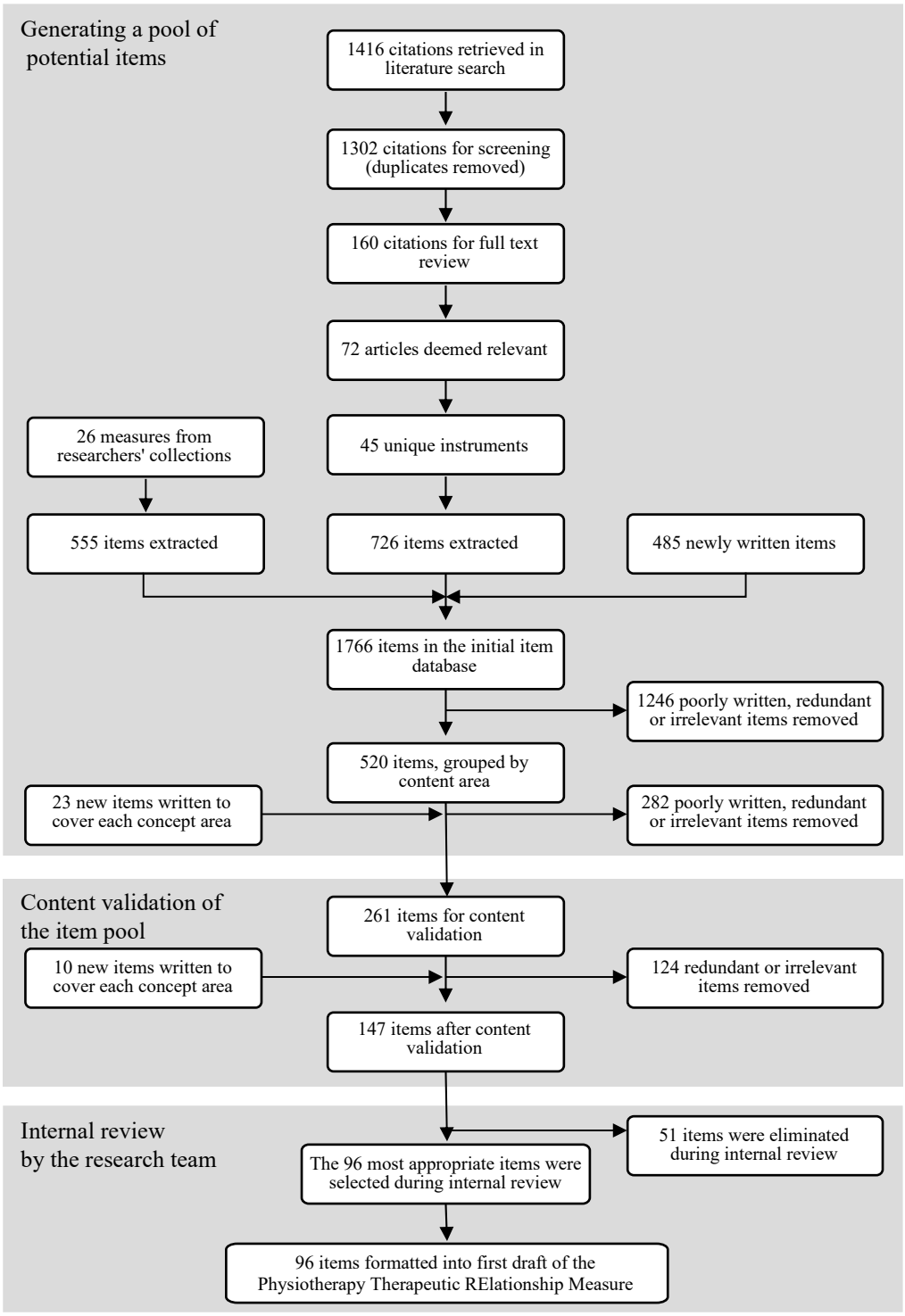
Generate a pool of items

In the database search we retrieved 1,416 citations, with 160 articles remaining after screening titles and abstracts, and 72 deemed relevant in the full text review. From those articles, we extracted 45 relevant measurement instruments, which were combined with 26 measures from the researchers' personal collections. We extracted 1,281 items from those measures, which were added to the 485 new items written by members of the research team. The initial item database was reduced to 261 items after examining items within each content grouping. Figure 4.2 is a flow diagram illustrating the results of the generation of an item pool, content validation of the item pool, and the internal review by the research team steps.

Content validation of the item pool

Through the content validation process, 124 items were eliminated, 10 new items were written, 68 items were rewritten, and 63 items were retained without modification. The final item pool contained 147 items.

Figure 4.2 Results of early instrument development steps (generate an item pool, content validation of the item pool, and internal review by the research team).



Internal review

The two researchers (EM, MM) eliminated 50 items (13 conditions items, 26 connections items, and 11 bond items), another 1 item was eliminated based on the recommendations of the third researcher (MRR) with 96 items retained.

External expert review

Five experts (2 physiotherapists, 3 patients) reviewed the first draft of the P-TREM. External expert reviewers are described in Table 4.1.

Table 4.1 External expert reviewer summary of demographics (n=5).

Variable	**Categories**	**Mean (min/max) or counts**
Age	Years	46.4 (28-71)
Gender	Female	4
	Male	1
Native Language	English	5
Background	Patient	3
	Physiotherapist	2
Clinic type*	Private practice	3
	Specialized hospital clinic	2
Education	Bachelor's degree	2
	Professional or graduate degree	3

Note: *clinical practice setting for physiotherapists; for patients, clinical setting where they see the physiotherapist

During external expert review, changes were made to 3 areas: the instructions, the terminology, and the items' wording. The instructions for completing the P-TREM were modified to clarify that the questionnaire focuses on the relationship with one specific physiotherapist (e.g., think about one particular physiotherapist that you have worked with as you answer the questions). We identified a need to change some of the terminology used in the items to make the questions more generalizable across patient experiences. For example, it was pointed out that "recovery" in the item, *My physiotherapist helps me feel hopeful about my*

recovery, may not be relevant for people with chronic conditions, so "recovery" was replaced by "future health". Similarly, not all patients would identify with seeing a physiotherapist for an "injury", and "problem" was seen by reviewers as potentially too vague. To address this, we decided that the term "injury or condition" would be used in items like, "*I am comfortable asking my physiotherapist questions about my injury or condition*." In terms of changes to the items in the P-TREM, 38 were eliminated, 16 were modified, and 42 items were retained without changes. One new item was added to reflect a concept that 2 reviewers felt was important: availability of the physiotherapist outside of their appointment times. After expert review, there were 59 items in the subsequent draft of the P-TREM.

Cognitive interviewing

We completed cognitive interviews with 9 participants. Three were conducted in-person, and six using teleconferencing technology. The cognitive interview participants are described in Table 4.2.

After the first six cognitive interviews, 21 items were modified (primarily to improve interpretability) and 12 items were eliminated (primarily because of redundant content). Two items were added because they covered topics that were suggested as missing by 2 interview participants. Minor changes were made to the P-TREM instructions. It was found that more complex items were easier for participants to understand when they followed simpler items that tap into similar concepts; therefore items were reordered to reduce cognitive load for respondents.

Following the first 6 interviews, the content of the P-TREM items was re-assessed to verify there were 3-7 items per key concept from the measurement framework. We found four concepts that required an additional item to be written: respect, being present, giving of self, and

caring. Two more interviews were conducted, where 4 items were eliminated because of redundant content. There were 49 items in the P-TREM when the final interview was conducted, and no changes to the items was deemed necessary.

Table 4.2 Cognitive interview participant demographics (n=9).

Variable	Categories	Mean (Min/Max) or counts
Age	Years	38 (23-62)
Gender	Female	5
	Male	4
Native Language	English	7
	Other	2
Condition	Inflammatory arthritis	3
	Musculoskeletal injury	4
	Haemophilia	2
Clinic type	Private practice	8
	Specialized hospital clinic	1
Education	High School	1
	Some post-secondary	1
	Post-secondary diploma	2
	Bachelor's degree	5

Pilot administration

Participants (n=5) in the pilot administration are described in Table 4.3. After pilot administration, two items in the P-TREM were returned to a previous iteration of that item because of difficulties with interpretation of the newer item. It became clear that some participants had a strong preference for items assessing either the personal or the professional aspects of therapeutic relationship, which could have an impact on drop-out and non-response to certain items. Therefore, we added a statement to the P-TREM instructions, "not all items will be relevant to your relationship, but please answer them as best you can", and also added a single

demographics question to assess respondent's preference for "friendliness" in their relationship with their physiotherapist.

Table 4.3 Pilot administration participant demographics (n=5).

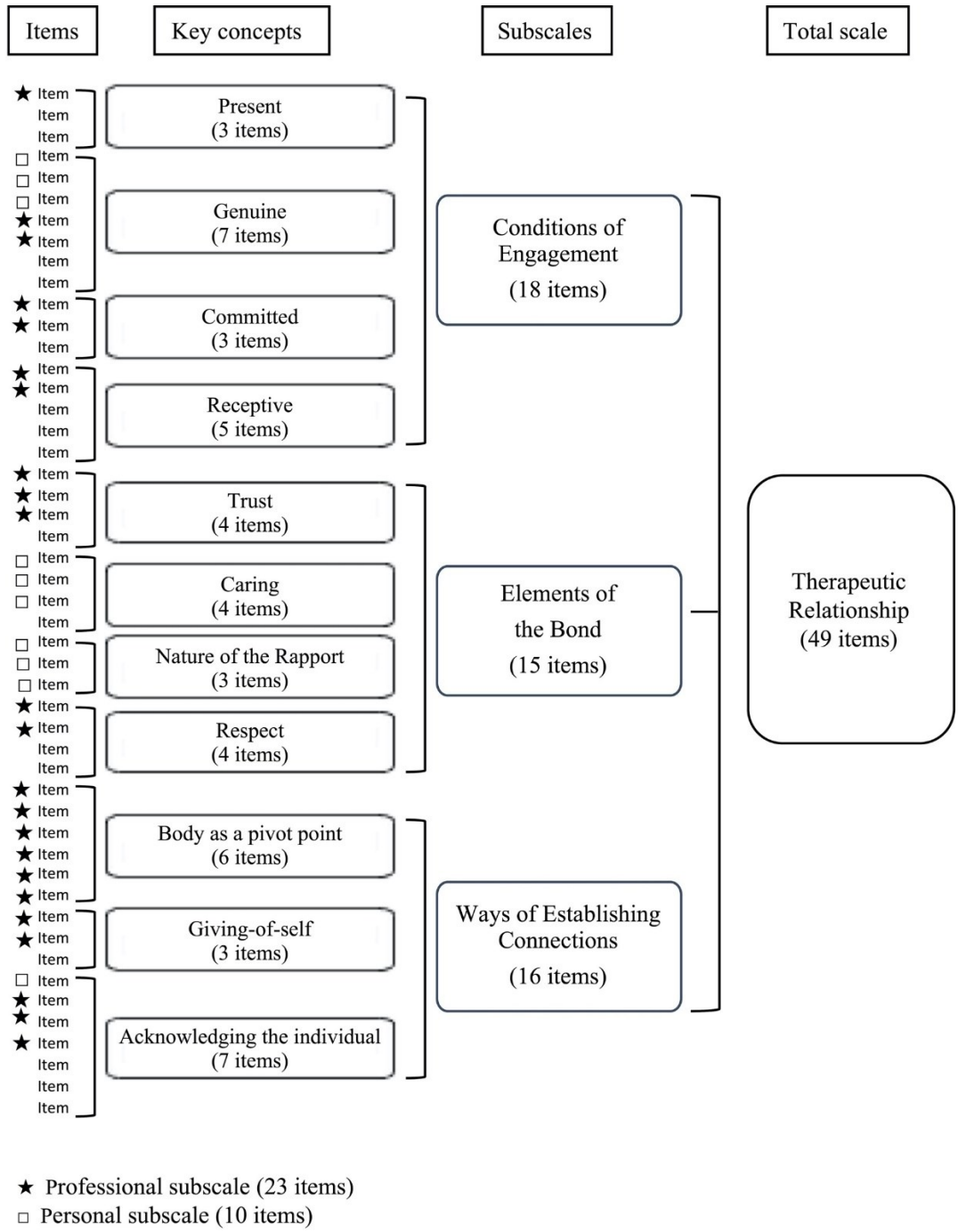
Variable	Categories	Mean (Min/Max) or counts
Age	Years	44.4 (28-60)
Gender	Female	4
	Male	1
Native Language	English	3
	Other	2
Condition	Inflammatory arthritis	3
	Musculoskeletal injury	2
Clinic type	Private practice	5
Education	Some post-secondary	1
	Bachelor's degree	2
	Professional or graduate degree	2

Constructing personal and professional subscales in the P-TREM

In the final questionnaire, 10 items were designated as part of a "personal" subscale, and 23 items were designated as "professional". For the other 16 items, there was no consensus as to whether it assessed a personal or professional aspect.

The final version of the P-TREM has 49 items. Figure 4.3 shows the measurement framework for the P-TREM, as well as the final distribution of items per key concept in the measurement framework. The final item list for the P-TREM is available in the Appendix (Appendix 4.2).

Figure 4.3. Measurement framework for the Physiotherapy Therapeutic RElationship Measure (P-TREM) with the final distribution of items per key concept and subscale.



Discussion

We described the first phase of a rigorous instrument development process for a new measure of therapeutic relationship in physiotherapy. The conceptual basis for the P-TREM is a comprehensive, detailed, theoretical model of therapeutic relationship, developed through qualitative research involving patients with musculoskeletal conditions and physiotherapists. The careful construction of our instrument ensures the content validity of the P-TREM, which is essential to establish before other measurement properties can be evaluated.[14,15] To our knowledge, the P-TREM is the first English-language measure based on a discipline-specific model of therapeutic relationship. There has been one other measure developed based on a discipline-specific model of person-centred therapeutic relationships (PCTR-PT) using similar methodologies.[24,25] It was constructed to have four dimensions "Relational Bond", "Individualized Partnership", "Professional Empowerment", and "Therapeutic Communication", and all have good internal consistency (co-efficient alpha values between .86 and .91).[25] While the ceiling effects for the total scale were not reported, the individual items all showed ceiling effects, a common issue in measures of relational constructs (e.g., working alliance, patient satisfaction).[25] The content of the PCTR-PT scale shares many similarities with the P-TREM.[24] The main difference is inclusion of elements in the PCTR-PT such as the environment and individual qualities of the physiotherapist, which we would conceptualize as factors *influencing* the therapeutic relationship. Also, the contribution of the patient to the therapeutic relationship is not recognized in the PCTR-PT, nor is the physiotherapist's use of touch, or the focus on the patient's body. Additionally, the PCTR-PT scale was developed and evaluated in Spanish, and the cross-cultural validity of an English translation has not been examined.

Strengths and limitations

The strengths of our study are that we have developed a measurement instrument based on a sound conceptual understanding of our construct of interest and used rigorous methods to ensure that the P-TREM items represent the concepts in therapeutic relationship in physiotherapy. A limitation of the study is the variability represented in our sample of participants in the item review stages. We desired greater variability than we achieved in participant's education levels (most participants had a post-secondary diploma or degree) to more closely represent our target population. However, we were reassured by our strategy of collecting data until no new information was forthcoming and by the representation of individuals in other characteristics (English as an additional language, age, gender, diagnosis).

Future directions

Since this is the first phase of instrument development (steps 1-4 of Devellis's methodology for developing measurement instruments), a subsequent validation study is needed and is underway.[12] We will examine the quality of the items using techniques from classical test theory and item response theory. Construct validity will be studied by looking at concurrent and convergent validity, as well as internal scaling structure. We will also examine the patterns of responses to the items to see if they differ by subgroups of the patients' sample (e.g., gender, condition, clinical setting). Although we have included the P-TREM measure as an appendix (Appendix 4.2), the validity of the P-TREM has not yet been established. Therefore, at this stage, it should not be considered ready to use to capture the quality and magnitude of therapeutic relationship in clinical research.

Conclusions

We describe the development of a new measure of the physiotherapy therapeutic relationship and steps taken to ensure its content validity. A valid measure will help physiotherapy researchers understand therapeutic relationship and how it impacts treatment outcomes. In turn, this could improve effectiveness of physiotherapy encounters and interventions.

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CHAPTER 5: An Investigation of the Measurement Properties of the Physiotherapy Therapeutic Relationship Measure in Patients with Musculoskeletal Conditions

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Abstract

Purpose: The therapeutic relationship between a patient and physiotherapist has been associated with improved physiotherapy outcomes. However, there is no agreed upon measure of therapeutic relationship in physiotherapy. This paper describes a validation study of a new patient-reported measure, the Physiotherapy Therapeutic Relationship Measure (P-TREM).

Methods: In this multi-site validation study, participants with musculoskeletal conditions (n=163) completed a survey containing the P-TREM, demographic questions, a Trust in Healthcare Providers scale, and a therapeutic relationship global rating for construct validation. We investigated item quality, internal structure using exploratory factor analysis (EFA), unidimensionality, internal consistency, and construct validity. We eliminated poor performing items to optimize the length of the P-TREM.

Results: The final version of the P-TREM has 30 items. EFA suggests two domains: "Physiotherapist role" and "Patient role", correlation between factors was 0.71. Internal consistency was excellent. We found a low-moderate correlation between P-TREM scores and Trust in Healthcare Providers and a strong correlation between P-TREM scores and the therapeutic relationship global rating, confirming our hypotheses for convergent and concurrent validity.

Conclusions: The P-TREM can be considered for use in clinical research to understand therapeutic relationship in the care of people with longstanding musculoskeletal conditions in outpatient, in-person settings.

Keywords: Therapeutic alliance, Therapeutic relationship, Measurement, Assessment, Physiotherapy, Validity, Patient-reported outcome measure

Introduction

Therapeutic relationship in physiotherapy can be defined as the safe relational space and affective bond between patient and practitioner, developed both professionally and personally, when establishing connections and engaging in the collaborative work of physiotherapy.[1] The therapeutic relationship is gaining attention in physiotherapy as a contextual factor that may contribute to physiotherapy outcomes.[2]

Physiotherapy researchers often use Bordin's tripartite model of working alliance (tasks, goals, bond)[3] from psychotherapy to describe the therapeutic alliance or relationship in physiotherapy. It may be time to consider applying discipline-specific models, given the amount of qualitative research and syntheses of existing literature that exists about the concept of therapeutic relationship in physiotherapy.[1,4–6,6–10] While there are areas of overlap with psychotherapy, there are aspects of therapeutic relationship unique to physiotherapy.[11] One key difference is that in physiotherapy, it is often through the patient's body that the patient and physiotherapist connect in the relationship.[12] This includes communicating about the patient's body, physical symptoms or health condition, and also connecting through physical contact (i.e. touch).[12]

Quantitative research on the therapeutic relationship in physiotherapy suggests that therapeutic relationship influences clinical outcomes for people with a variety of neurological, musculoskeletal and pain conditions, however there is some uncertainty about whether this influence is clinically important.[4,13–20] For the most part, these studies have been conducted using measures borrowed or adapted from psychotherapy.[4,5,17] However, the validity of using psychotherapy measures in physiotherapy research is questionable given the differences between psychotherapy and physiotherapy therapeutic relationships. Indeed, studies of the measurement properties of psychotherapy measures used in physiotherapy have demonstrated issues with

content validity and other measurement properties.[13,17,21–24] More accurate and precise measurement of therapeutic relationship would allow researchers to establish whether clinically important cause-effect relationships exist between therapeutic relationships and outcomes (e.g., pain, physical function). It would also be useful for comparing the effectiveness of interventions aimed at improving therapeutic relationships and understand the relative importance of different components of therapeutic relationship (e.g., trust, individualized treatment, receptivity). Therefore, a discipline-specific, high-quality measurement instrument for capturing the therapeutic relationship in physiotherapy is needed.

With this in mind, we developed a measure of the therapeutic relationship in physiotherapy, called the Physiotherapy Therapeutic RElationship Measure (P-TREM).[25] The P-TREM is a patient-reported measure with 49 items based on 11 key concepts from Miciak's *Physiotherapy Therapeutic Relationship Framework.*[1,25,26] Initial development included generating a pool of potential items, review by experts (patients, clinicians, researchers), a study of content validity, and cognitive interviews with potential respondents.[25] This paper describes a validation study examining the measurement properties and optimizing the length of the P-TREM. The specific objectives are to:

1. Evaluate the quality of items in the P-TREM
2. Optimize P-TREM scale length through item reduction
3. Investigate the internal structure of the P-TREM using factor analysis
4. Comprehensively evaluate the measurement properties of the P-TREM (internal consistency, convergent and concurrent validity).

Methods

Study Design

In developing the P-TREM, we adopted the 8-step measurement scale development process of DeVellis as described in *Scale Development: Theory and Applications*.[27] This process was designed for measuring abstract, multifaceted phenomena - such as therapeutic relationship.[27] Steps 1-4 guided the first phase of P-TREM development.[25] Steps 5-8 guided this study: (5) Consider the inclusion of validation items; (6) Administer items to a development sample; (7) Evaluate the items; and (8) Optimize the scale.[27] We used a cross-sectional, multi-site methodological study design. This study was approved by the University of Alberta's Health Research Ethics Board (Study ID Pro00086206).

Study Participants

Inclusion criteria

Inclusion criteria were: (1) individuals 16 years of age or older, (2) who received 3 or more physiotherapy sessions in the past 3 years, (3) for a condition affecting the musculoskeletal system, (4) in an outpatient in-person setting (e.g., hospital outpatient, publicly-funded rehabilitation and private practice clinics). The physiotherapy sessions must have been with the same physiotherapist, as we were interested in the interpersonal relationship developed between two individuals (physiotherapist and patient dyads). Individuals who did not have an adequate understanding of English (spoken or written) or cognitive impairment limiting their ability to interpret and respond to questions in the P-TREM were excluded. Participants from three patient population subgroups were recruited: (1) individuals with an inflammatory arthritic condition (e.g., rheumatoid arthritis, ankylosing spondylitis and psoriatic arthritis); (2) individuals with

hemophilia and related inherited bleeding disorders; or (3) individuals with a musculoskeletal concern seeking treatment in a general physiotherapy practice. Individuals with chronic conditions like inflammatory arthritis bleeding disorders and are often followed by the same clinical team, including a physiotherapist, over long periods of time. This typically results in long-standing relationships between patients and physiotherapists. Individuals from all three populations were involved in the development of the P-TREM.[25]

Recruitment

Patients were recruited from 4 private physiotherapy centres and 4 chronic disease hospital-based clinics from June 2020 – February 2021, using voluntary sampling techniques. Over these 8 clinics, there were 38 physiotherapists whose patients could have been included in the study. Recruitment coincided with the COVID-19 global pandemic. Recognizing the impact of the pandemic on clinic resources, each clinic was given the autonomy to choose the recruitment strategy that would be least burdensome. In five clinics, physiotherapists identified and approached patients for participation, two clinics had independent research assistants approach eligible patients, and one clinic sent an email message to past patients informing them of the study and inviting them to participate. In addition, seven special interest groups representing patients with inherited bleeding disorders (n=4) and inflammatory arthritis (n=3) advertised the study to their members. All participants were told that the survey was anonymous, that their physiotherapists would not know whether they participated, and that the physiotherapists will not have access to their responses.

Data Collection

Data were collected using an anonymous survey questionnaire that contained the preliminary P-TREM, a demographic questionnaire form, and two measures of related variables included for validation purposes and described below. Participants were given the choice to respond using an electronic, online format or a paper version. All data were collected anonymously. We aimed for a sample size of 245 using Norman and Streiner's estimated requirements for conducting exploratory factor analysis (EFA) (i.e., a minimum of 5 respondents per item), which would also be sufficient for correlational analyses.[28] However, recruitment was impacted by the global COVID-19 pandemic and our final sample included 169 respondents.

Measures

Physiotherapy RElationship Measure (P-TREM)

Measurement purpose. The P-TREM is a patient-reported measure developed to capture the strength (i.e., magnitude) and quality (positive or negative) of a therapeutic relationship between a patient and a specific physiotherapist, as developed over multiple encounters, in the context of outpatient physiotherapy.

Target population. Adult, English-speaking patients with a condition affecting the musculoskeletal system seeking physiotherapy in an outpatient, in-person setting (e.g., hospital outpatient, community and private practice clinics), who have established relationships with their physiotherapist (i.e., not newly developed relationships).

Construct of interest. The measurement framework of the P-TREM is a *reflective model* based on Miciak's *Physiotherapy Therapeutic Relationship Framework.*[1] It is described in detail elsewhere.[25,26] Briefly, Miciak's framework describes the therapeutic relationship between the physiotherapist and patient as having three components: (1) the actions they "do" together that

are part of the relationship (i.e., Ways of Establishing *Connections*); (2) the way they "are" together (i.e., *Conditions* of Engagement); and (3) the feelings that exist between them (Elements of the *Bond*). Each component has 3-4 subcomponents which make up the 11 key concepts in the P-TREM measurement framework. In the preliminary version of the P-TREM, each concept was represented by 3-7 items, with the content of the items reflecting the *patient's perspective* of those concepts.

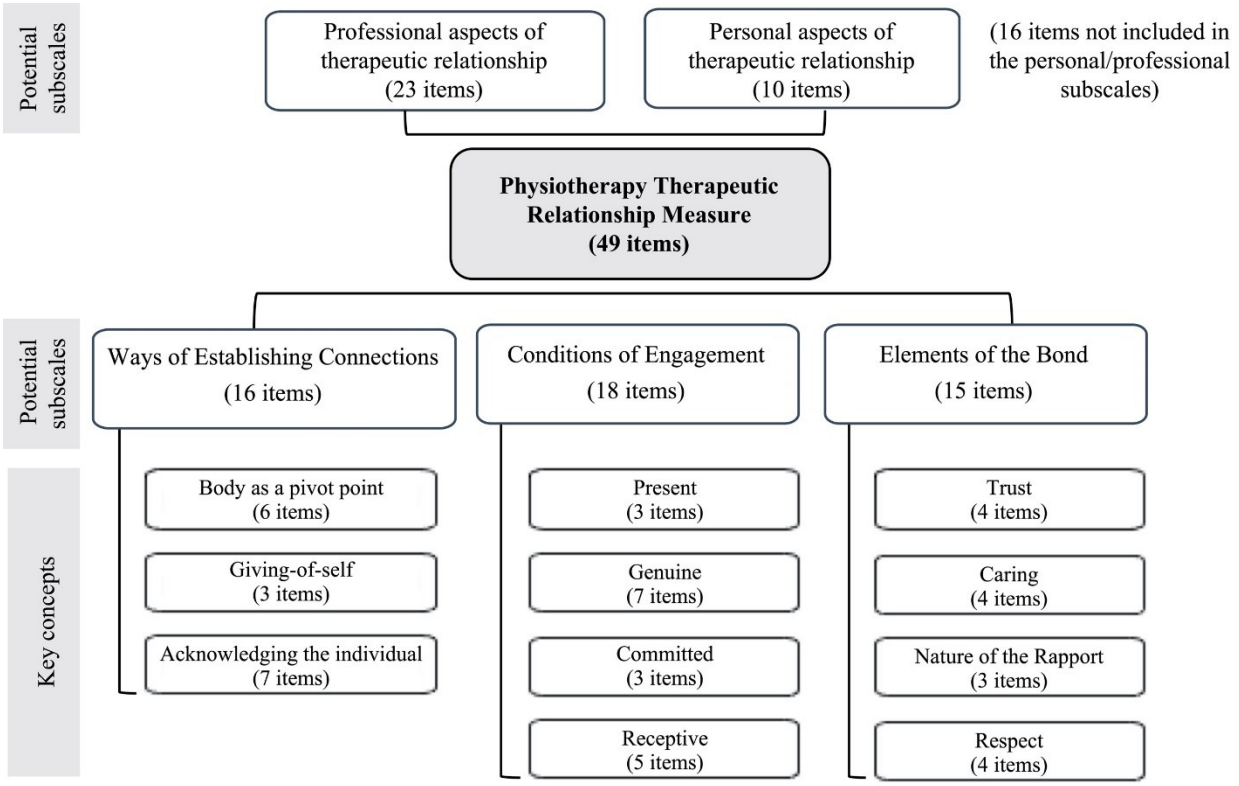
Miciak's Framework also includes three themes that are common to all components and were included in the content of the items. (1) *The therapeutic relationship is professional and personal* (i.e., it includes the physiotherapist's professional responsibilities and the activities and goals of physiotherapy, as well as personal aspects like caring about and taking an interest in the other person apart from the activities they do together during rehabilitation). (2) *The therapeutic relationship is a "mutual endeavor"* (i.e., both the physiotherapist and patient contribute to the therapeutic relationship), and (3) *Body is central to the therapeutic relationship (i.e., the patient's physical body is the main connecting point for the patient and physiotherapist).*

Measurement specifications

The preliminary P-TREM had 49 items with a 6-point ordinal response scale (Likert-type) ranging from 'Strongly disagree' to 'Strongly agree'. The total score is obtained by summing a person's responses across all items, with the total score ranging from 0-245. In alignment with Miciak's framework, two sets of subscales were proposed in the preliminary version of the P-TREM. The first set contained three subscales, one for each component of therapeutic relationship in the framework (Connections, Conditions, Bond). The second set had two subscales representing the "personal" and "professional" aspects of therapeutic relationship. The items in the personal and professional subscales do not represent unique content, rather they

overlap with the items in the three component subscales. There are 16 items which were not deemed clearly professional or personal and were not included in these subscales. Figure 5.1 summarizes the measurement framework and proposed scaling structure for the P-TREM. Appendix 4.2 contains the items in the preliminary version of the P-TREM.

Figure 5.1. Measurement framework and proposed scaling structure for the Physiotherapy Therapeutic RElationship Measure.



Global Rating of Therapeutic Relationship

We included a patient-reported global rating of the therapeutic relationship (GRTR) for the purpose of concurrent validation. The GRTR asked respondents to rate the overall quality of their relationship with their physiotherapist on a 10-point rating scale, with anchors "Very negative (i.e., poor)" and "Very positive (i.e., excellent)". Although it is unclear if a phenomenon such as a therapeutic relationship can be reliably measured using a single global judgement, there

is evidence that a single global rating can be more reliable than a multi-item scale in the assessment of interpersonal and communication skills in a medical setting.[29,30]

Trust in Healthcare Providers

We included a modified version of the "Trust in the Medical Profession" measure of Dugan, Trachtenberg, & Hall (2005).[31] We modified the items by replacing the word "doctor" with "healthcare providers", which we called "Trust in Healthcare Providers" (THCP). The measure has five items that assess patients' trust in healthcare providers in general (i.e., not with a specific provider). Responses are on a 5-point Likert-type scale, 'Strongly disagree' to 'Strongly agree', summed to give a score that ranges from 5–25. Higher values indicate more trust. Internal consistency has been shown to be 0.77 in the general population.[31]

Data Analyses

Analyses were carried out using Jamovi free and open statistical platform[32] and the 'psych' and 'lavaan' package in R.[33,34,35] We calculated descriptive statistics for study participant characteristics. We ran a missing data sensitivity analysis by imputing minimum and maximum values to evaluate the potential impact of missing data. There were no meaningful differences in results (<2.5% change in estimates) when imputing minimum, mean, or maximum values. Therefore, we handled missing response data by imputing the mean response to that item.

Item quality analysis

We calculated descriptive statistics for the item responses (mean and median, minimum, maximum, and standard deviations of the responses), as well as the frequency of endorsement (i.e., the proportion of people choosing each response option), and non-response rates. We also created two inter-item correlation matrices, examining both Pearson product-moment and

polychoric correlation coefficients. Finally, we examined corrected item-total correlations (i.e., total scale score with the item removed) for the items and the total P-TREM score. We used a Pearson product-moment correlation because it is robust enough against non-normality when calculating relationships between an item with >2 response alternatives and an assumed continuous variable such as total scale scores.[30]

Preliminary examination of internal structure

We examined correlations between each item and its corrected item-subscale score for each of the proposed subscales (Connections, Conditions, Bond, Personal and Professional). We compared each item's correlation with each of the component subscale scores to examine how items fit within the proposed scaling structure of the instrument. We expected an item's item-subscale correlation to be high with the subscale to which it belongs, and conversely, it's correlation with the other subscales to be significantly lower.

Optimizing scale length

We optimized the length of the P-TREM by examining item quality statistics as well as content. We began by eliminating items with lower corrected item-total correlations. Items were then grouped by content area and examined by one researcher (EM). Items with high inter-item correlation (i.e., greater than 0.8) with other item(s) in their grouping were flagged for further examination of their item quality statistics. Flagged items with one or more problems with the item's response endorsement frequencies (i.e., non-response rates, item ceiling effects, or low variance of responses), or lower correlation with the corrected total P-TREM score were tentatively eliminated. A second member of the research team reviewed these decisions and disagreements were resolved through discussion. Where a pair of items with redundant content

and/or high inter-item correlation had similar item quality statistics, items were eliminated based on the judgement of the two research team members (EM, MM), who relied on data from the instrument development phase[25] and from their knowledge of therapeutic relationship in physiotherapy. Once items were eliminated, the reduced version of the P-TREM was examined to ensure that all 11 content areas were still covered by at least 1 item.

Exploratory factor analysis

This was the first examination of internal structure of the P-TREM, therefore we conducted exploratory factor analysis (EFA) using the 'fa' function from the 'psych' package in R.[33,34] We used the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA) and Barlett's test of sphericity to check the factorability of our data. The eigenvalue one test and parallel analysis helped us determine the number of factors to extract. We used the principal axis factoring method with an oblique rotation because we expected our factors to be correlated. We used a critical value of 0.41 to determine whether a factor loading was considered significant, which was determined based on recommendations of Norman & Streiner.[28]

Unidimensionality check

We used confirmatory factor analysis (CFA) to assess the unidimensionality of all items in the reduced P-TREM. To do this, we fit a CFA model to the data set using the *lavaan* package in R with the 'WSMLR' estimator.[33,35] We used the criteria of Hu and Bentler: comparative fit index (CFI) > 0.95; Tucker-Lewis Index (TLI) > 0.95; the root mean square error of approximation (RMSEA) < 0.06; and the standardized root mean residuals (SRMR) < 0.08 to evaluate the fit of the model.[36]

Validation evidence

Descriptive statistics were calculated for the reduced version of the P-TREM total and domain scores, including ceiling effects (proportion of participants scoring the maximum on the P-TREM).

Measurement properties

Coefficient alpha. We calculated an estimate of reliability and a 95% confidence interval (CI), co-efficient alpha (α), for the P-TREM total score and domain scores found in the EFA. We used Ponterotto & Ruckdeschel's (2007) criteria for estimating adequacy of internal consistency co-efficient, which are based on sample size and number of items in the scale.[37]

Concurrent validation. We examined the magnitude of the association between GRTR and the total P-TREM and domain scores by calculating a Pearson product-moment correlation with a 95% CI. Since these variables are measures of the same construct, our hypothesis was that there would be large, positive associations between GRTR and all three scores (r greater than 0.5).[38]

Convergent validation. We used Pearson product-moment correlation coefficients with a 95% CI to examine the strength of association between total and domain scores and the patients' THCP scores. Trust in healthcare providers in general is moderately correlated with trust in a specific physician.[39] Considering that trust is a part of therapeutic relationship, it is conceivable that the level of trust a person has in healthcare providers in general will be associated with therapeutic relationship. However, a high correlation with the P-TREM would indicate the P-TREM is not adequately capturing the relationship in a specific patient-physiotherapist dyad. We hypothesized there would be a small to moderate, positive correlation between patients' trust in healthcare providers and the total and domain scores (r = 0.2 to 0.3).[38]

In order to provide evidence specific to our patient population subgroups (i.e., inherited bleeding disorders, inflammatory arthritis and general musculoskeletal), we conducted the analyses above for the total sample, as well as analyses separated by patient population subgroup.

Results

Sample characteristics

Out of 169 participants, 166 individuals provided complete or nearly complete data (missing 3 or less responses to the P-TREM items). Three participants were excluded because their demographic questions indicated they did not meet eligibility criteria (e.g., <3 encounters with their physiotherapist), leaving 163 participants in the analysis. Table 5.1 summarizes participant characteristics for the entire sample. The average age was 43.2 years (sd=16.6), 87 identified as female, 72 as male and 4 preferred not to answer, and 36.8% reported experiencing chronic or persistent pain. There were 87 in the general musculoskeletal patient subgroup, 43 in the inherited bleeding disorders subgroup and 33 in the inflammatory arthritis subgroup. The mean duration of relationship between the physiotherapist and patient was 53.7 months (sd=73.0), median was 24 months (range=3 weeks-30 years). The mean total number of appointments was 13.2 (sd=17.6), the median was 8 (range=3-150). Information on the characteristics of the inherited bleeding disorders and the inflammatory arthritis subgroups are available as an appendix (Appendix 5.1).

Item quality analysis

All items showed a ceiling effect with the majority of participants choosing either the highest or second highest responses (agree, strongly agree) for all items. For two items, >80% of people

Table 5.1 Participant demographic and clinical characteristics.

Characteristic	Number of responses	Categories	Mean, median or Number	%, range or SD
Age (years)	152	Years	43	16.6
Gender	163	Female	87	53.4
		Male	72	44.2
		Prefer not to answer	4	2.5
Language	163	English	147	90.2
		English as an additional language	16	9.8
Education level	159	Some high school	16	10.1
		High school diploma	12	7.5
		Some post-secondary	20	12.6
		Diploma or certificate	40	25.2
		University undergraduate degree (e.g., BSc, BA)	43	27.0
		Professional or graduate degree (e.g., BScN, MD, MBA)	28	17.6
Patient population	163	Inherited Bleeding Disorders	43	26.4
		Inflammatory arthritis	33	20.2
		General musculoskeletal	87	53.4
General self-rated health	158	Excellent	26	16.5
		Very Good	62	39.2
		Good	53	33.5
		Fair	12	7.6
		Poor	5	3.2
Reported chronic or persistent pain	163		60	36.8
Reason for seeking physiotherapy*	163	Acute injury	79	48.5
		Chronic condition or injury	89	54.6
		Post-surgery	36	22.1
		Annual assessment	32	19.6
		Education program	4	2.5
		Workers' compensation	7	4.3
		Motor vehicle accident	14	8.6
		Chronic or persistent pain	48	29.4
Importance of friendliness	158	Very important	90	57.0
		Important	55	34.8
		Somewhat important	13	8.2
		Not at all important	0	0.0

Global Rating of Therapeutic Relationship (rating 0-10).	161		9.43	0.99
Control preferences scale	157	I prefer to make treatment decisions on my own.	0	0.0
		I prefer to make treatment decisions after hearing the opinion of my physiotherapist.	37	23.6
		I prefer to share treatment decisions with my physiotherapist.	53	33.8
		I prefer that my physiotherapist makes treatment decisions after hearing my opinion.	41	26.1
		I prefer that my physiotherapist makes the treatment decisions.	26	16.6
Trust in Healthcare Providers (5-25)	163		17.1	5.1
Duration of therapeutic relationship (months) n=164	163		24	0.7-360
Most recent encounter with the physiotherapist (months)	163		4	0-36
Total number of encounters	144		8	3-150
Number of telerehabilitation appointments	158	None	131	82.9
		1-2	22	13.9
		3 or more	5	3.2
Physiotherapist's gender	151	Male	64	42.4
		Female	84	55.6
		Prefer not to say	3	2.0
Approximate age of physiotherapist	151	20 to 40	121	80.1
		40 or older	30	19.9
Type of clinical setting	154	Specialized chronic disease interdisciplinary clinic	27	17.5
		Hospital physiotherapy department	15	9.7
		Physiotherapy private practice	111	72.1
		Telehealth (over the internet)	1	0.6
Survey format	163	Online	144	93.5
		Paper	19	12.3

*participants could choose more than 1 option; therefore, proportions do not add up to 100%

chose the highest response category. The response options at the lower end of the scales (Disagree, Strongly Disagree) were under-utilized (less than 5%) in all items. Item non-response

rates were low with 14 items missing only 1-3 responses. The mean inter-item polychoric correlation was 0.53 (min/max: 0.26-0.95), while the average corrected item-total correlation was 0.75 (min/max: 0.45-0.89). Table 5.2 summarizes key item analysis statistics from the preliminary version of the P-TREM.

Table 5.2 Item descriptive statistics.

	Content *	Item	Descriptive Statistics				Response endorsement frequencies (%)							Item-scale correlation
			Mean	SD	Med-ian	Range	0	1	2	3	4	5	Miss-ing	Total P-TREM score
item 1	CX	explains how physiotherapy will help my condition.	4.66	0.60	5	4	0.0	0.6	0.0	3.1	25.8	70.6	0.0	0.75
item 2	CX	helps me understand my injury or condition.	4.67	0.67	5	4	0.0	1.2	0.0	3.7	20.2	74.8	0.0	0.75
item 3	CX	personalizes treatment to my needs.	4.71	0.55	5	3	0.0	0.0	0.6	3.1	21.0	75.3	0.6	0.78
item 4	CX	adapts our treatment plan as my injury or condition changes.	4.69	0.64	5	5	0.6	0.0	0.6	1.8	22.7	74.2	0.0	0.72
item 5	CX	helps me feel hopeful about my future health.	4.55	0.72	5	3	0.0	0.0	2.5	6.1	25.8	65.6	0.0	0.74
item 6	CX	educates me on ways that I can help myself.	4.64	0.63	5	3	0.0	0.0	1.2	4.3	23.9	70.6	0.0	0.74
item 7	CX	acknowledges my physical concerns.	4.62	0.72	5	4	0.0	0.6	2.5	3.1	22.1	71.8	0.0	0.80
item 8	CD	would notice if I were uncomfortable.	4.50	0.73	5	3	0.0	0.0	2.5	6.7	28.8	62.0	0.0	0.73
item 9	CX	appreciates what I know about how my condition affects me.	4.44	0.76	5	4	0.0	0.6	1.2	9.2	31.9	57.1	0.0	0.78
item 10	CX	encourages me to be mindful of sensations in my body (e.g. during hands-on treatment, exercises).	4.45	0.70	5	4	0.0	0.6	0.6	6.2	37.9	54.7	1.2	0.64
item 11	CX	adjusts their touch based on how it feels to me.	4.55	0.61	5	2	0.0	0.0	0.0	6.2	32.7	61.1	0.6	0.72
item 12	CX	moves my injured body part with care.	4.64	0.61	5	3	0.0	0.0	1.3	3.1	25.6	70.0	1.8	0.76
item 13	BO	is respectful when examining me.	4.73	0.54	5	4	0.0	0.6	0.0	1.2	21.6	76.5	0.6	0.65
item 14	CD	listens carefully to what I am saying.	4.67	0.62	5	3	0.0	0.0	1.2	4.3	20.4	74.1	0.6	0.80

item 15	CX	is available for me to contact outside of our appointments, if needed.	4.28	1.02	5	4	0.0	3.1	4.3	9.9	26.7	55.9	1.2	0.58
item 16	CX	would go 'above and beyond' to help me with my rehabilitation if needed (e.g. research my injury or condition, spend a little extra time with me).	4.42	0.85	5	4	0.0	0.6	4.3	7.4	28.2	59.5	0.0	0.75
item 17	CD	is honest with me about how much I can expect to improve.	4.56	0.69	5	3	0.0	0.0	2.5	3.7	28.8	65.0	0.0	0.76
item 18	BO	is easy to talk to.	4.74	0.55	5	4	0.0	0.6	0.0	1.8	20.2	77.3	0.0	0.77
item 19	BO	takes the time to get to know me.	4.57	0.71	5	4	0.0	1.2	0.6	3.7	28.8	65.6	0.0	0.80
item 20	CD	gives me their full attention when they are with me.	4.71	0.53	5	2	0.0	0.0	0.0	3.7	21.5	74.8	0.0	0.77
item 21	CD	is committed to fully understanding my injury or condition.	4.64	0.72	5	4	0.0	0.6	1.8	4.9	17.8	74.8	0.0	0.81
item 22	CX	gives me enough time to talk about my concerns.	4.61	0.66	5	4	0.0	0.6	0.6	4.3	26.4	68.1	0.0	0.86
item 23	CD	would be open to my suggestions.	4.55	0.66	5	3	0.0	0.0	1.2	5.6	29.8	63.4	1.2	0.82
item 24	CD	is interested in me not only as a patient, but as a person.	4.46	0.81	5	4	0.0	0.6	1.9	11.1	23.5	63.0	0.6	0.83
item 25	CX	understands what is important to me (e.g., my goals, what I value).	4.55	0.71	5	4	0.0	0.6	0.6	7.4	26.4	65.0	0.0	0.83
item 26	BO	respects me for who I am (e.g., my cultural background, gender).	4.66	0.55	5	2	0.0	0.0	0.0	3.7	26.4	69.9	0.0	0.63
item 27	BO	genuinely cares if I get better.	4.70	0.56	5	3	0.0	0.0	1.2	1.2	23.9	73.6	0.0	0.87
item 28	CD	is committed to helping me with my rehabilitation.	4.69	0.57	5	3	0.0	0.0	1.2	1.8	23.9	73.0	0.0	0.88
item 29	BO	cares about my well-being.	4.69	0.54	5	3	0.0	0.0	0.6	1.9	25.9	71.6	0.6	0.88
item 30	CD	is focused on what we are doing during physiotherapy.	4.70	0.55	5	2	0.0	0.0	0.0	4.3	21.5	74.2	0.0	0.83
item 31	CX	gives their best effort during our appointments.	4.71	0.54	5	3	0.0	0.0	0.6	2.5	22.4	74.5	1.2	0.77
item 32	CD	shares some details about their life outside of the clinic (e.g., their hobbies, interests, family, pets).	4.13	1.05	4	4	0.0	3.1	4.9	15.4	29.0	47.5	0.6	0.49
item 33	BO	I like my physiotherapist.	4.72	0.54	5	3	0.0	0.0	0.6	2.5	21.5	75.5	0.0	0.83
item 34	BO	I feel respected by my physiotherapist.	4.73	0.55	5	3	0.0	0.0	1.2	1.2	20.9	76.7	0.0	0.83

item 35	CD	My physiotherapist and I work well together as a team.	4.64	0.60	5	3	0.0	0.0	1.2	2.5	27.8	68.5	0.6	0.88
item 36	BO	My physiotherapist and I get along (e.g. are friendly).	4.65	0.58	5	3	0.0	0.0	0.6	3.7	25.8	69.9	0.0	0.82
item 37	BO	I care about my physiotherapist as a person.	4.60	0.60	5	2	0.0	0.0	0.0	6.2	27.8	66.0	0.6	0.74
item 38	BO	I am able to be myself with my physiotherapist.	4.60	0.65	5	3	0.0	0.0	0.6	7.4	23.9	68.1	0.0	0.81
item 39	BO	I have confidence in my physiotherapist's professional skills.	4.74	0.50	5	2	0.0	0.0	0.0	3.1	19.6	77.3	0.0	0.83
item 40	BO	I can depend on my physiotherapist to do what they have promised to do.	4.68	0.60	5	3	0.0	0.0	1.2	3.1	22.1	73.6	0.0	0.84
item 41	BO	I trust that my physiotherapist would tell me if they did not know how to help me with my injury or condition.	4.61	0.73	5	5	0.6	0.6	0.6	3.1	25.8	69.3	0.0	0.72
item 42	BO	I trust my physiotherapist enough to discuss a sensitive issue.	4.46	0.83	5	4	0.0	1.9	0.6	8.6	27.8	61.1	0.6	0.71
item 43	CD	I think my physiotherapist would acknowledge a mistake if they made one.	4.50	0.78	5	4	0.0	1.2	1.8	4.9	30.1	62.0	0.0	0.72
item 44	CD	I give my full attention to what we are doing during physiotherapy.	4.68	0.51	5	2	0.0	0.0	0.0	1.8	28.2	69.9	0.0	0.59
item 45	CD	I am open to hearing suggestions from my physiotherapist.	4.80	0.40	5	1	0.0	0.0	0.0	0.0	19.6	80.4	0.0	0.69
item 46	CD	I am committed to following our treatment plan.	4.56	0.63	5	2	0.0	0.0	0.0	7.4	29.4	63.2	0.0	0.45
item 47	CD	I answer my physiotherapist's questions honestly.	4.78	0.42	5	1	0.0	0.0	0.0	0.0	22.1	77.9	0.0	0.57
item 48	BO	I respect my physiotherapist's professional opinion.	4.79	0.45	5	2	0.0	0.0	0.0	1.9	16.9	81.3	1.8	0.74
item 49	CD	I would tell my physiotherapist if they did something I didn't like during physiotherapy.	4.53	0.71	5	4	0.0	0.6	1.3	5.0	30.6	62.5	1.8	0.64

SD=Standard Deviation, 0=Strongly disagree, 1=Disagree, 2=Slightly disagree, 3=Slightly agree, 4=Agree, 5=Strongly agree

*Conditions = CD, Connections = CX, Bond = BO

Preliminary examination of internal structure

The item-total correlation matrix for the proposed subscales is included as Appendix 5.2. Upon examining the corrected item-subscale correlations for the component subscales (Connections, Conditions, Bond), there was no observable pattern suggesting that these proposed subscales were present. Correlation between the proposed Connections and Bond subscales was r=0.93, between the Connections and Conditions was r=0.94, and between the Conditions and Bond was r= 0.94.

With regards to the Personal and Professional proposed subscales, all 10 personal items correlated more strongly with its proposed subscale and less with the other subscales, although the differences were small and may not be relevant (mean difference=0.045, min/max: <0.01-0.12). For the professional subscale, 20/23 items correlated more with its proposed subscale (mean difference = 0.062, min/max: 0.03-0.11). Correlation between the personal and professional proposed subscales was 0.92.

Optimizing scale length

Two items that had notably lower corrected item-total correlations than the other items, Item 15 (r=0.57) and Item 32 (r=0.47), also had potential issues with relevancy that were observed during the cognitive interviews in the instrument development phase[25]. Twenty more items were identified for elimination by the first researcher. The second researcher disagreed with the retain/eliminate decisions for 10 items. After discussion, decisions for 9 items were changed. In the end, 19 items were eliminated because they had lower corrected item-total correlation (n=11), lower variability in responses (n=2), or based on research team opinion (n=6). The final reduced version of the P-TREM has 30 items, with between 1-6 items per content area.

Exploratory Factor Analysis

The overall MSA was 0.94, with MSA for all items between 0.88 and 0.97, and Bartlett Sphericity Test was statistically significant (($\chi 2$) = $\chi 2$ = 4937.4, $p < 0.001$) indicating our factor analysis could proceed. Both parallel analysis and the eigenvalue one test suggested there were 2 factors. We attempted to extract between 1 and 4 factors. The 3 and 4 factor solutions were not a good fit, as there were factors on which no items loaded significantly. The one factor solution fit fairly well (factor loadings 0.45-0.88), however the 2-factor solution with an oblique, "promax" rotation produced the best solution with all items loading significantly (>0.41) on a single factor. Factor 1 loadings ranged from 0.50-1.0, Factor 2 loadings ranged from 0.46-0.88. Table 5.3 contains the rotated factor loading matrix. Three items tended towards item complexity (loading to some extent on both factors), however, they still loaded significantly on only one factor, and were retained in order to maintain the content of the P-TREM.

Factor 1 was interpreted as "Physiotherapist's Role" (25 items), comprising the Ways of Connecting (driven by the physiotherapist), the physiotherapist's contribution to the Conditions of Engagement, and the Bond Elements. Factor 2 was interpreted as "Patient's Role" (5 items) and consisted of items representing the patient's contribution to the Conditions of Engagement. Correlation between factors was 0.71 and the model explained 0.61 of the variance in our data.

Unidimensionality check

The model fit indices for a one factor CFA model were CFI=1.00, TLI=1.04; RMSEA<0.001, and SRMR 0.07, which were all within an acceptable range indicating a good fit.

Table 5.3 Rotated factor loading matrix.

Item number	Item content	Physio-therapist role	Patient role
item 2	helps me understand my injury or condition.	**0.757**	-0.013
item 5	helps me feel hopeful about my future health.	**0.780**	-0.034
item 6	educates me on ways that I can help myself.	**0.704**	0.069
item 7	acknowledges my physical concerns.	**0.706**	0.105
item 8	would notice if I were uncomfortable.	**0.638**	0.108
item 12	moves my injured body part with care.	**0.631**	0.141
item 16	would go 'above and beyond' to help me with my rehabilitation if needed (e.g. research my injury or condition, spend a little extra time with me).	**0.724**	0.012
item 17	is honest with me about how much I can expect to improve.	**0.706**	0.080
item 19	takes the time to get to know me.	**0.827**	-0.040
item 20	gives me their full attention when they are with me.	**0.697**	0.085
item 21	is committed to fully understanding my injury or condition.	**0.803**	0.010
item 22	gives me enough time to talk about my concerns.	**1.016**	-0.193
item 23	would be open to my suggestions.	**0.817**	0.020
item 24	is interested in me not only as a patient, but as a person.	**0.757**	0.093
item 25	understands what is important to me (e.g., my goals, what I value).	**0.678**	0.194
item 29	cares about my well-being.	**0.646**	0.311
item 33	I like my physiotherapist.	**1.045**	-0.243
item 34	I feel respected by my physiotherapist.	**0.915**	-0.092
item 35	My physiotherapist and I work well together as a team.	**0.890**	0.008
item 36	My physiotherapist and I get along (e.g. are friendly).	**0.879**	-0.068
item 37	I care about my physiotherapist as a person.	0.499	0.306
item 38	I am able to be myself with my physiotherapist.	**0.657**	0.209
item 41	I trust that my physiotherapist would tell me if they did not know how to help me with my injury or condition.	**0.626**	0.106
item 42	I trust my physiotherapist enough to discuss a sensitive issue.	**0.635**	0.104
Item 43	I think my physiotherapist would acknowledge a mistake if they made one.	**0.644**	0.086
Item 44	I give my full attention to what we are doing during physiotherapy.	-0.109	**0.875**
Item 45	I am open to hearing suggestions from my physiotherapist.	0.247	0.549
Item 46	I am committed to following our treatment plan.	-0.113	**0.711**
Item 47	I answer my physiotherapist's questions honestly.	-0.099	**0.842**
Item 49	I would tell my physiotherapist if they did something I didn't like during physiotherapy.	0.288	0.458

Validation evidence

Descriptive statistics and ceiling effects for the P-TREM are found in Table 4. Ceiling effects were present in the total score (21.5%), as well as the Physiotherapist role (28.8%) and Patient role domain scores (47.9%). The correlation between the total P-TREM score and the Physiotherapist role and Patient role domain scores was 0.99 and 0.81, respectively.

Table 5.4 Descriptive statistics for total and domain scores.

	Mean	**Standard Deviation**	**Median (Min-Max)**	**Skew**	**Kurtosis**	**Ceiling effects***	**Alpha (confidence interval)**
Total P-TREM score	124.85	13.08	131 (67-135)	-1.66	3.01	21.5%	0.974 (0.968, 0.979)
Physiotherapist role	101.50	11.55	107 (45-110)	-1.84	4.16	28.8%	0.974 (0.968, 0.980)
Patient role	23.35	2.05	24 (18-25)	-0.95	-0.44	47.9%	0.811 (0.769, 0.851)

*Percentage of respondents scoring the maximum

Measurement properties

Internal consistency of the P-TREM total and physiotherapist role domain were excellent and the patient role domain was good (see Table 5.4). We found large correlations between the GRTR and the P-TREM total (r=0.79, CI:0.72-0.84), Physiotherapist role domain (r=0.78, CI:0.72-0.84), and Patient role domain (r=0.58, CI:0.47-0.67), which supports the concurrent validity of the P-TREM. We found low to moderate correlations between the THCP and the P-TREM total (r=0.26, CI:0.11-0.40), Physiotherapist role domain (r=0.28, CI:0.10-0.39), and Patient role domain (r=0.22, CI:0.07-0.36), which offers evidence of convergent validity. Table 5.5 contains the validation evidence by population subgroup for the P-TREM total score.

Table 5.5 Concurrent and convergent validation for P-TREM total score by population subgroups.

Patient population subgroup	Number	Correlation with GRTR (CI)	Correlation with Trust in THCP (CI)	Alpha (CI)
General musculoskeletal	87	0.73 (0.61-0.81)	0.18 (-0.03-0.37)	0.973 (0.964,0.981)
Inherited bleeding disorders	43	0.75 (0.58-0.86)	0.27 (-0.03-0.52)	0.972 (0.959, 0.982)
Inflammatory arthritis	33	0.92 (0.84-0.96)	0.40 (0.07-0.65)	0.976 (0.962, 0.986)

Discussion

Evidence of Validity

In this study, we investigated the quality of the items in the P-TREM, optimized the length of the P-TREM and demonstrated validity evidence for the use of the P-TREM in outpatient in-person settings, for established therapeutic relationships (3 or more encounters with the physiotherapist).

Construct validation. A hypothetical construct such as therapeutic relationship cannot be directly observed, therefore investigating construct validity involves generating hypotheses about the relationships between the scores on the measure being investigated and other variables based on current knowledge and theory.[30,40] The extent to which those hypotheses are supported provides an indication of construct validity for the measure.[30,40] We made two hypotheses about how scores of the P-TREM were related to a global rating of therapeutic relationship and to trust in healthcare providers in general. Our hypotheses were supported, which provides evidence of the construct validity of the P-TREM. The two-factor structure found in the factor analysis aligns with the theoretical framework informing the P-TREM (discussed in more detail in the section "Internal Structure"), which provides some additional evidence to support construct validity. Content validity was established in the development of the P-TREM, with expert review by patients and physiotherapists, cognitive interviews and a content validation process.[25] In this

study, we ensured that the content of the P-TREM was maintained while optimizing the length of the P-TREM. We also observed generally high inter-item and item-total correlations, as well as low rates of non-response to items, which also provides evidence to support content validity. The content of the P-TREM is unique from other measures in its focus on the patient and physiotherapist's connections through the *patient's body*, which includes talking about the patient's physical sensations, as well as physical contact between them (i.e., touch). It also assessed the patient's participation in the relationship.

The findings of this study supported viewing therapeutic relationship as a unidimensional construct. Although a two-factor model was observed in the EFA, the two factors were strongly correlated, and a single factor CFA model fit the data well. In addition, the overall high item-total correlations suggest a unidimensional structure. A measure should be shown to be unidimensional before it makes sense to assess and report co-efficient alpha, a basic measure of the reliability of a scale.[41] A measure showing unidimensionality also supports the validity of using a simple sum total scoring process for a measure.[30] We calculated coefficient α for P-TREM total, as well as the two domains and found all three to represent good evidence for internal consistency. In fact, the α values for the P-TREM were quite high, suggesting there is redundancy in the items and that further reduction in the number of items in the P-TREM could be possible in future studies.[30] However, this is the first study of P-TREM measurement properties with a modest sample size. We did not want to eliminate too many items and risk the content validity of the P-TREM.

We conducted separate analyses for concurrent and convergent validity, as well as internal consistency (co-efficient α) for the three patient population subgroups in this study (i.e., inherited bleeding disorders, inflammatory arthritis, general musculoskeletal). In all population

subgroups, α values for the total score were excellent. The P-TREM score was strongly associated with the participant's global rating of therapeutic relationship, supporting concurrent validity. The hypothesis for convergent validity was partially supported, as associations between Trust in Healthcare Providers and the P-TREM total score were small to moderate, however not statistically significant for the musculoskeletal and inherited bleeding disorders subgroups. Additionally, patients from all three subgroups and clinicians working with these populations were involved in the development of the instrument, verifying the comprehensiveness and relevancy of the items to their experiences with their physiotherapists. Overall, there is enough evidence to support the use of the P-TREM in these three populations.

Internal structure

The EFA revealed two factors in the P-TREM: "Physiotherapist role" with 23 items and "Patient's role" with 5 items. These two factors may be considered domains in the P-TREM. The items in the "Physiotherapist role" domain refer to the *patient's perception* of the physiotherapist's actions during encounters (Connections), the physiotherapist's "way of being" (Conditions) in the relationship, and the Bond elements (i.e., trust, respect, caring, and rapport). The items in the "Patient role" domain refer to the *patient's self-reported* participation in the Conditions of Engagement (i.e., being present, being genuine, being committed, being receptive). Miciak described the conditions in the therapeutic relationship as being mutually generated by the patient and physiotherapist.[6] There are no P-TREM items that directly assess the patient's participation in Establishing Connections because the activities of a physiotherapy session are typically driven by the physiotherapist with the patient acting as a collaborative partner.[12]

There seems to be an imbalance between the patient role domain (5 items) and the physiotherapist role domain (25 items). This could be due in part to our current understanding of

therapeutic relationship, where the physiotherapist is primarily responsible for establishing and maintaining the relationship. Therefore, it makes sense that the patient's role contributes less to the total score. However, it is also possible that our understanding of the patient's role in therapeutic relationship is underdeveloped, and that the content of the items in the Patient role do not capture all aspects of the patient's role. New items may be needed to comprehensively assess this aspect of therapeutic relationship.[1] A second potential reason relates to the low variance in the responses to the item. It may be that the items in the physiotherapist's role domain actually constitutes more than one factor, which were not detected in the EFA due to the low variance in the data. For example, the items assessing the Elements of the Bond may be a separate factor from the Physiotherapist role in Connections and Conditions.

The physiotherapist and patient role dimensional structure we found for the P-TREM differs from that found in other measures of therapeutic relationship used in physiotherapy. This is most likely due to how therapeutic relationship is conceptualized in the measurement framework that informed the tool. The Person-Centered Therapeutic Relationship in Physiotherapy Scale (PCTR-PT) is a Spanish-language measure developed for use in all physiotherapy populations. It was found to have a four-dimensional structure: Relational Bond, Individualized Partnership, Therapeutic Communication and Professional Empowerment.[42,43] The PCTR-PT contains items asking about the emotional attachment between the patient and physiotherapist (i.e., there is mutual trust between us) and the way they work together (e.g., My physiotherapist and I agree on what I want to achieve from treatment). However, in contrast to the P-TREM, there are no items directly asking the patient about their individual participation in the therapeutic relationship, which may explain why a patient/physiotherapist dimensional structure is absent. The working alliance inventory (WAI) and its adaptations for rehabilitation,

the most commonly used measure in physiotherapy research, is similar to the PCTR-PT in that it assesses emotional attachments and collaboration between the patient and therapist but does not ask the patient directly about their participation.[44] The WAI has three domains: Goals, Tasks and Bond and it is common for the Goals and Tasks items to form one dimension, while the Bond items load as a separate dimension.[23,24]

There are some examples of measures where mutuality, or both the patient and healthcare provider's participation, are present in measures of similar constructs (e.g., patient-healthcare provider communication). One example of this is the Patient Involvement in Communication Scale and its modifications, which ask the patient about the healthcare provider's behaviour and "manner", as well as the patient's active involvement in communication, such as offering opinions on their treatment and information about their condition.[45,46] The Roter Interaction Analysis System is used to analyze communication in healthcare encounters and codes both the patient and healthcare provider's behaviours. Interestingly, the measurement of the concept of patient engagement, related to therapeutic relationship in that it can be defined as the process of gradual connection between the patient and physiotherapist, has the opposite issue.[47] Patient engagement measures often focus on the patient's actions and perceived attitudes to quantify the quality of engagement, despite the body of evidence that the healthcare provider's attitudes and actions play an important role in patient engagement.[47]

Ceiling effects

Ceiling effects, or a skew towards the favourable end of a response scale, are a common problem, especially when a clinician is being rated.[30] This may be due, in part, to biases inherent to patient responses, such as acquiescence and social desirability bias.[30,48] We implemented three strategies in constructing the P-TREM in an attempt to overcome the problem of ceiling effects.

The first was to use a 6-point Likert type scale, which has more potential for variability in response than a scale with fewer points.[30] The second was to ensure the content of the measure was comprehensive, as under-representation of a construct can results in ceiling effects.[49] Related to this, we also included items that directly address negative experiences in rehabilitation (e.g., "I think my physiotherapist would acknowledge a mistake if they made one"), which could help capture a broader range of relationship experiences.[26] Despite these strategies, the P-TREM showed ceiling effects in this study, in that 21.5% of participants scored the maximum score possible. This could be due to a bias in the sample, or a property of the P-TREM that will need to be addressed in further studies.

It is possible that there was a bias in the sample in this study due to the recruitment procedures. In the majority of recruitment sites (5 of the 8 clinics), physiotherapists approached their patients for participation using a non-consecutive approach. In these clinics, it seems likely that there could be an unconscious bias on the part of the physiotherapist to approach only those patients with whom they have a good relationship, and also possible that the patients who agreed to participate would be more willing to do so if they had a good relationship with their physiotherapist, since trust in the person asking a potential participant to complete a survey improves participation rates.[50] The recruitment procedures, in addition to very high mean score on the global rating of therapeutic relationship (9.4/10) in our sample, supports the idea that our sample may have better therapeutic relationships than might be expected in our target population. This makes it difficult to parse out whether the ceiling effects observed are true ceiling effects or a product of sampling bias. Another consideration is that we focused on measuring the therapeutic relationships of relatively long, established relationships (median duration of 2 years in this sample). Presumably, these patients have a good therapeutic relationship if they are

returning to their physiotherapist over multiple years. We selected this timeframe given the clinical populations of interest, which typically have longstanding relationships with physiotherapists. However, this could be another explanation for the ceiling effects observed.

Ceiling effects are consistently reported in measures of physiotherapy therapeutic relationships. Therefore, it could also be possible that physiotherapists generally develop positive relationships with their patients. If this is true, a high-quality measure should still have the capacity to differentiate between good, better and excellent therapeutic relationships, therefore more work in the area of addressing ceiling effects is needed. Paap et. al. (2020) used a strategy of replacing a balanced Likert frequency type scale with a Visual Analog Scale with the lower anchor "Sometimes" and the upper anchor "Always" in the WAI-ReD.[51] Their strategy was effective in reducing apparent ceiling effects, but whether that translates into a meaningful increase in the discriminating capacity of the scale still needs to be evaluated. Another strategy that could be implemented is to use an unbalanced Likert scale, with more options on the positive end. For example, in the P-TREM, this might look like a traditional 6-point Likert scale where the "average" or neutral response is closer to the negative anchor descriptor.[30]

Strengths and limitations

A strength of this study was our rigorous approach to validity testing, following the recommendations of the Consensus-based Standards for the Selection of health status Measurements Instruments.[52] The survey was anonymous, reducing the likelihood of response bias in participants, and participants were recruited from multiple clinical sites which enhanced the variability of the physiotherapists in the study.

The study sample represented the target population in most respects, however, as discussed above, it is conceivable that the recruitment strategy resulted in a bias in our sample

toward participants with better therapeutic relationships than would have been expected with the target population. The skew towards more positive relationships reduced the variability in the responses to the items. This could have impacted this study in several ways. It may have resulted in over-estimation of the ceiling effects of the P-TREM, less variability among the inter-item correlations, making it challenging to distinguish higher quality items from those of lower quality. It also makes it difficult to ascertain whether the validity evidence presented here would apply to a population with poorer therapeutic relationships. Furthermore, as discussed above, significant factors in the internal structure may have been missed, and internal consistency may also have been over-estimated. It also impacted our ability to use item response theory modelling in the scale development because very few respondents chose the response options at the lower end of the scale.

Future directions

Future studies should replicate factor analysis in a larger sample, where participants are recruited by an independent, neutral member of the research team (i.e., not the physiotherapist), using a more rigorous (e.g., concurrent enrolment) approach to sampling. A study with a larger sample size could also optimize the length of the P-TREM using item response theory methods to reduce the number of items and improve its performance in terms of discriminative capacity and ceiling effects. Further validation testing would also be useful to investigate the predictive validity and responsiveness to change of the P-TREM. While we focused on established therapeutic relationships as our target population, subsequent studies could examine the validity of the P-TREM for therapeutic relationships earlier in their development (e.g., after 2-3 encounters), or focus on a population with generally poorer therapeutic relationships, in which the P-TREM may perform differently.

More research characterizing the distinct contributions of the patient and physiotherapist to the therapeutic relationship, perhaps linking with patient engagement research, would be useful to ensure all aspects of the patient's role in therapeutic relationship are comprehensively assessed by the P-TREM. Understanding how the patient and physiotherapist contribute to the quality of a therapeutic relationship could inform efforts to improve therapeutic relationships in clinical practice.

Future measures should be developed that capture the quality of a therapeutic relationship from the perspective of the physiotherapist and also in more complex scenarios (e.g., individuals with cognitive impairment, pediatrics) where more than two people are involved in the therapeutic relationship. Modifications to the P-TREM for use in telerehabilitation or other clinical settings that do not involve direct patient contact should also be investigated.[20]

Final P-TREM specifications

The reduced P-TREM has a total of 30 items, scored 0-5, with the sum total score ranging from 0-150. All items have a 6-point ordinal response scale (Likert-type) ranging from strongly disagree to strongly agree. It is estimated to take 5-10 minutes to complete. It is intended for use in a population of patients with established therapeutic relationships during outpatient, in-person therapy. The P-TREM represents therapeutic relationship as a unidimensional construct. The magnitude of the total score from the P-TREM should be interpreted as the quality of a physiotherapy therapeutic relationship as a single entity, where a higher score indicates a relationship of higher quality. The final P-TREM scale is available as Appendix 5.3. A full list of the items with their content based on Miciak's framework is available from the corresponding author.

It should be noted that interpretations should only be made based on the total score from the P-TREM. There is insufficient evidence to interpret scores from each domain. For example, a low score on the Patient role items should not be interpreted as the patient not participating fully in the therapeutic relationship.

Conclusion

To our knowledge, the P-TREM is the first English-language patient-reported measure of therapeutic relationship based on a physiotherapy-specific theoretical framework. This study demonstrated validity evidence and supports the use of the P-TREM as a unidimensional measure in research for the purpose of quantifying the quality of therapeutic relationships in outpatient, in-person physiotherapy. Using the P-TREM could help physiotherapy researchers develop an understanding of the mechanisms of therapeutic relationship and how it impacts treatment outcomes. Further research is needed to evaluate the P-TREM administered earlier in the development of the relationship or within clinical settings that do not involve direct contact with patients (i.e., telerehabilitation).

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Author contributions

All authors made a substantial contribution to the design of the work, revised the article critically for important intellectual content and approved the version to be published.

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CHAPTER 6: Discussion and Conclusions

Introduction

This dissertation is comprised of a series of four papers, each building on the next, culminating in the evaluation of a physiotherapy-specific measure of therapeutic relationship – the Physiotherapy Therapeutic RElationship Measure (P-TREM). The first paper was a scoping review of the measures of therapeutic relationship and related constructs that have been used in research for patients with hemophilia. The study revealed a gap in current knowledge - there were no existing measures that could be used to adequately capture therapeutic relationship in physiotherapy. This provided the justification/direction for subsequent papers.

The second paper explored measurement theory in relation to therapeutic relationship in physiotherapy and summarized various approaches to measuring this complex, abstract phenomenon. It included a description of Miciak's framework of therapeutic relationship in physiotherapy and discussed its suitability as the conceptual basis of a measurement instrument for therapeutic relationship. It also provided examples of how Miciak's framework could be applied to three different measurement systems (e.g., patient-reported, physiotherapist-reported, behaviour-coding). The second paper provided the theoretical basis for the third and fourth papers, which described studies to develop and test the P-TREM.

The third paper outlined a study for the early development of the P-TREM, which included item generation, expert review, a content validation study and cognitive interviews. It produced a preliminary version of the P-TREM with 49 items, 3-7 items per key concept in the Miciak framework. The fourth paper aimed to evaluate the validity of the P-TREM and optimize its length. The end result was a 30-item version of the P-TREM with 1-6 items per content area. It showed good concurrent and convergent validity, as well as internal consistency.

Major Findings

In this dissertation we adopted the conceptualization of validity put forth by the American Educational Research Association in the *Standards for Educational and Psychological Testing* (herein, *Standards.*[1] We viewed validation as a three-step progression: (1) State the purpose of measurement; (2) State the inferences made when the instrument is used; (3) Evaluate the evidence to support those inferences. The *Standards* use sources of evidence to describe validity evidence.[2] The sources are evidence based on: content (e.g., measure grounded in theory, expert review of the relevance of items); response process (e.g., cognitive interviewing), internal structure (e.g., factor analysis); relations to other variables (e.g., correlate scores with a related instrument); consequences associated with measure use (e.g., feasibility of implementing the measure).[2]

The P-TREM was designed for the purpose of quantifying the quality of a therapeutic relationship in outpatient physiotherapy settings for individuals with conditions affecting the musculoskeletal system. The intended interpretation of the score from the P-TREM is that the total score is an indication of the magnitude of strength of a therapeutic relationship. There are inferences and assumptions made when making an interpretation about a therapeutic relationship based on the P-TREM score. Papers 3 and 4 in this dissertation provide evidence to support those inferences and are outlined below, structured by sources of evidence.

Evidence based on content and response processes

The validity of the content and response processes for the P-TREM were examined in Paper 3 (i.e., measure development process) and Paper 4 (i.e., validation study). There were 4 main elements in Paper 3 that supported the validity of the P-TREM: 1) the conceptual basis for the P-TREM being a comprehensive, detailed theoretical framework of therapeutic relationship in

physiotherapy, 2) the content validation process by experts with knowledge of therapeutic relationship, 3) items were found to be comprehensible, relevant and comprehensive in the expert review (patients and physiotherapists), and 4) cognitive interviews ensured items were interpreted as intended.[3] From Paper 4, we found generally high inter-item and item-total correlations, as well as low rates of non-response to items in the P-TREM which also provides evidence to support content validity.

Evidence based on internal structure

The results of the Confirmatory Factor Analysis (CFA) in Paper 4 support viewing therapeutic relationship, as measured by the P-TREM, as a unidimensional construct. Although we did find a two-factor model using exploratory factor analysis (EFA), the two factors were strongly correlated, and a single factor CFA model fit well. We found that the internal consistency of the P-TREM was excellent. In fact, the P-TREM alpha co-efficient was so high that it suggests there is redundancy in the items and that further reduction in the number of items could be possible.[4]

The two-dimensional structure found in the EFA aligns with the theme "*The therapeutic relationship is a "mutual endeavour"* (i.e., both the physiotherapist and patient contribute to the therapeutic relationship)" from Miciak's therapeutic relationship framework. This finding that the dimensional structure aligns with the theory informing the P-TREM provides additional evidence to support its validity. Future work should replicate the EFA in a larger sample to see if support for the two-factor structure is maintained.

Evidence based on relations to other variables

Paper 4 explored the associations between P-TREM scores and external variables. We proposed two hypotheses based on (1) respondent's trust in healthcare providers in general, and (2)

respondent's global rating of therapeutic relationship. Both hypotheses were supported by evidence from the study. We also examined these associations with our sample stratified by patient diagnostic subgroup (inflammatory arthritis, inherited bleeding disorder, general musculoskeletal conditions), and found that while there was some variability in the strength of associations, the hypotheses were supported across populations.

An additional source of evidence based on external variables would have been testing for differential item functioning (DIF). We intended to explore how patient characteristics such as diagnostic subgroup, gender, age, severity of the condition, type of clinical setting (community or specialized hospital clinic), and patient preferences for control of decision-making, might have influenced responses to the items. Unfortunately, our sample size and the distribution of responses did not allow for this type of testing to be carried out and produce trustworthy results. Therefore, future work should include testing for the presence of DIF in the P-TREM items, across variables that might influence therapeutic relationships in physiotherapy.

Situating the P-TREM within Existing Theory and Knowledge

Internal structure

The two-dimensional internal structure of the P-TREM found in the EFA, with physiotherapist and patient domains, aligns with theory about therapeutic relationship. The idea of patient and physiotherapist both actively contributing to the therapeutic relationship (i.e., *mutuality*) is present in the theme from Miciak's framework: *The therapeutic relationship is a "mutual endeavor.*[5] In Bordin's tripartite model of working alliance, often used as a conceptual framework for research in physiotherapy, mutuality is also present. In Bordin's model, the patient's role is described in terms of their collaboration in setting goals and in the tasks of therapy, as well as their emotional attachments with their therapist.[6] Physiotherapy researchers

also highlight the patient's emotional attachments (e.g., mutual trust and respect, affinity or rapport) as part of therapeutic relationship.[7,8] However the patient's personal characteristics, such as expectations for the outcomes of treatment and willingness to engage, are often seen as influencing the therapeutic relationship.[7,9,10] This is slightly different from Miciak's framework, where the patient's "willingness to engage" would be conceptualized as part of their contribution to the *Conditions* component of a therapeutic relationship.[11]

Beyond theory, it makes sense that a measure of therapeutic relationship should include items that assess both actors in the relationship. Therapeutic relationship is an interpersonal phenomenon where two people come together, each contributing to the relationship, influencing one another's actions, state of being, and feelings. While the therapeutic relationship may be directed or driven by the physiotherapist, it seems likely that the patient's intentions and attitudes toward engaging in the collaborative work of rehabilitation will also influence its quality. For example, a patient who is committed to doing the work of their treatment plan (e.g., performing their home exercises, activity modifications) may bring out a sense of respect and trust on the part of the physiotherapist, strengthening the bond or emotional attachment between them. Given that both the patient and physiotherapist contribute to the relationship, including items that assess both actors' participation in the relationship in the P-TREM adds to the content validity of the measure. However, it is unknown whether the patient's self-report of their participation corresponds to their behaviours and attitudes in practice and this should be investigated in further validity studies.

Proposed subscales

We had proposed five subscales based on Miciak's theoretical framework for therapeutic relationship. The first set of subscales was based on the three components of therapeutic

relationship in Miciak's framework (*Conditions, Connections, Bond*), but these were not supported by the data in Paper 4 (i.e., items did not relate more strongly with its own subscale, and less with the other). This was somewhat expected, given the challenge of taking abstract concepts from the Miciak framework and operationalizing them into concrete terms that are interpreted the same by and relevant to all respondents. In writing items for the P-TREM, we found that the *Connections* component was straightforward, likely because it is the most concrete in that it describes *actions* taken by the physiotherapist during the encounter. The *Conditions* component is more abstract in that it describes the "state of being" of both the physiotherapist and patient. Operationalizing the *Conditions* into concrete terms for items was difficult. The items relied on the *patient's interpretation of the physiotherapist's behaviours* to signify their state of being, therefore the items tended to sound similar to the *Connections* items. This is likely why they were not found to be separate dimensions. The *Bond* (trust, respect, rapport and caring), while abstract, are familiar concepts for most people and therefore items were less difficult to write. We did not find that the *Elements of the Bond* items were clearly more related to the other items in the *Bond* subscale, however, subsequent factor analysis might reveal it as a separate dimension. This would be similar to findings from factor analyses of the Working Alliance Inventory that has 3 domains, one of which is a similar construct (the Bond) and is often found as a distinct factor.[12,13]

We also proposed subscales representing the professional and personal aspects of the physiotherapy therapeutic relationship. The analysis of the item-subscale correlations suggested that this could be a possible scaling structure to investigate in future studies. Distinguishing the personal and professional aspects of therapeutic relationship in physiotherapy is a feature of Miciak's framework and of the P-TREM content that distinguishes it from other

conceptualizations of therapeutic relationship in physiotherapy. The 'professional' aspects of therapeutic relationship refer to the professional responsibility of physiotherapists to help the patient reach their rehabilitation goals. "*My physiotherapist moves my injured body part with care*" and *"My physiotherapist helps me feel hopeful about my future health*" are examples of "professional" items. The professional aspects of patient-provider relationships have traditionally been the focus of research and clinical practice. They can in some ways be considered analogous to Bordin's "working alliance" construct, in that it describes the part of the relationship needed to do the "work" of physiotherapy. Though arguably, some parts of Bordin's bond component could be considered personal, such as 'liking' or an affinity for the patient or therapist.

Miciak et. al. (2015) describes the "personal" in therapeutic relationship as being the physiotherapist and patient relating on a personal level (i.e., taking an interest in or caring about one another in ways that are not part of the specific goals and tasks of the rehabilitation process)[5]. For example, P-TREM items such as "*My physiotherapist is interested in me not only as a patient, but as a person*" and "*My physiotherapist takes the time to get to know me*" were deemed as assessing the personal aspects of therapeutic relationship. The personal aspects of relationships between patients and physiotherapists have been recognized to some degree, at least to the extent that the idea that physiotherapists should view the patient as a whole person. Tasker, Loftus, & Higgs (2012) identified personal aspects of the relationship to be important with themes "interest in me as a person" and "an emotional connection".[14] Besley et al. (2011) identified "personalized therapy" (i.e. holistic, whole body and person therapy) as one of the core themes of therapeutic relationship in physiotherapy in their literature review. The practitioner-as-person has been recognized in the patient-centred care literature from the general medicine literature.[15,16] The discipline of psychotherapy consistently conceptualizes the personal aspects of

relationship, the "real relationship" (i.e., the person-to-person relationship that invariably exists any time two persons get together), as theoretically distinct from the professional - the aspect of the relationship that exists to do the work of therapy (i.e., "working alliance").[17,18] There is less written about the physiotherapist being viewed as a whole person within the therapeutic relationship, although MacLoad & McPherson (2015) propose that intimacy, authenticity and a real human connection have an essential role in rehabilitation clinical interactions.[19]

We were interested in understanding whether personal and professional aspects of therapeutic relationship could be distinguished in the P-TREM for two reasons. The first is that we are not aware of any measures that distinguish those two dimensions, although the PCTR-PT does seem to include items that could be considered as tapping into the personal aspects of the relationship. The second is because it is possible that these two constructs make unique contributions to outcomes, based on findings from psychotherapy. In psychotherapy therapeutic relationship theory, there are two constructs that are similar to the personal and professional aspects of therapeutic relationship, the "real relationship" and the "working alliance" (i.e., working collaboration between therapist and patient). There is evidence that these two constructs are moderately correlated, but that each makes a unique contribution to the variance in the outcomes of therapy.[17,18] It seems important to understand whether each of the personal and professional aspects makes a unique contribution to the outcomes of physiotherapy treatment. This information could inform efforts aimed at improving therapeutic relationships (e.g. training programs or system-level changes to how care is delivered). It is possible that future work with the P-TREM could focus on creating subscales that distinguish the items that tap into these two aspects of therapeutic relationship.

Strengths and Limitations

This dissertation research was built upon a solid theoretical foundation that informed design of the development studies and content of the Physiotherapy Therapeutic RElationship Measure (P-TREM), the main product of this dissertation. The main challenge encountered was recruitment, due in part to a global pandemic. Public health restrictions caused some potential recruitment sites to close, delayed initiation of recruitment in others, while some sites completely withdrew their participation. Clinics were also operating at reduced capacity in terms of patient numbers, which limited the number of potential participants that were approached. This affected both the instrument development phase and the validation study.

For instrument development, we desired representation in our sample in the sense that we tried to interview the greatest cross-section of the population possible to identify a wide range of problems in the items.[20] Due to recruitment challenges, our sample was less representative in terms of education level. However, we were able to obtain a sample with diversity in other characteristics, and our strategy of continuing data collection until no new information was forthcoming likely compensated for this.

For the validation study, two recruitment sites which had previously agreed to participate withdrew due to pandemic-related resource issues, and all remaining sites were operating at a reduced capacity. Both issues limited our pool of potential participants. As discussed in Paper 4, the recruitment strategy was also affected due to clinic resources. Recognizing the increased resources needed by clinics to operate during the pandemic, we felt it ethically responsible to reduce the burden on the recruiting clinics as much as possible. Therefore, clinics selected a recruitment approach that best suited their situation at the time (i.e., voluntary or consecutive recruitment by physiotherapists, administrative staff, independent research assistant or through email and posters). Only 2/8 clinics had the capacity to recruit participants following the planned

recruitment procedures (i.e., consecutively, by a research assistant not affiliated with their clinic). Five out of eight clinics chose a recruitment strategy where the physiotherapists directly recruited potential participants in a non-consecutive manner, and one clinic emailed all eligible patients from their clinic about participating in the study. Both of these modified recruitment strategies have the potential to result in a selection bias. The physiotherapists may unconsciously approach only those patients with whom they have better relationships, and patients with better relationships are also more likely to participate.[21] There is also the potential for increasing measurement bias in this recruitment strategy, where participants may have responded more favourably to questions about their physiotherapist since they believed their physiotherapist had access to their responses. This is despite reassurances that the survey was completely anonymous.

The skew in the data towards positive relationships resulted in a high proportion of ceiling effects observed in the validation study (21.5% of respondents scoring at the top end). Ceiling effects are common in measures where a clinician is being rated, but are a problem because they reduce the capacity of the measure to discriminate between good relationships and also reduce its responsiveness to change[4]. It is not possible from this study to conclude whether the ceiling effects were due to a selection bias, a true property of the P-TREM, or because physiotherapists in general develop good relationships with their patients (which would make it difficult for any measure to discriminate between good relationships). The work of Paap et al. (2019) examining the measurement properties of the Working Alliance Inventory - Rehabilitation Dutch (WAI-ReD) across a variety of rehabilitative therapists (physiotherapist, hand therapist, speech therapists, psychologists and psychomotor therapists) seems to indicate that physiotherapists overall have good relationships. The WAI-ReD showed no ceiling effects

for the overall total score when the distribution of scores were stratified by healthcare discipline, but it appears physiotherapists were rated quite highly by participants. There may have been ceiling effects present in the physiotherapist scores, although this is not directly reported.[13] Another validation study with a more rigorous approach to recruitment would help clarify the source of ceiling effects in the P-TREM. Regardless, a high-quality measure of therapeutic relationship should be able to distinguish between relationships that are of higher quality, therefore, more work on the P-TREM may be necessary. Some strategies that could improve ceiling effects are modifying the response scale, and/or using item response theory (IRT) methods to select items that discriminate best between higher quality relationships.

Future Directions

A measurement instrument is considered valid for the purpose and context of use for which it was developed and tested.[4] It is possible that the use of a measure could be expanded to other purposes (i.e., different populations, clinical settings, capturing change), however, evidence for the expanded purpose should be examined and any gaps in the evidence addressed. Table 6.1 illustrates some expanded purposes of the P-TREM and corresponding evidence that will need to be gathered to justify these expanded purposes.

Table 6.1 Framework for validating the use of P-TREM for other purposes and in other contexts.

Expanded purpose	Additional evidence needed	Evidence source
Monitoring the quality of therapeutic relationships in clinical practice.	– Clinical feasibility	Consequences associated with measure use
Evaluating change in therapeutic relationship quality.	– A change in the score on the P-TREM reflects a change in the quality of a therapeutic relationship being measured.	Relationship to external variables
All items function similarly across patient subgrouping variables.	– Investigation of differential item functioning shows that items function similarly across patient subgrouping variables	Relationship with external variables
Evaluate therapeutic relationships in different patient populations (e.g.,	– The items are comprehensive and relevant to therapeutic relationship in this setting,	Content

neurological rehabilitation, in-patient rehabilitation).	according to patients and clinicians with experiences in that area.	
	– Moderate associations between global rating of therapeutic relationship and P-TREM scores observed in the population.	Relationship to external variables
	– Differential item functioning investigation	Relationship to external variables
Evaluate therapeutic relationship within a single session.	– The items are written in a way that is relevant to therapeutic relationship in a single session.	Content
	– There is a moderate association between a single session rating scale and the P-TREM scores	Relationship to external variables
Evaluate therapeutic relationships developed over telerehabilitation encounters.	– Remove or rewrite items not relevant to telerehabilitation	Content
	– Scoring system linking P-TREM scores from telerehabilitation to score from traditional delivery	Content
The "physiotherapist role" domain and the "patient role" domain can be used to make interpretations about how each is contributing to the quality of the relationship.	– The items in the P-TREM comprehensively cover the patient's participation in the therapeutic relationship	Content
	– Replication of factor analysis results	Internal structure
	– An association between patient relationship behaviours and attitudes and patient role domain score – An association between physiotherapist relationship behaviours and attitudes and the physiotherapist domain score	Relationship to external variables

As outlined above, there were limitations in our sample size and variability of responses to the items in the P-TREM, which may have been due to Paper 4 recruitment methods. The validation study should be repeated with the full preliminary P-TREM (49 items) in a study with a larger sample, using a recruitment method less prone to sampling bias (e.g., participants recruited consecutively by a research assistant not involved in the patient's care). A modification to the response scale, where an unbalanced Likert scale, with more options on the positive end, could be considered as well as a strategy to reduce ceiling effects. This would allow the replication of the factor analysis to verify whether the two-dimensional structure and unidimensionality are present in the new sample. A larger study might also permit the application of IRT methods to P-TREM refinement. IRT may be more effective at optimizing the length of the P-TREM with the aim of improving its discriminative capacity and reducing ceiling

effects. It would also allow the investigation of differential item functioning, which would give an idea of the validity of using the P-TREM across different patient populations. If this study found that the P-TREM items meet assumptions for use of IRT (i.e., unidimensionality, local independence), and the sample size were sufficient (minimum of 500 participants), the P-TREM items could be calibrated and used as a bank of items for computerized adaptive testing, which can improve the efficiency and precision of measurement of therapeutic relationship.[22]

Finally, if researchers were interested in examining the personal and professional aspects of therapeutic relationship, the analysis from the validation study in Paper 4 suggests the possibility of creating a set of subscales from the P-TREM items that measure each construct separately.

Clinical Implications

The P-TREM will be useful for researcher who want to quantify the quality of therapeutic relationships. It may be useful in trials examining the effects of therapeutic relationship on treatment outcomes. It may also be useful as an outcome measure in trials examining the effectiveness of interventions to improve therapeutic relationships, although the responsiveness of the P-TREM should be tested prior to this use. The findings of this type of research will enhance practicing physiotherapists', like the one in our opening vignette, understanding of how to use the positive benefits of therapeutic relationships to improve the effectiveness of their physiotherapy interventions.

Building and maintaining a good therapeutic relationship with a patient is often considered part of patient-centred care.[9,10,16] With further development and testing, the P-TREM may be used to monitor therapeutic relationship quality in clinical practice. This information could be used by administrators to identify a need for staff training, or to inform decisions about

program delivery in order to enhance patient-centredness. Physiotherapists could also use this information to enhance their reflections on the relationships they build with patients in their practice.

Conclusions

We have made a significant contribution to the literature on the measurement of therapeutic relationship in physiotherapy. We developed a new measure of therapeutic relationship, the P-TREM, based on a comprehensive, detailed, theoretical framework for physiotherapy. It contains items that assess how the patient and physiotherapist connect through the patient's body and physical condition, including touch (physical contact) between them. This makes it unique from other measures used in physiotherapy research. We provided evidence for the validity of the P-TREM for use in populations of patients with musculoskeletal issues.

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APPENDICES

Appendix 2.1. MEDLINE search strategy

Topic	Population	Measurement instruments
1. professional-patient relations/ or nurse-patient relations/ 2. ((professional* or doctor* or physician* or nurs* or physiotherap* or physical therap* or social work* or caregiver* or care-provider* or haemophilia treater* or provider* or hemophilia treater*) adj12 (patient* or client* or consumer* or haemophiliac* or hemophiliac*) adj8 (relation* or relationship* or alliance* or bond or communicat* or encounter* or interaction* or collaboration or trust or empathy or compassion* or responsiveness or caring)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] 3. (therapeutic alliance* or working alliance* or helping alliance or physiotherapeutic relationship* or therapeutic encounter* or therapeutic process* or patient-centred* or patient-centered* or shared decision making or patient satisfaction or quality of care or context* factor*).mp.	4. exp blood coagulation disorders, inherited/ 5. (hemophilia* or haemophilia*).mp.	6. (survey* or tool* or index or test* or instrument* or questionnaire* or scale* or psychometric* or validation or validity or factor analy* or health measurement or health measure or outcome measure or outcome assess* or evaluation).mp. 7. "weights and measures"/ or psychometrics/ or questionnaires/ 8. (1 or 2 or 3) and (4 or 5) and (6 or 7)

Appendix 2.2. Examples of item content appraisal

Item	Component	Subcomponent	Reasoning
"You have no worries about putting your life in your doctor's hands" [WFTPS]	Elements of the Bond	Trust	The patient trusts the doctor's professional capabilities
"Your doctor will do whatever it takes to get you all the care you need" [WFTPS]	Conditions of Engagement	Committed	The patient believes the healthcare provider to be committed to taking action to help the patient.
"I feel our doctor understands us and our problems" [Hemo-SAT]	Conditions of Engagement	Receptive	The conditions created by the doctor are such that the patient feels understood.
"Healthcare professionals help me improve my skills to deal with my illness" [UOv]	Ways of Establishing Connections	Using the body as a pivot point	Describes the information exchange between providers and patients having to do with the illness (physical body)
"The doctor gave me some help with my emotional problems" [QUOTE-Communication]	Ways of Establishing Connections	Acknowledging the individual	The patient feels that their problems were acknowledged.
"I always call the treatment center when I have questions about hemophilia or treatment." [Veritas-PRO]	Ways of Establishing Connections	Using the body as a pivot point	Describes accessing/communicating with providers about the disease.
"We feel comfortable at the treatment center/hospital" [Hemo-SAT]	Did not map	-	Not an interpersonal concept
"I am satisfied with the physiotherapy services" [MSPSS]	Satisfaction with care	-	Satisfaction with a service
"If I am lucky, my condition will improve" [MHLC]	Did not map	-	Not an interpersonal concept
"I am genuinely concerned about how (the patient) feels." [WAI-CC]	Elements of the Bond	Caring	Describes an emotional investment in the patient's health on the part of the healthcare provider.

Appendix 2.3. Content analysis of the tools. Results of item appraisal in reference to the components of the therapeutic relationship framework, or 'satisfaction with care'.

Mapped to the framework (number of items)	Wake Forest Trust in Physician Scale	University of Oviedo survey	Mountain States Patient Satisfaction	QUOTE Questionnaire	Multi-dimensional health locus of Veritas-PRO (communication subscale)	Theoretical model of deliberation dialogues	Hemofilia-QoL †	Hemo-SAT (physician/nurse Working Alliance Inventory – Chronic Conditions‡	
Ways of Establishing Connections	**0**	**10**	**4**	**10**	**4**	**4**	**1**	**0**	**17**
Acknowledging the individual		6	4	4		1	1		15
Giving-of-self		1							2
Using the body as a pivot point		3		6	4	3			
Elements of the Bond	**6**	**5**	**4**	**0**	**0**	**0**	**0**	**1**	**11**
Respect			4						4
Trust	5	5						1	3
Caring	1								2
Nature of the rapport									2
Conditions of Engagement	**4**	**9**	**6**	**0**	**0**	**0**	**0**	**1**	**10**
Present			4						0
Receptive	1	3	2					1	7
Genuine	2								1
Committed	1	6							2
Number of items that fit §	10	24	14	10	4	4	1	NA	2	32
Number of items in tool	10	29	37	10	18	4	1	NA	7	36
Comprehensiveness									
Proportion of relationship items††	1.00	0.83	0.38	1.00	0.22	1.00	1.00	NA	0.29	0.89
Components covered (of 3)	2	3	3	1	2	1	1	NA	1	3
Subcomponents covered (of 11)	5	7	2	2	2	2	1	NA	3	9
Component most often covered	elements of the bond	establishing connections	NA	establishing connections	NA	establishing connections	establishing connections	NA	NA	establishing connections
Presence of themes¶										
Mutuality Y/N	yes	yes	no	no	yes	no	yes	NA	yes	yes
Professional Y/N	yes	yes	yes	yes	yes	no	yes	NA	yes	yes
Personal Y/N	no	no	no	no	no	no	no	NA	no	no
Body is central Y/N	yes	yes	no	yes	yes	yes	no	NA	yes	no

† Test items not available, item analysis not possible; ‡ Item analysis carried out using the original long form of the Working Alliance Inventory, because the adapted version was not available; § number of items coded to a component in the framework; ¶ determined by whether the content of the tool covers the themes in therapeutic relationship framework; †† proportion of relationship items over the total number of items in the tool

Appendix 4.1. Full search strategy

MEDLINE (Ovid)
Search notes: we changed the "measurement" search term in this search to the MeSH heading "validation studies/" which made the search results more manageable and retrieved a greater proportion of relevant articles.

1. exp Professional-Patient Relations/

2. ((health professional* or doctor* or physician* or nurs* or physiotherap* or physical therap* or psycholog* or psychotherap*) adj6 (patient* or client*) adj6 (relation* or relationship* or alliance* or bond or communicat* or collaborat* or trust* or empath* or compassion* or responsive* or connection*)).ab.

3. (therapeutic alliance* or working alliance* or helping alliance or physiotherapeutic relationship* or therapeutic encounter*).ab.

4. 1 or 2 or 3

5. validation studies/

6. 4 and 5

EMBASE (Ovid)
Search notes: we changed the "measurement" search term in this search to the MeSH heading "validation studies/" which made the search results more manageable and retrieved a greater proportion of relevant articles.

1. exp professional-patient relationship/

2. ((health professional* or doctor* or physician* or nurs* or physiotherap* or physical therap* or psycholog* or psychotherap*) adj6 (patient* or client*) adj6 (relation* or relationship* or alliance* or bond or communicat* or collaborat* or trust* or empath* or compassion* or responsive* or connection*)).ab.

3. (therapeutic alliance* or working alliance* or helping alliance or physiotherapeutic relationship* or therapeutic encounter*).ab.

4. 1 or 2 or 3

5. validation study/

6. 4 and 5

PsychINFO (Ovid)
Search notes: searched only the abstracts for these search terms, which improved the specificity of the search.

1. therapeutic processes/

2. exp Therapeutic Alliance/

3. (therapeutic alliance* or working alliance* or helping alliance).ab.

4. ((health professional* or doctor* or physician* or nurs* or physiotherap* or physical therap* or psycholog* or psychotherap*) adj6 (patient* or client*) adj6 (relation* or relationship* or alliance* or bond or communicat* or collaborat* or trust* or empath* or compassion* or responsive* or connection*)).ab.

5. 1 or 2 or 3 or 4

6. patient-reported outcome/

7. measurement/

8. 5 AND (6 or 7)

CINAHL (EBSCOhost)
Search notes: searched using the Major subject headings to get a manageable number of results

(MH "Outcome Assessment")

AND

(MH "Professional-Patient Relations+") OR (MH "Physician-Patient Relations") OR (MH "Nurse-Patient Relations") OR (MH "Dentist-Patient Relations")

HaPI – Ovid
Notes: limited to search terms in abstracts

1. (therapeutic alliance* or working alliance* or helping alliance).ab.

2. ((health professional* or doctor* or physician* or nurs* or physiotherap* or physical therap* or social work* or psycholog* or psychotherap*) adj6 (patient* or client*) adj6 (relation* or relationship* or alliance* or bond or communicat* or encounter* or interact* or collaborat* or trust* or empath* or compassion* or responsive* or caring or connection*)).ab.

3. 1 or 2

Rehabmeasures Database (https://www.sralab.org/rehabilitation-measures)
Basic search string:
"therapeutic alliance" or "therapeutic relationship" or "helping alliance" or "patient-provider relationship" or "therapist client relationship" or “working alliance”

Test collection at ETS (http://www.ets.org/test_link/find_tests)
Basic search string:
"therapeutic alliance" or "therapeutic relationship" or "helping alliance" or "patient-provider relationship" or "therapist client relationship" or “working alliance”

Appendix 4.2 Preliminary version of the P-TREM

Physiotherapy Therapeutic Relationship Measure

Welcome

Thank you for taking the time to complete the "Physiotherapy Therapeutic Relationship Measure" about your relationship with your physiotherapist. Therapeutic relationship includes how a patient and their physiotherapist work together, and how they communicate and relate with one another. It also includes things like trust and respect between them.

This is a questionnaire to measure the quality of a physiotherapy therapeutic relationship from the patient's point of view. It will be used by researchers to better understand therapeutic relationships in physiotherapy.

Instructions

We will ask you a series of questions about the way you and your physiotherapist work together to address your health concerns. We will also ask some questions about you, like your age, your injury or condition and how often you see your physiotherapist.

While completing the survey, think about one particular physiotherapist that you have worked with as you answer the questions. For each question, circle the answer that seems most "right" for you. Please take your time answering the questions. It will be most helpful for us if you answer every question.

The questions are based on research that has identified aspects of therapeutic relationships. We expect physiotherapists to be strong in some areas and weak in others. Also, you might find that some questions are not as relevant to your own personal therapeutic relationship.

Please answer all the questions honestly about your experience with your physiotherapist. Keep in mind that this survey is anonymous, your physiotherapist will not know you are participating, and they will not have access to your answers.

Section 1: Physiotherapist's role

The following statements describe some of the actions that your physiotherapist may take towards developing a relationship with you.
Please rate your level of agreement by choosing the answer that best describes your physiotherapist.

My physiotherapist…	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
explains how physiotherapy will help my condition.	○	○	○	○	○	○
helps me understand my injury or condition.	○	○	○	○	○	○
personalizes treatment to my needs.	○	○	○	○	○	○
adapts our treatment plan as my injury or condition changes.	○	○	○	○	○	○
helps me feel hopeful about my future health.	○	○	○	○	○	○
educates me on ways that I can help myself.	○	○	○	○	○	○
acknowledges my physical concerns.	○	○	○	○	○	○
would notice if I were uncomfortable.	○	○	○	○	○	○
appreciates what I know about how my condition affects me.	○	○	○	○	○	○
encourages me to be mindful of sensations in my body (e.g. during hands-on treatment, exercises).	○	○	○	○	○	○
adjusts their touch based on how it feels to me.	○	○	○	○	○	○
moves my injured body part with care.	○	○	○	○	○	○
is respectful when examining me.	○	○	○	○	○	○
listens carefully to what I am saying.	○	○	○	○	○	○
is available for me to contact outside of our appointments, if needed.	○	○	○	○	○	○
would go 'above and beyond' to help me with my rehabilitation if needed (e.g. research my condition, spend a little extra time with me).	○	○	○	○	○	○
is honest with me about how much I can expect to improve.	○	○	○	○	○	○

Section 2: Physiotherapist's way of being

The following statements describe the ways your physiotherapist relates with you in your therapeutic relationship.

Please rate your level of agreement with each statement.

My physiotherapist…	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
is easy to talk to.	○	○	○	○	○	○
takes the time to get to know me.	○	○	○	○	○	○
gives me their full attention when they are with me.	○	○	○	○	○	○
is committed to fully understanding my injury or condition.	○	○	○	○	○	○
gives me enough time to talk about my concerns.	○	○	○	○	○	○
would be open to my suggestions.	○	○	○	○	○	○
is interested in me not only as a patient, but as a person.	○	○	○	○	○	○
understands what is important to me (e.g., my goals, what I value).	○	○	○	○	○	○
respects me for who I am (e.g., my cultural background, gender).	○	○	○	○	○	○
genuinely cares if I get better.	○	○	○	○	○	○
is committed to helping me with my rehabilitation.	○	○	○	○	○	○
cares about my well-being.	○	○	○	○	○	○
is focused on what we are doing during physiotherapy.	○	○	○	○	○	○
gives their best effort during our appointments.	○	○	○	○	○	○
shares some details about their life outside of the clinic (e.g., their hobbies, interests, family, pets).	○	○	○	○	○	○

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Section 3: Relationship elements

Research suggests that the patient-physiotherapist relationship can have friendly aspects to it.

Please rate your level of agreement with each statement.

	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
I like my physiotherapist.	○	○	○	○	○	○
I feel respected by my physiotherapist.	○	○	○	○	○	○
My physiotherapist and I work well together as a team.	○	○	○	○	○	○
My physiotherapist and I get along (e.g. are friendly).	○	○	○	○	○	○
I care about my physiotherapist as a person.	○	○	○	○	○	○
I am able to be myself with my physiotherapist.	○	○	○	○	○	○
I have confidence in my physiotherapist's professional skills.	○	○	○	○	○	○
I can depend on my physiotherapist to do what they have promised to do.	○	○	○	○	○	○
I trust that my physiotherapist would tell me if they did not know how to help me with my injury or condition.	○	○	○	○	○	○
I trust my physiotherapist enough to discuss a sensitive issue.	○	○	○	○	○	○
I think my physiotherapist would acknowledge a mistake if they made one.	○	○	○	○	○	○

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Section 4: Patient involvement

You also have a role in your therapeutic relationship.

Please rate your level of agreement with each statement.

	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
I give my full attention to what we are doing during physiotherapy.	○	○	○	○	○	○
I am open to hearing suggestions from my physiotherapist.	○	○	○	○	○	○
I am committed to following our treatment plan.	○	○	○	○	○	○
I answer my physiotherapist's questions honestly.	○	○	○	○	○	○
I respect my physiotherapist's professional opinion.	○	○	○	○	○	○
I would tell my physiotherapist if they did something I didn't like during physiotherapy.	○	○	○	○	○	○

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Appendix 5.1 Bleeding disorder and inflammatory arthritis participant characteristics

Table 5.1A Bleeding disorder participant demographic and clinical characteristics

Characteristic	Number	Categories	Mean (SD) or Number (%)
Age (years)	40	Years	37.6 (15.8)
Proportion of adolescents	40	Under 18	6 (15)
		18 and older	34 (85)
Gender	43	Female	7 (16.3)
		Male	35 (81.4)
		Prefer not to answer	1 (2.3)
Native Language	43	English	39 (90.7)
		Feel quite comfortable reading and writing English, but not first language learned	2 (4.7)
		Other	2 (4.7)
Education level	43	Some high school	8 (18.6)
		High school diploma	4 (9.3)
		Some post-secondary	9 (20.7)
		Diploma or certificate	10 (23.3)
		University undergraduate degree	7 (16.2)
		Professional or graduate degree	5 (11.6)
Inherited Bleeding Disorders	43	Severe hemophilia	29 (67.4)
		Moderate hemophilia	1 (2.3)
		Mild hemophilia	2 (4.7)
		Von Willebrand disease type 1	2 (4.7)
		Von Willebrand disease type 2	2 (4.7)
		Von Willebrand disease type 3	2 (4.7)
		Other	5 (11.6)
Inhibitor status	34	Active inhibitor	3 (8.8)
		History of inhibitor	5 (14.7)
		None	26 (76.5)
Co-infection	43	Yes	9 (20.7)
		None	33 (76.7)
		Prefer not to say	1 (2.3)
Bleeding Disorder Pharmacological management *	43	On demand	18 (41.8)
		Prophylaxis	26 (60.4)
		Tranexamic Acid	10 (23.3)
		Gene therapy	1 (2.3)
		None	3 (7.0)
Orthopaedic surgery	43	One joint	17 (39.5)
		Multiple joints	12 (27.9)
		Multiple surgeries on a single joint	3 (7.0)
		Other	11 (25.6)
Clinical setting	41	Bleeding Disorders Clinic	26 (63.4)
		Hospital Physiotherapy Department	8 (19.5)
		Physiotherapy private practice	7 (17.1)

*Participants could choose more than one option, therefore does not add up to 100%

Table 5.1B. Inflammatory arthritis participant demographic and clinical characteristics

Characteristic	Number	Categories	Mean (SD) or Number (%)
Age (years)	29	Years	54.7 (12.1)
Gender	33	Female	24 (72.7)
		Male	9 (27.3)
		Prefer not to answer	0
First Language	33	English	29 (87.8)
		Feel quite comfortable reading and writing English, but not first language learned	2 (6.0)
		Other	2 (6.0)
Education level	32	Some high school	0
		High school diploma	4 (12.5)
		Some post-secondary	4 (12.5)
		Diploma or certificate	14 (43.8)
		University undergraduate degree (e.g., BSc, BA)	5 (15.6)
		Professional or graduate degree (e.g., PhD, BScN, MD, MBA)	5 (15.6)
Inflammatory arthritis	31	Rheumatoid arthritis	16 (51.6)
		Ankylosing spondylitis	4 (12.9)
		Psoriatic arthritis	2 (6.5)
		Other/Specify	9 (29.0)
Inflammatory arthritis pharmacological therapy*	33	Disease Modifying Agents (DMARDs)	9 (27.3)
		Biologics	10 (30.3)
		Anti-inflammatories (NSAIDs)	15 (45.5)
		Steroids (e.g., prednisone)	3 (9.1)
		Tylenol	13 (39.4)
		None	4 (12.1)
		Other	4 (12.1)
Patient global assessment of disease activity	31		5.42 (2.51)
Orthopaedic surgery	31	One joint	6 (19.4)
		Multiple joints	7 (22.6)
		Multiple surgeries on a single joint	1 (3.2)
		None	17 (0.54.8)
Clinic type	28	Rheumatology Program	1 (3.6)
		Hospital Physiotherapy Department	5 (17.8)
		Physiotherapy private practice	22 (78.6)
Survey type	33	Online	33 (100)

*Participant could choose more than one option, therefore does not add up to 100%

Appendix 5.2 Corrected item-total correlations for proposed subscales

	Component	Personal or professional	Connections	Conditions	Bond	Personal	Professional
item.1	connections	professional	0.789	0.705	0.724	0.694	0.774
item.2	connections	professional	0.774	0.713	0.743	0.691	0.777
item.3	connections	professional	0.776	0.777	0.753	0.722	0.788
item.4	connections	professional	0.697	0.700	0.738	0.752	0.712
item.5	connections	na	0.765	0.708	0.725	0.708	0.740
item.6	connections	professional	0.745	0.723	0.727	0.688	0.741
item.7	connections	na	0.808	0.782	0.756	0.708	0.810
item.8	conditions	na	0.728	0.751	0.673	0.719	0.713
item.9	connections	professional	0.805	0.760	0.726	0.742	0.788
item.10	connections	professional	0.661	0.642	0.594	0.571	0.660
item.11	connections	professional	0.716	0.724	0.672	0.664	0.722
item.12	connections	professional	0.778	0.735	0.717	0.677	0.785
item.13	bond	professional	0.656	0.626	0.653	0.626	0.676
item.14	conditions	na	0.811	0.787	0.775	0.740	0.815
item.15	connections	professional	0.619	0.556	0.548	0.554	0.580
item.16	connections	na	0.766	0.728	0.714	0.708	0.750
item.17	conditions	professional	0.748	0.759	0.728	0.707	0.750
item.18	bond	personal	0.752	0.733	0.794	0.802	0.756
item.19	bond	personal	0.804	0.770	0.800	0.844	0.781
item.20	conditions	na	0.767	0.768	0.742	0.748	0.766
item.21	conditions	professional	0.801	0.797	0.786	0.737	0.820
item.22	conditions	professional	0.880	0.837	0.821	0.814	0.879
item.23	conditions	professional	0.832	0.818	0.773	0.759	0.833
item.24	conditions	personal	0.807	0.832	0.809	0.868	0.799
item.25	connections	personal	0.811	0.822	0.816	0.827	0.805
item.26	bond	na	0.616	0.643	0.599	0.576	0.603
item.27	bond	professional	0.845	0.858	0.860	0.833	0.861
item.28	conditions	professional	0.866	0.860	0.883	0.855	0.877
item.29	bond	personal	0.855	0.885	0.878	0.860	0.860
item.30	conditions	professional	0.817	0.828	0.813	0.770	0.837
item.31	connections	professional	0.771	0.763	0.744	0.713	0.774
item.32	conditions	personal	0.441	0.516	0.485	0.564	0.454
item.33	bond	personal	0.803	0.783	0.868	0.856	0.821
item.34	bond	personal	0.807	0.784	0.866	0.843	0.821
item.35	connections	personal	0.857	0.851	0.909	0.886	0.874
item.36	bond	personal	0.782	0.796	0.858	0.873	0.801
item.37	bond	professional	0.687	0.749	0.748	0.740	0.719

item.38	conditions	personal	0.756	0.808	0.843	0.842	0.786
item.39	bond	professional	0.822	0.789	0.866	0.785	0.838
item.40	bond	na	0.807	0.808	0.881	0.801	0.833
item.41	bond	professional	0.686	0.719	0.723	0.684	0.715
item.42	bond	personal	0.673	0.717	0.728	0.730	0.694
item.43	conditions	na	0.681	0.735	0.704	0.686	0.699
item.44	conditions	na	0.555	0.631	0.545	0.495	0.579
item.45	conditions	na	0.661	0.676	0.706	0.625	0.678
item.46	conditions	na	0.433	0.484	0.419	0.390	0.436
item.47	conditions	na	0.527	0.599	0.553	0.510	0.535
item.48	bond	professional	0.727	0.722	0.757	0.658	0.746
item.49	conditions	na	0.576	0.698	0.619	0.605	0.615

Appendix 5.3 Reduced version of the P-TREM (next page)

Physiotherapy Therapeutic Relationship Measure

Welcome

Thank you for completing the "Physiotherapy Therapeutic Relationship Measure" about your relationship with your physiotherapist. Therapeutic relationship includes how you and the physiotherapist work together, and how you communicate and relate to each other. It also includes things like trust and respect.

This questionnaire measures the quality of a physiotherapy therapeutic relationship from a patient's point of view. It will be used to better understand therapeutic relationships in physiotherapy.

Instructions

We will ask you a series of questions about the way you and your physiotherapist work together to address your health concerns.

While completing the survey, think about the one particular physiotherapist that you are working with as you answer the questions. For each question, circle the answer that seems most "right" for you. The questions are based on research that has identified aspects of therapeutic relationships. We expect physiotherapists to be strong in some areas and weak in others. Also, you might find that some questions are not as relevant to your own personal therapeutic relationship. Please answer all the questions honestly about your experience with your physiotherapist. It will be most helpful for us if you answer every question.

Section 1: Physiotherapist's role

The following statements describe some of the actions that your physiotherapist may take towards developing a relationship with you.

Please rate your level of agreement by choosing the answer that best describes your physiotherapist.

My physiotherapist…	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
helps me understand my injury or condition.	O	O	O	O	O	O
helps me feel hopeful about my future health.	O	O	O	O	O	O
educates me on ways that I can help myself.	O	O	O	O	O	O
acknowledges my physical concerns.	O	O	O	O	O	O
would notice if I were uncomfortable.	O	O	O	O	O	O
moves my injured body part with care.	O	O	O	O	O	O
would go 'above and beyond' to help me with my rehabilitation if needed (e.g. research my condition, spend a little extra time with me).	O	O	O	O	O	O
is honest with me about how much I can expect to improve.	O	O	O	O	O	O

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Section 2: Physiotherapist's way of being

The following statements describe the ways your physiotherapist relates with you in your therapeutic relationship.

Please rate your level of agreement with each statement.

My physiotherapist…	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
takes the time to get to know me.	O	O	O	O	O	O
gives me their full attention when they are with me.	O	O	O	O	O	O
is committed to fully understanding my injury or condition.	O	O	O	O	O	O
gives me enough time to talk about my concerns.	O	O	O	O	O	O
would be open to my suggestions.	O	O	O	O	O	O
is interested in me not only as a patient, but as a person.	O	O	O	O	O	O
understands what is important to me (e.g., my goals, what I value).	O	O	O	O	O	O
cares about my well-being.	O	O	O	O	O	O

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Section 3: Relationship elements

Research suggests that the patient-physiotherapist relationship can have friendly aspects to it.

Please rate your level of agreement with each statement.

	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
I like my physiotherapist.	○	○	○	○	○	○
I feel respected by my physiotherapist.	○	○	○	○	○	○
My physiotherapist and I work well together as a team.	○	○	○	○	○	○
My physiotherapist and I get along (e.g. are friendly).	○	○	○	○	○	○
I care about my physiotherapist as a person.	○	○	○	○	○	○
I am able to be myself with my physiotherapist.	○	○	○	○	○	○
I trust that my physiotherapist would tell me if they did not know how to help me with my injury or condition.	○	○	○	○	○	○
I trust my physiotherapist enough to discuss a sensitive issue.	○	○	○	○	○	○
I think my physiotherapist would acknowledge a mistake if they made one.	○	○	○	○	○	○

CONTINUED ON NEXT PAGE...

Section 4: Patient involvement

You also have a role in your therapeutic relationship.

Please rate your level of agreement with each statement.

	Strongly disagree	Disagree	Slightly disagree	Slightly agree	Agree	Strongly agree
I give my full attention to what we are doing during physiotherapy.	O	O	O	O	O	O
I am open to hearing suggestions from my physiotherapist.	O	O	O	O	O	O
I am committed to following our treatment plan.	O	O	O	O	O	O
I answer my physiotherapist's questions honestly.	O	O	O	O	O	O
I would tell my physiotherapist if they did something I didn't like during physiotherapy.	O	O	O	O	O	O

Thank you for completing this questionnaire about your relationship with your physiotherapist.