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Correlation of Trust and Outcomes Following Physical Therapy for Chronic Low Back Pain

by

Kory J. Zimney, PT, DPT

A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy

Nova Southeastern University
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Department of Physical Therapy

October 26, 2020

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Abstract

Background: Trust is a key component for developing therapeutic alliance. Improvements in trust have been found to improve outcomes for patients receiving psychiatric and medical physician care. Current trust measurement scales have not been utilized in a physical therapy setting and no studies have explored the relation of trust in provider to physical therapy outcomes.

Purpose: The primary goal was to explore the correlation of patient trust measured at various points within the therapeutic encounter to the change in outcome measurements after receiving physical therapy care.

Research Design and Methods: Non-experimental correlational quantitative analysis of patient trust in their physical therapist as they received care for chronic and persistent low back pain. Participants (n = 30) completed three different trust measurement scales along with a general provider trust scale and therapeutic alliance measurement prior to initial visit, after initial visit, and at discharge. These scales were correlated to outcome measurements through the course of the encounter related to pain, function, and global improvement. Physical therapist measurement of patient connection and engagement was collected from physical therapist during episode of care.

Data Analysis: The Spearman rho correlation was utilized to provide correlational statistics for various trust measurement scales with therapeutic alliance scale, patient connection and engagement, and outcome measurement instruments. Linear regression was applied to individual trust measurement scales and outcome variables for predictive modeling of trust and outcomes.

Results: Trust scores at discharge correlated the most with Global Rate of Change score and change in function at discharge (r_s = 0.47 – 0.72). Change in trust score from post-initial visit to discharge provided the most correlation with pain scores at discharge and change of pain score (r_s = 0.49 – 0.80). Trust measurement scores correlated strongly with therapeutic alliance scale (r_s = 0.74 – 0.86) during the two measurement points.

Discussion: Higher levels of end trust scores showed strong correlation to improved function and global rate of change at discharge. The change in trust scores over treatment showed moderate to strong correlation with increasing trust to lower pain at discharge and greater improvements in change of pain.

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Chapter 1: Introduction

1.1 Introduction

Trust can be defined as "a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another."[1] This psychological state is composed of both thoughts and feelings. Trust has also been proposed to be a primary emotion according to some theorists.[2] There is substantial debate over how many primary emotions there are, what specific emotions are primary, and which are combinations or substrates of the primary emotions.[2-7] This should not deter from the fact that trust is an important psychological state that is vital in the development of social relationships.[8-10] The trustworthiness decision by an individual toward someone else can happen quickly, within 100 milliseconds of exposure to someone,[11] and develop and change over time.[12-14] These changing levels of trust between an individual contribute to the success or failure of that relationship as it proceeds.[8,15] The importance of trust and its development within a relationship carries over into a healthcare relationship between a patient and provider.[9,10,16] For a patient that is seeking care for a healthcare related injury or illness from an unfamiliar person, trust plays a key role in their decision to seek and follow through with care when the patient is in a vulnerable state of health.[16,17]

The healthcare relationship that is formed between a patient and their healthcare provider has been termed working alliance,[18] therapeutic alliance,[19] or therapeutic relationship.[20] For the purposes of this dissertation study, the term therapeutic alliance (TA) will be used to describe the relational component that occurs between patient and therapist during the clinical interaction. TA consists of three essential features: agreement on goals, assignment of a task or series of tasks, and the development of bonds.[18] The TA between a patient and healthcare provider has been studied heavily in the medical fields of psychological[19,21-28] and medical physician[10,29-44]

literature, but to a lesser degree in the physical therapy research.[20,45-48] Evidence in the various healthcare professions have shown that improvements in TA correlate with improved outcomes[25,34,47,49-52] and better adherence to treatment.[38,50,52,53]

The development of a bond between patient and clinician has been foundational to the concept of TA since the early development of the concept.[18] In more recent work that was specific to TA within the physical therapy encounter, bond was again found to be a key component of TA.[20] Miciak's qualitative study looking into TA found that bond consisted of four elements: nature of rapport, respect, trust, and caring.[20] The element of trust was found to be a shared element, not only did the patient have to trust the physical therapist, the physical therapist was found to need to trust the patient as well.

Trust is an important psychological state in any human relationship, especially when vulnerability is greatest. A patient entering into a healthcare relationship with a provider is one of those moments when vulnerability is high because the stakes of the relationship revolve around the individual's health.

1.2 Statement of the Problem

It is evident from a theoretical and empirical standpoint that trust is key to TA. Most healthcare providers would agree that development and advancement of trust within the TA is important for quality care and improved outcomes. TA and its effect on outcomes in healthcare has been well studied, but the research into the specific element of trust within the bond that is formed during TA less so.[41,54] This overall healthcare trend of limited study into the construct of trust as it relates to patient care is also evident in the specific field of physical therapy. While a few studies have explored TA and its effect on physical therapy outcomes,[46,47,55] to date based on this investigator's review of the literature there have been no studies looking specifically into the

area of trust and its associated effect on outcomes. One drawback from looking specifically at trust within the physical therapy literature is there are no trust measurement scales established for the context of a physical therapy encounter. There have been trust measurement scales established for the physician and psychology literature,[28,29,39,53] but none of these scales have been used within a physical therapy setting. A concern with blindly adopting these scales in physical therapy is partly due to a different relational dynamic present during a physical therapy encounter compared to a medical physician or psychologist encounter with patients, so these scales may or may not be appropriate. Physical therapy encounters with patients are often more transient in nature and not as long standing as seen with medical doctors caring for patients with chronic conditions over several years. In addition, the relational dynamic between a physical therapist and a patient is most likely different from those being seen for psychotherapy because of the nature of the treatment focus and diagnoses involved.

Because trust within the TA has been found to be a bidirectional shared element, further study into the physical therapist's trust of the patient may deserve attention and study. In July 2015 at the American Physical Therapy Associations Section on Research Retreat – Piecing Together the Pain Puzzle: The Biopsychosocial Model, Lorimer Moseley, PhD, shared in personal conversation that his research team found there was a strong correlation of the physical therapist's perceived "connection" to the patient and improved outcomes. These findings were not associated with a validated measurement instrument, so to date it is still unpublished. This perception of connection and engagement with the patient may also have some association with patient trust and outcomes.

1.2.1 Specific aims

The primary goal of this dissertation was to explore the correlation of patient trust measured at various points (prior to treatment, after initial evaluation, and at the close of treatment) within the therapeutic encounter to the change in outcome measurements after receiving physical therapy care. This exploratory study did look at three different trust measurement scales (Trust in Physician Scale, Patient Care Assessment Survey, and Wake Forest Scale) to determine if one scale provided better correlation to outcomes following physical therapy care for chronic low back pain. The relationship of the trust measurement scores were compared to an established TA measurement (Working Alliance Inventory – Short Revised) previously used in the field of physical therapy. A secondary goal is the development of a PT Survey of Patient Connection and Engagement scale to look at the therapist's perception of connecting with his or her patient and rating of patient engagement in the therapeutic process. This scale was correlated to the trust measurement scales and TA measurement along with patient outcomes following care. A descriptive look at changes in trust scores over the course of the treatment was evaluated through comparison of scores at the three different collection points of prior to initial evaluation, immediately after the initial evaluation, and again at the discontinuation of services. The primary patient outcomes were pain, function, and global rating of change.

The primary research questions for this dissertation are:

- Do baseline or end trust scores of patient trust with the treating physical therapist correlate with outcomes for patients with chronic low back pain?

- Do changes in trust measurement scores of patient trust with their treating physical therapist over the course of care correlate with outcomes for patients with chronic low back pain?
- What is the relationship of the trust measurement scores that have not been used in physical therapy and an established TA measurement tool that has been used in the research for physical therapy encounters?
- Which of the three trust measurement scales shows the strongest correlation with patient outcomes?
- What is the shift in patient trust through the course of treatment, both in the short-term (pre and post-initial evaluation) and long-term (pre and post-initial evaluation to discharge)?
- Is there a relation between the patient trust scores toward the physical therapist and the physical therapist's perception of the patient rapport and engagement during the therapeutic encounter, and does this relationship predict outcomes?

1.3 Relevance and Significance of the Study

Getting high quality care with optimal outcomes from the treatment plan is a basic goal for the patient when they choose a healthcare provider to assist in their care. This similar goal of optimal outcomes is a goal of the healthcare provider as well, as they work with a patient to help them recover from injury or illness. In order to achieve optimal outcomes both patient and healthcare provider need to bring certain elements into the relationship that is formed. Providers recognize that patient engagement within the treatment plan plays a crucial role in high-quality health care.[56,57] Patient engagement is when a patient takes an active role in their own healthcare. Patients must be involved with decisions to create the best treatment approach with the

healthcare providers' guidance to overcome the injury or illness that they face. They must also follow through with the treatment plan and be open and honest on the progress they are making and any setbacks that arise during care. Patients also have a need for healthcare providers that are good communicators, provide current evidence-based clinical knowledge and skills, deliver empathetic and compassionate care, along with providing them time and attention specific to their problem.[58] Trust needs to be a foundational component that both the patient and healthcare provider bring into the healthcare relationship and help form a sound TA.

When looking at what both the patient and the healthcare provider want during the TA, one can see how trust is vital when considering the five potential overlapping domains of patient and provider trust: fidelity, competence, honesty, confidentiality, and global trust.[16,41,59,60] Fidelity is faithfulness to another through the strict observance of promises. It is a provider giving full time and attention to a patient and offering ethical and sound care. For the patient it is being committed to the treatment plan as guided by the provider with the patient involvement. Competence is the ability to do things successfully and efficiently without error. The provider needs to provide sound and up-to-date evidence-based knowledge, clinical decision-making, and clinical skills delivered with interpersonal skills such as rapport and good communication. A patient needs to effectively carry out the entire treatment plan in accordance with the recommendations and guidance of the healthcare provider. Honesty, which is telling the truth and avoidance of misrepresentation of the facts. Both healthcare provider and patient need to have open and honest communication about all facets of the treatment. Mutual understanding of the health condition and treatment, along with the effects of that condition and treatment on the patient's life is needed. Confidentiality is the proper use of the sensitive information shared between both patient and provider. Keeping information that is shared during the encounter in

confidence is important to maintain trust during the relationship. The last domain is global trust, which has been described as the irreducible soul of trust, which combines elements of some or all of the other domains.[38] Each of these domains of trust are part of what a patient and healthcare provider want from each other to assist in getting quality care and a good outcome as they form a TA.

With trust being a central feature in the patient-healthcare provider relationship, having effective ways of conceptualizing and measuring it is important to move forward with the study of this key element of TA. Through the improved understanding of trust during the clinical encounter, it may lead to improved care, better health of the patient, and proper healthcare utilization. While the concept of trust and its relation to care, health, and utilization have been explored in some healthcare disciplines, it has not specifically been looked at within physical therapy. Establishing ways of measuring trust in physical therapy and the relation trust has with outcomes is the first step in further exploration of the concept. First establishing if a link exists in physical therapy, as it does in other healthcare disciplines, that improved trust relates to improved outcomes needs to be accomplished. Finding an appropriate measurement instrument for trust in the physical therapy profession needs to be determined for future study to take place. If such a link is present and it can be measured appropriately, it can help drive future research to explore how to enhance trust during the therapeutic encounter and investigate the effect that may have on patient outcomes. Also increased understanding of how trust might change during the encounter will help point future research to investigate what points in time strategies and interventions might be the most helpful to potentially enhance trust. In addition, understanding the patient's connection and engagement to the therapist and therapeutic process can provide

insights into the bidirectional component of trust within TA and its relation to improving outcomes.

After completion of this dissertation, it will be established what link trust has with outcomes as they relate to physical therapy care for chronic low back pain. In addition, there will be improved understanding if baseline trust scores, trust scores during the episode of care, and/or the change in the trust scores are linked to improved outcomes. There will be more evidence to how the measurement of trust relates to the broader concept of TA. Better determination on which established trust measurement tool is more suited to measure trust in physical therapy, as it relates to outcomes, upon completion of this dissertation. Further insights into the potential changes in trust through the course of clinical care for a patient with chronic low back pain going through physical therapy care will be provided. Lastly, the exploration into how the physical therapist's perception of the patient's connection and engagement relate to patient trust and outcomes was investigated.

1.4 Elements to be Investigated

1.4.1 Trust

The primary focus of this dissertation was looking into the psychological state of trust, specifically as it related to patient's trust in their treating physical therapist as they received care for chronic low back pain. In general, trust has been studied regarding it being a significant element to any relationship. More specifically in healthcare, the TA relationship has looked at trust but only within limited disciplines and physical therapy is not currently one of them. While research supports the importance of trust within the therapeutic relationship between patient and provider, it cannot be identified in the current literature if the same holds true in physical therapy.

Trust is not a feeling of warmth but the conscious choice of dependency on another.[61] This is evident during any health care episode where a patient seeks care for their health care problem from a health care provider. The patient must reduce some of their independence in controlling the healthcare situation by himself or herself and hand over some reliance to the healthcare provider. Trust has a way to reduce uncertainty and provide dependability in the other during the relationship,[62] which can be helpful for a patient going through an injury or illness that might be outside their knowledge base and the future as it relates to their health and wellbeing.

1.4.2 Therapeutic alliance

TA is developed when a patient seeks to enter a relationship with a healthcare provider to assist with their current healthcare problem. TA is one of many various contextual factors that can influence the overall outcome of patients as they move through an injury or illness experience. A patient's injury and/or illness experience is fundamentally dependent, to some degree, on the context in which it is occurring; due to the complex systems involved from a biological, psychological, and sociological perspective. Evidence has shown that improving the contextual factor of TA can improve outcomes in healthcare, even specifically in physical therapy. Theoretically TA has been broken into three key aspects: agreement on goals, tasks, and bonds.[18] Trust has been shown to be one of the key elements of the bond that is formed during TA.[20]

1.4.3 Patient connection and engagement

Patient engagement into the therapeutic treatment process and connection to their treating clinician have been gaining increased attention to assist in improving quality and healthcare utilization within the healthcare system.[63,64] Patient engagement is centered on the patient taking

an active role in their care. With shared-decision making being central to patient-centered care,[65] the patient needs to be actively involved through a complete understanding of the their health condition to make wise choices about the most appropriate direction for clinical care. This patient-centered care method has shown to provide for better adherence to treatment and improved outcomes.[63] While a patient-centered approach to care should be ubiquitous in today's healthcare practice, putting it into daily practice in the real world has its challenges. Historically, the patient-provider relationship was more paternalistic in nature.[66] The lack of full connection and engagement between the provider and patient could affect the reciprocal effort of the therapist toward patient-centered care and return it toward the traditional paternalistic practice.

1.4.4 Chronic low back pain outcomes

Low back pain is a common ailment that will affect most individuals at some point in their lifetime.[67] It is estimated that between five and ten percent of the cases will progress into chronic low back pain, which becomes a source of significant healthcare costs and individual suffering.[68] The annual prevalence of chronic low back pain is between 15% and 45%.[69] While clinical practice guidelines into the care for low back pain have been established,[70-72] the prevalence of chronic low back pain continues to rise in-spite of these.[73] Looking at all facets of clinical care for chronic low back pain, not just interventional strategies, maybe key in reducing the prevalence, chronicity, cost, and suffering associated with chronic low back pain.

1.4.5 Hypotheses

Hypothesis #1

- Higher trust level scores correlate positively with improved outcome measurements of pain and function.

Hypothesis #2

- The three trust measurement scales used in other healthcare professions (Trust in Physician Scale, Primary Care Assessment Survey, and Wake Forest Scale) will correlate with the TA scale (Working Alliance Inventory – Short Revised) used in previous physical therapy research.

Hypothesis #3

- One of the three trust measurement scales (Trust in Physician Scale, Primary Care Assessment Survey, and Wake Forest Scale) will demonstrate better predictive qualities for improved outcomes (pain and function) in physical therapy after receiving care for chronic low back pain.

Hypothesis #4

- The majority of the patients will show an increase in trust both in the short-term duration of care (pre to post-initial exam) and in the long-term duration of care over the course of the entire episode (pre and post-initial exam to discharge).

Hypothesis #5

- Patients with higher changes in trust levels will demonstrate improved outcomes (pain, and function) compared to patients with no or negative changes in trust levels during short-term duration of care (pre to post-initial exam) and in the long-term duration of care over the course of the entire episode (pre and post-initial exam to discharge).

Hypothesis #6

- Patients with higher levels of trust in their physical therapist will also demonstrate higher scores in patient connection and engagement as rated by their physical therapist.

Hypothesis #7

- Physical therapist ratings of patient connection and engagement will correlate positively with improved patient outcomes (pain and function).

1.5 Definition of Terms

Trust: a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another.[1]

Therapeutic alliance (TA): the working collaborative relationship between the patient and the clinician, containing the three main components of agreement on goals of treatment, agreement on interventions, and the affective bond between patient and clinician.[18]

Chronic low back pain: pain, muscle tension, or stiffness localized below the costal margin and above the inferior gluteal folds, with or without sciatica, and is defined as chronic when it persists for 12 weeks or more.[74]

Patient engagement: recognizing and understanding the importance of taking an active role in one's health and healthcare; having the knowledge, skills, and confidence to manage health; and using knowledge, skills and confidence to engage in health-promoting behaviors to obtain the greatest benefit.[57]

Patient connection (synonymous with patient rapport): a close and harmonious relationship in which the patient and clinician understand each other's feeling or ideas and communicate well.[75]

1.6 Summary

Trust is a significant psychological state to foster human relationship. The importance of trust carries over into patient and healthcare provider relationship, known as TA. A key component of TA is the bond that develops between both parties,[18] and one of the key elements of the bond is trust.[20] Research has shown that improving the contextual factor of TA can improve outcomes and increase adherence to medical treatments.[26,76] These similar

improvements in outcomes have been found in the physical therapy specific literature.[55] The specific element of trust has also shown to be related to improvements in outcomes in medical[50] and psychiatric care,[24] but has not been studied specifically in physical therapy.

The lack of study into trust within physical therapy care is, in part, due to the lack of a recognized tool to measure trust. Multiple trust measurement tools[28,29,38,39] have been created and validated for use within medical and psychiatric care, but none of these have been used within a physical therapy patient population. Finding an appropriate trust measurement scale for use within the physical therapy patient population is one of the primary initial steps into studying the construct of trust in physical therapy.

A primary goal of this dissertation project was to explore the use of established trust measurement scales within a physical therapy patient population of chronic low back pain. Exploratory correlational analysis investigated the relation of trust scores and/or changes in scores effect to outcomes with this patient population during their care with a physical therapist. It also provided an improved understanding of how trust levels may change at different points in time during the physical therapy encounter. Lastly, it explored the bidirectional relationship of trust. Looking into parallels of the physical therapist's perceived connection and patient engagement to outcomes and patient trust levels.

The knowledge gained from this dissertation will help foster future research looking into the specific element of trust as part of the TA within the field of physical therapy. Future research can study ways to enhance trust within the patient-provider relationship in the hopes of improving care and outcomes for various patient populations that come to physical therapy for care.

Chapter 2: Review of the Literature

2.1 Introduction

This chapter explores the historical overview of the literature regarding trust as an essential element of the bond that is established between a patient and their healthcare provider, known as therapeutic alliance (TA). It provides a historical overview of TA from its early origins found in altruistic care for others and expand into the current research behind various theoretical components and outcomes associated with TA. The investigator will then more specifically provide an overview of trust and its relationship as a foundational state in developing TA. Finally, this review provides an overview of trust in healthcare looking into the measurement tools, predictors, and outcomes associated with trust.

2.2 Historical Overview of the Theory and Research

2.2.1 Therapeutic alliance

TA, also termed working alliance[18] or therapeutic relationship[20], can be defined as the working collaborative relationship between the patient and the healthcare provider.[18] It is through this relationship that the patient is looking to the provider to engage in a way that will assist in beneficial change for the patient. The altruistic prosocial behavior of one species caring for another who is in need of help can be found in many animals, but of interest to this study is this behavior in humans.[77] The human behavior of one individual caring for another that is sick or injured dates back to early man, at least 1.77 million years ago.[78] A well-preserved skull and jawbone were recovered during a field discovery. The cranium and mandible demonstrated the individual had lost all but one of their teeth several years prior to their death. It is theorized that this individual would have needed assistance from others for their subsistence strategy to survive as long as they did.

As societies have progressed over time, certain individuals took on different roles within a group to maximize survival of the group. The individual that took over the role of caring for the sick was usually named the shaman. Shamanistic practices most likely date back to the Paleolithic period, and without doubt were present during the Mesolithic and Neolithic periods.[79] The shaman was someone that communicated with the spirit world to treat sickness that was caused by evil spirits. The various practices and procedures varied from culture to culture, but common to all situations was that the ill individual trusted the shaman and had strong beliefs in their therapeutic skills. This belief, trust, and relationship between patient and shaman were the cultural origins of TA.

As medical care has evolved through the years from shamanistic practices to modern medicine, so has the concept of TA. The development of study and understanding around TA has evolved more recently with the emergence of patient-centered care[80] and the biopsychosocial model[81] within modern medicine. While many definitions exist for patient-centered care, a comprehensive model has been provided by Stewart and colleagues.[82] They provide six interconnecting components to be a part of patient-centered care: (a) exploring both the disease and the illness experience; (b) understanding the whole person; (c) finding common ground regarding management; (d) incorporating prevention and health promotion; (e) enhancing the doctor-patient relationship; and (f) being realistic about personal limitations and issues such as the availability of time and resources. Highlighted within this model is the importance of enhancing the doctor-patient relationship. The biopsychosocial model of care was proposed by Engel[81] in 1977 as an alternative expansion of the prevailing biomedical model of the time. The biomedical model assumes that all disease and injury can be reduced and fully accounted for through biological variables and mechanisms. The biopsychosocial model expanded to bring the

psychological, social, and behavioral aspects of injury and illness to more fully understand the patient experience. Central to understanding the patient experience is the development of a strong TA between patient and provider.

Significant work on the original theoretical construct and study of TA has been done in the field of psychotherapy. Some of the earliest work can be directed back to Freud when he originally discussed the concept of transference.[83] Transference was the terminology developed by Freud to explain the clinical phenomenon of the relationship development between patient and practitioner that could not be accounted for by normal interactions between individuals. This term was used to convey the "transfer" of traits, emotions, and expectations onto the psychoanalyst from the patient. Freud suspected that transference was not limited to psychoanalytic treatment but to all medical interactions.

Bordin's essay[18] in 1979 further developed the psychoanalytic concept of TA. In this seminal work, Bordin proposed that TA between the patient (the one seeking change) and provider (change agent) is one of the keys, if not the key, to the change process. Three key features of TA were brought forward in Bordin's work: (a) an agreement on goals, (b) an assignment of task or a series of tasks, and (c) the development of bond. These three features can transcend across other healthcare disciplines as foundational to TA.

Multiple healthcare disciplines have continued this exploration of TA: psychology,[19,21-23,27,84-89] medicine,[34,35,63,80,90-94] chiropractic,[95] nursing,[96,97] occupational therapy,[98] and physical therapy.[20,45-48,55,76,99,100] While TA is often times referred to as a single construct, various characteristics have emerged as key components to develop this relationship between patient and provider. Some of the key characteristics for providers that continually show up in the literature are nonjudgemental,[23,45] communication and listening skills (verbal and non-verbal),[34,45,88,93,99,101]

empathy,[20,23,27,35,45,102] provider competency,[23,45,89] trust,[20,23,34,55,88,93,94] collaboration,[23,27,45,89,93,94] respect and validate patient,[20,35,88,93] and rapport/connection.[20,23,27,45,88] Certain characteristics and techniques have also shown to negatively impact TA as well.[21] Providers that are more rigid, self-focused, sharing of personal conflicts, critical of the patient, and less involved in the process are perceived as less understanding.[85-87] Research has also shown that increase stress of the provider related to organizational aspects of work affect the TA between patient and provider.[48] Patients also have traits that add to the TA; such as, trusting the therapist,[23,55,63] actively engaged in treatment,[23,57,63,64,88,90,103] perceived utility of treatment,[23,27,64,90,100,104] and being authentic.[23] These multiple components can enhance or take away from the TA between provider and patient, which potentially could affect the relationship and outcome.

2.2.2 Therapeutic alliance and outcomes

Theoretical understanding looking into the development of TA between patient and provider is important; potentially more important is how TA affects outcomes of care. Within the framework of patient-centered and biopsychosocial model of care, TA can be viewed as part of the therapeutic intervention process leading to different outcomes. All therapeutic interventions have to show utility in improving outcomes to have clinical impact. Various studies have looked at different variables as they relate to outcomes and correlation to TA. A systematic review looking into the relation of TA in psychiatric care to outcomes showed a moderate correlation ($\bar{r} = 0.22$).[26] This has led some individuals in psychotherapy to proclaim that TA is one of the more reliable, if not the most reliable and important, predictors of outcomes across all psychological interventions.[105,106]

In the physician literature various studies have investigated changes in outcomes related to TA. Increased adherence to the medical regimen has been a consistent finding in various

studies looking at the effect of improved TA.[63,107] Patient adherence on average lead to 26% more patients experiencing a positive outcome by adhering to the treatment than those that do not.[103] Overall patient satisfaction in their provider and care is another area that shows improvement with higher levels of TA.[51] Positive influence on health status has also been associated with improved patient-physician relations.[108]

Studies more specifically directed to physical therapy care investigating TA and outcomes have shown similar improved outcomes. Hall, et al.[55] completed a systematic review of thirteen studies looking into the effect of TA and outcomes in physical rehabilitation. They found a positive correlation between TA and outcomes related to treatment adherence, pain, function, mental health, and satisfaction with treatment. Lakke and Meerman[76] looked into TA more specifically for individuals with chronic musculoskeletal pain. They found that there was strong evidence that TA had an influence on outcomes of therapy as evident by positive improvement in pain and physical function. One specific study in the Lakke and Meerman systematic review was the published paper by Fuentes and colleauges[46] as a result of his dissertation project.[109] They found a large effect size for changes in pain intensity and muscle pain sensitivity with an enhanced TA over a limited TA delivery of care. Interestingly in the study, the group that received a sham treatment with an enhanced TA outperformed the group with the active treatment and limited TA.

2.2.3 Trust

Multiple complex social and psychological interactions take place during this altruistic system of caring for others known as TA. Some of the foundational items such as friendship, the emotion of liking and disliking, gratitude, sympathy, empathy, honesty, respect, guilt, trust, and suspicion all play a role in the development of the bond that occurs during TA.[21,77] One of these

foundational items, trust, has been studied independently in the literature for its role in relationships in general[8,62] but also the specific relationship[41,59] between healthcare provider and patient.

Trust is foundational to any relationship where there is an expectancy of an individual that behavior of another would be altruistic.[110] There are certain critical elements thought to be vital for the development of trust.[62] First, trust evolves out of past experiences, thus it develops as the relationship develops. Second, the motives of an individual need to be reliable and dependable that their actions will be altruistic. Third, is the component of putting oneself at risk through disclosure and reliance on the other individual for future benefits. Lastly, trust is associated with the feeling of confidence and security in the caring response of the other in the relationship.

Trust is a dynamic state and not a fixed trait that does not change and develop over time.[14,54] As stated, trust emerges out of past experiences.[62] Each individual involved within a relationship is learning about the trustworthiness of the other as the relationship evolves over time. In addition, external changes in relationship value can affect trust based on the context of the situation. While the initial trust measurement can happen rapidly,[11] it does take time to deepen and develop trust within a relationship.[14] Added time, although, does not guarantee improved trust because of the number of mechanisms that can have positive or negative effects on trust.

The neurobiological changes that are underlying the prosocial behavior of trust and trustworthiness can be linked to oxytocin.[111,112] While oxytocin is most known for its role in lactation and child birth, the past several decades have revealed that this neuropeptide hormone has significant neurobiological effects within the central nervous system as well.[113] Of primary

interest to the study of trust, Zak and colleagues[111,112] seminal work demonstrated that oxytocin played a key role in the development of trust within individuals. Oxytocin has also been shown to have an effect on the stress response system in humans and work as an anxiolytic by reducing the release of stress hormones.[113] Some of this function is done through suppressing the activity of the amygdala and thus decreasing untrustworthiness emotions and restoring the emotion of trustworthiness.[17] There is also good evidence that oxytocin is involved with affect, with lower levels of oxytocin being related to depression and increased levels associated with elevated mood and decreased anxiety.[113]

This basic element of trust found to be foundational to relationships carries over to the more specific relationship of a TA that forms between a healthcare provider and patient. The trust in the healthcare provider by the patient has been conceptualized to have five overlapping domains: fidelity, competence, honesty, confidentiality, and global trust.[37,41,59,60] Fidelity is caring and advocating for the patient's best interest and avoiding any conflicts of interest that could detour the provider's judgement. Competence is providing quality care with good interpersonal skills and without error. Honesty is telling the truth and avoidance of misrepresentation of the facts. Confidentiality is the proper use of the personal information shared between both patient and clinician. The last domain is global trust which has been described as the irreducible soul of trust, which combines elements of some or all of the other domains.[38] In healthcare it has been shown that trust is more of a unidimensional construct.[37] This means that patients do not tend to distinguish trust toward healthcare providers in the basic domains of fidelity, competence, honesty, and confidentiality; instead they are most correlated to the global trust measurement.

When looking at trust as part of the patient and healthcare provider relationship one needs to distinguish between social trust and interpersonal trust.[41,59,114] Social trust is the general trust in the collective institutions and professions. Media and previous experiences of the individual influence this general social trust broadly. Whereas, interpersonal trust is the individual trust developed through repeated interactions over time with a specific individual. The link between general social physician trust and specific individual physician trust has been explored in the literature.[37] Patients with higher levels of general social trust tend to have higher initial individual trust. In addition, individual trust on average is one-fourth higher than global social trust in the same populations.[37] This higher level of individual trust over global social trust can be due to various factors. One specific factor can be attributed to the fact that people tend to demonstrate the overconfidence effect, where their bias is toward over placement of their judgement of themselves and their relationships.[115] A simple example of this overconfidence effect can be found when asking individuals how good a driver they think they are, 75% of respondents will see themselves as above average.[116]

2.3 Theory and Research Specific to the Topic

It is evident based upon research and social science that trust is key to the formation of a relationship between two individuals, which carries over into the medical relationship established between patient and provider. This continues to hold true in the specific relationship between physical therapist and patient. In a qualitative study done by Miciak, four elements emerged regarding the bond that develops during TA.[20] Nature of rapport, respect, trust, and care/attachment were identified as key elements of building a strong TA in physical therapy. Specific to this dissertation project is the finding of trust being one of the four key elements of TA. Miciak's research also highlighted that trust within the TA was identified as having three

overlapping aspects: (a) patient trust in the physical therapist (interpersonal trust), (b) overlap of professional trust and personal trust (interpersonal and social trust), and (c) physical therapist trust in the patient (interpersonal trust).[20]

Miciak's qualitative study provides a link from the other research regarding trust and TA to the specific discipline of physical therapy. While the link exists, qualitative studies provide only discovery of ideas and theoretical frameworks, they cannot provide empirical data to begin to find the causal inference behind that framework. While there is a potential link to understanding trust as a key element to building TA specific to the field of physical therapy, no empirical evidence specifically related to trust and physical therapy care exists. Currently there are no quantitative studies specific to trust and outcomes within physical therapy based on this literature review. To begin to draw out the causal relationships regarding trust and its relation to outcomes quantitative measurement principles have to be utilized.

2.3.1 Measurement of trust in healthcare and provider

An important feature in any quantitative research is the value of having reliable and valid measurement tools. The specific measurement of trust within healthcare has been developed and utilized mostly in primary and specialty physician care.[28,29,37-39,53,117-119] The majority of the trust measurement scales have been directed toward individual trust with looking at patient trust in their provider.[28,29,38,39,53,119] Some scales have explored social trust issues regarding medical institutions and insurance providers.[30,37,50,118] Probably the least studied aspect of trust is that of physicians trust in their patients.[42]

The theoretical concept regarding the importance of trust to TA has been well established for nearly a century, but the study into utilizing trust measurement scales is relatively new to the literature. The first trust measurement scale was published in 1990.[29] Since that time, other scales

have been derived through various methods with each demonstrating good psychometric properties.[28,32,38,39] The measurement surveys developed to measure the construct of patient trust in their physician have various dimensions of trust (fidelity, competence, honesty, confidentiality, and global trust) emphasized differently or disregarded in the questionnaires. To date no one trust measurement scale is established as a gold standard.[38,41,54]

These trust measurement scales have not been utilized specifically in the field of physical therapy. Considering that the TA and trust that develops between a patient and physical therapist may differ from that of the patient and their medical physician, measurement validity concerns do arise when applying the scales to physical therapy care. Patient interactions are different between physicians and physical therapists on multiple levels; including time spent on individual sessions, length of relationship, and focus of treatment interventions. Even though trust specifically has not been measured and studied within physical therapy, the more global construct of TA has been investigated.[47,52,55] Various scales have been used in the literature to study TA, the most common, Working Alliance Inventory, was used in almost half of the studies in the systematic review by Hall, et al.[55] looking into TA and outcomes in physical rehabilitation.

2.3.2 Predictors of trust in patient-provider relationship

Overall, most patient characteristics have not been found to be strong or consistent predictors of trust in the patient-physician interpersonal relationship. This potentially suggests that most patients enter into the patient-provider relationship with the capacity to trust.[59] In addition the relationship between these various characteristics and trust may have compounding effects and be modified by various cultural factors and trust types.[10] Gopichandran and Chetlapalli study of various groups in India found different groups had different levels of trust when investigated based on community-based factors that influence their trust. A group marked

as comfort-based trust (those that were comfortable talking to their doctor) demonstrated the highest levels of trust if they were an older female with a lower educational level coming from a rural community. Contrast this with the group identified as personal trust (personal involvement with physician) had the highest levels of trust if they were a highly educated younger individual from an urban location. Differences in trust levels toward their provider have also been found between different countries in similar patient populations as well as between different providers.[54,119]

Age has been shown to have a modest, positive correlation with trust.[34,120-123] One study found individuals older than 50 years of age rated trust at 82%; whereas, those in the 18-30 age group only scored 56% on their trust rating toward their physician.[120] Interestingly, some studies have shown that age may have a negative effect[117] or have a "U" pattern relationship (high levels with young and old and lower trust in middle age) with trust.[44]

Race is another patient characteristic that shows a relationship with trust. Multiple studies have shown that patients of African American and Hispanic race have lower levels of trust on multiple levels regarding their healthcare including their physician.[36,117,120,122,124] While African Americans may show lower levels of trust compared to Caucasians, their overall levels of trust in their physician are still very high.[124]

Other various patient characteristics (educational level, health status, socioeconomic class, medical skepticism, and sex of the patient) inconsistently show some to no correlation in relation to trust. Education level has been demonstrated to have negative correlation in some studies,[10,117,122,123] positive correlation in others,[10,121] and no correlation as well.[32,123] Patient reported health status also has some positive relation with improved trust levels in patients toward their physicians,[32,34,117,122] but this was not found in all studies.[39,119,121,123] Socioeconomic

class has not been shown to have any strong connection with trust levels of a patient toward their provider.[32,119,121-123] Another patient characteristic that has some correlation to trust is found with medical skepticism. The higher the patient level of medical skepticism, the lower levels of physician trust they had.[117] Variability in trust measurements have also been found regarding sex of the patient, with the only consistent potential correlation being related to concordance of patient and provider.[121-123]

The strongest predictors related to trust are physician personality and behavior. Trust in physician scores are highly related to communication and interpersonal skills.[28,34,38,39,53,54] Research looking into the communication behavior of physicians and its effect on trust of patients with breast cancer with their providers showed some interesting findings.[12] At baseline those patients that received informational, emotional, and decision-making support were found to have the highest levels of trust. As their care progressed over the 5-month study period, only helpful emotional support continued to be associated with higher levels of trust. While the perceived helpfulness of the three types of support decreased over time, the overall levels of trust remained high and unchanged. Demonstrating that initial informational and decision-making support were important early in trust development, but emotional support may have more effect on maintaining trust. The interpersonal communication skill of exploring the patient experience demonstrates to also be helpful in increasing trust levels with patients.[34,60] Another key communication skill and interpersonal trait is the ability to build shared-decision making and taking a more patient-centered approach to build trust levels between patient and provider.[40,60] Other physician characteristics (age, race, and sex) have shown little to no predictive ability or relation to trust levels with patients.[38,39,44,53] Concordant race with the patient has shown some minimal relation to increased trust levels toward physicians[30] but not in all studies.[124]

Other relational and contextual factors have been found to be important in improving trust in the patient-provider relationship. The length of the relationship between the provider and the patient along with time between interactions has shown to relate to trust.[30,34,36,38,39,44,53,121,123] Typically, the longer the relationship with the provider and the more frequent the interactions the higher the trust levels. While the relationship exists, evidence has shown this correlation between the length of the relationship and trust is weak. This potentially demonstrates that patients form their trust impression early with physicians and do not alter much from their initial trust assessment but there is some inconsistent change and development of trust over time.[59] Patients having an independent choice in selection of the provider seems to give a boost to their trust levels with providers.[28,30,32,37-39,53,118] Higher levels of social trust also tend to lead to higher levels of interpersonal trust in one's physician.[37] Longer wait times, prior disputes with their physician, planning on switching physicians, or seeking a second opinion have also been associated with lower levels of trust.[30,32,38] The importance of choice is also a factor in trust, not just in the patient choosing their provider, but also in making decisions with their health practitioner during care. Lower levels of trust in a physician showed moderate correlation with a drop in shared decision making and the patient making more independent decisions about their care.[117]

2.3.3 Outcomes related to trust in healthcare provider

Trust levels have shown to link to outcome measures in healthcare. Overall patient's with a general increase in trust of the healthcare system show decreased levels of psychological distress.[125] Patients with higher levels of trust also demonstrate improved health.[28,37,53]

One of the items most commonly studied is the link between patient-provider trust and patient satisfaction. Thom, et al.[44] showed that even when intervention and services provided

were not different, patients with low trust levels were more likely to report a service was not provided. In addition, patients with higher trust were more satisfied with care and more likely to follow physician recommendations and showed more improvement over a 2-week follow up. The strong correlation between trust and patient satisfaction has shown up in various studies but still demonstrate to be distinct constructs.[28,30,38,53,54,59] Trust is forward looking and constantly evolving with the ongoing relationship; whereas, satisfaction is an assessment of past events and physician actions. This is highlighted with research showing satisfaction levels did not change predictors of high versus low trust levels.[30] Trust has been shown to be a better predictor than satisfaction in patients staying with their physician and following treatment.[53]

Higher levels of trust have also shown strong connection to increase compliance with following the prescribed treatment plan.[28,37,38,53] The overall outcome to care improves with increased compliance of following the treatment plan through the specific effects of the intervention when followed more accurately.[53] Trust may also improve the therapeutic response to an intervention through non-specific (placebo) effects.[17] A significant increase in continuity of care has also been found with increased trust levels with only 3% of high trust patients leaving their provider after 6 months. Compare that with 24% of the patients in the lower quartile of trust toward their physician left their provider.[53] Trust related to healthcare utilization has not been studied directly.[54] Theoretically, there would be an improvement in healthcare utilization with more efficiency with improved compliance and better follow-up by same provider.

2.4 Summary of what is Known and Unknown

It has been well established that trust is a foundational state in the development of a good TA. When trust and TA are improved during the patient-provider relationship, positive outcomes are seen at multiple levels including satisfaction, compliance, improved function and health, and

reduced pain levels. Trust between a patient and their provider currently is measured through various questionnaires that have shown validity and reliability in the psychology and physician literature. To date none of these trust measurement scales have been used in the specific healthcare discipline of physical therapy. Because of the current dearth of measurement of trust during a physical therapy encounter, it is untested to see if similar or other improved outcomes correlate to trust levels between the patient and their physical therapist.

2.5 Relevance and Contribution to the Field of Physical Therapy

This dissertation study looked to explore if trust measurement scores or change in scores correlate with outcomes related to pain and function in patients receiving physical therapy care for chronic low back pain. It provided further examination of different trust measurement scales used for other healthcare disciplines. It evaluated their effectiveness regarding reliability and validity for use in physical therapy, along with prediction of patient outcomes. The dissertation study also observed the changes in trust scores over the course of a physical therapy encounter from short-term duration (pre- to post-initial evaluation) and long-term duration (initial evaluation to discharge or 6 months of care). The last component looked at the physical therapist's perception of patient connection and engagement during the episode of care and inspect its relationship to patient trust in the provider and outcomes.

This deeper understanding of trust specific to the field of physical therapy may help further with improving outcomes and TA for patients receiving care from a physical therapist. Providing validity and reliability to a trust measurement tool for use in physical therapy will provide a quantitative measurement tool for future studies. Future research can look to consider interventions to improve trust levels and be able to evaluate the effectiveness of the techniques.

2.6 Summary

This chapter links together the research of TA and trust providing theoretical background to both. It then more specifically delved into trust with healthcare exploring the measurement tools, predictors of trust development, and patient outcomes associated with improved patient-provider trust. Lastly, it showed the measurement of trust has not been specifically measured or studied in physical therapy and this warrants further investigation for which this dissertation will seek to provide.

Chapter 3: Methodology

3.1 Introduction

This chapter will outline the methodology proposed to investigate the primary research questions of this dissertation project.

Research questions:

- Do baseline or end trust scores of patient trust with the treating physical therapist correlate with outcomes for patients with chronic low back pain?
- Do changes in trust measurement scores of patient trust with their treating physical therapist over the course of care correlate with outcomes for patients with chronic low back pain?
- What is the relationship of the trust measurement scores that have not been used in physical therapy and an established therapeutic alliance (TA) measurement tool that has been used in the research for physical therapy encounters?
- Which of the three trust measurement scales shows the strongest correlation with patient outcomes?
- What is the shift in patient trust through the course of treatment, both in the short-term (pre and post- initial evaluation) and long-term (pre and post-initial evaluation to discharge)?
- Is there a relation between the patient trust scores in the physical therapist and the physical therapist's perception of the patient rapport and engagement during the therapeutic encounter, and does this relationship predict outcomes?

This chapter covers the process of participant recruitment both from the clinical site and patient participants at those sites regarding training and the eligibility requirements. Each of the

various trust, TA, and outcomes instruments are defined and explained along with the procedural process of when data collection occurred throughout the study. The statistical analysis of the various data is covered along with the resources needed to complete the project. The chapter concludes with review of the reliability and validity analysis of the various instruments used during the dissertation study.

3.2 Research Methods

This dissertation was a non-experimental correlational quantitative analysis of multi-clinic site locations of consecutive patients referred to or coming via direct access for physical therapy care related to chronic low back pain. It was a collection of trust surveys, TA questionnaires, and patient reported outcomes related to their low back pain and function completed by the patient participant through an interrupted time-series of prior to initial evaluation, post-initial evaluation, and at discontinuation of the current episode of care. The physical therapist completed a patient connection and engagement questionnaire after the second visit and at discharge along with outcomes measurement data collect at the completion of the current episode of care. Data collection was at multiple outpatient physical therapy sites with multiple physical therapists and wide patient demographics to improve generalizability of the study findings.

The research project was conducted according to the Declaration of Helsinki. All the participants were fully informed of the study content before their participation in this study and completed informed consent. Institutional Review Board (IRB) at the University of South Dakota served as the IRB of record with joint approval from Nova Southeastern University IRB.

3.3 Procedures

3.3.1 Participant recruitment

Various clinic sites (AZ, CA, RI, VA, WA, and WI) were approached through email, phone, and direct contact and were provided general study protocol to investigate their interest in serving as a data collection site. Clinic sites interested in participating completed an IRB Location Site Application along with a clinic site consent agreement (Appendix 1). Each clinic site had a point of contact person appointed, and that contact person ensured that all informed consent forms were signed for those physical therapists willing to consent to participate in the study protocol. Once each clinic site and participating physical therapists at those sites were set up, new patients potentially meeting inclusion criteria of chronic low back pain (pain greater than 3 months) coming to the clinic were identified by front office staff scheduling the appointment. Upon arrival at the clinic, potential patient participants were handed regular clinic site new patient paperwork, but they were also given a participant recruitment flier. If the patient verbally expressed interest in participation, they were provided with an introductory letter with a PsychData link. This link had the informed consent and the participant was given a Health Insurance Portability Accountability Act (HIPAA) form as part of the IRB process. This method of recruitment was utilized to minimize any potential coercion.

Once patient participants completed the informed consent process they were directed to a second PsychData link in order for them to complete a participant demographics form (Appendix 2) that further verified their eligibility into the study. Inclusion criteria consisted of greater than 18 years of age, able to read, speak, and write in English, and presence of low back pain for at least 3 months. Exclusion criteria were current pregnancy or active cancer diagnosis. Patient participants were also excluded from the study if at any point during the episode of care they

required different medical attention beyond physical therapy and needed to be referred out for medical reasons and had to discontinue their physical therapy prior to achieving goals. Any patient participant that did not receive at least 80% of the treatments from the initial physical therapist were excluded from primary data collection. Physical therapist participant inclusion criteria were having a physical therapy license to treat patients and employed at a clinic site approved for the study.

The initial *a priori* was set for a total of 64 patient participants with the primary complaint of chronic low back pain that had lasted a minimum of 3 months prior to initiating the current physical therapy episode of care. The patients were consecutively enrolled in the study at the various clinic sites. The *a priori* achieved 79% power to detect a Pearson correlation of 0.400 using a two-sided hypothesis test with a significance level of 0.05 with an included 20% dropout rate. These results were based on 1000 samples from the bivariate normal distribution under the alternative hypothesis. The number of physical therapist participants was determined by the clinic site enrollment and treating at least one patient participant during the course of the study.

3.3.2 Instruments – Predictor variables

Various instruments were used to measure trust during the encounter. For the purpose of this dissertation, three of the most well studied provider-specific trust measurement scales (Trust in Physician Scale,[29] Primary Care Assessment Survey (PCAS),[28] and Wake Forest Scale[38]) used in the physician and psychology literature were chosen that have items written that could easily translate to physical therapy practice and patient care. To date, none of these provider-specific trust measurement scales had been studied for use in physical therapy practice. General trust in the medical profession and physical therapy was assessed by the General Trust in Physician Scale.[37] A TA measurement scale (Working Alliance Inventory – Short Revised) was used and

was the only predictor instrument previously used in the physical therapy literature.[126] The final instrument was developed as part of the dissertation process to assess the physical therapist's perception of their patient's connection and engagement (PT Survey of Patient Connection and Engagement) within the therapeutic process during the physical therapy encounter.

Trust in Physician Scale: The Trust in Physician Scale[29] is one of the first instruments developed to assess a patient's interpersonal trust in their physician. The original published work of Anderson and Dedrick in 1990, detailed the development and validation of the Trust in Physician Scale. Three different dimensions of trust were assessed: dependability of the physician, confidence in the physician's knowledge and skills, and confidentiality and reliability of information between the physician and patient. The Trust in Physician Scale is a patient self-report tool with 11-items scored on a 5-point Likert scale. The labels for the Likert scale followed the later modified version by Thom, et al.[53] (1 = totally disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = totally agree). Raw scores can range from 11 to 55 with higher scores demonstrating higher trust. The scale was modified for the purposes of this study with the words "physical therapist" inserted any place the original version had the word "doctor". It has a combination of positively (questions #2, 3, 4, 6, 8, 9, and 10) and negatively (questions #1, 5, 7, and 11) worded questions. The Flesch reading ease score equates to 52.3 to provide a Flesch-Kincaid grade level at 9.6 according to Microsoft® Word 365 for Office (Redman, WA). This scale has been used in research in primary care physicians and specialty medical practice with a variety of patient populations.[29,53,59] (Appendix 3)

Primary Care Assessment Survey: The PCAS[28] was developed to measure seven different domains of care through 11 different summary scales. The trust summary scale assesses the physician's integrity, competence, and role as the patient's agent. The trust summary scale is

measured with eight different item questions with a lowest score of 8 and maximal score of 40, with the higher score demonstrating more trust. Seven of the item questions (questions #1-7) are measured by a five-point Likert scale (1 = strongly agree, 2 = agree, 3 = not sure, 4 = disagree, 5 = strongly disagree). Question #8 is scored on a 11-point scale with anchors (0 = not at all, 10 = completely) it requires recalibration to align with questions #1-7 (1 = 0-2 precoded item value, 2 = 3-4 precoded item value, 3 = 5-6 precoded item value, 4 = 7-8 precoded item value, 5 = 9-10 precoded item value). Four of the seven Likert scale items (questions #1, #3, #5, #8) are reverse score items and must be recoded for final scoring (5 = precoded item value 1, 4 = precoded item value 2, 3 = precoded item value 3, 2 = precoded item value 4, 1 = precoded item value 5). For purposes of this study, the word "doctor" was replaced with "physical therapist" from the original scale. The PCAS scoring algorithms calculate a score if a respondent answers at least 50% of the items on the scale (4 items on the trust scale), the missing whole values are inputted as the respondent's average score across all completed items for the scale. A transformed scale score can be computed as the product of the actual raw scale score minus the lowest possible raw scale score (8 on the trust scale) that is divided by the possible raw scale score range (32 on the trust scale) multiplied by 100. The Flesch reading ease score is 62.6, which equates to an 8.4 Flesch-Kincaid grade level according to Microsoft® Word 365 for Office (Redman, WA). The scale was originally developed and tested on Massachusetts state employees on their level of trust with their primary care physician. (Appendix 4)

Wake Forest Scale: The third provider specific trust measurement scale used was the Wake Forest Scale[38] developed by Hall, et al. The Wake Forest Scale was developed to improve on the various trust measurement scales that currently had been published at that time (Anderson/Dedrick[29] with the Thom modification[53], Safran[28], and Kao[39,118]) and to be more

generalized to other care providers, not just physicians. The Wake Forest Scale development was done by retaining or modifying questions from the existing scales that fit their conceptual model of trust measurement. To address areas of the trust domain that the study team did not think where fully covered, they, along with a group of experts developed additional items. After initial testing and screening of questions, it produced 26 candidate items for further testing, which ultimately produced the final 10-items that were accepted for the scale. The 10 items reflect dimensions of trust (fidelity = #1-2, competence = #3-4 and #8, honesty = #6, global = #5, #7, and #9-10). The items cover question format consisting of a mixture of positive (#1, #4-7, and #9-10) and negative (#2, #3, and #8) statements in Likert categories (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). Trust is measured with a sum of the 10 item scores, with reverse scoring for negative items, to produce a range of scores from 10 to 50, with higher scores demonstrating higher levels of trust. For purposes of this study the questions with the words "your doctor" were replaced with "your physical therapist". The final Flesch reading ease is 54.0, demonstrating a Flesch-Kincaid grade level of 9.6 according to Microsoft® Word 365 for Office (Redman, WA). (Appendix 5)

General Trust in Physician Scale: Patient general trust in healthcare providers has been shown to be different than interpersonal healthcare provider trust.[37] Thus general trust potentially has a strong influence on the formation of interpersonal trust and was measured prior to the initial visit for the purpose of this study with the General Trust in Physician Scale.[37] This scale was developed to test general trust in physicians in contrast to other scales that assess individual physician trust. An 11-item scale was formulated from the initial 25 candidate items that were based on five domains (fidelity, competence, honesty, confidentiality, and global trust). Five-point Likert scale categories were utilized for each question (1 = strongly disagree, 2 = disagree,

3 = neutral, 4 = agree, 5 = strongly agree). The final 11-items have both positive (#1, #3-6, and #8-10) and negative (#2 and #7) worded questions, with reverse scoring for negative items. Scores can range from 11 to 55, with higher scores demonstrating higher trust. If one or two scores were left out, the missing values were imputed with the average score, if three or more scores were missing the total score was not be calculated and left out. The words "physical therapists" were inserted for the word "physician" for use with this study. The General Trust in Physician Scale according to Microsoft® Word 365 for Office (Redman, WA) has a Flesch reading ease of 42.4 providing a Flesch-Kincaid grade level of 10.8. (Appendix 6)

Working Alliance Inventory-Short Revised: The Working Alliance Inventory-Short Revised (WAI-SR)[127] is one of the most commonly used instruments to measure the alliance between patients and therapists in physical rehabilitation.[55] A 12-item short form was originally developed in 1989[128] from the original 1986 36-item Working Alliance Inventory[129] and revised in 2006[127] into the current WAI-SR. The WAI-SR has been developed to assess Bordin's Task, Goal, and Bonds dimensions.[18] The scale is measured on a 5-point Likert scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always). All items are positively worded and higher scores reflect higher levels of therapeutic alliance. Flesch reading ease score is at 63.0, producing a Flesch-Kincaid grade level of 8.0 according to Microsoft® Word 365 for Office (Redman, WA). (Appendix 7)

PT Survey of Patient Connection and Engagement: This survey questionnaire was developed for use during this dissertation study. An original 10-question survey was developed and created based on current literature[48,52,93,130,131] in the area of TA along with personal conversation with experts in the field of physical therapy and patient care management. After original survey item creation was completed, it was sent to a panel of five clinicians throughout

the US that have experience in research and the study of patient involvement and psychosocial aspects of clinical care from both practice and academic settings. After review of the questionnaire and the comments made by the panel, it was revised into its current consensus form. This questionnaire was aimed to evaluate the physical therapist's perceptions of the patient's engagement and connection with their physical therapist during the therapeutic encounter. No measurement tool such as this existed based on the review of the current literature. The scale contains 10 positively worded items scored on a 5-point Likert scale (1 = very poor, 2 = below average, 3 = average, 4 = above average, 5 = excellent). The score contains two sub-scores connection (questions 1, 3, and 7) and engagement (questions 2, 4-6, and 8-10). The questionnaire scores a 62.0 on the Flesch reading ease scale, making it at an 8.5 Flesch-Kincaid grade level according to Microsoft® Word 365 for Office (Redman, WA). (Appendix 8)

3.3.3 Instruments – Outcome measurement variables

The outcome measurements chosen for this study assessed the patients' progress during their physical therapy episode of care on various levels. Patient reported outcomes assessed clinical pain and functional progress by utilizing the Oswestry Disability Index 2.0 (ODI), Numeric Pain Rating Scale (NPRS), and a Global Rate of Change Scale (GROC) as these have been shown to be more responsive than physical impairment measurements.[132,133]

Oswestry Disability Index 2.0: Improvement in function is a key outcome measurement for clinical conditions and the ODI has shown to have some of the best responsiveness when it comes to patients with low back pain.[134] The ODI has been an extensively used measurement tool to evaluate function and how back pain affects an individual's ability to do daily activities.[135-138] The ODI assesses function in 10 categories (pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sexual activity, social life, and traveling). Version 2.0[135] was

utilized for the purposes of this study. Each of the 10 categories has six statements that are scored from 0 to 5, the statement with the least disability is scored a 0 and the greatest disability scored with a 5. If more than one statement is marked, then the highest score is recorded. The overall score (index) is calculated by taking the total points added up for items answered and dividing by the total possible score (number of categories answered x 5). This number is then multiplied by 100 and rounded to a whole number. Overall index scores can be interpreted for the range of 0-20% for minimal disability, 21-40% for moderate disability, 41-60% for severe disability, 61-80% for crippled, and 81-100% for individuals bed bound or exaggerating their symptoms.[139,140] (Appendix 9)

Numeric Pain Rating Scale: The NPRS is a unidimensional measurement of pain intensity in adults.[132,141-147] It consists of an 11-point ordinal scale measuring pain from "0" = no pain to "10" = worst pain imaginable. The respondents were asked to report on current, best and worst pain in the last 24 hours. All three scores (current, best, and worst) were recorded along with calculation of the average of all three being reported. This scale has been used across various diagnoses and age ranges.[132,143-145,148] (Appendix 10)

Global Rate of Change scale: The GROC scale, as stated in its name, is a global rating of improvement and satisfaction over the course of treatment.[149] It does not measure a specific dimension such as pain or function, but allows the patient to decide what they consider important. The GROC is a commonly used outcome tool in clinical research, especially as it relates to musculoskeletal care.[150,151] The most common formats of the GROC is typically a 7, 11, or 15 point scale on a number line with 0 in the middle and moving out one integer in the positive and negative numerical direction. The end anchors also contain the negative and positive words of "very much worse" and "very much improved" or "completely better" with "no

change" being in the middle at the zero.[152] Evidence shows that scales with 7 or 11 points offer the best mix of patient preference, appropriate discrimination ability, and test-retest reliability.[153,154] For purposes of this study the recommended 11-point scale was used (-5 = very much worse, 0 = unchanged, 5 = completely recovered).[152] (Appendix 11)

3.3.4 Instruments – Demographic collection

Demographic data was collected on both the patients along with the treating physical therapists involved in providing care. Each patient provided information regarding age, gender, race, and educational level. The patient's birth order was recorded, as first born or only child designations have been shown to accept treatment more readily and stay in treatment longer.[155] Questions related to whether the patient had been seen in physical therapy previously, at this specific site, or by this specific therapist was enquired upon during the initial demographics screening. Lastly, the choice of why the patient participant selected physical therapy, the specific clinic, and physical therapist was asked. (Appendix 2) Each of the participating physical therapists also completed a demographics form providing their age, gender, race, level of physical therapy education, specialty certifications (if any), and years practicing as a physical therapist. (Appendix 12)

3.3.5 Procedural process

Clinical sites across the US were recruited to be data collection sites. These sites were chosen based on interest in participating with research design and availability to be a data collection site. Physical therapists at each location were given the option to opt in or out as a participating physical therapist. If the physical therapist opted in, they signed an informed consent and completed a physical therapist participant demographic information form and were provided a coded ID#.

At each clinical site, front office staff that recognized potential patients for the study (patients being seen for initial evaluation of low back pain or equivalent diagnosis by a physical therapist that had consented to partake in the study) gave the patient a research study recruitment flier. Those patients interested in participating were provided a link to an online PsychData link to complete the informed consent and a HIPAA form. Once the patient participant provided informed consent, they progressed to additional PsychData questionnaires to be filled out by the patient participant prior to their initial evaluation with their physical therapist. Information collected consisted of: baseline demographic information sheet, General Trust in Physician Scale, Trust in Physician Scale, PCAS, Wake Forest Scale, ODI, and NPRS. The online participant data collection allowed for blinding of the physical therapist throughout the study to the trust measurement scores. Patient participants received a normal physical therapy evaluation and treatment as directed by the physical therapist. Upon completion of the initial visit, the patient participant completed the WAI-SR, Trust in Physician Scale, PCAS, and Wake Forest Scale through a second PyschData link. After completion of the second physical therapy visit, the participating physical therapist completed the PT Survey of Patient Connection and Engagement. Patient participants were blinded to the physical therapist's responses on this instrument. Patient participants continued to receive normal physical therapy care as directed by the physical therapist working toward discontinuation of the current episode of care. The majority of the physical therapy encounters (80%) needed to have the initial physical therapist directly involved with the care of the patient participant to be eligible for data collection. If less than 80% of the visits had the direct care delivered by someone other than the initial physical therapist, that data was excluded from primary analysis. Upon discontinuation of the current episode of care or the end of 6 months of care, the patient participant completed the Trust in

Physician Scale, PCAS, Wake Forrest Scale, WAI-SR, ODI, NPRS, and GROC. The participating physical therapist completed a second PT Survey of Patient Connection and Engagement at the conclusion of care. (Figure 1) Patient participants that completed the survey forms for pre-initial visit and/or post-initial visit received a $5 Walmart gift card for each survey, those that completed the discharge survey received an additional $15 Walmart gift card mailed to an address of their choice.

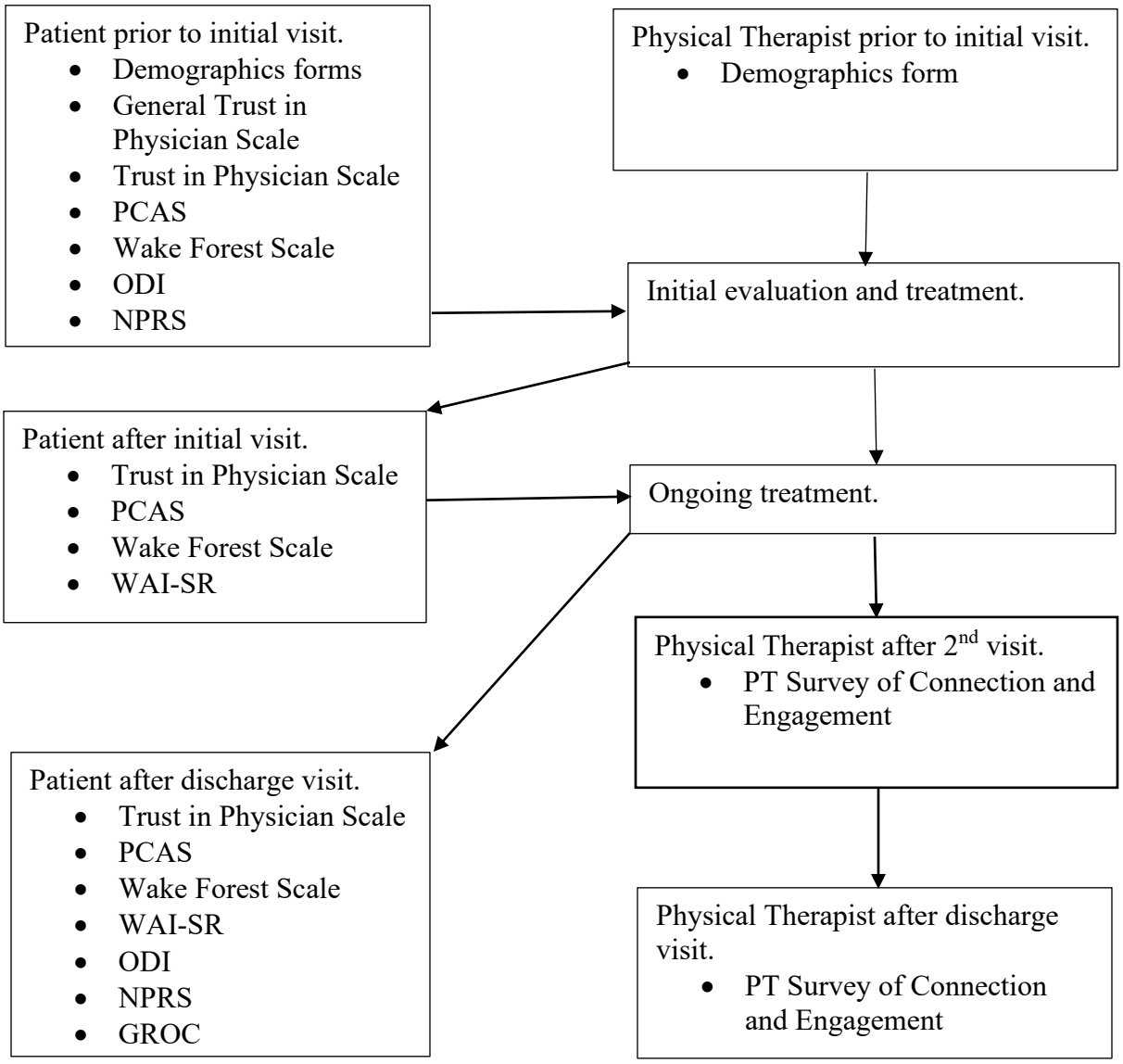


Figure 1. Procedural flow chart

3.4 Statistical Analysis for Results

All data was coded and entered into SPSS version 27.0 (IBM Corp., Armonk, N.Y., USA) for statistical analysis. Patient participant and physical therapist demographic data was reported with means, ranges, and standard deviations. The primary correlational statistics was the Spearman rho to assess the various individual trust measurement scores and changes in scores over time and individual scores with the primary outcome measurements of pain, function, and global change. The individual trust measurement scores, that have not been used in physical therapy, were be analyzed for correlation to WIA-SR, which has been used in physical therapy research, with Spearman's rho. Friedman's analysis of variance looked at changes in individual trust measurement scores over time from pre-initial visit, post-initial visit, and discharge. The non-parametric analysis was used due to the ordinal nature of the outcome variables. The PT Survey of Patient Connection and Engagement was analyzed for correlation with outcomes and the individual trust measurement scales with the Spearman rho. Linear regression analysis was done with the individual trust measurement scales and outcomes variables for predictive modeling of trust and outcomes assessment.

3.5 Resources Used

The various measurement tools were loaded into the PsychData for patient participants to complete. Walmart gift cards for the patient participants were provided for each person that completed any of the sets of measurements. An internal University of South Dakota Physical Therapy Department grant to cover the cost for two $5 gift cards was secured for completion of initial visit pre and post. (Appendix 13) An additional external grant for an additional $15 gift card was applied for and approved through the Iowa Physical Therapy Foundation to reimburse patient participants for completion of final set of questionnaires at discontinuation. (Appendix

13) Mailing of the various forms and information was covered through internal department funds from the University of South Dakota Physical Therapy Department. All other clinic physical therapy treatment was provided as part of normal physical therapy care for the patient and normal billing procedures were done per each facility's normal policy and procedures.

3.6 Reliability and Validity

Trust in Physician Scale: Initial derivation of the scale contained 25-items with both positive and negative worded statements to be measured with a five-point Likert scale. Item analysis was done of each question to condense the questionnaire down to 11-items that demonstrated a relatively high variance and so not restricted in range and item to total correlation above 0.40.[29] The internal consistency measured Cronbach alpha at 0.90 for the final 11-items pulled out of the original 25-items for creation of the scale. A follow up study[29] was completed on a new independent sample with the 11-items for validation of the assessment. It demonstrated item-to-total scale correlation to be adequate and consistent with the original study. Internal consistency demonstrated a Cronbach alpha of 0.85.

Further validation and reliability study[53] with a group of community-based, primary care patients has demonstrated item-scale correlations between 0.53 and 0.72, except for item 11 which had a correlation of 0.39 after modification to the Likert scale anchors (1 = totally disagree, 2 disagree, 3 = neutral, 4 = agree, 5 = totally agree). Cronbach's alpha was calculated to be 0.89 for the total score in this follow up study. Only 4.6% of the scores reached the ceiling score with the modifications of the anchors compared to 18% with the original anchors as proposed by Anderson and Dedrick. The interclass coefficient for 1-month test-retest reliability was 0.77 demonstrating stability over time. Construct validity was established with testing the

scale and its positive association to patients' satisfaction and physician behaviors during the visit, along with a general measure of interpersonal trust.[53]

Patient Care Assessment Survey: The PCAS was shown to have a Cronbach's alpha at 0.86 upon initial derivation.[28] Tests for Likert scaling assumptions were met for the trust scale and the scale showed that it performed consistently well across 16 different population subgroups. The range of item-scale correlations for the trust scale were 0.49-0.73. The ceiling and floor effect percentages were 7.71% and 0.03% respectively for the observed range of 7-100. The initial study for the PCAS showed skewness of -0.56 and kurtosis of 3.23.

Wake Forest Scale: In total, 78 questions were generated for initial testing and categorized into one of four dimensions (fidelity, competence, honesty, or confidentiality) along with a global dimension.[38] These questions went through a series of tests to look for items that were the most understandable and produced variability in responses and greater internal consistency which were narrowed down 26 items and eventually into the 10-item scale, which covered all dimensions except for confidentiality. Final psychometric properties for the final version of the Wake Forest Scale demonstrated construct validity in its comparison to previous trust measurement scales and patient satisfaction. Cronbach's alpha for the scale demonstrated to be 0.93 in a national survey and 0.92 in a regional survey. Score ranges have been found to be between 10 and 50 with the national survey. The scale distribution was skewed to the left (skewness = -1.07) and a thinner than normal shape (kurtosis = 2.55). Two-month test-retest reliability demonstrated $r = 0.75$.

General Trust in Physician Scale: After piloting various items from other scales that relate to trust in physicians, 25-items were selected for use in a national telephone survey.[37] They items covered the four dimensions of physician trust (fidelity, competence, confidentiality, and

honest), along with global trust items. From this testing, 11-items demonstrated to have the best psychometric properties to be retained for the final scale. Together the 11-items demonstrated a Cronbach alpha = 0.89, with the main factors eigenvalue of 4.6 explaining 100 percent of the estimated common variance. Concurrent validity was shown in comparison to interpersonal physician trust, satisfaction with care, and always following the doctor's recommendations.

Working Alliance Inventory – Short Revised: The WAI-SR has shown to have similar psychometric properties compared to the original Working Alliance Inventory with similar total scores in two different samples that showed correlations of 0.95 and 0.94 respectively.[127] Content validity has been supported from both rational and empirical data methods.[128] In regards to construct validity it correlates well with other therapeutic alliance measures.[127] The WAI-SR has demonstrated good internal consistency with Cronbach's alpha for the subdomains (bond, task, and goal) ranging from 0.77 to 0.92, with a total score Cronbach's alpha of 0.83-0.97.[126,127] Test-retest reliability demonstrated good reliability of 0.93 (95% CI 0.83-0.97).[156,157] Due to relatively high scores in most studies,[47,126,127] concern of ceiling affects need to be considered in relation to responsiveness of the scale.

PT Survey of Patient Connection and Engagement: The revised and updated PT Survey of Patient Connection and Engagement was piloted at an outpatient orthopedic clinic with four physical therapists on 20 patients over two different trial episodes of care on the same patients. Inter-item correlation for each individual item (questions 1, 3, and 7) when compared to the connection subscale average item score were all above 0.8 for each episode the survey was delivered. Comparison through inter-item correlation of the individual items (questions 2, 4, 5, 6, 8, 9, and 10) compared to the engagement subscale was slightly less with scores ranging from 0.619-0.786 the first trial and 0.649-0.928 the second trial. Because all items scored above 0.600

for the item to total correlation, they were kept in accordance to other survey development processes.[38] Cronbach's alpha for engagement sub-score was 0.843 and 0.915 for each individual trial episode, and 0.893 and 0.852 respectively for connection sub-score.

Oswestry Disability Index (2.0): Psychometric properties of the ODI have been extensively studied at multiple levels for patients with low back pain.[158-163] It has shown to have criterion,[158,160,162] construct,[160,161] and content[158] validity. Minimal detectable change for individuals with chronic low back pain was found to be a change in score of 11.74 at the 95% confidence interval with a minimally clinically important difference of 12.88 with 88% sensitivity and 85% specficity.[162] Test-retest reliability has demonstrated a spectrum of results from excellent to poor depending on the subsection tested,[159] but overall scores have shown to be good with ICC = 0.88 (0.77-0.94),[159] 0.94 (0.89-0.97), [161] 0.97 (0.94-0.98)[163] at the 95% confidence interval. Internal consistency for overall ODI score has also been shown to be good with Cronbach's alpha = 0.83-0.90.[161,163]

Numeric Pain Rating Scale: Adequate test-retest reliability has been found, with improved reliability with more ratings taken along with excellent internal consistency with Cronbach's alpha = 0.89-0.98 for individuals with chronic pain.[164] The NPRS has also demonstrated criterion,[147] construct,[165] content,[166] and face[147] validity. The minimal detectable change for low back has been found to be 2 based on the 95% confidence interval.[146] The minimally clinically important difference for low back pain at 1-week was 1.5 points and 2.2 points at 4 weeks of physical therapy treatment.[146] Another study looking at patients with chronic musculoskeletal pain found the minimally clinically important difference to be 1 point or 15% change in score.[167]

Global Rate of Change: The test-retest reliability for an 11-point GROC scale with patients with low back pain has been shown to good with an ICC of 0.90 (0.84-0.93) for the 95% confidence interval.[168] The minimal detectable change has been reported to be 0.45 points, with a minimal clinically important difference of 2 points on the 11-point scale.[168] Face and construct validity has also been established in the literature.[152]

3.7 Summary

This chapter outlines to the methodology used to further study the construct of trust and its relation to clinical outcomes in physical therapy. This was accomplished through the various measurement instruments carefully researched and chosen to most fully and succinctly study the research questions of this dissertation project.

Chapter 4: Results

4.1 Introduction

This chapter will provide detailed information on the various statistical tests chosen for data analysis. The various results provide an analysis that synthesizes patient data, physical therapist (PT) participant responses to demographic questionnaires, trust measurement scales, and treatment outcome measures. These results aim to answer the dissertation research questions:

- Do baseline or end trust scores of patient trust with their treating physical therapist correlate with outcomes for patients with chronic low back pain?
- Do changes in trust measurement scores of patient trust with their treating physical therapist over the course of care correlate with outcomes for patients with chronic low back pain?
- What is the relationship of the trust measurement scores that have not been used in physical therapy and an established therapeutic alliance (TA) measurement tool that has been used in the research for physical therapy encounters?
- Which of the three trust measurement scales shows the strongest correlation with patient outcomes?
- What is the shift in patient trust through the course of treatment, both in the short-term (pre and post-initial evaluation) and long-term (pre and post-initial evaluation to discharge)?
- Is there a relation between the patient trust scores in the physical therapist and the physical therapist's perception of the patient rapport and engagement during the therapeutic encounter, and does this relationship predict outcomes?

An overview of the results is provided to synthesize the various results and provide insights that answer the research aims. This will provide evidence for confirming or refuting the original hypotheses generated.

4.2 Data Analysis

Data collected from each patient participant was entered directly into a secured survey link within the online PsychData (State College, P.A., USA) survey site by the participant. The data then was downloaded into an Excel file and visually observed for completeness. Patient participant data that only had scores from one of the three test measure time points were excluded from analysis. Total scores from the individual responses for each of the measurement tool questions were individually calculated based on scoring procedure for each of the tools. Total scores for measurement variables of Trust in Physician Scale,[29] Primary Care Assessment Survey (PCAS),[28] Wake Forest Scale,[38] General Trust in Physician Scale,[37] Working Alliance Inventory – Short Revised (WAI-SR),[126] and Oswestry Disability Index (ODI)[135] were added to participant demographics and single score outcome variables (numeric pain rating scale (NPRS) and global rate of change (GROC) scale) and then transferred into SPSS version 27.0 (IBM Corp., Armonk, N.Y., USA) for analysis. Demographic data from PT participant was hand-coded from a paper data collection forms and entered into an Excel file along with therapist rating of PT Survey of Patient Connection and Engagement scale for each patient. All data that had at least two measurement time periods were used for analysis, any individual cases that were missing scores for a measure were excluded on a pairwise basis.

Both patient and PT participant demographic data were reported with counts, percentages, means, standard deviations, and ranges. Patient participant data was analyzed for differences in group scores for trust measure scores based on birth order, receiving PT in the

past, receiving care at PT clinic in the past, and receiving care from same PT in the past using an independent samples t-test. Spearman's correlation coefficient was used to determine relationships between trust measure scores and outcomes. The associations between trust measurement scores and the TA measure (WAI-SR) and General Trust in Physician scores were analyzed using Spearman's rank-order correlation. Prediction of outcome measures based on trust measurement scores was calculated using a simple linear regression analysis of trust measure scores that had significant correlation with an outcome measure. Initial residual analysis for each regression consisted of visual assessment, looking for goodness of fit, of the normal probability-probability plot and scatter plot analysis so no point exceeded -3 or 3. Standard residuals were also calculated and viewed for ranges between -3 and 3, and Cook's distance was calculated and assessed for anything greater than 1 to examine for influential cases. Independence of observations was calculated with Durbin-Watson test looking for values between 1 and 3. Adjusted R^2 value along with R^2 was reported for the model due to small sample size. Only adjusted coefficient of determination (R^2) values greater than 0.25 (correlation coefficient greater than .5, large effect size) are reported. To test for significant changes in trust measure scores at the three test points of pre-initial visit, post-initial visit, and discharge a Friedman's Analysis of Variance (ANOVA) was used because of the ordinal data produced by the outcome scores. Post-hoc test analysis to determine significance between different time points utilized a Wilcoxon sign-rank test for any significant Friedman's ANOVA results. Lastly the relationship of the PT Survey of Connection and Engagement and various outcome measures and trust scales was calculated using Spearman's correlation coefficient. The strength of correlation for Spearman's coefficients was reported as 0.1 small, 0.3 medium, and 0.5 large effect size.[169] Significance was set at $p < 0.05$.

4.3 Results

4.3.1 Patient participant demographics

Forty-three initial patient participants signed informed consent to begin the study, with 13 participants only completing initial pre-visit data collection and not finishing any additional sets of measurements at post-initial or discharge. Of the 30 remaining patient participants, 9 participants did not complete the final discharge set of measurements. One subject was removed from the data after analysis of linear regression assumptions, as the patient's data was an influential outlier, as observed through scatter plot and Cook's distance analysis. (Figure 2) Independent sample t-test revealed no differences in age, low back pain duration, gender, pain, or disability at pre-initial visit measure point for those excluded from analysis, when compared to those included.

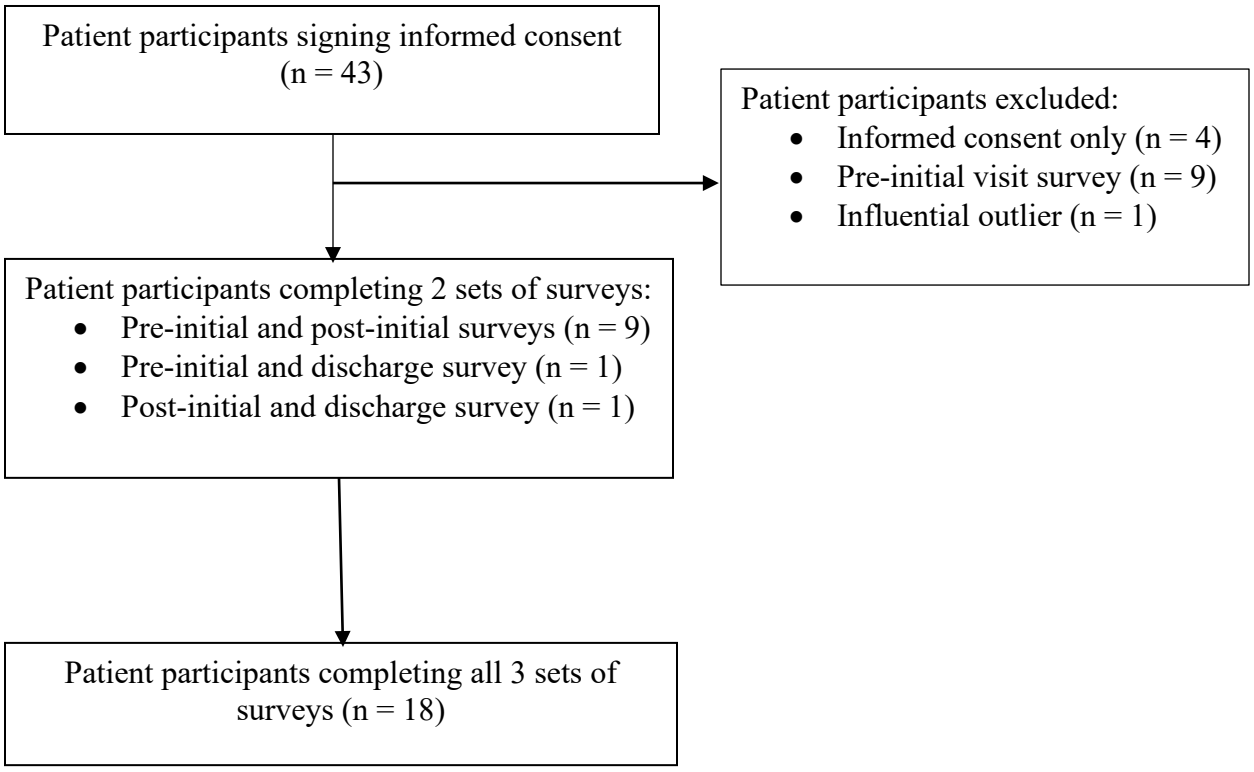


Figure 2. Flow diagram of dissertation patient participants.

The average age of the patient participants was 49.3 years old with a mean duration of low back pain at time of referral was about 2 years. Participants demonstrated a large range of pain duration, from 3 months to 15 years. There was a near-even split of females and males, with 15 females and 14 males. The majority (79%) of the patient participants were from a white racial background, with the remaining 21% being African American or Hispanic race, and one individual not choosing to report a racial category. Seventy-nine percent of the patient participants had received PT in the past prior to this visit. Interestingly, only about one-third had returned to the same clinic, and, of those only 4 patients (14%) were seeing the same PT that they had seen in the past. The majority (79%) of the patients were referred to PT via a physician, with only 21% showing up for care through direct access. Physician recommendation (45%) was the most common reason for selecting a PT clinic for care, with recommendation from family or friend being second (21%). Specific demographic data information for the baseline patient participants characteristics are provided in the Table 1.

Table 1. Baseline demographic characteristics of patient participants

Characteristics	Initial (n=29)	Range
Age, mean (SD), years	49.3 (15.0)	23 - 86
Low back pain duration, mean (SD), months	24.9 (42.9)	3 - 180
Gender, Female, No. (%)	15 (52)	
Race, No. (%)		
Black / African American	3 (10.3)	
Hispanic / Latinx	2 (6.9)	
White	24 (79.3)	
Not reported	1 (3.4)	
Education, No. (%)		
Less than high school	1 (3.4)	
Graduated from high school	5 (17.2)	
Some college	10 (34.5)	
Graduated from college	7 (24.1)	
Some post-graduate course work	1 (3.4)	
Completed post-graduate degree	5 (17.2)	
Birth order, first born, No. (%)	11 (36.7)	
Received some PT care in the past, Yes, No. (%)	23 (79.3)	
Received care at PT care at current clinic in the past, Yes, No. (%)	10 (34.5)	
Received care from current PT in the past, Yes, No. (%)	4 (13.8)	
Decision for coming to PT		
Physician referral, No. (%)	23 (79.3)	
Direct access to PT, No. (%)	6 (20.7)	
Choice for PT clinic		
Location (most convenient), No. (%)	3 (10.3)	
Advertisement, No. (%)	1 (3.4)	
Physician recommendation, No. (%)	13 (44.8)	
Family/Friend recommendation, No. (%)	6 (20.7)	
Insurance coverage, No. (%)	1 (3.4)	
Received care previously, No. (%)	5 (17.2)	
Choice of PT		
Seen previously, No. (%)	4 (13.8)	
Recommended by physician, No. (%)	8 (27.6)	
Recommended by family/friend, No. (%)	4 (13.8)	
Clinic choice by specialty of PT, No. (%)	6 (20.7)	
Clinic choice by first available, No. (%)	6(20.7)	
Not reported, No. (%)	1 (3.4)	

Abbreviations: SD, standard deviation; PT, physical therapy

4.3.2 Patient participant outcomes measurement reporting

Outcomes measurements of interest for this population of individuals with chronic low back pain consisted of the NPRS[143] recorded on the 0 – 10 scale and ODI[135] listed as percentage of disability measured at the pre-initial point and discharge time point. GROC[149] was measured at discharge visit on the 11-point Likert scale from -5 (very much worse) to +5 (completely recovered). On average patients saw about 1-point improvement in pain throughout the course of treatment, with 11.1 % improvement in disability rating on the ODI, and reported their GROC at a positive 2. (Table 2)

Table 2. Patient participant outcomes measurements at initial and discharge visits

Outcome measure	Initial (n=29)	Discharge (n=20)	Change (n=20)
NPRS current, mean (SD)	4.2 (2.0)	3.2 (2.3)	1.0 (2.7)
NPRS best, mean (SD)	2.5 (1.7)	1.9 (2.0)	0.9 (2.5)
NPRS worst, mean (SD)	6.5 (2.6)	4.8 (2.7)	1.7 (3.3)
NPRS average, mean (SD)	4.4 (1.8)	3.3 (2.2)	1.1 (2.6)
ODI, mean (SD)	30.0 (16.4)	19.5 (16.1)	11.1 (17.7)
GROC, mean (SD)		2.4 (2.3)	

Abbreviations: NPRS, numeric pain rating scale; SD, standard deviation; ODI, Oswestry disability index; GROC, global rate of change

4.3.3 Trust and therapeutic alliance measurement reporting

The General Trust in Physician scale was measured prior to the initial evaluation. Twenty-nine participants completed this questionnaire demonstrating an average score of 43.9 with a standard deviation of 6.3 points with a minimum rating of 28 and maximum rating at 55 points. Descriptive results of the three trust measurement scales (Trust in Physician Scale, PCAS, and Wake Forest Scale) at all three time points are provided in Table 3. The WAI-SR scale measured after the initial visit provided a mean score of 55.4 (SD = 5.3) and 54.7 (SD = 8.9) at discharge.

Table 3. Trust measurement scores at the three time points of measurement

Trust Measurement Scale	Pre-initial	Post-initial	Discharge
Trust in Physician Scale, mean (SD)	44.4 (6.7)	47.4 (6.2)	49.6 (7.2)
Primary Care Assessment Survey, mean (SD)	31.3 (4.8)	33.4 (4.5)	34.6 (5.7)
Wake Forest Scale, mean (SD)	40.5 (6.3)	42.4 (5.7)	44.7 (7.8)

Patient participant population analysis for differences between trust measure scores based on grouping variable birth order, showed no significant differences between groups. Receiving PT care in the past or care at the clinic previously also showed no differences in trust measure scores between groups at any time of measurement. If the patient participant had seen the PT participant in the past there was one significant difference found in trust measure scores, but there were only 4 participants that met this criterion. The PCAS score at pre-initial visit showed a significantly higher mean score ($t(26) = 2.168$, $p = .039$) for those that had seen the PT previously ($\overline{x} = 35.8$ ($SD = 4.9$)) compared to those that had not ($\overline{x} = 30.5$ ($SD = 4.4$)).

4.3.4 Physical therapist participant demographics

Sixteen different PT participants from 8 different clinic sites informed the analysis. Clinic sites were located in Arizona, California (x2), Rhode Island, Virginia, Washington (x2), and Wisconsin. Average age of PT participants was 34.2 ($SD = 8.4$) years with a range from 25 to 57 years old. There were 8 females and 8 males, with 14 (87.5%) being of white racial category and the other 2 PT participants (12.5%) being of Asian racial decent. All but one of the PT participants possessed an earned Doctorate of Physical Therapy degree as their professional educational level. The one PT participant that did not have their Doctorate of Physical Therapy degree graduated with a Bachelor of Science in Physical Therapy degree. Seven therapists (43.8%) noted they were in the 0-5 year career tenure range, another 6 (37%) in the 6-10 year range, and 2 with 16-20 years' experience. One PT reported more than 30 years' experience. A

total of 8 therapist reported board certification, 5 had gone through a residency program, and 3 completed fellowship training.

4.3.5 Baseline, end, and changes in trust scores correlation with outcomes

Trust scores measured through the Trust in Physician Scale at the pre-initial visit, showed a significant correlation with worst pain change score (r_s = -0.459, p = 0.048) alone. Trust in Physician Scale scores at post-initial visit and discharge visit show no statistically significant correlations with pain outcomes. The change in Trust in Physician Scale score from post-initial to discharge correlated with best pain at discharge (r_s = -0.500, p = 0.029). There also was a significant correlation for best pain change (r_s = 0.484, p = 0.036), worst pain change (r_s = 0.528, p = 0.020) and average pain change (r_s = 0.504, p = 0.028) with the change in the Trust in Physician Scale score from post-initial to discharge scoring. The change in Trust in Physician Scale from pre-initial to discharge score demonstrated only a significant correlation with best pain at initial rating (r_s = 0.505, p = 0.027). There were no significant correlations with changes in Trust in Physician Scale from pre-initial to post-initial or pre-initial to discharge for any of the pain outcomes.

The PCAS trust measurement scores at post-initial visit did correlate with best pain at discharge (r_s = 0.502, p = .034) and change of worst pain (r_s = -0.463, p = 0.046). There were no significant correlations with the PCAS score at pre-initial or discharge with pain measurement scores. Changes in the PCAS score from pre-initial to post-initial and pre-initial and discharge provided no significant correlations with pain measurements. The change in the PCAS score from post-initial to discharge did produce significant correlations with pain outcomes at discharge and with change in pain over course of treatment. (Table 4)

Table 4. Correlation of change in Primary Care Assessment Survey from post-initial to discharge with pain measurements

Pain Measurement	Spearman's Correlation Coefficient	Significance (p-value)
Current at discharge	-0.635	0.005
Current change at discharge	0.612	0.020
Best at discharge	-0.754	<0.001
Best change at discharge	0.797	<0.001
Worst at discharge	-0.668	0.002
Worst change at discharge	0.688	0.002
Average at discharge	-0.692	0.001
Average change at discharge	0.745	0.001

The Wake Forest Scale scores at pre-initial and discharge did not show any correlation with pain outcome measures. The post-initial score for the Wake Forest Scale showed an inverse relationship with worst pain at initial (r_s = -0.384, p = 0.044). Changes in the pre to post-initial score for the Wake Forest Scale showed a single correlation meeting statistical significance as best pain at discharge score (r_s = 0.550, p = 0.015). The change in the Wake Forest Scale score from post-initial to discharge and pre-initial to discharge found no significant correlations with pain outcome measures.

The change in Trust in Physician Scale score from pre-initial to discharge showed a correlation with ODI from initial visit (r_s = 0.526, p = 0.021). The ODI score at discharge correlated with the PCAS at discharge (r_s = -0.536, p = 0.015) and the Wake Forest Scale discharge score (r_s = -0.484, p = .031). The change in ODI had correlations with the Trust in Physician Scale score from discharge (r_s = 0.575, p = 0.008), PCAS at discharge (r_s = 0.569, p = 0.009), and Wake Forest Scale at discharge (r_s = 0.474, p = 0.047).

The outcome measurement of GROC showed various significant correlations to the different trust measurement scale scores and changes in scores between time points. The

significant findings, along with Spearman's correlation coefficient are listed in Table 5. The other measurement and time period correlations showed no significance with GROC.

Table 5. Correlation of change in trust measurement scores and time period and Global Rating of Change scores

Trust Measurement and time period	Spearman's Correlation Coefficient	Significance (p-value)
Trust in Physician Scale at post-initial	0.469	0.043
Trust in Physician Scale at discharge	0.721	<0.001
Primary Care Assessment Survey at pre-initial	0.507	0.027
Primary Care Assessment Survey at discharge	0.756	<0.001
Primary Care Assessment Survey change from post-initial to discharge	0.517	0.023
Wake Forest Scale at pre-initial	0.463	0.046
Wake Forest Scale at discharge	0.721	<0.001

4.3.6 Trust scores correlation with Working Alliance Inventory – Short Revised and General Trust in Physician scores

All three trust measurement scores in the current study showed strong correlation with the WAI-SR scale both the scale score at the time of measurement and the change in scores. Spearman's correlation coefficient along with significance statistic are found in Tables 6-8.

Table 6. Correlation of trust measurement scores and Working Alliance Inventory – Short Revised score at post-initial visit

Trust Measurement	Spearman's Correlation Coefficient	Significance (p-value)
Trust in Physician Scale	0.782	<0.001
Primary Care Assessment Survey	0.747	<0.001
Wake Forest Scale	0.742	<0.001

Table 7. Correlation of trust measurement scores and Working Alliance Inventory – Short Revised score at discharge visit

Trust Measurement	Spearman's Correlation Coefficient	Significance (p-value)
Trust in Physician Scale	0.847	<0.001
Primary Care Assessment Survey	0.801	<0.001
Wake Forest Scale	0.861	<0.001

Table 8. Correlation of change in trust measurement scores and change in Working Alliance Inventory – Short Revised score from post-initial visit to discharge visit

Trust Measurement	Spearman's Correlation Coefficient	Significance (p-value)
Trust in Physician Scale	0.628	0.004
Primary Care Assessment Survey	0.639	0.004
Wake Forest Scale	0.504	0.028

The General Trust in Physician scale that was taken pre-initial visit show a strong correlation with pre-initial trust measures (Table 9).

Table 9. Correlation of trust measurements and General Trust in Physician score at pre-initial visit

Trust Measurement	Spearman's Correlation Coefficient	Significance (p-value)
Trust in Physician Scale	0.783	<0.001
Primary Care Assessment Survey	0.753	<0.001
Wake Forest Scale	0.744	<0.001

4.3.7 Working Alliance Inventory – Short Revised scores correlation with outcomes measures

Investigation into the correlation of the WAI-SR scores correlation to outcomes showed a few significant findings with the change in the WAI-SR score from after initial visit to discharge with discharge pain scores in Table 10. The WAI-SR post initial and discharge scores had no significant correlations to pain outcome measures or change in pain outcomes at any time point. The GROC and ODI demonstrated significant changes in the WAI-SR scores at both test points, as well as the change in WAI-SR scores from initial to discharge. See Table 10 for significant findings, all others were not significant to the $p < 0.05$ level.

Table 10. Correlation of Working Alliance Inventory – Short Revised with outcome measures

WAI-SR measurement and outcome measurement	Spearman's Correlation Coefficient	Significance (p-value)
Change in WAI-SR and current pain at discharge	-0.503	0.028
Change in WAI-SR and best pain at discharge	-0.554	0.014
Change in WAI-SR and worst pain at discharge	-0.622	0.004
Change in WAI-SR and average pain at discharge	-0.622	0.004
Post-initial WAI-SR and GROC at discharge	0.483	0.036
Discharge WAI-SR and GROC at discharge	0.773	<0.001
Discharge WAI-SR and ODI at discharge	-0.483	0.031
Change in WAI-SR and GROC at discharge	0.498	0.010
Change in WAI-SR and change in ODI	0.475	0.040

Abbreviations: WAI-SR, Working Alliance Inventory – Short Revised; GROC, Global rate of change; ODI, Oswestry disability index

4.3.8 Trust measurement scores prediction of outcomes

Simple linear regression analysis was run for all significant correlations between outcomes measure and trust measurement scores or changes in trust measure scores for the different time periods of data collection. Each prediction model of the trust measurement score or change in score for outcomes measures that demonstrated p-value greater than 0.05 and R^2 value greater than 0.25 has been provided in Table 11-13.

Table 11. Linear regression model statistics for Trust in Physician scores and outcome measures

	R^2	Adj. R^2	F-Statistic	p-value	Durbin-Watson	B_0	B_1
TPS post-initial score and GROC	0.393	0.358	F(1,17)=11.016	0.004	2.472	-8.644	0.232
TPS discharge score and change in ODI	0.306	0.268	F(1,18)=7.949	0.011	2.488	-55.965	1.354
TPS discharge score and GROC	0.632	0.611	F(1,18)=30.889	<0.001	2.429	-10.033	0.250
TPS change post-initial to discharge and best pain change	0.328	0.289	F(1,17)=88.312	0.010	2.117	0.170	0.404
TPS change post-initial to discharge and worst pain change	0.371	0.334	F(1,17)=10.017	0.006	2.886	0.750	0.564
TPS change post-initial to discharge and average pain change	0.321	0.281	F(1,17)=8.031	0.011	2.709	0.446	0.409
TPS change pre-initial to discharge and best pain at initial	0.347	0.308	F(1,17)=9.025	0.008	0.992	1.716	0.173

Abbreviations: Adj., Adjusted; TPS, Trust in Physician Scale; ODI, Oswestry disability index; GROC, Global rate of change

Table 12. Linear regression model statistics for Patient Care Assessment Survey scores and outcome measures

	R^2	Adj. R^2	F-Statistic	p-value	Durbin-Watson	B_0	B_1
PCAS at discharge and ODI at discharge	0.382	0.348	F(1,18)=11.145	0.004	2.159	80.383	-1.764
PCAS at discharge and ODI change	0.359	0.323	F(1,18)=10.078	0.005	2.226	-53.664	1.876
PCAS at discharge and GROC	0.661	0.642	F(1,18)=35.078	<0.001	2.034	-8.949	0.327
PCAS change from post-initial to discharge and current pain at discharge	.0319	0.277	F(1,16)=7.510	0.015	2.682	3.877	-0.422
PCAS change from post-initial to discharge and current pain change	0.385	0.347	F(1,16)=10.031	0.006	2.869	0.096	0.525
PCAS change from post-initial to discharge and best pain at discharge	0.414	0.377	F(1,16)=11.294	0.004	2.556	2.595	-0.404
PCAS change from post-initial to discharge and best pain change	0.606	0.581	F(1,16)=24.583	<.001	2.254	-0.234	0.630
PCAS change from post-initial to discharge and worst pain at discharge	0.382	0.343	F(1,16)=9.871	0.006	2.233	5.675	-0.537
PCAS change from post-initial to discharge and worst pain change	0.435	0.399	F(1,16)=12.303	0.003	2.632	0.492	0.702

PCAS change from post-initial to discharge and average pain at discharge	0.374	0.335	F(1,16)=9.570	0.007	2.462	4.053	-0.427
PCAS change from post-initial to discharge and average pain change	0.504	0.473	F(1,16)=16.286	0.001	2.989	0.120	0.589
PCAS change from post-initial to discharge and GROC	0.291	0.247	F(1,16)=6.564	0.021	1.188	1.676	0.391

Abbreviations: Adj., Adjusted; PCAS, Primary Care Assessment Survey; ODI, Oswestry disability index; GROC, Global rate of change

Table 13. Linear regression model statistics for Wake Forest Scale scores and outcome measures

	R^2	**Adj. R^2**	**F-Statistic**	**p-value**	**Durbin-Watson**	**B_0**	**B_1**
WFS at discharge and GROC	0.519	0.493	F(1,18)=19.447	<0.001	2.525	-7.075	0.211

Abbreviations: Adj., Adjusted; WFS, Wake Forest Scale; GROC, Global rate of change

4.3.9 Change in trust scores over time

All three trust measurement scores showed an increase in trust over time: Trust in Physician Scale χ^2_F (2) = 12.3, p = 0.002; PCAS χ^2_F (2) = 12.3, p = 0.002; and Wake Forest Scale χ^2_F (2) = 13.8, p = 0.001. For the Trust in Physician Scale the significant changes in trust occurred between pre-initial to post-initial (p = 0.001) and pre-initial to discharge (p = 0.007), but not post-initial to discharge (p = .060). The Wake Forest Scale showed a similar statistical significance of trust measure score over time with pre-initial to post-initial being significant (p = 0.006) along with pre-initial to discharge (p = 0.005), but no significance found post-initial to discharge (p = .053). The PCAS found significant changes across all three different time

measures pre-initial to post-initial (p = 0.005), pre-initial to discharge (p = 0.001), and post-initial to discharge (p = .030).

4.3.10 Trust scores and therapeutic alliance correlation with PT survey of connection and engagement

Trust scores and therapeutic alliance scores showed significant correlations after initial visit, but not at discharge visit or with change in scores from initial to discharge visit to the PT survey of connection and engagement (Table 14).

Table 14. Correlation coefficient and significance of PT survey of connection and engagement score with trust scores and therapeutic alliance measure over test points

	Post-initial	Discharge	Post-initial to discharge change
Trust in Physician Scale	0.524 (p = 0.007)	-0.093 (p = 0.712)	0.134 (p = 0.608)
Primary Care Assessment Survey	0.447 (p = 0.029)	0.230 (p = 0.358)	0.089 (p = 0.734)
Wake Forest Scale	0.422 (p = 0.036)	0.142 (p = 0.575)	0.056 (p = 0.830)
Working Alliance Inventory – Short Revised	0.472 (p = 0.017)	0.213 (p = .397)	0.013 (p = 0.960)

4.3.11 PT survey of connection and engagement correlation with outcomes measures

Looking at the correlation of the PT Survey of Connection and Engagement scores with the various outcome measures, the only significant correlations found were with best pain at initial with the PT Survey of Connection and Engagement after initial visit (r_s = -0.394, p = 0.047) and change in PT Survey of Connection and Engagement from initial visit to discharge (r_s = 0.471, p = 0.027).

4.4 Summary of Results

4.4.1 Do baseline or end trust scores of patient trust with their treating physical therapist correlate with outcomes for patients with chronic low back pain?

Various trust measure scores at different time points from the three different surveys showed variable responses in their correlation to outcomes. No one trust measurement score

predicted improvements in all the outcome measures. Trust in Physician Scale scores taken pre-initial visit had a negative correlation with changes in worst pain over the course of treatment. Thus, patients that higher trust prior to evaluation and treatment correlated with lower changes in pain over the course of care. Higher Trust in Physician Scale scores at post-initial visit and discharge correlated with higher GROC scores. In addition, the better Trust in Physician Scale score at discharge correlated with improved change in ODI over the course of treatment. The PCAS had the most significant correlations with outcome measure improvements and changes. The PCAS at initial and discharge correlated positively with GROC score. The PCAS scores at discharge had a large negative correlation with ODI scores at discharge and positive correlation with change in ODI score over course of treatment at end of treatment episode of care. Therefore, patients with higher levels at discharge showed lower disability scores through the ODI and large improvements in their disability. The Wake Forest Scale score at discharge showed a negative correlation with ODI at discharge and positive correlations with change in ODI and GROC. The Wake Forest Scale taken pre-initial visit also showed a positive correlation with GROC. A medium negative correlation was found for the Wake Forest Scale score with worst pain at initial visit.

The end trust scores of all three measures correlated strongly with the outcome measures for function and global rate of change at discharge. The baseline trust scores at the beginning of treatment did not have any correlation with the outcome measurements collected. There were only a few correlations with the outcome of pain to the baseline and end trust scores.

4.4.2 Do changes in trust measurement scores of patient trust with their treating physical therapist over the course of care correlate with outcomes for patients with chronic low back pain?

The change in Trust in Physician Scale score from post-initial visit to discharge showed a large positive correlation with best, worst, and average pain change over course of treatment. The PCAS change from post-initial to discharge showed strong correlations with all the pain scores at discharge and change in pain scores. Patient participants with greater PCAS change from post-initial to discharge had lower pain scores at discharge and greater changes in pain scores over the course of care. The change in PCAS scores from post-initial to discharge also showed a positive correlation with GROC score. The only Wake Forest Scale change that correlated with outcomes was from pre-initial to post-initial for best pain at discharge. The results showed a positive correlation, with larger Wake Forest Scale score matching larger best pain scores at discharge.

The change in trust measure scores, over the course of treatment, showed good correlation with the outcome measure of pain but not with ODI or GROC. The greatest improvements in pain at discharge or change in pain from beginning to end of treatment were found with changes in improving trust scores from post-initial visit to discharge for the Trust in Physician Scale and PCAS. The PCAS change from post-initial to discharge was the only trust measure change that correlated with GROC. None of the trust measure change scores correlated with ODI.

4.4.3 What is the relationship of the trust measurement scores that have not been used in physical therapy to an established TA measurement tool that has been used in the research for physical therapy encounters?

There was a strong positive correlation between all three trust measurement scales with the WAI-SR scale previously used in physical therapy research at all measurement points. In addition, the change in WAI-SR correlated strongly with the change in trust measurement scores

from the initial to discharge visit. The General Trust in Physician Scale taken pre-initial visit also showed a large correlation with all three trust measure scores at the pre-initial test point.

4.4.4 Which of the three trust measurement scales shows the strongest correlation with patient outcomes?

When comparing all three scales, the PCAS provided the strongest and most correlations with patient outcomes. The discharge PCAS score demonstrated significant adjusted coefficient of determination values for ODI at 0.348, change in ODI at 0.323, and GROC at 0.642. The PCAS change score between post-initial and discharge also produced significant predictions models for all the pain scores at discharge, change in pain scores, and GROC. The Wake Forest Scale only had one strong predictor for an outcome measure. The discharge score for the Wake Forest Scale explained 49% of the variation of the GROC. The Trust in Physician Score provided more predictors than the Wake Forest Scale. The Trust in Physician scores had good coefficient of determination for the GROC when taken at post-initial and discharge, along with change in ODI when completed at discharge. The changes in the Trust in Physician Score from post-initial to discharge provided some predicted change scores with adjusted R^2 values between 0.28 and 0.33 for pain rating scores.

4.4.5 What is the shift in patient trust through the course of treatment both in the short-term (pre and post- initial evaluation) and long-term (pre and post-initial evaluation to discharge)?

All three trust measurement scores showed increases in trust through the course of treatment. Changes in trust from pre-initial to post-initial, a short-term duration of care was found in all three trust measurements. Each trust measurement also showed significant

improvements in trust from pre-initial to discharge, long duration. The PCAS was the only trust measurement that found a significant shift in trust from post-initial to discharge.

4.4.6 Is there a relation between the patient trust scores in the physical therapist and the physical therapist's perception of the patient connection and engagement during the therapeutic encounter, and does this relationship predict outcomes?

Interestingly, there was a medium to large correlation between the patient rated trust scores and PT perception of patient connection and engagement measure at post-initial visit timepoint. This correlation disappeared in all the measures at discharge and with the change in scores from post-initial to discharge. There was only one outcome variable, best pain at initial, that correlated with the PT Scale of Connection and Engagement. A higher level of best pain at initial correlated with lower PT Scale of Connection and Engagement rating at post-initial visit as well as change scores over the course of treatment.

4.5 Summary

Based on the results patients showed a correlation between their outcomes and trust measurement scores. Higher end trust scores correlated with improvements in function and global rate of change, whereas greater improvements in trust over the course of treatment correlated with lower pain rating scores at discharge. The trust measurement scores did correlate highly with the therapeutic alliance measure to demonstrate some validity that trust is most likely a component of therapeutic alliance. This dissertation did find that trust scores prior to initial visit do change in the short term (pre and post-initial evaluation) and long term (pre and post-initial evaluation to discharge). Surprisingly there was not any correlation with patient reported trust measurement scores with the PT reported scoring of patient connection and engagement at

discharge but there was post initial evaluation. The PT scoring of patient connection and engagement had no correlation with outcomes.

Chapter 5: Discussion

5.1 Introduction

The purpose of this dissertation was to explore the role of trust within the physical therapy encounter and its relation to outcomes for patients with chronic low back pain. Better therapeutic alliance (TA) has long been associated with improved outcomes during the clinical encounter.[25,34,47,49,51] A recent investigation has shown that the bond development between physical therapist and patients within the TA contains four key elements: nature of the rapport, respect, trust, and caring.[20] The element of trust has not been examined specifically within the physical therapy literature, although it has been explored in the general medical literature.[10,30,50,120,121,125,170,171] To further investigate trust, an appropriate measurement tool needs to be used for quantitative measurement of the construct. Three primary trust measurement scales[28,29,38,53] have been used in the literature within the medical literature, but none have been employed to study trust in physical therapy, specifically. The aims for this project were to investigate these scales in more detail within the context of physical therapy care for patients with chronic low back pain.

The intent of the study was to measure trust with three different scales (Trust in Physician Scale,[29] Primary Care and Assessment Survey (PCAS),[28] and Wake Forest Scale[38]) prior to and after the initial visit to determine the effects of the initial evaluation on trust scores. The trust scores were also measured at the end of care to measure changes of trust over the course of the plan of care. These trust measurement scores at each time point were then compared to the outcome measures for pain using the numeric pain rating scale (NPRS),[132] disability with the Oswestry Disability Index (ODI),[135] and global rate of change (GROC)[149] during physical therapy care. The trust measurement scales s were also compared with a previously used TA measure (Working Alliance Inventory – Short Revised (WAI-SR))[127] which has been used in

physical therapy. Another aim was looking at the physical therapist rating of patient connection and engagement within the treatment and compare that to the patient's rating of trust for correlations and relationship to outcomes.

This chapter will discuss the findings and results of the study aims. The discussion will focus on how these findings add to our knowledge base about trust within a physical therapy encounter, in relation to past information about the broader category of TA in physical therapy and comparison to trust in general medical care. The various implications of the dissertation findings will be presented, along with the recommendations for future study and research direction. The various limitations of the dissertation will be provided to allow the results and discussion to be put into an appropriate context of the boundaries of what the dissertation revealed.

5.2 Discussion

Baseline trust scores prior to initial visit only showed a small correlation to improved outcome with the GROC scale but not with pain or disability scores, with two of the trust measures. The Trust in Physician Scale, which did not show a correlation to the GROC when measured pre-initial visit, showed a moderate correlation to GROC score with the post-initial visit score. The other two trust measure scores did not demonstrate this correlation. All three trust measure scores at discharge did, however, have a large positive correlation with the GROC and change in ODI at discharge. Patients with higher levels of trust at discharge had higher GROC and improved changes in their disability. This coincides with previous research showing that patients with higher levels of trust demonstrated improved health.[28,37,53]

Interestingly, the trust scores at each time point had very few and small correlations with any of the pain measures. Improvements in pain scores over the course of treatment or lower

pain scores at discharge were more correlated with the changes in trust scores, not the actual trust score. This trend was most notable between the change in the post-initial and discharge trust scores. Thus, the level of a patient's pain coming into the visit did not have a relationship to the trust level they had in their provider to start with. This same phenomenon was evident with ODI scores, as beginning ODI scores had no correlations to trust measure scores. These results are consistent with the evidence in the general medical literature that the baseline amount of pain or disability does not predict the level of trust a patient has in their provider.[59] Other patient characteristics, such as age and race, which have shown some correlation to trust levels in previous research,[34,120-122] did not present as having an effect on trust levels within this study population. Characteristics such as educational level,[10,117,123] gender,[121-123] and birth order have also shown occasional correlations with trust levels in their provider, but these traits also did not present themselves as being connected to trust levels in this study population.

In general, higher levels of end trust scores correlated with higher ratings of GROC and improvements with disability through treatment. But it was the change of improved trust scores from post-initial visit to discharge visit that were strongly correlated with lower pain at discharge and greater changes in pain over the course of treatment.

Linear regression analysis for the ability of the trust scores or changes in trust scores to predict outcomes and responses to treatment revealed some interesting goodness-of-fit values. The discharge trust scores ability to predict the GROC for all three trust measures demonstrated coefficient of determinations in the 50-60% range, with the PCAS being the best at 64%. The PCAS at discharge also provided large correlations and adjusted R^2 values of 0.323 and 0.348 for ODI change and ODI at discharge. As noted in the correlation analysis, the change in the PCAS from post-initial visit to discharge also produced large correlations with pain at discharge and

changes in pain over the course of treatment. The coefficient of determination values was between 28-58% for the various pain ratings using the adjusted R^2 value. There is no standard rule for interpreting the strength of R^2 when applying to clinical significance.[172] Also caution needs to be applied to comparing R^2 across different samples, but seeing these coefficient of determination values around the 0.3 and 0.5 range or higher demonstrates that around one-third to a half of the improved change in pain can be predicted by the level of improving trust in this population.

There was consistency in findings when comparing the results of the current study to previously reported patient ratings of physicians. The Trust in Physician scale was delivered to patients of primary care physicians showing an average score of 41.4.[53] Safran's PCAS that was sent to Massachusetts state employees for ranking of their personal physician showed an average score of 30.3.[28] The last trust score of interest, Wake Forest Scale, demonstrated an average score of 33.5 with the general populations rating of their regular physician.[37] These numbers are slightly lower than the scores found at the various time points for the physical therapists ratings during this dissertation study when using the same scales. These surveys were collected either via phone call or mail survey and not completed in the providers office, which could account for the slightly lower scores. In this dissertation study the scale was completed in the office and may have influenced the patient rater to provide a higher score. Also, the type of relationship between physical therapist and medical provider is most likely different and could be related to the difference in trust measure scores.

Drawing direct comparisons with the trust measure scales to previous physical therapy research is not possible due to the scales not being used in the physical therapy literature. However, the therapeutic alliance measure, WAI-SR, has been used previously within the

context of physical therapy encounters. Based on the work from Miciek[20] showing that trust was a component of the TA, it was hypothesized that the trust scores would correlate significantly with the WAI-SR scores. This study did show a very strong correlation, with Spearmen's coefficient in the 0.7 to 0.8 range, with all three trust measurement scores comparing post-initial and discharge time periods with the WAI-SR scales at the same time periods. Also, changes in trust and therapeutic alliance over the course of treatment from post-initial to discharge also had a large correlation, offering evidence of concurrent validity to the trust scales with the WAI-SR used previously in physical therapy research.

Ferreira, et al.,[47] measured TA with a version of the Working Alliance Inventory – Long Form with patients with chronic low back pain receiving three different treatment interventions. They did find that TA measured after the second visit had a slight positive association with final outcomes scores for pain, disability, and global perceived effect. While significant, the linear regression adjusted coefficient values for the main effect of all participants were -0.044 for pain, -0.113 for disability, and 0.050 for global perceived effect. This dissertation study did see higher adjusted R^2 values for prediction models for pain, disability, and GROC in comparison. One straightforward difference between the studies is the population. Ferreira, et al.'s[47] population had higher pain ratings and longer duration of chronic low back pain along with being from Australia compared to our US based cohort. Another difference was design, this dissertation study therapists could treat and develop the plan of care within the normal context of their professional judgement and shared decision making; whereas, Ferreira, et al. had to provide the randomized treatment within the study parameters. Another potential reasons for the significantly higher coefficient of determinations might lie in the fact that Ferreira, et al.,[47] only measured TA after the second visit and not at discharge as was done with this analysis. It was the discharge

trust score and not the post-initial visit score that showed greater correlation and R^2 values with the outcome variables in the current analysis. Also, no change in therapeutic alliance was measured over time in Ferreira, et al.'s work, which the change in trust scores also revealed larger correlations and coefficients of determination in the current dissertation study.

The idea that end trust scores and change in trust scores may be an important factor in prediction of outcomes with patients, more so than beginning trust scores is evident based on the data of the current dissertation study. This study revealed that trust scores, in general, do improve over time both on short term, pre-initial to post-initial, along with changes over time from post-initial to discharge with this population. In general, the study group showed improvement over time that coincided with the improvement of trust over time. The study population saw an average pain rating improvement of just over one on the NPRS, which for chronic pain has been shown to meet the minimal clinical important difference.[167] The study population showed half of patient participants achieving 1.0 or greater improvement in average NPRS and the other half did not. The ODI change of 11% was also at the baseline of meeting the minimal detectable change and two points short of meeting the minimal clinical important difference.[162] Five of the patient participants achieved ODI changes greater than 13%, while the other 13 did not. The GROC of positive two also meet the minimal clinical important difference of two points on the 11 point scale.[152] Twelve patient participants had a two or greater rating on the GROC, with six rating their GROC less than two. These results demonstrated that the sample population made valuable gains during therapy, corresponding to the general mean increase in the trust scores. There was also a nice mix of patients showing improvement and those that did not make gains during therapy to help with the generalizability of the results.

The area of exploration regarding the physical therapist participants rating of patient connection and engagement and its relationship to patient trust during treatment provided some intriguing results. There was moderate to large correlation with the physical therapist's rating of patient connection and engagement after the second visit with the post-initial trust scores provided by the patient. But, over time, this correlation disappeared at discharge. The therapist rating over time did not change significantly, as compared to the improving trust score of the patient over the course of the treatment to discharge. In addition, this rating of the patient connection and engagement provided very little regarding correlation with outcomes. The only interesting connection to outcomes had to do with the physical therapist having higher connection and engagement scores for patients with lower best pain ratings at the initial visit. Surprisingly, that best pain rating at initial visit correlated positively with a change in connection and engagement over the course of treatment. Thus, patients that had higher initial best pain ratings got a higher positive change in the rating of improvement of connection of engagement from their therapist over the time. The lack of correlation between these two scales over the course of treatment shows they are measuring significantly different constructs over time and that they do not have much influence on one another over the course of treatment.

One of the biggest challenges during the dissertation study was subject recruitment and retention. Original institutional review board (IRB) approval from both university bodies was received on January 2018. Because of some delays in the joint IRB process, one of the original three sites secured to perform the data collection was lost prior to any data collection. The site lead for the clinic took another position outside of the clinic site and no other clinician at the site was able to take on the role of site lead. The other two sites were able to start with collection in January 2018. One site had significant turnover in front office staff during the next 6-month

period, so limited recruitment took place. The site lead at this clinic also eventually left for other employment and this clinic site was lost for recruitment in November of 2018. The other site was also eventually lost, due to the solo practitioner in the private clinic moving into a new professional role and out of day to day clinical practice on June 2019. Two new sites were recruited in July and August of 2018 to promote increase recruitment due to the original sites no longer recruiting or limited recruitment. Unfortunately, these two sites also ran into recruitment issues for various reasons mostly related to getting patients to consent to treat. Of these two sites, only one site eventually was included in the dissertation study. The other site had no patient recruitment during a 12-month period and was dropped. Further clinic recruitment began again during April and June 2019. Of the eight clinics recruited during that period, five were able to produce patient participants for use in data collection by the end of the dissertation.

Six of the nine patients that dropped out after completing only the pre-initial evaluation surveys and two of the four that completed only the patient consent were during the lockdown period of the COVID-19 pandemic from March 2020 to April 2020. In addition, five of the nine participants that only completed the first two sets of surveys and not the discharge survey occurred during the COVID-10 lockdown. In May 2020 the investigator made the decision to run statistical analysis on the current data set without additional recruitment to complete the dissertation due to uncertainty of reopening of clinic sites and continued participant recruitment.

5.3 Implications

This dissertation adds to the literature in the growing area of study around the broad topic of TA and its relationship to outcomes with care. The investigator explored specifically the concept of trust within the TA and how it correlated with outcomes during the care of patients receiving physical therapy care for their chronic low back pain. This study provides evidence

that trust measurement scores previously used in the physician literature may be helpful as a measurement tool in physical therapy. Most notably, the PCAS outperformed the Trust in Physician Scale and the Wake Forest Scale around predictions regarding outcomes as they relate to pain, disability, and global rate of change with the study population. Trust improves over time during physical therapy care when the patient makes improvements. This change in trust and end trust score seems to have a bigger impact on outcomes then the initial trust score, reaffirming that trust is a dynamic state that can change and develop over time and has a role in providing improved outcomes with patients. The therapists rating of the patient's connection and engagement showed to have little to no impact on outcomes and did not change over time, even when the patient's trust levels were improving in the therapist. These results demonstrate that a clinician's judgment of the patient's connection and engagement over the course of treatment had little bearing on the outcome that the patient achieved.

Recognizing that trust measurement tools correlate with more general TA scales further validates that trust is likely an important component of the TA. In addition, this study provided evidence that the PCAS is the trust measurement tool that may be best suited for physical therapy research. This will help researchers in the future select the most relevant tool to measure trust within physical therapy research.

5.4 Recommendations

Identifying a tool that has shown good to fair psychometric properties within the physician literature and has demonstrated characteristics of content and criterion validity within physical therapy practice will allow afford studies, going forward, a tool to measure trust within physical therapy encounters. Now different patient-therapist interaction types can be measured against each other for changes and improvement in trust levels to see if changes in outcomes

maybe associated with this construct within the patient care experience. Other studies can explore to see if these changes and trust and improvement in outcomes caries across other physical therapy settings and patient diagnoses. It is suggested going forward that the PCAS be strongly considered for use within physical therapy research, as it showed better correlation to outcomes and was predictive of the ability to measure changes in trust over time for patients receiving physical therapy.

5.5 Limitations and Delimitations

This study presents with various limitations, due to methodological choices made during the development process and implementation of the study design. One of the biggest limitations was the sample size (n = 43). The study did surpass the minimum of 10-15 cases of data per predictor for linear regression analysis,[173] but we did fall short of our original *a priori* of 64 participants, built on a 20% dropout rate, hoping to achieve 51 end participants. The dropout rate was higher than anticipated (33%), mostly due to the majority (19%) of those coming during the COVID-19 pandemic lockdown period, which lead to analysis on 29 patients. While the demographic data showed no differences between the dropout group and those that continued with the study, some potential differences in the sample population could lead to differences in future replication efforts. This limitation leads to challenges with potential replication of results due risk of false positives. The analysis of the data looked primarily at correlations that were large ($r_s > 0.5$ compared to the original *a priori* of 0.4) and the adjusted coefficient of determination above 0.25 to reduce the risk of smaller and potentially insignificant findings in the analysis. Not only did the study have a small sample size, there was also occasional missing data points due to participant not completing a trust survey or outcome measure. This was adjusted for by using case-wise comparisons within the statistical analysis. The COVID-19

pandemic and subsequent lockdown also lead to an unexpected limitation as some of the patients' data was collected during this period. The effects of the pandemic on trust and clinical outcomes are unknown, which leads to concerns with replication and generalization. Another delimitation was the choice to use multiple clinics and multiple therapists. While this does provide for a more generalized sample of therapists, we cannot look at potential confounders with concordance to the therapist due to limited numbers in each grouping for any multilevel regression analysis. This study looked solely at outpatient physical therapy patients receiving care for chronic low back pain, so caution needs to be maintained to generalize these results to other settings and diagnoses. Due to limited racial separation in the patient and therapist participants, lack of concordance of race and its effect on trust scores could not be determined. The concordance of race between clinician and patient has been shown to be a factor to effect trust in other studies.[124] The measurement of the physical therapist's rating of connection and engagement tool has not gone through extensive psychometric property testing and may not be a valid and reliable tool. This leads to inferences made between the therapist's rating of patient connection and engagement and the patient trust level scores potentially invalid. Because this was the first time these trust scales were used in physical therapy research, no comparisons can be made on reproducibility of results at this time. Lastly, due to the methodological design of the study inferences of causation can not be made. Trust and outcomes showed correlation, but no determination can be made if improved trust scores and changes in trust scores were the causative agent in the subsequent improvements in outcome measures.

5.6 Summary

The findings of this dissertation showed that higher trust level scores, most notable at discharge and the change in the trust score from post-initial to discharge, correlated to improved

outcomes in pain, disability, and GROC for patients with chronic low back pain receiving outpatient physical therapy treatment. The PCAS demonstrated the best prediction model for improved outcomes of the three measurement tools assessed. The trust measurement scales also had strong correlation with a TA scale used in the physical therapy literature adding to the current literature that trust is a component of TA. Patient's rating of trust in the physical therapist had correlations with the physical therapist's scoring of patient connection and engagement at the beginning of treatment but not at the end of treatment. This physical therapist rating of connection and engagement had little correlation to outcomes.

References

1. Rousseau DM, Sitkin SB, Burt RS, Camerer C. Not so different after all: A cross-discipline view of trust. *Acad Manage Rev.* 1998;23(3):393-404.
2. Plutchik R. The Nature of Emotions Human emotions have deep evolutionary roots, a fact that may explain their complexity and provide tools for clinical practice. *Am Sci.* 2001;89(4):344-350.
3. Davidson RJ. Seven sins in the study of emotion: Correctives from affective neuroscience. *Brain Cogn.* 2003;52(1):129-132.
4. Plutchik R. A general psychoevolutionary theory of emotion. *Theories of emotion.* 1980;1:3-31.
5. Panksepp J. Toward a general psychobiological theory of emotions. *Behav Brain Sci.* 1982;5(03):407-422.
6. Ekman P. An argument for basic emotions. *Cogn Emot.* 1992;6(3-4):169-200.
7. Ekman P, Friesen WV. Constants across cultures in the face and emotion. *J Pers Soc Psychol.* 1971;17(2):124.
8. Lewis JD, Weigert A. Trust as a social reality. *Soc Forces.* 1985;63(4):967-985.
9. Gilson L. Trust and the development of health care as a social institution. *Soc Sci Med.* 2003;56(7):1453-1468.
10. Gopichandran V, Chetlapalli SK. Factors influencing trust in doctors: a community segmentation strategy for quality improvement in healthcare. *BMJ Open.* 2013;3(12):e004115.
11. Willis J, Todorov A. First impressions making up your mind after a 100-ms exposure to a face. *Psychol Sci.* 2006;17(7):592-598.
12. Arora NK, Gustafson DH. Perceived Helpfulness of Physicians' Communication Behavior and Breast Cancer Patients' Level of Trust Over Time. *J Gen Intern Med.* 2009;24(2):252-255.
13. King-Casas B, Tomlin D, Anen C, Camerer CF, Quartz SR, Montague PR. Getting to know you: reputation and trust in a two-person economic exchange. *Science.* 2005;308(5718):78-83.
14. Vanneste BS, Puranam P, Kretschmer T. Trust over time in exchange relationships: Meta-analysis and theory. *Strategic Management Journal.* 2014;35(12):1891-1902.
15. Rotter JB. Interpersonal trust, trustworthiness, and gullibility. *Am Psychol.* 1980;35(1):1.
16. Thorne SE, Robinson CA. Reciprocal trust in health care relationships. *J Adv Nurs.* 1988;13(6):782-789 788p.
17. Benedetti F. Placebo and the new physiology of the doctor-patient relationship. *Physiol Rev.* 2013;93(3):1207-1246.
18. Bordin ES. The generalizability of the psychoanalytic concept of the working alliance. *Psychotherapy (Chic).* 1979;16(3):252.
19. Horvath AO, Luborsky L. The role of the therapeutic alliance in psychotherapy. *J Consult Clin Psychol.* 1993;61(4):561.
20. Miciak M. *Bedside Matters: A Conceptual Framework of the Therapeutic Relationship in Physiotherapy*, University of Alberta; 2015.
21. Ackerman SJ, Hilsenroth MJ. A review of therapist characteristics and techniques negatively impacting the therapeutic alliance. *Psychotherapy (Chic).* 2001;38(2):171.
22. Ardito RB, Rabellino D. Therapeutic alliance and outcome of psychotherapy: historical excursus, measurements, and prospects for research. *Front Psychol.* 2011;2:270.
23. Bachelor A. Clients' perception of the therapeutic alliance: A qualitative analysis. *J Couns Psychol.* 1995;42(3):323.
24. Clarke N. *The effects of therapeutic alliance and client readiness to change on cognitive behavior therapy treatment outcomes for a sample of substance and non-substance abusing psychiatric inpatient women*, Rutgers University-Graduate School of Applied and Professional Psychology; 2011.

25. Langhoff C, Baer T, Zubraegel D, Linden M. Therapist–patient alliance, patient–therapist alliance, mutual therapeutic alliance, therapist–patient concordance, and outcome of CBT in GAD. *J Cogn Psychother.* 2008;22(1):68-79.
26. Martin DJ, Garske JP, Davis MK. Relation of the therapeutic alliance with outcome and other variables: a meta-analytic review. *J Consult Clin Psychol.* 2000;68(3):438.
27. Raue PJ, Goldfried MR, Barkham M. The therapeutic alliance in psychodynamic-interpersonal and cognitive-behavioral therapy. *J Consult Clin Psychol.* 1997;65(4):582.
28. Safran DG, Kosinski M, Tarlov AR, et al. The Primary Care Assessment Survey: tests of data quality and measurement performance. *Med Care.* 1998;36(5):728-739.
29. Anderson LA, Dedrick RF. Development of the trust in physician scale: A measure to assess interpersonal trust inpatient-physician relationships. *Psychol Rep.* 1990;67(3f):1091-1100.
30. Balkrishnan R, Dugan E, Camacho FT, Hall MA. Trust and satisfaction with physicians, insurers, and the medical profession. *Med Care.* 2003;41(9):1058-1064.
31. Berzins P. *Therapeutic alliance as a predictor of psychotherapy process and outcome: The role of expert versus novice raters.* ProQuest; 2008.
32. Dugan E, Trachtenberg F, Hall MA. Development of abbreviated measures to assess patient trust in a physician, a health insurer, and the medical profession. *BMC Health Serv Res.* 2005;5(1):1.
33. Elżbieta K-K, Magdalena C, Wojciech K, Janis A, Antigoni C, Emilia R. Assessment of physician-patient trust in the obstetrics and gynecology departments in Poland and Greece. *Ginekol Pol.* 2011;82:905-910.
34. Fiscella K, Meldrum S, Franks P, et al. Patient trust: is it related to patient-centered behavior of primary care physicians? *Med Care.* 2004;42(11):1049-1055.
35. Goold SD, Lipkin M. The doctor–patient relationship. *J Gen Intern Med.* 1999;14(S1):26-33.
36. Halbert CH, Armstrong K, Gandy OH, Shaker L. Racial differences in trust in health care providers. *Arch Intern Med.* 2006;166(8):896-901.
37. Hall MA, Camacho F, Dugan E, Balkrishnan R. Trust in the medical profession: conceptual and measurement issues. *Health Serv Res.* 2002;37(5):1419-1439.
38. Hall MA, Zheng B, Dugan E, et al. Measuring patients' trust in their primary care providers. *Med Care Res Rev.* 2002;59(3):293-318.
39. Kao AC, Green DC, Davis NA, Koplan JP, Cleary PD. Patients' trust in their physicians. *J Gen Intern Med.* 1998;13(10):681-686.
40. Krupat E, Bell RA, Kravitz RL, Thom D, Azari R. When physicians and patients think alike: patient-centered beliefs and their impact on satisfaction and trust.(Original Research). *J Fam Pract.* 2001;50(12):1057-1063.
41. Pearson S, Raeke L. Patients' Trust in Physicians: Many Theories, Few Measures, and Little Data. *J Gen Intern Med.* 2000;15:509-513.
42. Schäfer G, Prkachin KM, Kaseweter KA, de C Williams AC. Health care providers' judgments in chronic pain: the influence of gender and trustworthiness. *Pain.* 2016;157(8):1618-1625.
43. Thom DH. Training physicians to increase patient trust. *J Eval Clin Pract.* 2000;6(3):245-253.
44. Thom DH, Kravitz RL, Bell RA, Krupat E, Azari R. Patient trust in the physician: relationship to patient requests. *Fam Pract.* 2002;19(5):476-483.
45. O'Keeffe M, Cullinane P, Hurley J, et al. What Influences Patient-Therapist Interactions in Musculoskeletal Physical Therapy? Qualitative Systematic Review and Meta-Synthesis. *Phys Ther.* 2016;96(5).
46. Fuentes J, Armijo-Olivo S, Funabashi M, et al. Enhanced therapeutic alliance modulates pain intensity and muscle pain sensitivity in patients with chronic low back pain: an experimental controlled study. *Phys Ther.* 2014;94(4):477-489.

47. Ferreira PH, Ferreira ML, Maher CG, Refshauge KM, Latimer J, Adams RD. The therapeutic alliance between clinicians and patients predicts outcome in chronic low back pain. *Phys Ther.* 2013;93(4):470-478.
48. Alesii A, Damiani C, Pernice D. The physical therapist-patient relationship. Does physical therapist'occupational stress affect patients' quality of life? *Funct Neurol.* 2004;20(3):121-126.
49. Lynch MM. *Factors influencing successful psychotherapy outcomes*: School of Social Work, St. Catherine University; 2012.
50. Trachtenberg F, Dugan E, Hall MA. How patients' trust relates to their involvement in medical care: trust in the medical profession is associated with greater willingness to seek care and follow recommendations. *J Fam Pract.* 2005;54(4):344-353.
51. Safran DG, Taira DA, Rogers WH, Kosinski M, Ware JE, Tarlov AR. Linking primary care performance to outcomes of care. *J Fam Pract.* 1998;47(3):213-221.
52. Bliss EL. *The roles of attachment, depression, and the working alliance in predicting treatment outcomes in chronic pain patients seeking physical therapy services*. UMI Dissertation Publishing, University of Miami; 2009.
53. Thom DH, Ribisl KM, Stewart AL, Luke DA. Further validation and reliability testing of the Trust in Physician Scale. *Med Care.* 1999;37(5):510-517.
54. Thom DH, Hall MA, Pawlson LG. Measuring Patients' Trust In Physicians When Assessing Quality Of Care. *Health Aff (Millwood).* 2004;23(4):124-132.
55. Hall AM, Ferreira PH, Maher CG, Latimer J, Ferreira ML. The influence of the therapist-patient relationship on treatment outcome in physical rehabilitation: a systematic review. *Phys Ther.* 2010;90(8):1099-1110.
56. Barello S, Graffigna G, Vegni E. Patient engagement as an emerging challenge for healthcare services: mapping the literature. *Nurs Res Pract.* 2012;2012.
57. Simmons LA, Wolever RQ, Bechard EM, Snyderman R. Patient engagement as a risk factor in personalized health care: a systematic review of the literature on chronic disease. *Genome Med.* 2014;6(2):16.
58. Coulter A. What do patients and the public want from primary care? *Br Med J.* 2005;331(7526):1199-1201.
59. Hall MA, Dugan E, Zheng B, Mishra AK. Trust in Physicians and Medical Institutions: What Is It, Can It Be Measured, and Does It Matter? *Milbank Q.* 2001;79(4):613-639.
60. Thom DH, Campbell B. Patient-physician trust: an exploratory study. *J Fam Pract.* 1997;44(2):169-177.
61. Zand DE. Trust and managerial problem solving. *Adm Sci Q.* 1972:229-239.
62. Rempel JK, Holmes JG, Zanna MP. Trust in close relationships. *J Pers Soc Psychol.* 1985;49(1):95-112.
63. Berry LL, Parish JT, Janakiraman R, et al. Patients' commitment to their primary physician and why it matters. *Ann Fam Med.* 2008;6(1):6-13.
64. Hibbard JH, Stockard J, Mahoney ER, Tusler M. Development of the Patient Activation Measure (PAM): Conceptualizing and Measuring Activation in Patients and Consumers. *Health Serv Res.* 2004;39(4 Pt 1):1005-1026.
65. Barry MJ, Edgman-Levitan S. Shared decision making—the pinnacle of patient-centered care. *N Engl J Med.* 2012;366(9):780-781.
66. Teutsch C. Patient–doctor communication. *Med Clin North Am.* 2003;87(5):1115-1145.
67. Andersson GB. Epidemiological features of chronic low-back pain. *The lancet.* 1999;354(9178):581-585.
68. Meucci RD, Fassa AG, Faria NMX. Prevalence of chronic low back pain: systematic review. *Rev Saude Publica.* 2015;49.

69. Manchikanti L, Singh V, Datta S, Cohen SP, Hirsch JA. Comprehensive review of epidemiology, scope, and impact of spinal pain. *Pain physician.* 2009;12(4):E35-70.
70. Chou R, Qaseem A, Snow V, et al. Diagnosis and Treatment of Low Back Pain: A Joint Clinical Practice Guideline from the American College of Physicians and the American Pain SocietyDiagnosis and Treatment of Low Back Pain. *Ann Intern Med.* 2007;147(7):478-491.
71. Savigny P, Watson P, Underwood M. Early management of persistent non-specific low back pain: summary of NICE guidance. *BMJ.* 2009;338.
72. Childs JD, Cleland JA, Elliott JM, et al. Neck pain: clinical practice guidelines linked to the International Classification of Functioning, Disability, and Health from the Orthopaedic Section of the American Physical Therapy Association. *J Orthop Sports Phys Ther.* 2008;38(9):A1-A34.
73. Freburger JK, Holmes GM, Agans RP, et al. The rising prevalence of chronic low back pain. *Arch Intern Med.* 2009;169(3):251-258.
74. Chou R. Low back pain (chronic). *BMJ Clinical Evidence.* 2010;2010:1116.
75. rapport. (n.d.). In. *Dictionary.com Unabridged*: Random House, Inc.; Retrived July 7, 2017:http://www.dictionary.com/browse/rapport.
76. Lakke SE, Meerman S. Does working alliance have an influence on pain and physical functioning in patients with chronic musculoskeletal pain; a systematic review. *J of Compassionate Health Care.* 2016;3(1):1-10.
77. Trivers RL. The evolution of reciprocal altruism. *Q Rev Biol.* 1971;46(1):35-57.
78. Lordkipanidze D, Vekua A, Ferring R, et al. Anthropology: the earliest toothless hominin skull. *Nature.* 2005;434(7034):717-718.
79. Benedetti F. *The Patient's Brain - The neuroscience behind the doctor-patient relationship.* Oxford, NY: Oxford University Press; 2011.
80. Mead N, Bower P. Patient-centredness: a conceptual framework and review of the empirical literature. *Soc Sci Med.* 2000;51(7):1087-1110.
81. Engel GL. The Need for a New Medical Model: A Challenge for Biomedicine. *Science.* 1977;196(4286):129-136.
82. Stewart M. *Patient-centered medicine: transforming the clinical method.* Radcliffe Publishing; 2003.
83. Katz J. *The silent world of doctor and patient.* JHU Press; 2002.
84. Salvio M-A, Beutler L, Wood J, Engle D. The strength of the therapeutic alliance in three treatments for depression. *Psychother Res.* 1992;2(1):31-36.
85. Marmar CR, Weiss DS, Gaston L. Toward the validation of the California Therapeutic Alliance Rating System. *Psychol Assess.* 1989;1(1):46.
86. Coady NF, Marziali E. The association between global and specific measures of the therapeutic relationship. *Psychotherapy (Chic).* 1994;31(1):17.
87. Price PB, Jones EE. Examining the alliance using the Psychotherapy Process Q-Set. *Psychotherapy (Chic).* 1998;35(3):392.
88. Bedi RP, Duff CT. Client as expert: A Delphi poll of clients' subjective experience of therapeutic alliance formation variables. *Couns Psychol Q.* 2014;27(1):1-18.
89. Shick Tryon G, Collins Blackwell S, Felleman Hammel E. A meta-analytic examination of client–therapist perspectives of the working alliance. *Psychother Res.* 2007;17(6):629-642.
90. Fuertes JN, Mislowack A, Bennett J, et al. The physician–patient working alliance. *Patient Educ Couns.* 2007;66(1):29-36.
91. Laine C, Davidoff F. Patient-centered medicine. A professional evolution. *JAMA.* 1996;275(2):152-156.
92. Mead N, Bower P. Patient-centred consultations and outcomes in primary care: a review of the literature. *Patient Educ Couns.* 2002;48(1):51-61.

93. Grant S. Are there blueprints for building a strong patient-physician relationship? *AMA J Ethics.* 2009;11(3):232-236.
94. Kerse N, Buetow S, Mainous AG, Young G, Coster G, Arroll B. Physician-patient relationship and medication compliance: a primary care investigation. *Ann Fam Med.* 2004;2(5):455-461.
95. Hurwitz EL, Morgenstern H, Yu F. Satisfaction as a predictor of clinical outcomes among chiropractic and medical patients enrolled in the UCLA low back pain study. *Spine (Phila Pa 1976).* 2005;30(19):2121-2128.
96. Forchuk C, Westwell J, Martin M-L, Bamber-Azzapardi W, Kosterewa-Tolman D, Hux M. The developing nurse-client relationship: Nurses' perspectives. *J Am Psychiatr Nurses Assoc.* 2000;6(1):3-10.
97. Forchuk C. The orientation phase of the nurse-client relationship: testing Peplau's theory. *J Adv Nurs.* 1994;20(3):532-537.
98. Cole MB, McLean V. Therapeutic relationships re-defined. *Occup Ther Ment Health.* 2003;19(2):33-56.
99. Ambady N, Koo J, Rosenthal R, Winograd CH. Physical therapists' nonverbal communication predicts geriatric patients' health outcomes. *Psychol Aging.* 2002;17(3):443.
100. Carroll LJ, Lis A, Weiser S, Torti J. How Well Do You Expect to Recover, and What Does Recovery Mean, Anyway? Qualitative Study of Expectations After a Musculoskeletal Injury. *Phys Ther.* 2016;96(6):797-807.
101. Stewart MA. Effective physician-patient communication and health outcomes: a review. *CMAJ.* 1995;152(9):1423.
102. Halpern J. What is Clinical Empathy? *J Gen Intern Med.* 2003;18:670-674.
103. DiMatteo MR, Giordani PJ, Lepper HS, Croghan TW. Patient adherence and medical treatment outcomes: a meta-analysis. *Med Care.* 2002;40(9):794-811.
104. Herman SM. The relationship between therapist–client modality similarity and psychotherapy outcome. *J Psychother Pract Res.* 1998;7(1):56.
105. Wampold BE. Outcomes of individual counseling and psychotherapy: Empirical evidence addressing two fundamental questions. 2000.
106. Gelso CJ, Carter JA. The relationship in counseling and psychotherapy: Components, consequences, and theoretical antecedents. *Couns Psychol.* 1985;13(2):155-243.
107. Demmer C. Relationship with health care provider and adherence to HIV medications. *Psychol Rep.* 2003;93(2):494-496.
108. Kaplan SH, Greenfield S, Ware Jr JE. Assessing the effects of physician-patient interactions on the outcomes of chronic disease. *Med Care.* 1989:S110-S127.
109. Fuentes J. *Therapeutic contextual Factors in Physiotherapy: magnitude, Mechanisms and Contributors of Placebo Mediated Anagesia in Chronic Low Back Pain*, University of Alberta; 2013.
110. Frost T, Stimpson DV, Maughan MR. Some correlates of trust. *J Psychol.* 1978;99.1:103-108.
111. Kosfeld M, Heinrichs M, Zak PJ, Fischbacher U, Fehr E. Oxytocin increases trust in humans. *Nature.* 2005;435(7042):673-676.
112. Zak PJ, Kurzban R, Matzner WT. The neurobiology of trust. *Ann N Y Acad Sci.* 2004;1032(1):224-227.
113. Lee H-J, Macbeth AH, Pagani JH, Young 3rd WS. Oxytocin: the great facilitator of life. *Prog Neurobiol.* 2009;88(2):127-151.
114. Mechanic D, Schlesinger M. The impact of managed care on patients' trust in medical care and their physicians. *JAMA.* 1996;275(21):1693-1697.
115. Hall JA, Dornan MC. Meta-analysis of satisfaction with medical care: description of research domain and analysis of overall satisfaction levels. *Soc Sci Med.* 1988;27(6):637-644.

116. Roy MM, Liersch MJ. I am a better driver than you think: examining self-enhancement for driving ability. *J Appl Soc Psychol.* 2013;43(8):1648-1659.
117. Freburger JK, Callahan LF, Currey SS, Anderson LA. Use of the Trust in Physician Scale in patients with rheumatic disease: psychometric properties and correlates of trust in the rheumatologist. *Arthritis Care Res (Hoboken).* 2003;49(1):51-58.
118. Kao AC, Green DC, Zaslavsky AM, Koplan JP, Cleary PD. The relationship between method of physician payment and patient trust. *JAMA.* 1998;280(19):1708-1714.
119. Krajewska-Kułak E, Chilicka M, Kułak W, Adraniotis J, Chadzopulu A, Rozwadowska E. Assessment of physician-patient trust in the obstetrics and gynecology departments in Poland and Greece. *Ginekol Pol.* 2011;82(12).
120. Boulware LE, Cooper LA, Ratner LE, LaVeist TA, Powe NR. Race and trust in the health care system. *Public Health Rep.* 2003;118(4):358.
121. Bonds DE, Foley KL, Dugan E, Hall MA, Extrom P. An exploration of patients' trust in physicians in training. *J Health Care Poor Underserved.* 2004;15(2):294-306.
122. Doescher MP, Saver BG, Franks P, Fiscella K. Racial and ethnic disparities in perceptions of physician style and trust. *Arch Fam Med.* 2000;9:1156-1163.
123. O'Malley AS, Sheppard VB, Schwartz M, Mandelblatt J. The role of trust in use of preventive services among low-income African-American women. *Prev Med.* 2004;38(6):777-785.
124. Benkert R, Hollie B, Nordstrom CK, Wickson B, Bins-Emerick L. Trust, mistrust, racial identity and patient satisfaction in urban African American primary care patients of nurse practitioners. *J Nurs Scholarsh.* 2009;41(2):211-219.
125. Ahnquist J, Wamala SP, Lindström M. What has trust in the health-care system got to do with psychological distress? Analyses from the national Swedish survey of public health. *Int J Qual Health Care.* 2010;22(4):250-258.
126. Munder T, Wilmers F, Leonhart R, Linster HW, Barth J. Working Alliance Inventory-Short Revised (WAI-SR): psychometric properties in outpatients and inpatients. *Clin Psychol Psychother.* 2010;17(3):231-239.
127. Hatcher RL, Gillaspy JA. Development and validation of a revised short version of the Working Alliance Inventory. *Psychother Res.* 2006;16(1):12-25.
128. Tracey TJ, Kokotovic AM. Factor structure of the working alliance inventory. *Psychol Assess.* 1989;1(3):207.
129. Horvath A, Greenberg L. The development of the Working Alliance Inventory: A research handbook. *Psychotherapeutic processes: A research handbook.* 1986:529-556.
130. Cohen JL. *A New Approach to Patient-therapist Match: Forecasting Therapeutic Alliance.* ProQuest; 2006.
131. Schafer G. *Healthcare providers' judgements in chronic pain: the influence of depression, trustworthiness and gender*, UCL (University College London); 2015.
132. Pengel LH, Refshauge KM, Maher CG. Responsiveness of pain, disability, and physical impairment outcomes in patients with low back pain. *Spine (Phila Pa 1976).* 2004;29(8):879-883.
133. Grotle M, Brox JI, Vøllestad NK. Concurrent comparison of responsiveness in pain and functional status measurements used for patients with low back pain. *Spine (Phila Pa 1976).* 2004;29(21):E492-E501.
134. Taylor SJ, Taylor AE, Foy MA, Fogg AJ. Responsiveness of common outcome measures for patients with low back pain. *Spine (Phila Pa 1976).* 1999;24(17):1805.
135. Fairbank JC, Pynsent PB. The Oswestry disability index. *Spine (Phila Pa 1976).* 2000;25(22):2940-2953.

136. Phillips FM, Slosar PJ, Youssef JA, Andersson G, Papatheofanis F. Lumbar spine fusion for chronic low back pain due to degenerative disc disease: a systematic review. *Spine (Phila Pa 1976).* 2013;38(7):E409-E422.
137. Hägg O, Fritzell P, Nordwall A. The clinical importance of changes in outcome scores after treatment for chronic low back pain. *Eur Spine J.* 2003;12(1):12-20.
138. Chapman JR, Norvell DC, Hermsmeyer JT, et al. Evaluating common outcomes for measuring treatment success for chronic low back pain. *Spine (Phila Pa 1976).* 2011;36:S54-S68.
139. Davidson M, Keating J. Oswestry Disability Questionnaire (ODQ). *Aust J Physiother.* 2005;51(4):270.
140. Fairbank JC, Couper J, Davies JB, O'Brien JP. The Oswestry low back pain disability questionnaire. *Physiotherapy.* 1980;66(8):271-733.
141. MacCaffery M, Beebe A. *Pain: Clinical manual for nursing practice.* Mosby; 1989.
142. Downie W, Leatham P, Rhind V, Wright V, Branco J, Anderson J. Studies with pain rating scales. *Ann Rheum Dis.* 1978;37(4):378-381.
143. Williamson A, Hoggart B. Pain: a review of three commonly used pain rating scales. *J Clin Nurs.* 2005;14(7):798-804.
144. Hawker GA, Mian S, Kendzerska T, French M. Measures of adult pain: Visual analog scale for pain (vas pain), numeric rating scale for pain (nrs pain), mcgill pain questionnaire (mpq), short-form mcgill pain questionnaire (sf-mpq), chronic pain grade scale (cpgs), short form-36 bodily pain scale (sf-36 bps), and measure of intermittent and constant osteoarthritis pain (icoap). *Arthritis Care Res (Hoboken).* 2011;63(S11):S240-S252.
145. Jensen MP, Karoly P, Braver S. The measurement of clinical pain intensity: a comparison of six methods. *Pain.* 1986;27(1):117-126.
146. Childs JD, Piva SR, Fritz JM. Responsiveness of the numeric pain rating scale in patients with low back pain. *Spine (Phila Pa 1976).* 2005;30(11):1331-1334.
147. Herr KA, Spratt K, Mobily PR, Richardson G. Pain intensity assessment in older adults: use of experimental pain to compare psychometric properties and usability of selected pain scales with younger adults. *Clin J Pain.* 2004;20(4):207-219.
148. Hjermstad MJ, Fayers PM, Haugen DF, et al. Studies comparing Numerical Rating Scales, Verbal Rating Scales, and Visual Analogue Scales for assessment of pain intensity in adults: a systematic literature review. *J Pain Symptom Manage.* 2011;41(6):1073-1093.
149. Dworkin RH, Turk DC, Farrar JT, et al. Core outcome measures for chronic pain clinical trials: IMMPACT recommendations. *Pain.* 2005;113(1-2):9-19.
150. Pengel LH, Refshauge KM, Maher CG, Nicholas MK, Herbert RD, McNair P. Physiotherapist-Directed Exercise, Advice, or Both for Subacute Low Back PainA Randomized Trial. *Ann Intern Med.* 2007;146(11):787-796.
151. Hancock MJ, Maher CG, Latimer J, et al. Assessment of diclofenac or spinal manipulative therapy, or both, in addition to recommended first-line treatment for acute low back pain: a randomised controlled trial. *The Lancet.* 2007;370(9599):1638-1643.
152. Kamper SJ, Maher CG, Mackay G. Global rating of change scales: a review of strengths and weaknesses and considerations for design. *J Man Manip Ther.* 2009;17(3):163-170.
153. Miller GA. The magical number seven, plus or minus two: some limits on our capacity for processing information. *Psychol Rev.* 1956;63(2):81.
154. Preston CC, Colman AM. Optimal number of response categories in rating scales: reliability, validity, discriminating power, and respondent preferences. *Acta Psychol (Amst).* 2000;104(1):1-15.
155. Frank JD, Frank JB. *Persuasion and healing: A comparative study of psychotherapy.* JHU Press; 1993.

156. Hanson WE, Curry KT, Bandalos DL. Reliability generalization of working alliance inventory scale scores. *Educ Psychol Meas.* 2002;62(4):659-673.
157. Paap D, Dijkstra PU. Working Alliance Inventory-Short Form Revised. *J Physiother.* 2017;63(2):118.
158. Copay AG, Glassman SD, Subach BR, Berven S, Schuler TC, Carreon LY. Minimum clinically important difference in lumbar spine surgery patients: a choice of methods using the Oswestry Disability Index, Medical Outcomes Study questionnaire Short Form 36, and pain scales. *Spine J.* 2008;8(6):968-974.
159. Dawson AP, Steele EJ, Hodges PW, Stewart S. Utility of the Oswestry Disability Index for studies of back pain related disability in nurses: Evaluation of psychometric and measurement properties. *Int J Nurs Stud.* 2010;47(5):604-607.
160. Frost H, Lamb SE, Stewart-Brown S. Responsiveness of a patient specific outcome measure compared with the Oswestry Disability Index v2.1 and Roland and Morris Disability Questionnaire for patients with subacute and chronic low back pain. *Spine (Phila Pa 1976).* 2008;33(22):2450-2457; discussion 2458.
161. Grotle M, Garratt AM, Krogstad Jenssen H, Stuge B. Reliability and construct validity of self-report questionnaires for patients with pelvic girdle pain. *Phys Ther.* 2012;92(1):111-123.
162. Johnsen LG, Hellum C, Nygaard OP, et al. Comparison of the SF6D, the EQ5D, and the oswestry disability index in patients with chronic low back pain and degenerative disc disease. *BMC Musculoskelet Disord.* 2013;14:148.
163. Miekisiak G, Kollataj M, Dobrogowski J, et al. Validation and cross-cultural adaptation of the Polish version of the Oswestry Disability Index. *Spine (Phila Pa 1976).* 2013;38(4):E237-E243.
164. Jensen MP, McFarland CA. Increasing the reliability and validity of pain intensity measurement in chronic pain patients. *Pain.* 1993;55(2):195-203.
165. Dijkers M. Comparing quantification of pain severity by verbal rating and numeric rating scales. *J Spinal Cord Med.* 2010;33(3):232-242.
166. Bryce TN, Budh CN, Cardenas DD, et al. Pain after spinal cord injury: an evidence-based review for clinical practice and research. Report of the National Institute on Disability and Rehabilitation Research Spinal Cord Injury Measures meeting. *J Spinal Cord Med.* 2007;30(5):421-440.
167. Salaffi F, Stancati A, Silvestri CA, Ciapetti A, Grassi W. Minimal clinically important changes in chronic musculoskeletal pain intensity measured on a numerical rating scale. *Eur J Pain.* 2004;8(4):283-291.
168. Costa LOP, Maher CG, Latimer J, et al. Clinimetric testing of three self-report outcome measures for low back pain patients in Brazil: which one is the best? *Spine (Phila Pa 1976).* 2008;33(22):2459-2463.
169. Portney LG, Watkins MP. *Foundations of clinical research: applications to practice.* Vol 2: Prentice Hall Upper Saddle River, NJ; 2000.
170. Mainous AG, Baker R, Love MM, Gray DP, Gill JM. Continuity of care and trust in one's physician: evidence from primary care in the United States and the United Kingdom. *Fam Med.* 2001;33(1):22-27.
171. Mechanic D, Meyer S. Concepts of trust among patients with serious illness. *Soc Sci Med.* 2000;51(5):657-668.
172. Hamilton DF, Ghert M, Simpson AHRW. Interpreting regression models in clinical outcome studies. *Bone Joint Res.* 2015;4(9):152-153.
173. Field A. *Discovering statistics using IBM SPSS statistics.* sage; 2013.

Appendix 1

Site Letters of Support

Butte Premier Physical Therapy

February 4, 2019

To Whom It May Concern:

As head of the Physical Therapy Department for Butte Premier Physical Therapy, I attest that we will serve as a data collection site for the research project: Correlation of Trust and Outcomes following Physical Therapy for Chronic Low Back Pain being conducted by Kory Zimney (PI). Please contact me if any additional information is needed.

Regards

Leigh Langerwerf PT, DPT
Board Certified in Orthopaedic Physical Therapy
Fellow, American Academy of Orthopaedic Manual Physical Therapists
President, Butte Premier Physical Therapy
leigh@bpptchico.com

kitsap physical therapy
AND SPORTS CLINICS
2400 NW Myhre Road, #102, Silverdale, WA 98383
(360) 613-1834 • Fax (360) 613-2716

Date: 3/14/19

To whom it may concern:

As head of the Silverdale Clinical Director/Partner for Kitsap Physical Therapy and Sports Clinics I attest that we will serve as a data collection site for the research project: Correlation of Trust and Outcomes following Physical Therapy for Chronic Low Back Pain being conducted by Kory Zimney (PI).

Please contact me if any additional information is needed.

Regards

Dr. David Damon, PT, DPT, OCS, ATC

The Miriam Hospital
A Lifespan Partner

Outpatient Rehabilitation Services

University Medical Center
Suite 301, Third Floor
195 Collyer Street
Providence, RI 02904

Tel 401 793-4080
Fax 401 793-4110

Hand Therapy
Lymphedema Management
Occupational Therapy
Physical Therapy
Pulmonary Rehabilitation
Speech Language Pathology
Wound Care

Date:

To whom it may concern:

As head of the Outpatient Rehab Department for The Miriam Hospital, I attest that we will serve as a data collection site for the research project: Correlation of Trust and Outcomes following Physical Therapy for Chronic Low Back Pain being conducted by Kory Zimney (PI).
Please contact me if any additional information is needed.

Regards

Robert Wishtischin, PT, DPT, MBA, SCS
Manager, Lifespan Outpatient Rehab Services
RI Hospital, The Miriam Hospital and Newport Hospital
765 Allens Ave Suite 102
Providence, RI 02905
Office 401-444-4043
Cell 401-465-5748
Fax 401-444-5089

Harvest Physical Therapy DBA

580 N Camino Mercado Suite 25 Casa Grande, AZ 85122
P 855.331.7522 · F 520.836.7987 · info@OneAccordPT.com · www.OneAccordPT.com

Date: 7/3/2018

To whom it may concern:

As Clinical Operations Manager of One Accord Physical Therapy Casa Grande I attest that we will serve as a data collection site for the research project: Correlation of Trust and Outcomes following Physical Therapy for Chronic Low Back Pain being conducted by Kory Zimney (PI).
Please contact me if any additional information is needed.

Regards

Corey Brinton PT, DPT, OCS
Clinical Operations Manager, OAPT

PT, DPT

OUTPATIENT
PHYSICAL THERAPY

June 14th, 2017

To whom it may concern:

I the owner of this clinic attest that we will serve as a collection site for this research. Please contact me if you need any further information.

Thanks,

Zach Steele, PT

Owner

Auburn
701 M St NE, STE 102
Auburn, WA 98002
P:253.833.8766
F:253.833.6748

Covington
16720 SE 271st St, STE 200
Covington, WA 98042
P:253.630.5808
F:253.630.6438

Covington Sat.
27005 168th Pl SE, STE 200
Covington, WA 98042
P:253.639.4788
F:253.639.4789

Kent
8009 S 180th St STE 112
Kent, WA 98032
P:425.226.7827
F:425.251.5757

Kent Easthill
13106 SE 240th St, STE 103
Kent, WA 98031
P:253.631.1933
F:263.631.2094

Maple Valley
26837 MV-BD Rd SE, STE 200
Maple Valley, WA 98038
P:425.413.4425
F:425.413.4429

Puyallup
2930 S. Meridian, STE 120
Puyallup, WA 98373
P:253.445.2733
F:253.445.2399

PHiLEO health

partners purpose progress

June 12, 2017

Re: Correlation of Trust and Outcomes following Physical Therapy for Chronic Low Back Pain
Principal Investigator: Kory Zimney

Dear IRB Committee,

I, Jessie Podolak, own Phileo Health, LLC, and I attest that we will serve as a data collection site for this research.

Best Regards,

Jessie Podolak PT, DPT

Jessie Podolak, PT, DPT

Phileo Health, LLC
2519 North Hillcrest Parkway, Suite 101
Altoona, WI 54720
715-271-0388
Fax: 715-830-9585

1729 N. Shenandoah Ave.
Suite 2 • United Bldg.
Front Royal, VA 22630
Phone (540) 636-6179
Fax (540) 636-8753

P.R.O. physical therapy

www.mypropt.com

3127 Valley Avenue
Creekside Station
Winchester, VA 22601
Phone (540) 667-1800
Fax (540) 667-3839

Date: February 28th, 2019

To whom it may concern:

As head of the Physical Therapy Department for PRO Physical Therapy, I attest that we will serve as a data collection site for the research project: Correlation of Trust and Outcomes following Physical Therapy for Chronic Low Back Pain being conducted by Kory Zimney (PI).

Please contact me if any additional information is needed.

Regards

Annetta Haddox, PT

Date: 3/19/2019

To whom it may concern:

As head of the Physical Therapy for Signature Physical Therapy I attest that we will serve as a data collection site for the research project: Correlation of Trust and Outcomes following Physical Therapy for Chronic Low Back Pain being conducted by Kory Zimney (PI).

Please contact me if any additional information is needed.

Regards

Belinda McDonald PT DPT

Appendix 2

Participant Demographics Questionnaire

Participant Demographic Information

Thank you for completing this questionnaire. This questionnaire will help us make sure you qualify for participation in this study along with providing us some additional information about you for use in the study. Your responses will be held in the strictest confidence. Please try to answer every question. There is no right or wrong answer. If you are not sure how to answer a question, just give the best answer you can. If you find a question too private or personal, you can skip it and answer the other questions.

Subject ID: _____ **Today's Date:** _____/_____/_____
mm dd yy

Age (in years):_____

Gender:

- ☐ Male
- ☐ Female
- ☐ Transgender

Race:

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Hispanic or Latino
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White or Caucasian
- ☐ Other _____

1. Please answer the following questions:

	YES	NO
• Are you **less than** 18 years of age?		
• Are you **unable** to speak and read English?		
• Has your back pain been **less than** 3 months?		
• Are you currently pregnant?		
• Do you currently have an active cancer diagnosis?		

❖ **If you checked "YES" for any question, please stop, as you are not eligible for this study.**

2. How long have you had your current back pain (in months):_____

3. What level of education have you completed?

- ☐ Less than high school
- ☐ Graduated from high school
- ☐ Some college
- ☐ Graduated from college
- ☐ Some post-graduate course work
- ☐ Completed post-graduate degree

(Continue on back)

If this form is found, please contact Kory Zimney at 605-658-6373 or by email at kory.zimney@usd.edu. Thank you.

4. What was your birth order?
   - ☐ First born child
   - ☐ Second or later child
     a. If second or later what number child where you?_____

5. Have you received physical therapy for your back or any other injury or illness in the past?
   - ☐ Yes (see questions 5a and 5b)
   - ☐ No (go to question 6)

   5a. Have you been treated at this clinic before?
   - ☐ Yes
   - ☐ No

   5b. Have you been treated by the physical therapist you are seeing today before?
   - ☐ Yes
   - ☐ No

6. How did you decide to come to physical therapy?
   - ☐ A physician or some other health care provider referred me to physical therapy
   - ☐ You directly choose physical therapy on your own (another health care provider did not refer you first)

7. Why did you choose this physical therapy clinic?
   (check **only one** answer that most reflects why)
   - ☐ Location (most convenient)
   - ☐ Advertisement
   - ☐ Physician or other health care provider recommendation
   - ☐ Family or friend recommendation
   - ☐ Insurance coverage
   - ☐ You have received care here previously

8. How did you choose the physical therapist you are seeing?
   (check **only one** answer that most reflects how)
   - ☐ You have seen them before and wanted to see them again
   - ☐ They were recommended by your physician or other health care provider
   - ☐ They were recommended by a friend or family member
   - ☐ The clinic set you up with them specifically because of their specialty for your condition
   - ☐ The clinic set you up with first available physical therapist

Appendix 3

Trust in Physician Scale

In regards to your **current** physical therapist, please answer the following statements by circling the appropriate response. (If you have not seen this physical therapist before, respond based on what you think it will be.)

1. I doubt that my physical therapist really cares about me as a person.

Totally Disagree	Disagree	Neutral	Agree	Totally Agree

2. My physical therapist is usually considerate of my needs and puts them first.

Totally Disagree	Disagree	Neutral	Agree	Totally Agree

3. I trust my physical therapist so much I always try to follow his/her advice.

Totally Disagree	Disagree	Neutral	Agree	Totally Agree

4. If my physical therapist tells me something is so, then it must be true.

Totally Disagree	Disagree	Neutral	Agree	Totally Agree

5. I sometimes distrust my physical therapist's opinion and would like a second one.

Totally Disagree	Disagree	Neutral	Agree	Totally Agree

6. I trust my physical therapist's judgements about my medical care.

Totally Disagree	Disagree	Neutral	Agree	Totally Agree

(Continue on back)

7. I feel my physical therapist does not do everything he/she should for my medical care.

Totally Disagree	Disagree	Neutral	Agree	Totally Agree

8. I trust my physical therapist to put my medical needs above all other considerations when treating my medical problems.

Totally Disagree	Disagree	Neutral	Agree	Totally Agree

9. My physical therapist is a real expert in taking care of medical problems like mine.

Totally Disagree	Disagree	Neutral	Agree	Totally Agree

10. I trust my physical therapist to tell me if a mistake was made about my treatment.

Totally Disagree	Disagree	Neutral	Agree	Totally Agree

11. I sometimes worry that my physical therapist may not keep the information we discuss totally private.

Totally Disagree	Disagree	Neutral	Agree	Totally Agree

Anderson, L. A. and R. F. Dedrick (1990). "Development of the trust in physician scale: A measure to assess interpersonal trust inpatient-physician relationships." Psychological reports **67**(3f): 1091-1100.

Appendix 4

Primary Care Assessment Survey (Trust Subscale)

Thinking about how much you **TRUST** your physical therapist, how strongly do you **agree** or **disagree** with the following statements: (If you have not seen your physical therapist before, respond based on what you think it will be.)

	Strongly agree	Agree	Not Sure	Disagree	Strongly disagree
1. I can tell my physical therapist **anything**, even things that I might not tell anyone else.	π	π	π	π	π
2. My physical therapist sometimes **pretends** to know things when he/she is really not sure.	π	π	π	π	π
3. I completely trust my physical therapist's **judgment** about my medical care.	π	π	π	π	π
4. My physical therapist cares more about **holding down costs** than about doing what is needed for my health.	π	π	π	π	π
5. My physical therapist would always tell me the **truth** about my health, even if there was bad news.	π	π	π	π	π
6. My physical therapist cares **as much** as I do about my health.	π	π	π	π	π
7. If a mistake was made in my treatment, my physical therapist would try to **hide** it from me.	π	π	π	π	π

8. All things considered, how much do you trust your physical therapist?

0	1	2	3	4	5	6	7	8	9	10
Not at all										Completely

Safran, D. G., M. Kosinski, A. R. Tarlov, W. H. Rogers, D. A. Taira, N. Lieberman and J. E. Ware (1998). "The Primary Care Assessment Survey: tests of data quality and measurement performance." Medical care **36**(5): 728-739.

Appendix 5

Wake Forest Scale

In regards to your **current** physical therapist (please place their name anywhere you read [your physical therapist]), please answer the following statements by circling the appropriate response. (If you have not seen this physical therapist before, respond based on what you think it will be.)

1. [Your physical therapist] will do whatever it takes to get you all the care you need.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. Sometimes [your physical therapist] cares more about what is convenient for [him or her] than about your medical needs.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3. [Your physical therapist's] medical skills are not as good as they should be.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

4. [Your physical therapist] is extremely thorough and careful.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

5. You completely trust [your physical therapist's] decisions about which medical treatments are best for you.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

(Continue on back)

6. [Your physical therapist] is totally honest in telling you about all of the different treatment options available for your condition.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

7. [Your physical therapist] only thinks about what is best for you.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

8. Sometimes [your physical therapist] does not pay full attention to what you are trying to tell [him or her].

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

9. You have no worries about putting your life in [your physical therapist's] hands.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

10. All in all, you have complete trust in [your physical therapist].

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Hall MA, Zheng B, Dugan E, et al. Measuring patients' trust in their primary care providers. *Medical care research and review.* 2002;59(3):293-318.

Wake Forest Scale

Appendix 6

General Trust in Physician Scale

Thinking in general about how much you trust health care providers, **primarily physical therapists**, please answer the following statements by circling the appropriate response.

1. Physical therapists [in general] care about their patients' health just as much or more as their patients do.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

2. Sometimes physical therapists care more about what is convenient for them than about their patients' medical needs.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

3. Physical therapists are extremely thorough and careful.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

4. You completely trust physical therapists' decisions about which medical treatments are best.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

5. Physical therapists are totally honest in telling their patients about all of the different treatment options available for their conditions.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

(Continue on back)

6. Physical therapists think only about what is best for their patients.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

7. Sometimes physical therapists do not pay full attention to what patients are trying to tell them.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

8. Physical therapists always use their very best skill and effort on behalf of their patients.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

9. You have no worries about putting your life in the hands of physical therapists.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

10. A physical therapist would never mislead you about anything.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

11. All in all, you trust physical therapists completely.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Hall, M. A., F. Camacho, E. Dugan and R. Balkrishnan (2002). "Trust in the medical profession: conceptual and measurement issues." Health services research **37**(5): 1419-1439.

Appendix 7

Working Alliance Inventory – Short Revised

Instructions: Below is a list of statements and questions about experiences people might have with their therapy or therapist. Some items refer directly to your therapist [my therapist] as you read the sentences, mentally insert the name of your physical therapist in place of [my therapist] in the text. Think about your experience in therapy, and decide which category best describes your own experience.

IMPORTANT!!! Please take your time to consider each question carefully.

1. As a result of these sessions I am clearer as to how I might be able to change.

①	②	③	④	⑤
Never	Rarely	Sometimes	Very Often	Always

2. What I am doing in therapy gives me new ways of looking at my problem.

①	②	③	④	⑤
Never	Rarely	Sometimes	Very Often	Always

3. I believe [my therapist] likes me.

①	②	③	④	⑤
Never	Rarely	Sometimes	Very Often	Always

4. [My therapist] and I collaborate on setting goals for my therapy.

①	②	③	④	⑤
Never	Rarely	Sometimes	Very Often	Always

5. [My therapist] and I respect each other.

①	②	③	④	⑤
Never	Rarely	Sometimes	Very Often	Always

6. [My therapist] and I are working towards mutually agreed upon goals.

①	②	③	④	⑤
Never	Rarely	Sometimes	Very Often	Always

(Continue on back)

7. I feel that [my therapist] appreciates me.

①	②	③	④	⑤
Never	Rarely	Sometimes	Very Often	Always

8. [My therapist] and I agree on what is important for me to work on.

①	②	③	④	⑤
Never	Rarely	Sometimes	Very Often	Always

9. I feel [my therapist] cares about me even when I do things that he/she does not approve of.

①	②	③	④	⑤
Never	Rarely	Sometimes	Very Often	Always

10. I feel that the things I do in therapy will help me to accomplish the changes that I want.

①	②	③	④	⑤
Never	Rarely	Sometimes	Very Often	Always

11. [My therapist] and I have established a good understanding of the kind of changes that would be good for me.

①	②	③	④	⑤
Never	Rarely	Sometimes	Very Often	Always

12. I believe the way we are working with my problem is correct.

①	②	③	④	⑤
Never	Rarely	Sometimes	Very Often	Always

Munder T, Wilmers F, Leonhart R, Linster HW, Barth J. Working Alliance Inventory-Short Revised (WAI-SR): psychometric properties in outpatients and inpatients. *Clinical Psychology & Psychotherapy.* 2010;17(3):231-239.

Appendix 8

PT Survey of Connection and Engagement

PT Survey of Patient Connection and Engagement

Based on your interaction with the patient during the most recent episode of care please respond to each of the following questions. (*Please circle your response*)

1. How well did you feel you connected with the patient?

Very Poor Below Average Average Above Average Excellent

2. Overall, what level of confidence did you have that the patient was giving their full effort during therapy?

Very Poor Below Average Average Above Average Excellent

3. How would you rate the patient's level of trust in you?

Very Poor Below Average Average Above Average Excellent

4. How would you rate the level of patient compliance with their home program?

Very Poor Below Average Average Above Average Excellent

5. How would you rate the patient's expectation that physical therapy would help their condition?

Very Poor Below Average Average Above Average Excellent

6. How would you rate the level of shared decision-making between the patient and you?

Very Poor Below Average Average Above Average Excellent

7. How would you rate the patient's confidence in you as their therapist?

Very Poor Below Average Average Above Average Excellent

8. How strong was the cooperation between you and the patient during the most recent episode of care?

Very Poor Below Average Average Above Average Excellent

9. How would you rate the level of understanding by the patient of the therapeutic process and procedures?

Very Poor Below Average Average Above Average Excellent

10. How well did you feel the patient shared and disclosed information to help you in their care?

Very Poor Below Average Average Above Average Excellent

Appendix 9

Oswestry Disability Index 2.0

OSWESTRY LOW BACK PAIN DISABILITY QUESTIONNAIRE (2.0)[1]

Section 1: To be completed by patient

Participant:_____ Date:_____

Section 2: To be completed by patient

Could you please complete this questionnaire. It is designed to give us information as to how your back (or leg) trouble has affected your ability to manage in everyday life. Please answer **every section**. Mark **one box only** in each section that most closely describes you **today**.

Pain Intensity

_____I have no pain at the moment.
_____The pain is very mild at the moment.
_____The pain is moderate at the moment.
_____The pain is fairly severe at the moment.
_____The pain is very severe at the moment.
_____The pain is the worst imaginable at the moment.

Personal Care (Washing, Dressing, etc.)

_____I can look after myself normally without causing extra pain.
_____I can look after myself normally but is very painful.
_____It is painful to look after myself and I am slow and careful.
_____I need some help but manage most of my personal care.
_____I need help every day in most aspects of self care.
_____I do not get dressed, wash with difficulty and stay in bed.

Lifting

_____I can lift heavy weights without extra pain.
_____I can lift heavy weights but it gives extra pain
_____Pain prevents me from lifting heavy weights off of the floor, but I can manage if they are conveniently positioned (e.g. on a table).
_____Pain prevents me from lifting heavy weights off of the floor, but I can manage light to medium weights if they are conveniently positioned.
_____I can lift only very light weights.
_____I cannot lift or carry anything at all.

Walking

_____Pain does not prevent me walking any distance.
_____Pain prevents me walking more than 1 mile.
_____Pain prevents me walking more than ½ of a mile.
_____Pain prevents me walking more than 100 yards.
_____I can only walk using a stick or crutches.
_____I am in bed most of the time and have to crawl to the toilet.

Sitting

_____I can sit in any chair as long as I like.
_____I can sit in my favorite chair as long as I like..
_____Pain prevents me from sitting for more than 1 hour.
_____Pain prevents me from sitting for more than ½ an hour.
_____Pain prevents me from sitting for more than 10 minutes.
_____Pain prevents me from sitting at all.

(Continue on back)

Section 2 (con't): To be completed by patient

Standing

_____I can stand as long as I want without extra pain.
_____I can stand as long as I want but it gives me extra pain.
_____Pain prevents me from standing more than 1 hour.
_____Pain prevents me from standing more than ½ an hour.
_____Pain prevents me from standing more than 10 minutes.
_____Pain prevents me from standing at all.

Sleeping

_____My sleep is never disturbed by pain.
_____My sleep is occasionally disturbed by pain.
_____Because of my pain, I have less than 6 hours sleep.
_____Because of my pain, I have less than 4 hours sleep.
_____Because of my pain, I have less than 2 hours sleep.
_____Pain prevents me from sleeping at all.

Sex Life (if applicable)

_____My sex life is normal and causes no extra pain.
_____My sex life is normal but causes some extra pain.
_____My sex life is nearly normal but is very painful
_____My sex life is severely restricted by pain.
_____My sex life is nearly absent because of pain.
_____Pain prevents any sex life at all.

Social Life

_____My social life is normal and causes me no extra pain.
_____My social life is normal, but it increases the degree of pain.
_____Pain has no significant effect on my social life apart from limiting my more energetic interests, e.g. sport, etc.
_____Pain has restricted my social life and I do not go out as often.
_____Pain has restricted my social life to my home.
_____I have no social life because of my pain.

Traveling

_____I can go anywhere without pain.
_____I can travel anywhere but it gives extra pain.
_____Pain is bad but I manage journeys over two hours.
_____Pain restricts me to journeys of less than one hour.
_____Pain restricts me short necessary journeys under 30 minutes.
_____Pain prevents me from traveling except to receive treatment.

Fairbank JC, Pynsent PB. The Oswestry disability index. *Spine.* 2000;25(22):2940-295

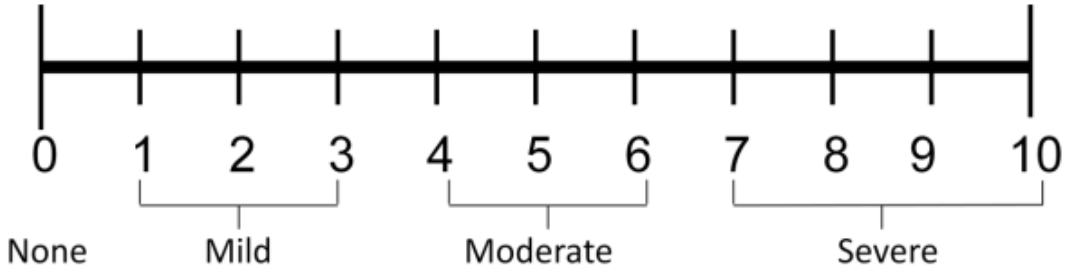
Appendix 10

Numeric Pain Rating Scale

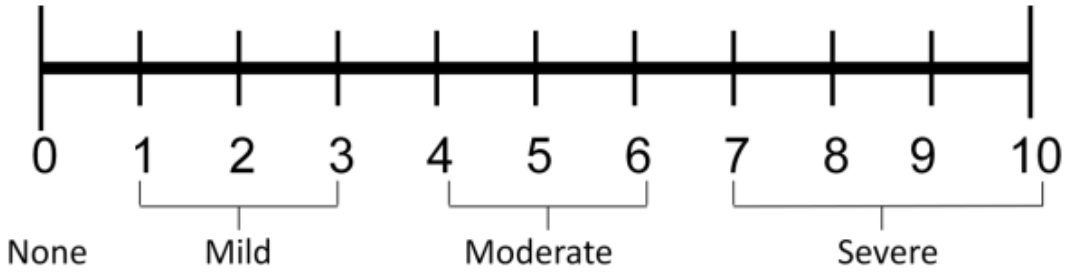
Numeric Pain Rating Scale

Participant ID: _____ Date: ____/_____/_____
mm dd yy

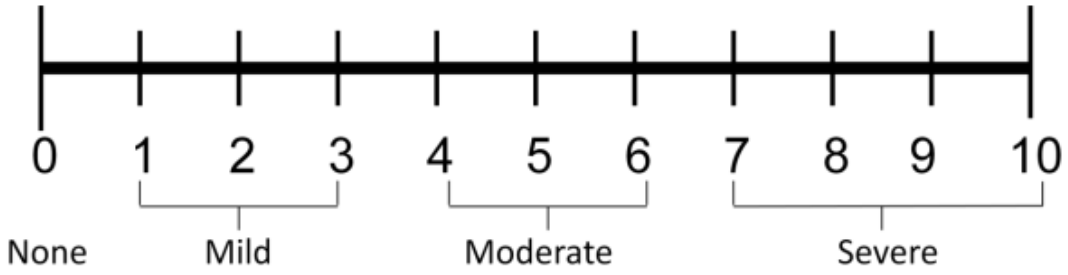
Please indicate the intensity of **current** pain level on a scale of 0 (no pain) to 10 (worst pain imaginable)" (circle **ONLY** one number):



Please indicate the intensity of **best** pain levels over the past 24 hours on a scale of 0 (no pain) to 10 (worst pain imaginable)" (circle **ONLY** one number):



Please indicate the intensity of **worst** pain levels over the past 24 hours on a scale of 0 (no pain) to 10 (worst pain imaginable)" (circle **ONLY** one number):



McCaffery, M., Beebe, A., et al. (1989). Pain: Clinical manual for nursing practice, Mosby St. Louis, MO.

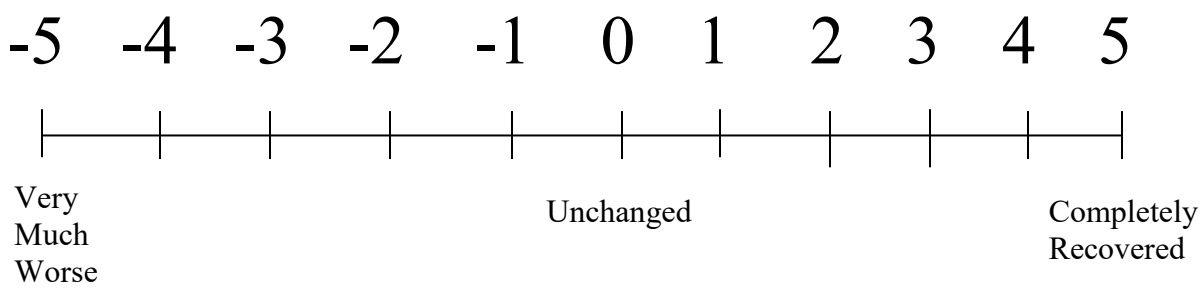
Appendix 11

Global Rating of Change Scale

Global Rating of Change

With respect to your back problem, how would you describe yourself now compared to when you started physical therapy?

(please circle **ONLY** one number)



Appendix 12

Physical Therapist Demographics Questionnaire

Physical Therapist Demographic Information

Thank you for completing this questionnaire. Your responses will be held in the strictest confidence. Please try to answer every question. There is no right or wrong answer. If you are not sure how to answer a question, just give the best answer you can. If you find a question too private or personal, you can skip it and answer the other questions.

Therapist ID: _____ **Today's Date:** _____/_____/_____
mm dd yy

Age (in years):_____

Gender:

- ☐ Male
- ☐ Female
- ☐ Transgender

Race:

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Hispanic or Latino
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White or Caucasian
- ☐ Other _____

3. What level of physical therapy education have you completed?
   - ☐ Doctor of Physical Therapy (DPT)
   - ☐ Master of Physical Therapy (MPT)
   - ☐ Bachelor of Physical Therapy (BSPT)

4. Do you have any certifications or additional training beyond entry-level physical therapy program?
   - ☐ ABPTS board certified (specialty:_____)
   - ☐ Residency training (location:_____)
   - ☐ Fellowship training (location:_____)
   - ☐ Other: (type:_____)

5. Number of years as a PT.
   - ☐ 0-5
   - ☐ 6-10
   - ☐ 11-15
   - ☐ 16-20
   - ☐ 21-25
   - ☐ 26-30
   - ☐ 30+

If this form is found, please contact Kory Zimney at 605-658-6373 or by email at kory.zimney@usd.edu. Thank you.

Appendix 13

Grant Approval Letters

UNIVERSITY OF
SOUTH DAKOTA
SCHOOL OF HEALTH SCIENCES

414 East Clark
Vermillion, SD 57069-2390
605-677-5000
605-677-6745 fax
www.usd.edu/health
health@usd.edu

Dr. Lana Svien, Chair
Department of Physical Therapy

May 23, 2017

Dear Dr. Svien,

Attached you'll find a request for funding related to a project entitled "Correlation of Trust and Outcomes Following Physical Therapy for Chronic Low Back Pain." The intent of the study is examine explore the construct of trust during the therapeutic encounter in physical therapy and to see its potential relation to outcomes. This is my dissertation project to be completed as part of the requirements for my PhD from Nova Southeastern University. To achieve our research goals, we are requesting funding for recruitment incentives for the participants to complete all of the patient reported outcomes measurements during their episode of care. Below you will find the costs for gift cards for the 64 patient participants we are trying to enroll for this study. We appreciate the department's support for this project.

Thank you!

Sincerely,

Kory Zimney, PT, DPT

UNIVERSITY OF
SOUTH DAKOTA
SCHOOL OF HEALTH SCIENCES

414 East Clark
Vermillion, SD 57069-2390
605-677-5000
605-677-6745 fax
www.usd.edu/health
health@usd.edu

REQUEST FOR INTERNAL FUNDING

Today's Date: May 23, 2017
Requested By: Kory Zimney
Date Required: As soon as possible

Approved √☐
Not Approved ☐

Chair Signature: Joya L. Irion PT, PhD, MA

	Number of Subjects	Price of Gift Card	Total Expected Cost
Funds for purchase of Walmart Gift Card	64	$10	$640
TOTALS	64	$10	$640

Justification: This study relies on patient participants completing a series of three different episodes of patient reported outcomes measurement tools and trust measurement scale questionnaires. The time needed to complete the various assessment tools would be beyond their normal time required to complete their physical therapy care. The gift cards will serve as an incentive to participate and complete all three series of questionnaires. Participants are not eligible for the gift card unless they complete all three series of questionnaires.

We are also seeking external grant funding (Iowa Physical Therapy Foundation) to increase the gift from the $10 as sought by this request, to $15 more, for a total of a $25 dollar Walmart gift card. Walmart gift cards do not have extra fees attached to them at time of purchase or use.

Chair Comments:

Iowa Physical Therapy Foundation

July 5, 2017

Kory Zimney
4012 Glen Oaks Blvd
Sioux City, IA 51104-4315

Dear Kory,

The purpose of this letter is to inform you that the Iowa Physical Therapy Foundation board of directors has approved a research grant of $960.

Please print this letter, sign at the bottom to acknowledge that you will abide by the application criteria, particularly the requirement that you provide us with post-research information. You can email this to mail@iowaapta.org. Upon receipt of this information, we will mail you a check for $960.

Also, please complete and return a Form W-9, which is included in this mailing.

Please contact me if you have any questions regarding this research grant funding.

Sincerely,

Natalie Battles
Executive Director

Kory Zimney, PT, DPT