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This Doctoral Thesis, **Telehealth for MSK Rehabilitation & Pain Care:** Applying Qualitative Methods and the Six-Forces Innovation Framework to Assess and Address a Prevalent US Healthcare Need, presented by Ahmad Alkasir,
and Submitted to the Faculty of The Harvard T.H. Chan School of Public Health
in Partial Fulfillment of the Requirements for the Degree of Doctor of Public Health, has been read and approved by:

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Telehealth for MSK Rehabilitation & Pain Care: Applying Qualitative Methods and the Six-Forces Innovation Framework to Assess and Address a Prevalent US Healthcare Need

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A Doctoral Thesis Submitted to the Faculty of

The Harvard T.H. Chan School of Public Health

in Partial Fulfillment of the Requirements

for the Degree of *Doctor of Public Health*

Harvard University

Boston, Massachusetts.

May 2021

Thesis Advisor: Richard Siegrist Ahmad Alkasir

Telehealth for Musculoskeletal Rehabilitation & Pain Care: Applying Qualitative Methods and the Six-Forces Innovation Framework to Assess and Address a Prevalent US Healthcare Need

Abstract

Musculoskeletal Disorders are the leading cause of pain and disorder in the United States and globally. Of all musculoskeletal disorders, back pain is the most prevalent, with a lifetime prevalence of 84% for any form of back pain and a prevalence of 23% for chronic low back pain. This burden of pain has led to calls for a cultural shift in how pain is diagnosed and treated in the United States by the Institute of Medicine and National Institute of Health, and other Federal and State agencies. The IOM and the NIH's central recommendation is to design new pain care models that rely on individualized, multimodal, multidisciplinary care, centered on establishing a patient-clinician therapeutic alliance and shared-decision making.

The doctoral project involved 15 semi-structured patient interviews and 10 physical therapist interviews to assess therapeutic alliance and patient experience in the MSK rehab and pain care context to inform a startup organization looking to remodel MSK pain care through telehealth. Themes identified under the therapeutic alliance fell under a *Goal, Task*, and *Bond* conception. Themes identified for patient experience fell under the categories of *Barriers*, *Adherence Determinants*, and *Patient Pleasers*. Finally, the thesis presents recommendations to the startup on translating the learning on the therapeutic alliance and patient experience into a consumer-focused strategy. The recommendations aim to guide the startup on strengthening the alliance and improving the patient experience through telehealth. Furthermore, it addresses relevant considerations regarding the forces of structure, financing, public policy, technology, consumers, and accountability that healthcare innovators are bound to experience.

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1. Introduction

Musculoskeletal disorders are the leading cause of disability in the United States and worldwide. According to the World Health Organization, about 1.7 billion people suffer from musculoskeletal conditions worldwide. Furthermore, low back pain causes the highest burden with a lifetime prevalence of 84 percent, with chronic forms of low back pain (i.e., pain lasting more than 12 weeks) having a prevalence of 23 percent overall. That puts 11 to 12 percent of the global population as disabled by low back pain (Balagué *et al.*, 2012).

In the United States, historical trend lines offer evidence of the increasing burden from musculoskeletal disorders and pain in the number of people affected by these disorders and the cost of caring for patients. The Agency for Healthcare Research and Quality's Medical Expenditure Panel Survey (MEPS) shows that the number of people treated for back problems, osteoarthritis, and other non-traumatic joint disorders has increased from about 30 million patients in the year 1996 to about 65 million patients in the year 2016. Furthermore, total expenditures associated with caring for these patients rose from $ 30.4 to $ 137.7 billion within the same period (AHRQ, 2015).

Musculoskeletal disorders fall within a more significant problem – namely that of chronic pain. The United States continues to struggle with a high pervasiveness of pain and a well-intentioned but inadequate medical response leading to ongoing responses from state and federal agencies that include the DOD, VHA, NIH, FDA, and the CDC (Tick *et al.*, 2018). Seminal reports by the Institute of Medicine (2010) and the Department of Health & Human Services (2019) have called for a cultural shift in how

pain is diagnosed and treated. Their recommendations primarily advocate for a public health response to pain that regards chronic pain as a complex disease with biological, psychological, and social dimensions – otherwise known as the biopsychosocial model for pain. Therefore, pain care should transition to a model that is individualized, multimodal, and multidisciplinary.

This thesis is the culmination of an extensive study of musculoskeletal disorders and back pain care within the larger context of the IOM and DHHS recommendations for general pain care. The study was conducted using qualitative research methods (i.e., framework analysis) into one of the most prominent musculoskeletal pain care forms – outpatient physical therapy. The doctoral project's goal was to produce conclusions for a healthcare startup that sought to find pain care gaps prime for innovation through telehealth. Semi-structured interviews with 15 patients who received outpatient physical therapy care and 10 physical therapists, the study aimed at answering two main questions:

1. What are the themes of *therapeutic alliance*[1] in the context of musculoskeletal injury rehabilitation and pain management?

2. What are the facilitators and barriers to a positive *patient experience* with therapy (i.e., patient satisfaction) from patients' and therapists' perspectives? Can a telehealth modality fill some gaps?

[1] Therapeutic Alliance, also known as the Working Alliance, describes the working relationship between a therapist and a patient to achieve a desired therapeutic goal.

The first platform of the thesis (i.e., the Analytic Platform) presents secondary research results from the literature on the evolution of our understanding of pain and the scale of this public health problem in the U.S. and around the world, albeit focused on musculoskeletal pain. Furthermore, it provides a brief history of telehealth and an account of the changes in telehealth reimbursement regulations before and after the Covid-19 pandemic of 2019. It provides an analysis of the strengths and weaknesses of telehealth in addressing chronic pain management. Finally, it presents a detailed description of the primary research methods used for the doctoral project.

The second platform (i.e., the Results Platform) presents the analysis results in two sections, one for each of the research questions listed above. The first section presents the framework analysis results into the therapeutic alliance through figures and summary tables that list the identified themes of therapeutic alliance within the context of musculoskeletal rehabilitation. The Bordin (1979) framework of therapeutic alliance served as the theoretical underpinning of the framework analysis methodology. The section expands on the research-identified themes through an interpretive discussion that links evidence from the literature where appropriate. The second section of the platform presents conclusions on patient experience with physical therapy. The Herzlinger six-forces alignment framework for healthcare innovation served as the theoretical underpinning of the analysis and the overall change framework for the startup organization. The section presents the identified themes of patient experience through summary tables and presents an interpretation of the results, this time through the lens of six-forces alignment.

2. Analytical Platform

2.1 Literature Review

2.1.1 Review Introduction

Musculoskeletal pain is a subset of a much larger public health problem, i.e., Chronic pain. As this review will show, chronic pain is a condition with biological, social, and psychological dimensions, affects millions of Americans, and is a public health problem with a hefty price tag. The current state of pain care offers an opportunity to remodel the way it is structured, rendered, and reimbursed. Furthermore, effective management of chronic pain, including MSK pain, will require a change in how pain is evaluated by patients, clinicians, and the public. This is echoed by the Institute of Medicine's (IOM) recommendation for interdisciplinary, multimodal care that facilitates self-management.

The review below is divided into two main sections: (1) *Pain: A Chronic Public Health Problem* presents the evolution of our understanding of pain and the scale of this

public health problem in the U.S. and around the world, intentionally highlighting statistics relating to Musculoskeletal chronic pain. The review then presents the recommendations of the Institute of Medicine's (IOM) seminal report on chronic pain in the U.S. and discusses the barriers to change in how pain care is delivered in the United States. The section also provides an explanation for why low back pain deserves special attention. (2) *Telehealth for Pain Management* begins by providing a brief history of telehealth and explains some of the nuances in definitions. The section then reviews the literature on the efficacy, benefits, and drawbacks of telehealth for MSK rehabilitation, i.e., telerehabilitation). Finally, it explains the state of telehealth regulations before the Covid-19 pandemic and changes made in response to the pandemic. Finally, the section ends the

2.1.2 Pain - A Chronic Public Health Problem

Overview of the Public Health Burden

"*Medical pain management is in crisis; from the pervasiveness of pain to inadequate pain treatment, from the escalation of prescription opioids to an epidemic in addiction, diversion and overdose deaths. The rising costs of pain care and managing adverse effects of that care have prompted action from state and federal agencies including the DOD, VHA, NIH, FDA, and CDC.*"

- (Tick *et al.*, 2018)

In his writings, the 17th-century French philosopher René Descartes promoted the idea of a separation between mind and body— known as Cartesian mind-body dualism— and was the first to propose the view of pain as resembling an alarm-bell mechanism (Todd and Kucharski, 1984). Inaccurate interpretations of Descartes were the basis of 19th-century theories that described pain solely on the basis of either a mechanistic stimulation of nerves or the activation of nociceptors (i.e., activation of pain nerves from noxious stimuli) (Kuner, 2010).

Had those descriptions of pain been accurate, it would follow that pain of all forms would subside upon healing. However, patients' and clinicians' experiences suggest otherwise, as illustrated by the plethora of cases in which chronic pain persists even when there is no identifiable clinical cause. We now know that pain itself actually induces biological changes in the peripheral and central nervous system, including the brain itself. These changes can be maladaptive, leading to hypersensitivity and over-responsiveness that remains long after recovery from an acute injury, and can even exist without

identifiable nociception or physical pathology. This is strong evidence that traditional biomedical pain theories were overly simplistic and reductionist (IOM, 2011).

At its most fundamental level, pain is a complex evolutionary phenomenon that serves to protect from harm. The International Association for the Study of Pain (IASP) defined pain in 2020 as:

> *An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage.*
>
> - (Raja *et al.*, 2020)

This definition resulted from a reevaluation of the one established by the IASP in 1979. The phrase "or *resembling* that associated with actual or potential tissue damage" alludes to the complexity of pain, particularly that of chronic pain.[2] The change was motivated by the new understanding of pain from research and clinical practice, as well as criticisms of the old definition as one that excluded the cognitive and social factors which modify a person's experience of pain. These criticisms were joined by concerns for the older definition's exclusion of ethical dimensions relating to pain in neglected populations (Raja *et al.*, 2020).

Most of us are familiar with acute pain that follows a specific injury or accompanies an illness. Patients often manage acute pain on their own with rest and over-the-counter (OTC) medications or analgesics. In contrast, chronic pain is usually defined as such when it lasts for more than 3 to 6 months. Chronic pain often persists after the initial injury has healed and may even arise without a clear pathological provocation. This is seen in

[2] The 1979 definition: "An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage."

examples where pain doesn't obey somatotopic borders[3] (e.g., phantom limb syndrome) or when it is evoked through typically harmless sensory modalities (e.g., feeling pain when brushing the skin at the site of injury) (Kuner, 2010). Once established, chronic pain can be very difficult to treat and may be severely debilitating. As expressed aptly by a panel of pain experts, "[Chronic pain] is complex - physically, neurologically, psychologically, socially, spiritually, economically, and symbolically" (Tick *et al.*, 2018).

The escalating impact and costs of pain led to calls for a cultural change in pain medicine by The Office of the Army Surgeon General Pain Management Task Force (PMTF), Institute of Medicine (IOM), and the Interagency Pain Research Coordinating Committee's (IPRCC) National Pain Strategy. A report by the National Institute for Drug Abuse presented evidence that not only are there inadequacies in pain management strategies, but that the conventional pain management models have fueled the opioid epidemic across the nation (NIH, 2017; Tick *et al.*, 2018).

In 2010, the Patient Protection and Affordable Care Act required the Health and Human Services (HHS) to engage with the Institute of Medicine (IOM) to report an assessment of the state of pain research, care, and education. The incentive was to "increase the recognition of pain as a significant public health problem in the United States" (HHS, as quoted in IOM, 2011). This reflected the increasing human and financial costs of chronic pain, with at least 116 million U.S. adults burdened by chronic pain, at a national cost conservatively estimated at ranging between $ 560 and 635 billion per year (Gaskin and Richard, 2012).

[3] Somatotopy refers to the orderly arrangement of a body organ and its correspondence with the central nervous system.

Global Burden of Disease (GBD) data presented in Figures 1 and 2 below show Disability Adjusted Life Years (DALY) and Years Living with Disability (YLD) rankings in the years 1990 and 2019 for the United States.[4] Musculoskeletal conditions, the leading cause of chronic pain, remained the 3rd highest ranked contributor to DALYs in the United States for three decades. Notably, when looking at YLD, Musculoskeletal Conditions ranked as the leading cause of disability in the U.S., followed by Mental Disorders and Substance Use (GBD, 2019). YLD presents an important picture of disease because it includes both prevalence and severity, and hence the impact on individuals, their communities, and the health and social services provided to them (Rice, Smith and Blyth, 2016).

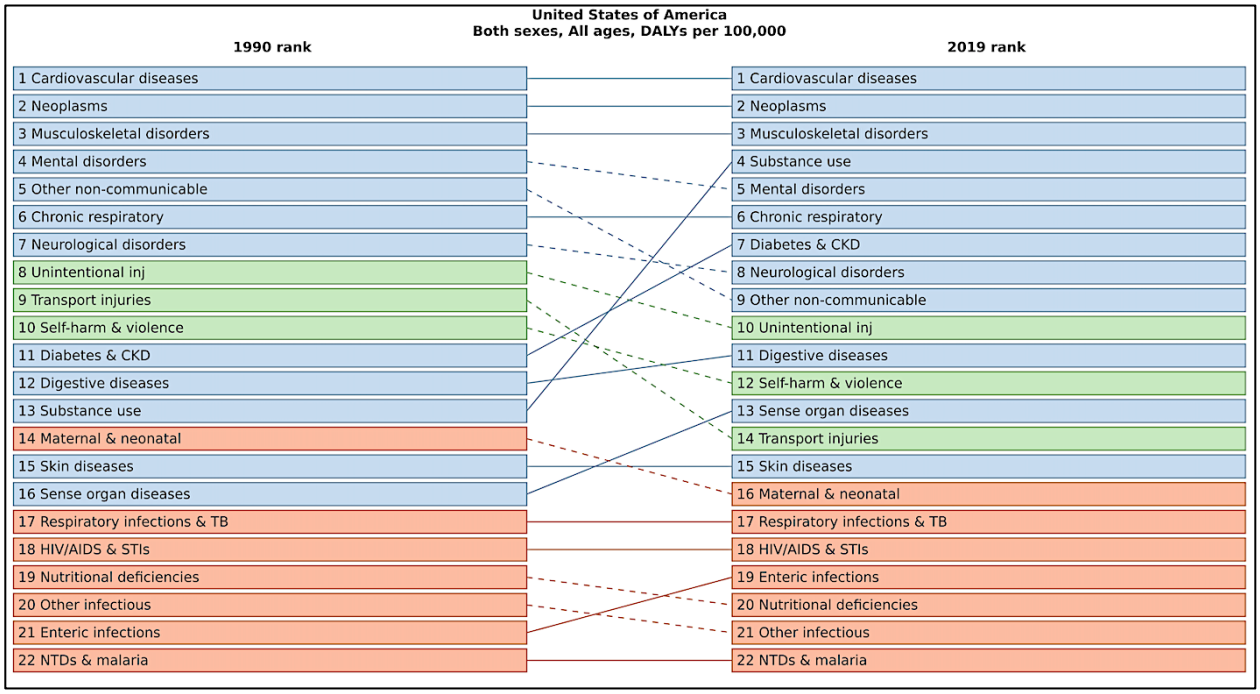


Figure 1- DALY per 100,000 in the United States. Disease ranks and rank changes from 1990 to 2019 (GBD, 2020). **Blue**: Non-communicable Diseases || **Green**: Injuries || **Orange**: Communicable, Maternal, Neonatal, & Nutritional Diseases

[4] DALYs are calculated by summing Years of Life Lost (YLL) due to dying early and Years Living with Disability. i.e., **DALY** = **YLL** + **YLD**

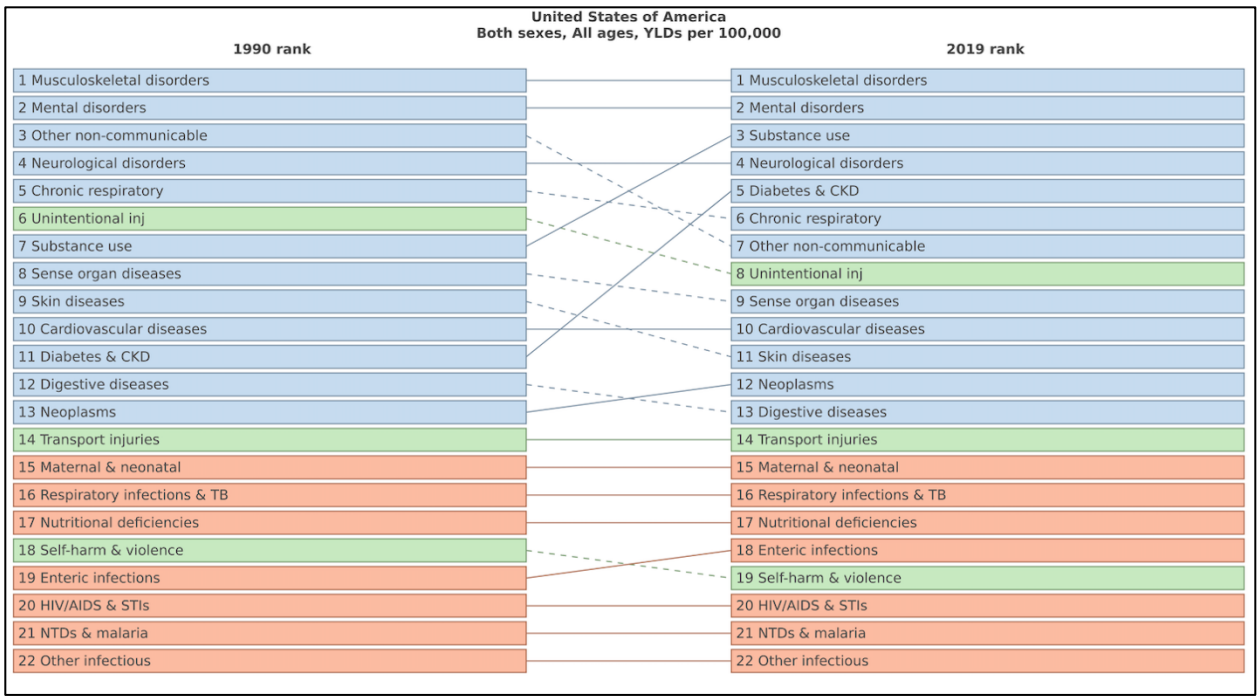


Figure 2 - YLD per 100,000 in the United States. Disease ranks and rank changes from 1990 to 2019 (GBD, 2020).

The problem exists outside the U.S. borders, as well. Figures 3 and 4 below present the DALY and YLD ranking of Musculoskeletal Conditions globally, where these conditions were found to be the 1st leading cause of disability worldwide (Rice, Smith and Blyth, 2016; GBD, 2019). Specifically, low back pain is the most prevalent musculoskeletal disorder and is the single largest contributor to disability worldwide (Rice, Smith, and Blyth, 2016). It's important to note that musculoskeletal disorder rank the highest in cause of disability (YLD) but does not rank as high in terms of DALYs. This is because DALYs factors in the Years of Life Lost (YLL) in the calculation. That is, while MSK disorders are the main cause of disability in the US and worldwide, they don't typically lead to early death in the population – not directly, at least.

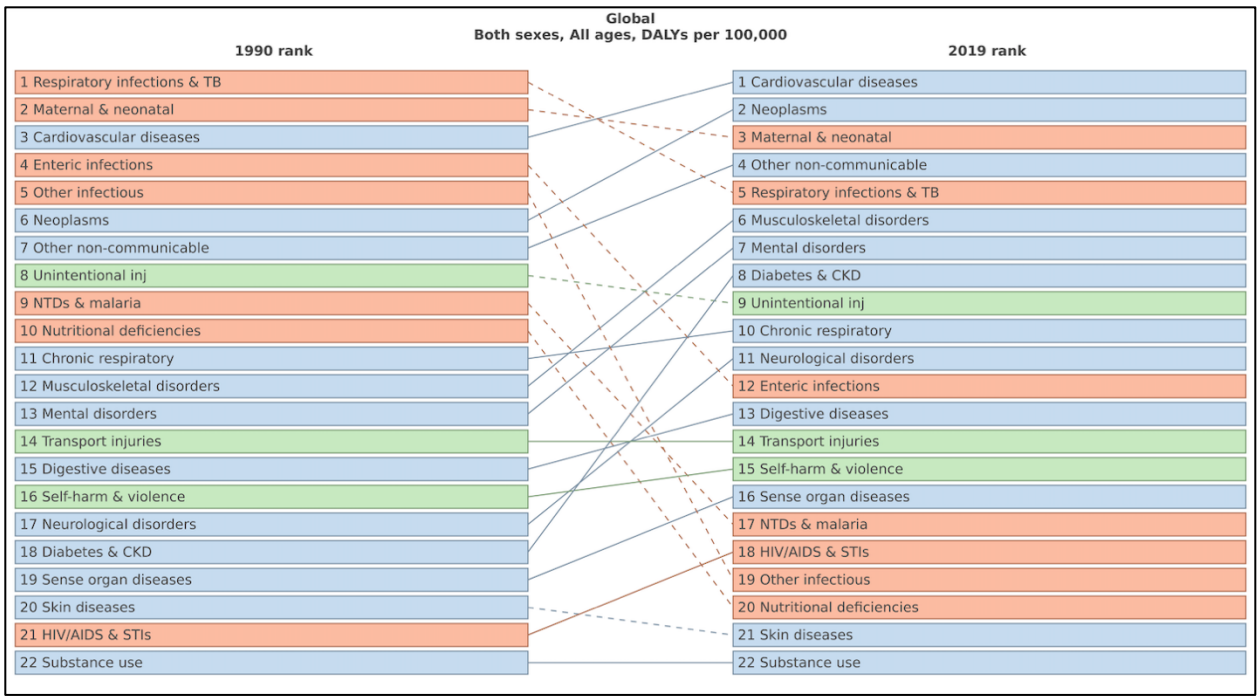


Figure 3 - YLD per 100,000 globally. Disease ranks and rank changes from 1990 to 2019 (GBD, 2020).

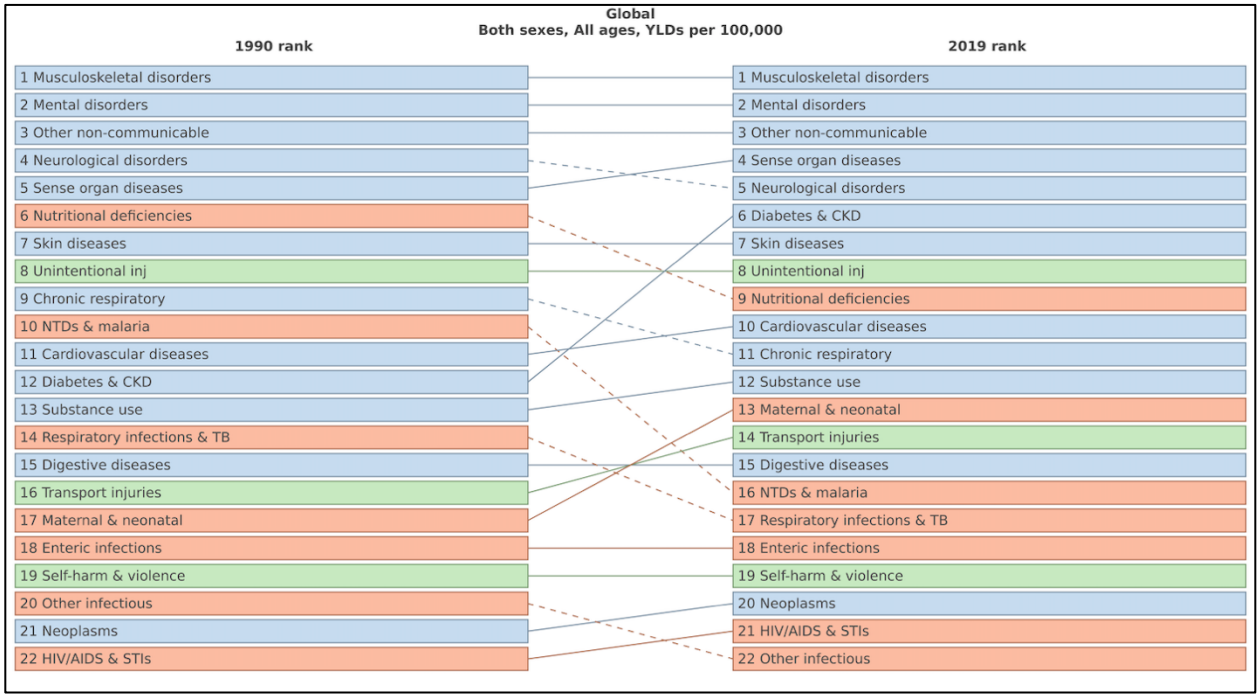


Figure 4 – DALY per 100,000 (Global). Disease ranks and rank changes from 1990 to 2019 (GBD, 2020).

Digging in further, low back pain surfaces as the single largest cause of disability on earth, and musculoskeletal conditions rank at the top across all sociodemographic index (SDI) categories.[5]

[5] SDI is a summary measure that identifies where countries or other geographic areas sit on the spectrum of development. Expressed on a scale of 0 to 1, SDI is a composite average of the rankings of the incomes per capita, average educational attainment, and fertility rates of all areas in the GBD study.

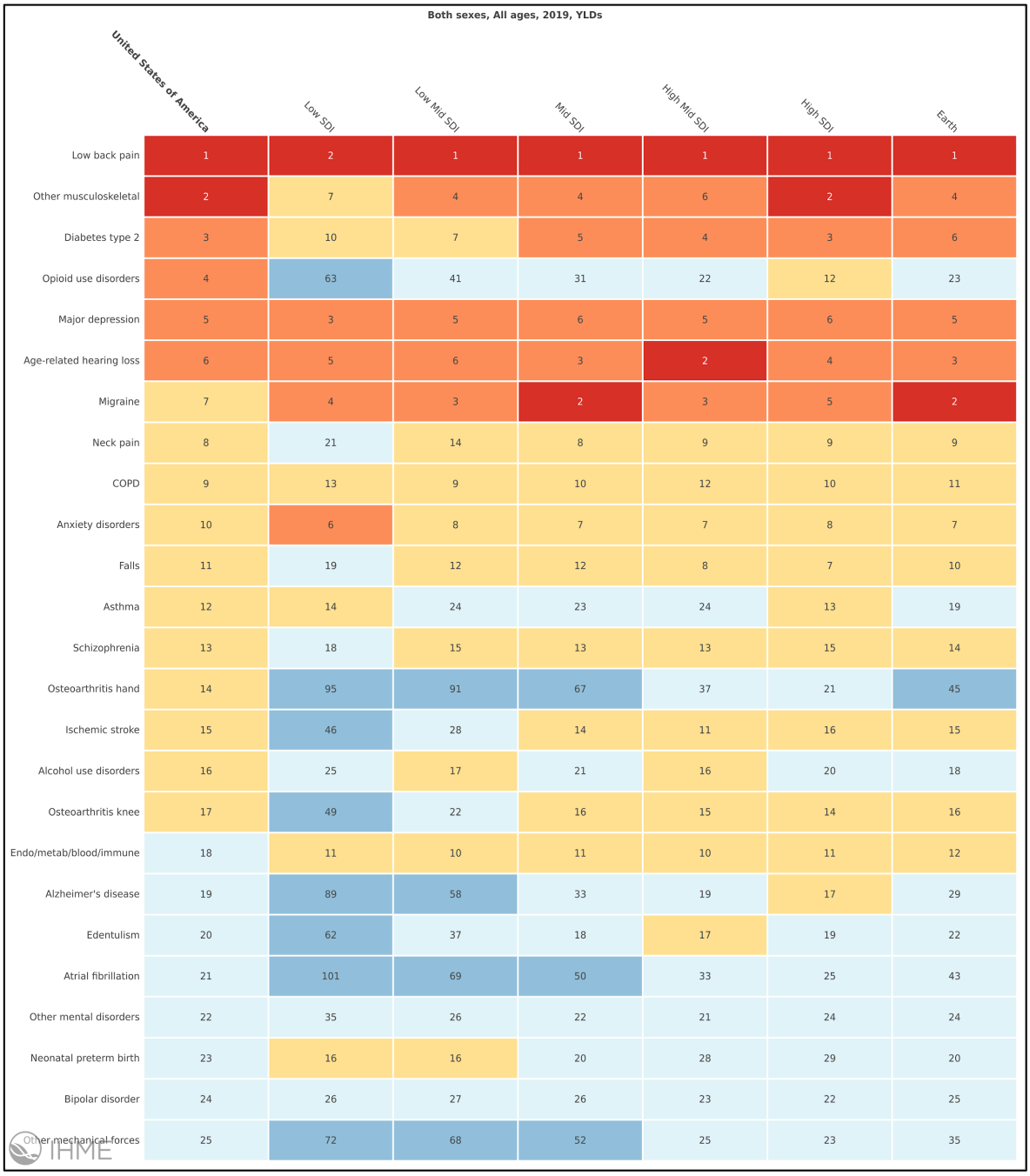


Figure 5 - The leading causes of Years Living in Disability (YLD) across Socio-Demographic Indexes (SDIs) (GBD, 2020).

The problem is not solely that pain is prevalent and has been the leading cause of disability for several decades, but that the scale of the burden continues to expand and challenge health systems globally. In the U.S., a significant piece of the annual $ 3.6

trillion healthcare costs (as of 2018) is pain-related because pain is the most prevalent cause for seeking healthcare services (Dahlhamer *et al.*, 2018; Tick *et al.*, 2018). Furthermore, the prevalent pain management protocols of the health system have not been successful in holding off the increase in the public health burden of pain, evidenced by a high prevalence despite a costly medical response that relied heavily on pharmaceuticals and high-tech interventions (Tick *et al.*, 2018). The increased burden of musculoskeletal disorders alone is seen in Figure 6, with a steady increase in YLD. This experience is shared globally (shown in Figure 7).

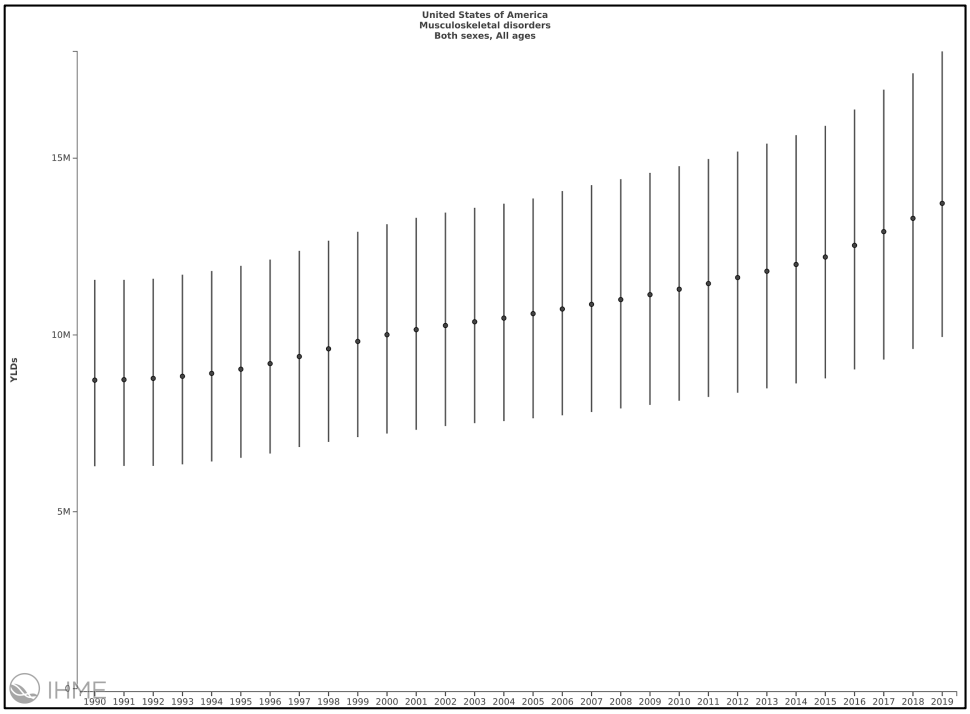


Figure 6 - Steady increase in YLD from Musculoskeletal disorders in the United States (GBD, 2020).

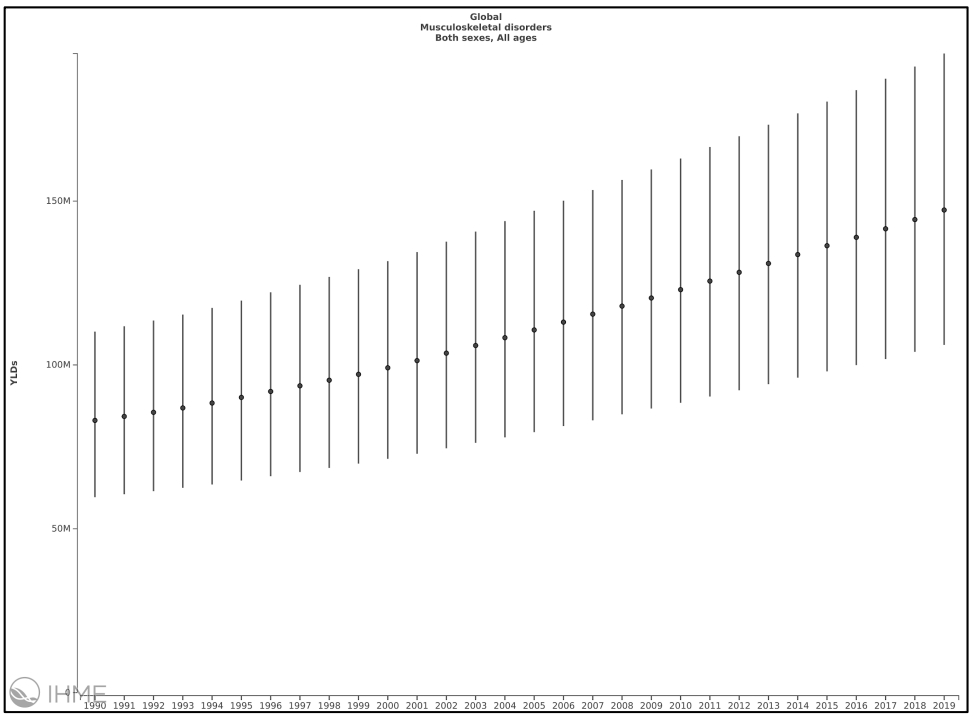


Figure 7 - Global steady increase in YLD from Musculoskeletal disorders (GBD, 2020).

Mental Health and Opioid Misuse: Correlations with Pain Care

The public health burden of musculoskeletal disorders should not be assessed through the lens of treatment costs and missed workdays alone. Given the research that documents the link between pain, mental health, and opioid use (Von Korff and Simon, 1996; Bair *et al.*, 2003; Miller and Cano, 2009), it would be overly simplistic to assess the burden of pain without taking these related effects into account. In general, the prevalence of pain is higher amongst those with depression and vice versa (Bair *et al.*, 2003; Battaglia, 2016). Pain and depression exacerbate each other through their shared

biological pathways and neurotransmitters, and their combination is more disabling and costlier to treat than each condition individually. This is often referred to as the **depression-pain dyad** (Bair *et al.*, 2003). As such, it comes as no surprise then that major depression and opioid use disorders also rank notably high on the leading causes of disability chart that was previously presented above.

The interaction between physical pain and emotional pain, combined with the overuse of opioids to treat pain was partly what fueled an opioid epidemic in the U.S. The economic burden of pain in the U.S. was estimated by Gaskin & Richards (2012) to be $ 210.5 billion (Greenberg *et al.*, 2015). Concurrently, the rate of opioid dependence rose by 3,203% amongst people with private insurance in the U.S., opioid dependence healthcare services grew 13-fold, and Emergency Departments (E.D.) treated about 259,000 prescription opioid poisoning visits with 21,900 being pediatric cases (Tick *et al.*, 2018).

It is important to note that while the opioid epidemic raged on in the U.S., it did not occur in the European Union, despite the sharing of clinical best practices amongst the two. Europe did not mirror the trend due to having clinical effectiveness organizations and regulators with higher degrees of regulatory influence on healthcare products and services. In particular, the U.S. business model of medicine, "cultural authority of projected and perceived certainty," disempowered position of patients and strong lobbying powers of pharmaceutical corporations have led to overmedicalized solutions (Tick *et al.* 2018). According to an interview with Dr. Richard Rosenquist, Chairman of the Cleveland Clinic Department of Pain Management, this is also due in part to "[U.S.] physicians who bought into opioids for chronic pain started people on the medications and were told to just give them more and more if the meds didn't work and

eventually the patients would get pain relief. Well, that didn't work. Long-term use of opioids is only partially effective in most cases and is associated with many adverse long-term effects on the body" (Clinic, 2018).

A Call for Cultural Transformation: Pain as a Complex Biopsychosocial Condition

Regardless of whether it is low back pain or other types of musculoskeletal pain and non-cancer pain, the prevailing view is that pain is a symptom. While acute pain and some forms of longer-lasting pain can indeed be viewed through such a lens, an overwhelming body of research affirms that much of the burden of pain reflected in the GBD data is caused by chronic pain (IOM, 2011). Research also points out that chronic pain goes beyond symptoms and is an independent chronic disorder of its own (Kuner, 2010; IOM, 2011; Rice, Smith and Blyth, 2016). As per the IOM's (2011) report, their findings and recommendations revolve around a single conclusion, i.e.,

> *Pain affects the lives of more than a hundred million Americans, making its control of enormous value to individuals and society. To reduce the impact of pain and the resultant suffering will require a transformation in how pain is perceived and judged both by people with pain and by the healthcare providers who help care for them. The overarching goal of this transformation should be gaining a better understanding of pain of all types and improving efforts to prevent, assess, and treat pain.* (p.4)

In essence, the IOM recommendations called for identifying chronic pain as a public health problem and for classifying it as a complex disease of its own. The report

urged governing bodies to pursue additional improvements in the science of pain through further research, more timely care, and improved medical management. It also recommended relying on integrated, multimodal, and interdisciplinary treatments to effectively prevent the development of acute pain to chronic pain, and chronic pain to high-impact chronic care[6] (IOM, 2011; Interagency Pain Research Coordinating Committee, 2016). Table 1 below presents a more detailed summary of the IOM report recommendations.

Table 1 - The findings and recommendations of the IOM on chronic pain in the United States (Adapted from IOM, 2011, pp.4-12)

Findings	Recommendations
1. **Pain is a public health problem.** Pain is prevalent in the U.S., reduces quality of life, affects specific population groups disparately, and is very costly (~ $2000 / U.S. resident).	● Improve collection and reporting of data on pain, to include: a. Incidence and prevalence; b. Interference with daily living and work; c. Utilization of clinical and social services; d. Costs of pain and pain care; and e. The effectiveness of treatments in reducing pain and associated disability.
2. **More consistent data on pain are needed.** There is a lack of consistent data to help describe the extent of the problem or identify subpopulations that would benefit the most from future interventions. Improvements in state and national data are needed.	

[6] High Impact Chronic Pain refers to chronic pain that frequently limits life or work activities. (Dahlhamer *et al.*, 2018)

Table 1 (Continued)

3. A population-based strategy for reducing pain and its consequences is needed. This is the IOM committee's conclusion on the ideal way to effect change at a large scale and account for the varied burden across population groups.	● Create a comprehensive population health strategy for pain prevention, treatment, management, reimbursement, and research, to include: a. Integrating efforts across government agencies and utilizing public-private partnerships to encourage population-focused strategies; b. Developing an agenda to link physiological, clinical, behavioral, and psychological outcomes research; c. Improve pain assessment and management programs within service delivery and financing programs of the federal government; and d. Enhance public awareness about the nature of chronic pain and the role of self-care in its management.
4. Pain care must be tailored to each person's experience. The majority of pain care and management should take place through self-management and primary care. Specialty care should focus on recalcitrant and/or complex cases. Providers need to foster patient-centered care that is comprehensive and interdisciplinary when needed.	● Promote and enable self-management of pain. a. Healthcare organizations should take the lead in promoting and enabling self-management through educational approaches that are culturally and linguistically appropriate.
5. Significant barriers to adequate pain care exist. These barriers include provider attitudes and training, reimbursement policies and the system and organizational barriers they create, and the cultural attitudes of patients themselves, most of whom are not aware of the need to address pain early on.	● Develop strategies for reducing barriers to pain care ● Provide educational opportunities in pain assessment and treatment in primary care ● Support collaboration between pain specialists and primary care physicians ● Revise reimbursement policies to foster coordinated and evidence-based care.

Table 1 (Continued)

6. Education is a central part of the necessary cultural transformation of the approach to pain. In medical education, pain generally receives little attention, which contributes to the problem of undertreatment.	• Expand and redesign education programs to transform patient and public understanding of pain. • Improve curriculum and education for healthcare professionals. • Increase the number of health professionals with advanced expertise in pain care.

The IOM recommendations are based on researchers and pain experts applying the **biopsychosocial** model of pain (Figure 8). This model presents the interaction between biological, psychological, and social factors that impact the severity of pain, its evolution, and the effectiveness of pain treatments. Hence, it highlights the individuality of each pain experience. The model makes the distinction between *disease*; i.e., "an objective biological event involving the disruption of specific body structures or organ systems caused by either anatomical, pathological, or physiological changes," and *illness*; i.e., "a subjective experience or self-attribution that a disease is present…[which] refers to how a sick person and members of his or her family live with, and respond to, symptoms of disability" (Gatchel *et al.*, 2007). This distinction is analogous to the difference between *nociception* and *pain*, where nociception refers to the stimulation of nerves (i.e., biophysical), whereas pain refers to the subjective perception of sensory transmission (Gatchel *et al.*, 2007).

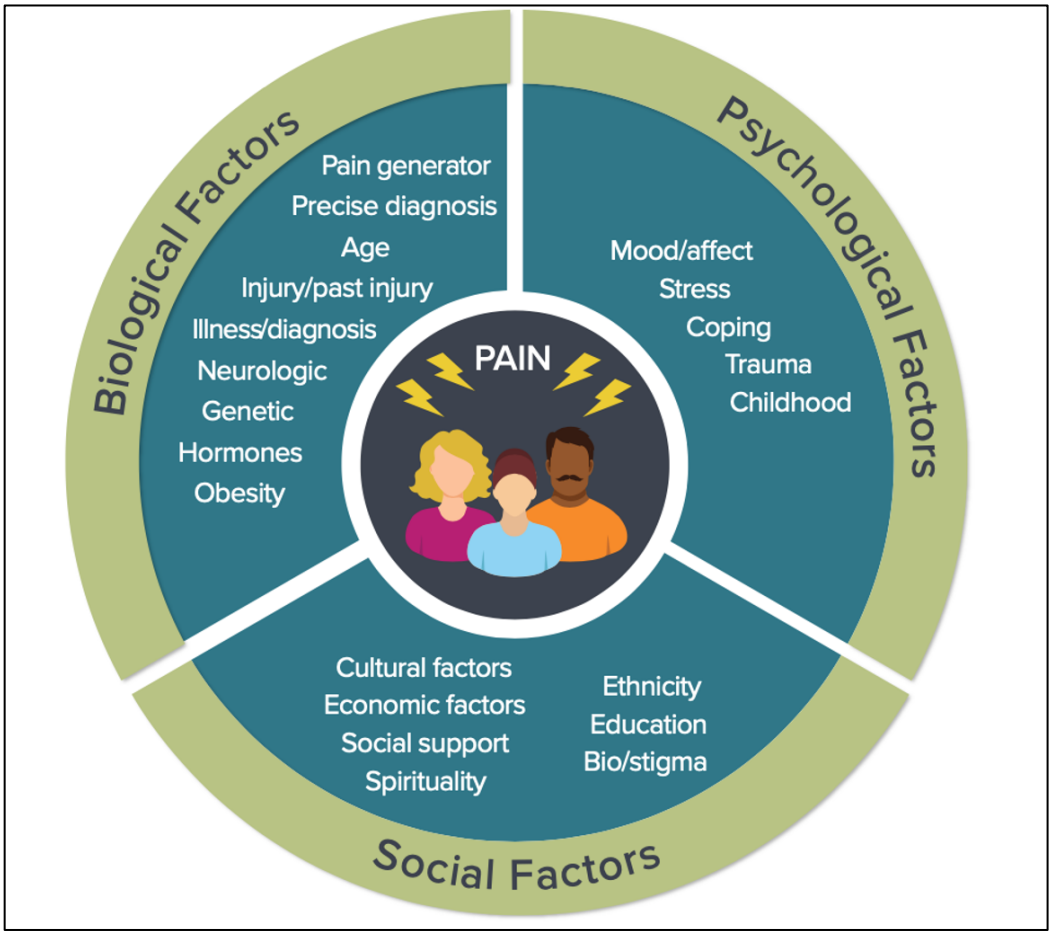


Figure 8 - The Biopsychosocial Model for Pain (NIH, 2019).

Health Inequities: Evidence Supporting the Biopsychosocial Conception of Pain

Unsurprisingly, the burden of pain is not equal across subpopulations in the U.S. Predictors of increased vulnerability to pain include race, ethnicity, geographic location, military service, education level, and having English as a second language. Furthermore, many of these groups face access barriers to pain care. For example, Blacks have a lower likelihood of receiving comprehensive pain assessment and management than their white counterparts. Yet this leads to having a higher chance of them receiving a disc herniation diagnosis and undergoing surgery for back pain, where in fact, less invasive treatments for back pain are linked to better results (Nelson, 2002; Tick *et al.*, 2018).

Nonetheless, this does not "erase the sting of discriminatory care…[where] episodes of major lifetime racial discriminatory events are the strongest predictors of back pain reported in African Americans, with perceived day-to-day discrimination being the strongest predictor of back pain for African American women" (Tick *et al.*, 2018). Many Blacks, particularly when they are older and/or suffering from physical and mental health comorbidities, experience severe mismanagement of pain and are at risk for dangerous medication interactions due to fragmented and limited access to health services (Tick *et al.*, 2018). It is not just Blacks, however. Increased risk for chronic pain and undertreatment is shared among most Americans experiencing barriers to education, income, and access to care. Being a woman is another predictor of increased risk of chronic pain and undertreatment. American women are more likely to experience misdiagnoses, delays, improper treatment, neglect, and outright dismissal and discrimination from the healthcare system (IOM, 2011; Tick *et al.*, 2018).

Barriers to the Required Systemic Change in Pain Care

> *Is it too much to ask that we, the patients, no longer be bound to a system where no one professional takes responsibility for the patient—a system of unbelievable referrals with unscientific, unproven treatments (and hope) sold to the patient by each referring physician. In many cases, patients end up worse and more and more destitute, yet they grasp for hope with each referral.*
>
> - A chronic pain advocate, as quoted in (IOM, 2011)

Chronic pain has all the characteristics of a progressive public health issue and often contributes to the many tragedies surrounding depressive disorders and opioid addiction that are reported in news cycles nationwide. What then stands in the way of changing how pain is perceived and treated? The answer lies in the systemic, clinician, and patient-level barriers that prevent our improved understanding of pain from translating into comprehensive and interdisciplinary management. This results in the "Picture of Pain "presented in Figure 9 below (IOM, 2011).

At the system level, pain features in many clinical disciplines, be it neurology, orthopedics, cancer centers, or others. Hence, pain is the clear responsibility of no single entity. This creates a systemic bystander effect, where patients suffer from pain, but no single stakeholder has enough locus of control to institute change independently. Furthermore, the reimbursement regulations complement the organizational structure of the U.S. health system and present yet another system-level barrier to change. Hence, while there are pain clinics that do implement an interdisciplinary and comprehensive

approach, they are few in number, and their impact is depressed by a reimbursement system that stifles interdisciplinary care (IOM, 2011).

At the clinician level, providers face several barriers. Some are related to the system-level barriers, where primary care physicians are limited by reimbursement barriers to interdisciplinary care. In addition, not all health professionals are sufficiently educated on the importance of early pain management (i.e., to prevent the development of chronic pain) and other best practices for prevention and treatment. Hence, many primary care physicians may not know with whom to engage with for chronic pain patients even if they recognized the need for interdisciplinary care (IOM, 2011).

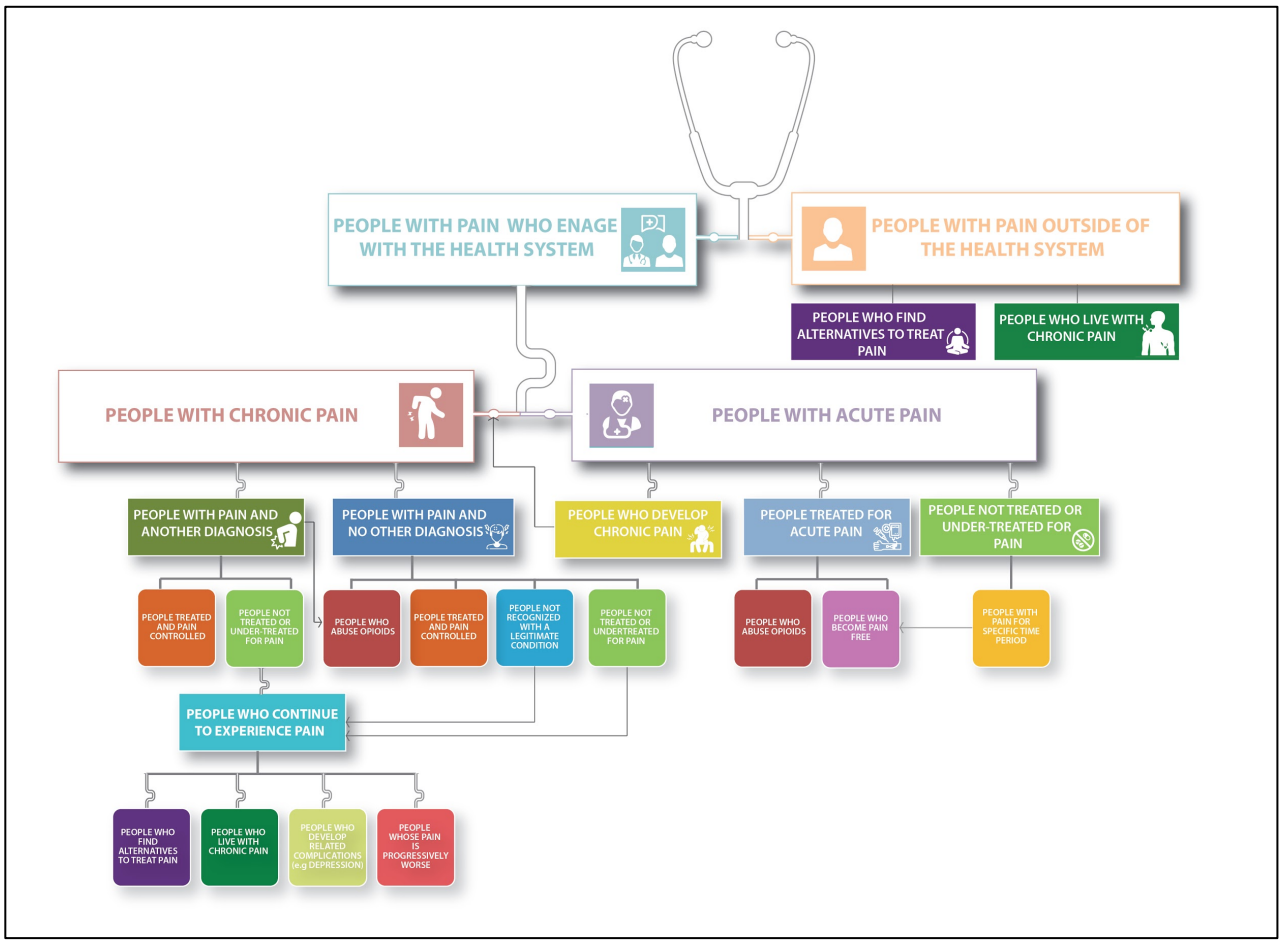


Figure 9 - The Picture of Pain. Adapted from (NIH, 2019)

At the patient level, there can be a societal stigma for those struggling with chronic pain, both consciously and unconsciously. Family, friends, coworkers, and clinicians themselves may question the validity of patient complaints and accuse them of malingering and/or drug-seeking. Popular culture (e.g., "Suck it up; No pain, no gain"), as well as religious and moral qualifications (e.g., "Mankind is meant to suffer; giving in to pain is a sign of weakness), can also be dismissive of legitimate pathological pain (IOM, 2011).

Following the publications of the IOM committee report, the HHS asked the Interagency Pain Research Coordinating Committee (IPRCC) to lead the creation of a National Pain Strategy (NPS) and the Federal Pain Research Strategy to complement it. The goal was to identify gaps in the research agenda and develop recommendations for future pain research programs (Interagency Pain Research Coordinating Committee, 2016). The IPRCC specified the following items in their vision for future pain care;

- Patients get timely access to patient-centered care that meets biopsychosocial needs;
- Patients have access to education on pain, treatment options, and self-management approaches;
- Americans recognize chronic pain as a complex disease and a threat to public health and productivity;
- Clinicians receive better education and training on biopsychosocial pain management and provide comprehensive assessments to patients with chronic pain;
- A robust and well-trained behavioral health workforce supports patients with chronic pain; and
- Payment structures would support interdisciplinary, multimodal care.

- (Interagency Pain Research Coordinating Committee, 2016)

In conclusion, chronic pain is a biopsychosocial condition that affects millions of Americans and is a public health problem with a hefty price tag. The effective management of chronic pain will require a change in how pain is understood and evaluated by patients, clinicians, and the general public. In particular, healthcare providers are subject to bias and often lack a comprehensive perspective on pain, leading to misjudgments on the nature and depth of pain (IOM, 2011). As for patients, many do not recognize the need to address pain early on to avoid the development of chronicity. Furthermore, education on self-management is instrumental in reducing flare-ups of pain and improved functioning. When it comes to the general public, educating them about pain promotes community action towards prevention, advocacy for appropriate acute and chronic pain care, and public support for improvements in pain prevention and control policies (IOM, 2011). Therefore, the status quo offers an opportunity to remodel the way pain care is structured, rendered, and reimbursed to follow the IOM's recommendation for interdisciplinary, multimodal care that promotes and facilitates self-management by patients.

A Short Note on Low Back Pain (LBP)

It is necessary to highlight the complexity of low back pain given its global pervasiveness as the leading cause of disability worldwide, as well as point to the recent changes in the American College of Physicians (ACP) clinical guidelines for low back pain treatment in light of new research data. As noted in previous sections, low back pain (LBP) is the leading cause of disability worldwide, is the most prevalent form of chronic musculoskeletal pain, and has been the most burdensome nonfatal condition globally for over two decades (Hush, 2020). When chronicity develops, low back pain embodies all of the features of chronic pain described above - it is present without the presence of observable tissue damage or known nociceptive cause, is complex, modified by biopsychosocial factors, correlated with poor mental health outcomes, challenging to treat, and costly to society and health systems. Furthermore, the condition is overrepresented in low socioeconomic status populations (Hartvigsen *et al.*, 2018), highlighting the existing inequities that affect the risks and prevalence for chronic pain in high-income, middle-income, and low-income countries alike. The lifetime prevalence of low back pain of any form is 84 %, with chronic low back pain prevalence estimates at 23%, with about 12% of the global population disabled by low back pain (Balagué *et al.*, 2012).

The puzzling nature of the condition is apparent in the nomenclature, i.e., 'non-specific low back pain' (NSLBP), a term which is often used to describe chronic low back pain and that reflects the lack of an attributable specific pathology (Balagué *et al.*, 2012).

Furthermore, despite the multitude of treatment options available[7], the burden of low back pain has increased, and non-evidence-based treatment approaches are utilized regardless of income setting. Clinical practice guidelines recommend approaches for assessment and management that rely on the biopsychosocial framework for initial non-pharmacological treatment, and the prudent use of medication, imaging, and surgery (Foster *et al.*, 2018). Unfortunately, low back pain prevention is not well researched despite the high likelihood of its recurrence. The only effective form of secondary prevention currently known is exercise, with or without education and/or cognitive-behavioral therapy (CBT) (Foster *et al.*, 2018).

The American College of Physicians (ACP) and the American Pain Society co-developed clinical guidelines, presented below, for diagnosing and treating LBP. The listed guidelines were labeled as strong recommendations (except for recommendation 7, explained further below) and all the recommendations are backed by moderate-quality evidence. Refer to Appendix 1 for details on the evidence quality grading system used by the American College of Physicians.

The guidelines for diagnosing and treating low back pain are as follows:

1. Clinicians should perform a physical examination and thorough psychosocial history assessment to place the patient into one of three

[7] Interventions for low back pain can be classified as either non-pharmacological treatments, pharmacological treatments, injection therapies, and surgical treatments. Pharmacological treatments include NSAIDs, opioids, muscle relaxants, acetaminophen, muscle relaxants, antiseizure medications, antidepressants, and corticosteroids. Non-pharmacological interventions include exercise and related interventions (e.g., Tai Chi, Yoga), complementary therapies and alternative therapies (e.g., spinal manipulation, massage, and acupuncture), physical modalities (e.g., traction, ultrasound, superficial heat and cold, back supports, electrical nerve stimulation, interferential therapy, and magnets) and psychological therapies (e.g., CBT, relaxation techniques, and multidisciplinary rehabilitation) (Chou *et al.*, 2016).

categories - i.e., (i) non-specific low back pain, (ii) back pain potentially associated with a radiculopathy or spinal stenosis, or (iii) back pain potentially associated with another specific spinal cause.

2. Clinicians should refrain from routine imaging and other diagnostic tests for non-specific low back pain.
3. Clinicians should perform imaging and testing when severe or progressive neurological deficits are present or when a serious underlying cause is suspected.
4. Clinicians should rely on magnetic resonance imaging (MRI) or computed tomography (C.T.) to evaluate patients with persistent low back pain or when symptoms of radiculopathy or spinal stenosis[8] are present only in cases where the patient is a candidate for surgery or an epidural steroids injection.
5. Clinicians should provide patients with evidence-based education on low back pain, their expected course, effective self-care options, and recommendations for continued physical activity.
6. In conjunction with educational material, clinicians should consider the use of medications with proven benefits following an assessment of the severity of baseline pain and functional deficit. Clinicians should also weigh potential benefits with the risks and the relative lack of long-term efficacy before initiating pharmacological therapy.
7. For pain conditions that are resistant to self-management approaches, clinicians should consider the use of other non-pharmacological therapies with proven benefits. For acute low back pain, spinal manipulation; for chronic or subacute[9] low back pain, intensive interdisciplinary rehabilitation, exercise therapy, acupuncture, massage therapy, spinal manipulation, yoga, cognitive-behavioral therapy, or progressive relaxation (Chou *et al.*, 2007).

[8] **Radiculopathy** describes a range of symptoms produced by the pinching of a nerve root in the spinal column. **Spinal stenosis** is a narrowing of the spinal canal.
[9] **Subacute** refers to a transition period between acute and chronic low back pain.

In a significant update to the clinical guidelines, the ACP expanded its recommendations on non-invasive therapies (i.e., recommendation 7 from above) to three new recommendations based on more recent control trials and systematic reviews:

1. Provided that most patients with acute or subacute low back pain improve over time regardless of treatment, clinicians and patients should select nonpharmacologic treatment with superficial heat (moderate-quality evidence), massage, acupuncture, or spinal manipulation (low-quality evidence). If pharmacologic treatment is desired, clinicians and patients should select nonsteroidal anti-inflammatory drugs or skeletal muscle relaxants (moderate-quality evidence). [*Grade: Strong recommendation*]
2. For patients with chronic low back pain, clinicians and patients should initially select non-pharmacologic treatment with exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction (moderate-quality evidence), tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation (low-quality evidence). [*Grade: Strong recommendation*]
3. In patients with chronic low back pain who have had an inadequate response to nonpharmacologic therapy, clinicians and patients should consider pharmacologic treatment with anti-inflammatory drugs as first-line therapy, or tramadol or duloxetine as second-line therapy (moderate-quality evidence). Clinicians should only consider opioids as an option in patients who have failed the aforementioned treatments and only if the potential benefits outweigh the risks and realistic benefits with patients. [*Grade: Week Recommendation*] (Qaseem *et al.* 2017)

The increase in the disability burden attributed to low back pain hints at the inadequacy of the current management of LBP (GBD, 2019; Hush, 2020). Like other pain

conditions, LBP has traditionally been viewed through a biomedical lens. However, limitations of the biomedical model were observed in clinical settings, such as the lack of effectiveness of treatments targeting lumbar pathology (e.g., spinal manual therapy or radiofrequency denervation), as well as the poor correlation between symptoms and signs of spinal degeneration detected through lumbar imaging (Hush, 2020).

The lack of appreciation for the biopsychosocial complexity of LBP permeates through to the design of clinical trials, where it is customary for the trial to test unimodal treatments that target single domains of LBP (Hush, 2020) and/or to exclude patients with presentations of depression and anxiety disorders from the study (Darnall, 2018), which are common comorbidities modulating the psychosocial dimensions of the pain experience. Hence, trials often fail to demonstrate clinically important benefits. A *Lancet* review of non-specific LBP showed that even in clinical settings, unimodal treatments focused on biological contributors (e.g., heat, massage, muscle relaxants, and others) have little impact on patient-reported primary outcomes like pain and disability (Hush, 2020).

The conclusion here is that chronic LBP, like other forms of chronic pain, is a complex condition with a unique mosaic of factors involved in each individual case. In line with the National Pain Strategy of the United States, "patient-centered, interdisciplinary care that is compassionate, well informed, and individualized to every patient who is experiencing pain" is the goal for which to strive (Interagency Pain Research Coordinating Committee, 2016; Hush, 2020).

Guidelines for Pain Care: How to Incorporate the Biopsychosocial Model

In response to the opioid epidemic, the Pain Management Inter-Agency Task Force was established through the U.S. Department of Health and Human Services, in conjunction with the U.S. Department of Defense, the Department of Veterans Affair, and the Office of National Drug Control Policy, to develop(?) acute and chronic pain treatment best practices. The 29-member Task Force of federal and non-federal representatives reviewed the medical literature, received information from experts in pain management, addiction, and mental health, reviewed patient testimonials, held public meetings, and collected over 9000 comments from the public. In their 2019 report, the task force recommended:

- An emphasis on developing an effective treatment plan to establish a diagnosis, with **measurable outcomes that focus on improvements**, including Quality of Life (QOL), improved functionality, and Activities of Daily Living (ADL).
- An emphasis on **individualized**, **patient-centered care** when diagnosing and treating acute and chronic pain, which is essential in establishing a **therapeutic alliance**.
- A **multimodal approach** that includes medications, nerve blocks, physical therapy, and other modalities should be considered for acute pain conditions.
- A **multidisciplinary approach** for chronic pain across various disciplines that is based on a **biopsychosocial model** of care.

- (NIH, 2019)

There are five central components of individualized, multidisciplinary, multimodal pain care (Figure 14); (i) Restorative Therapies (e.g., physical therapy); (ii) Behavioral Health (e.g., Cognitive Behavioral Therapy); (iii) Medications (i.e., opioids and non-opioid); (iv) Complementary & Integrative Health (e.g., yoga); and (v) Interventional Procedures (e.g., epidural steroid injection). In addition, performing thorough *Risk assessments*, addressing *Stigma*, *improving Access to Care*, *and providing effective pain care Education* ought to be features across these components of care.

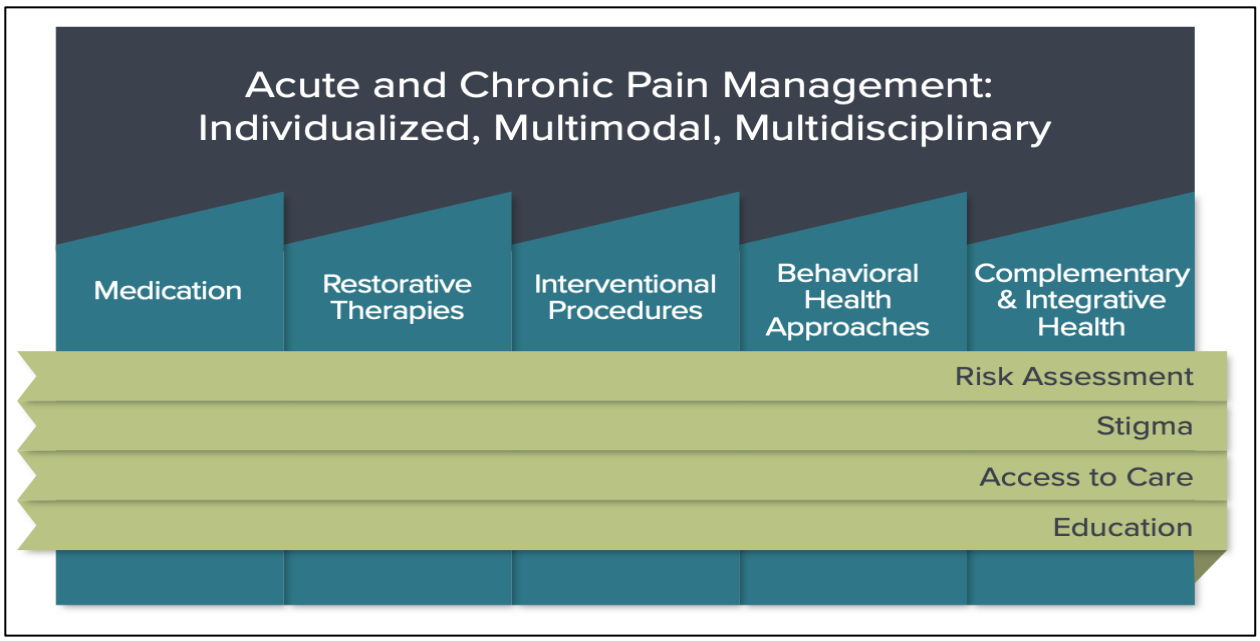


Figure 10 – Components of individualized, multimodal, multidisciplinary pain management (Trout *et al.*, 2017).

Risk assessment refers to the thorough assessment of patients to identify risk factors from family history, patient history, biopsychosocial factors, and others to conduct a risk-stratification that aids in determining optimal treatment. *Stigma* refers to compassionate, empathetic care centered on a therapeutic alliance to address the societal and/or patient-held stigma associated with living with pain. *Access to care* refers to

addressing the gap in the workforce for disciplines involved in pain management, as well as improvements in coverage and reimbursement for pain management modalities. Both of these items are typically beyond the purview of health providers and are issues addressed by advocacy groups and legislators. However, primary care providers like Iora Health [10] and others have paved the path for successful financing of value-based primary care models, offering inspiration and guidance for innovators in the field of pain management. The NIH also refers to the need for improved coverage for pain telehealth (NIH, 2019).

Finally, *Education* refers to providing patients and their families with educational material about their pain condition and treatment. In reference to the education component, the NIH further elucidates the need for enhanced pain education at all levels of the pain management vertical, including clinician training, undergraduate educational curricula, and graduate professional training. Furthermore, the NIH task force, like the IOM, highlights the need for educating the public, policymakers, and legislators about pain science as a crucial step towards improved pain care. Last but not least, continued research and development into understanding the mechanisms of the transition from acute to chronic pain is required for much-needed improvements in prevention, diagnosis, and therapy (NIH, 2019).

[10] Iora Health is a primary care organization that redesigned services by adding health coaches, eliminating fee-for-service payments in exchange for a fixed fee-per-member, and removing copayments for primary care visits.

What is Therapeutic Alliance?

According to Horvath and Luborsky (1993), the conceptualization of a therapeutic alliance between therapist and patient can be traced back to Sigmund Freud's theorization of transference. Therapeutic alliance, also referred to as the 'working alliance,' is more than communication between a therapist and a patient; it is a set of change-inducing relational factors that impact patient health outcomes. Most research publications on alliance come from the psychotherapy field, induced by a recognition that different types of psychotherapy produced similar therapeutic results. This kindled interest in studying the alliance variables that are common in all forms of therapy (Horvath and Greenberg, 1989; Ardito and Rabellino, 2011).

Therapeutic alliance refers to the non-transferential relationship between the patient and therapist. There is a distinction between transference/countertransference, the real relation, and the alliance components of the therapeutic process. Transference-countertransference is when a patient unconsciously redirects emotions for another person (e.g., a mother, father, sister, etc.) onto their therapist or vice versa. The real relation refers to the interactions between the therapist and the patient that reflect their existence as individuals. Alliance, on the other hand, refers to the working, reality-based collaboration between patient and therapist (Meissner, 2007; Ardito and Rabellino, 2011)

Studies aimed at identifying alliance variables led to a variety of theoretical frameworks and scoring systems to delineate and measure therapeutic alliance. One of the most reliable scales for the therapeutic alliance is the Working Alliance Inventory (WAI) developed by Horvath & Greenberg (1989) on the basis of Bordin's (1979) theory

of working alliance. Bordin's seminal papers delineated the therapeutic alliance as having three core elements, which are: (1) an agreement on **goals**; (2) an assignment of **tasks**; and (3) the development of **bonds** (Bordin, 1979). Based on this delineation, the WAI survey items are equally distributed across the goals, tasks, and bonds scale to assess therapeutic alliance (Bordin, 1979; Horvath and Greenberg, 1989).

Within the WAI, *Tasks* refer to the "behaviors and cognitions that form the substance of the counseling process…[where] both persons must perceive these tasks as relevant and efficacious, [and] each must accept responsibility to perform these acts." *Bonds* refer to the "complex network of positive personal attachments…that includes issues such as mutual trust, acceptance, and confidence" (Horvath and Greenberg, 1989). Finally, *Goals* refer to the degree to which the client and therapist mutually endorse and value the intended outcomes from therapy.

Bordin (1979) refers to the alliance as that which "makes it possible for the patient to accept and follow treatment faithfully" (p.2, as quoted in (Horvath and Greenberg, 1989). His framework was the first to focus on collaborative participation as the key to overcoming inevitable ruptures in the working alliance that arise from assigned therapeutic tasks that tap into self-defeating habits of feeling, thought, and action. A strong therapeutic alliance has been shown to influence patient satisfaction and adherence to treatment in several studies (Fuertes et al., 2007; Griffith, 1990; Horvath, Del Re, Flückiger, and Symonds, 2011; Martin, Garske, and Davis, 2000, as quoted in Taccolini Manzoni *et al.*, 2018). Furthermore, strong therapeutic alliance has been shown to have an effect on healthcare outcomes, which has been demonstrated with trials in a variety of clinical disciplines.

A systematic review and meta-analysis of 13 Randomized Clinical Trials (RCTs) found that patient-physician relationships have a small but significant effect on objective (e.g., blood pressure) and validated subjective (e.g., pain) health outcomes (Kelley *et al.*, 2014). One RCT aimed to study the relationship between therapeutic alliance and outcomes for chronic low back pain by asking 182 patients to complete the WAI on their second visit to the physical therapist. Outcomes of function and effect of treatment on pain and disability were also assessed before and 8-weeks post-treatment. Linear regression found that therapeutic alliance was a consistent predictor for all the measures of treatment outcomes[11] (Ferreira *et al.*, 2013).

(Fuentes *et al.*, 2014) compared the effect of enhanced versus limited therapeutic alliance on pain intensity and sensitivity in patients with chronic low back pain. Their study found that enhanced therapeutic alliance led to meaningful improvements in patient outcomes. Finally, a recent systematic review of the literature on therapeutic alliance within the context of physical therapy concluded that "for individuals participating in physical therapy for chronic musculoskeletal pain, a strong TA may improve pain outcomes. In order to facilitate a strong TA, physical therapists must understand factors that positively and negatively influence the relationship. Studies demonstrate that the definition of TA remains consistent as it transitions to the physical therapy setting." (Kinney *et al.*, 2020) p.886

[11] The primary outcomes of the study included Patient-Specific Functional Scale [PSFS], Global Perceived Effect of Treatment Scale [GPE], Current Back Pain Status compared with when back pain episode first started (score ranges from -5 to +5). The secondary outcomes were pain (Visual Analog Scale from 0 to 10) and disability, measures using the Rolland-Morris Disability Questionnaire [RMDQ].

2.1.3 Telehealth for Pain Management

Telehealth: Definitions and Brief History

Telehealth is defined as the use of electronic information and telecommunication to facilitate long-distance healthcare, health education, public health, and health administration (Tauben *et al.*, 2020). Telehealth is generally classified as synchronous (e.g., live video), asynchronous (e.g., store-and-forward content application), M-Health (e.g., patient-reported outcomes), and E-Health (e.g., live or recorded educational presentations to patients or healthcare professionals) (Tauben *et al.*, 2020). Appendix 2 presents an infographic of telehealth capabilities, as well as several term definitions tied with" telehealth."

Telehealth and telemedicine are often used interchangeably in the literature. However, telehealth is distinct from telemedicine in that it refers to a broader range of remote health services when compared to telemedicine, which refers to using telecommunications infrastructure to deliver clinical care at a distance (AAFP, 2020), making telemedicine a subset of telehealth. The central value proposition of delivering telehealth is that it reduces or removes barriers experienced in traditional in-person care. Telehealth promotes access, shrinks waiting lists, and can be more cost-effective. Thus, telehealth helps patients with barriers related to cost, insurance status, scheduling health appointments, transportation, and taking time off work (Lin *et al.*, 2020).

It might come as a surprise that telehealth dates back to the 1920s when the Royal Flying Doctor Service in Australia began to experiment with the pedal radio to enable contact between remote outposts and a central medical base (Wijesooriya *et al.*, 2020). It was the National Aeronautics and Space Administration (NASA) that propelled telehealth and telemedicine. As the space race between the U.S. and the Soviet Union intensified, the complexity and length of missions increased, and issues like "physiological adaptations to microgravity, radiation exposure, extreme temperature and vacuum, and psychosocial reactions to space flight" became critical. NASA's terrestrial validation of telemedicine technologies both provided feedback to the space program and also advanced the telehealth field here on earth (Nicogossian, Pober and Roy, 2001).

Telehealth and Telemedicine for Chronic Pain Management

Telehealth holds promise in treating chronic illnesses, where the clinical consensus has shifted toward self-management (Slattery *et al.*, 2019; Tauben *et al.*, 2020). Self-management is described as activities used to limit the impact of a chronic condition on a patient's health and to manage psychosocial problems attached to that condition (Heapy *et al.*, 2015). It is also described as the "ability to monitor one's condition and to effect the cognitive, behavioral, and emotional responses necessary to maintain a satisfactory quality of life" (Barlow *et al.*, 2002; Heapy *et al.*, 2015).

Telehealth has a demonstrable ability to enable the collection and analysis of health data and to include care from multiple clinical disciplines, thereby convincing many practitioners that adoption beyond Covid-19 is warranted (Tauben *et al.*, 2020). The challenge, however, is in performing physical evaluations for new patients, a crucial part of a thorough evaluation of patients suffering from chronic pain. Clinicians and therapists palpate, press, and move patients during physical examinations and use special equipment to arrive at an accurate diagnosis, most of which is not possible through telehealth (Burris *et al.*, 2020). Nevertheless, the challenge can be overcome through a blended approach with the addition of an on-site component or with the assistance of a coached attendant caregiver, if possible. If the patient experiences no new presentations of pain, follow-up visits can be conducted virtually (Tauben *et al.*, 2020). Indeed, several aspects of the care process can be conducted remotely, such as recording patient history, tracking pain and other patient-reported outcomes, or reviewing medical prescriptions and adherence. Table 2 below summarizes the benefits and drawbacks of telehealth for chronic pain.

Table 2 - Benefits and Drawbacks of Telehealth/Telemedicine for Chronic Care Management. (Adapted from (Emerick *et al.*, 2020; Wijesooriya *et al.*, 2020)).

Benefits of Telehealth for Chronic Pain	
Psychosocial factors	• Observation in the home environment can provide informal assessments of mental status. • Social information such as the living environment, family interactions, smoking habits, etc., can be observed. • Providers can get a sense of commitment to and compliance with recommendations, e.g., is the patient taking the call from a bed?
Convenience and efficiency for patients and providers	• Patients avoid many transportation barriers. • Care is more patient-centered when they can attend appointments from home. • Improved access for patients in underserved and rural areas. • Reduced patient processing inefficiencies. • Improved scheduling flexibility for patients, e.g., visits can be scheduled during patients' work breaks. • Improved scheduling flexibility for providers, e.g., providers seeking nontypical clinic hours with less commute time. • Lower no-show rates are seen for patients with telemedicine visits. • Lower overhead costs for providers. • Facilitate multidisciplinary care for providers.

Table 2 (Continued)

Telehealth evaluations can still be comprehensive	• When coupled with patient-reported outcomes obtained from Web-based applications (e.g., pain, function, mood, expectations, and sleep ratings), telemedicine evaluations can provide a comprehensive assessment efficiently. • Remote telemedicine vital sign monitoring equipment is becoming available.

Drawbacks of Telehealth for Chronic Pain	
Potential for Diminished Quality of the Patient-Provider Interaction	• Providers may face challenges in creating boundaries around work due to increased access. • Providers may miss nonverbal cues that aid in establishing the patient-provider relationship, making it more challenging to discuss complex issues later on. • Potential for biased assessment when providers only see patients when they are at home.
Patient Engagement Issues	• Creates challenges for patients who are less tech-savvy. • Technical issues occur quite frequently. • Lack of personal contact potentially hinders sharing of emotional information.

Table 2 (Continued)

Operational Considerations	• Requires the implementation of new workflows. • Requires ancillary staff with telehealth training. • Potential overuse of multidisciplinary services when not needed. • Limited ability to perform a physical exam when needed. • Some procedures may not receive health insurance pre-authorization without physical examination.
Financial Considerations	• Potential overuse of services due to increased access. • Requires new reimbursement models.
Ethical Considerations	• Exacerbating existing health disparities given that underrepresented patient populations don't have robust internet access.

The State of Telehealth Adoption and Regulation Before and After the Coronavirus Pandemic

Before moving to the research methods, it is important to highlight the changes in telehealth regulations in response to the Covid-19 pandemic. The Covid-19 pandemic created a new normal for pain clinicians across the world, and yet "Verily, with hardship comes ease" (94:6 - The Holy Quran). This holds true when one considers the exponential increase in the adoption of telehealth technology, alongside changes in local and national health policy rules around access, delivery, and reimbursement of telehealth, all of which

were expected to take much longer than they did. Today, telehealth is better positioned to transform complex and chronic pain care needs of rural communities and low-resource settings by removing the obstacles around collaborative, multidisciplinary chronic pain management, known to be the optimal approach in conjunction with self-management (Tauben *et al.*, 2020).

Prior to the Covid-19 pandemic, several studies reported on the causes for the gap that exists between rising telehealth capabilities and slow rates of telehealth adoption. The most cited barriers included reimbursement restrictions, interstate medical licensure requirements, and hospital credentialing requirements (Weinstein *et al.*, 2014; Bashshur *et al.*, 2020). Other barriers include poor infrastructure, limited equipment availability, concerns for patient confidentiality, and insufficient access to training and education for medical personnel (Lewis *et al.*, 2012; Bashshur *et al.*, 2020).

Notwithstanding these many barriers, the literature makes it clear that reimbursement hurdles represent the most pernicious obstacle to consisten adoption of telehealth by healthcare providers. Case in point: the odds of receiving a telehealth visit in states with telehealth parity laws[12] was 29.8% higher than in states without parity laws (Harvey *et al.*, 2019). However, it's important to note that patient-side barriers like technology access, digital literacy, and reliable internet access are experienced disproportionately among persons of color, the elderly, and people of low socioeconomic status (Schmit *et al.*, 2020), who also tend to be at higher risk for pain.

Unsurprisingly, the Covid-19 pandemic shifted the healthcare industry's mood towards telehealth. This was most acutely observed in providers' reliance on telehealth to

[12] Telehealth parity laws refer to those stipulating that payers reimburse certain telehealth care the same way they would for in-person care.

demand-manage the flow of patients with respiratory symptoms into the emergency departments. Further, in conjunction with swift changes in telehealth reimbursement regulations (described below), a compelling increase occurred in outpatient consultations conducted on live video, particularly for mental health, and even social media was relied upon to direct people to trusted sources for health information and thwart misinformation (Eccleston *et al.*, 2020; Merchant and Lurie, 2020). However, recent evidence has shown that marginalized groups experienced a reduction in telehealth visits during the Covid-19 pandemic (Figure 10 and 11), hinting at exacerbated inequities when telehealth adoption favors higher reimbursement rates. In other words, when (Burris *et al.*, 2020; Nouri *et al.*, 2020)

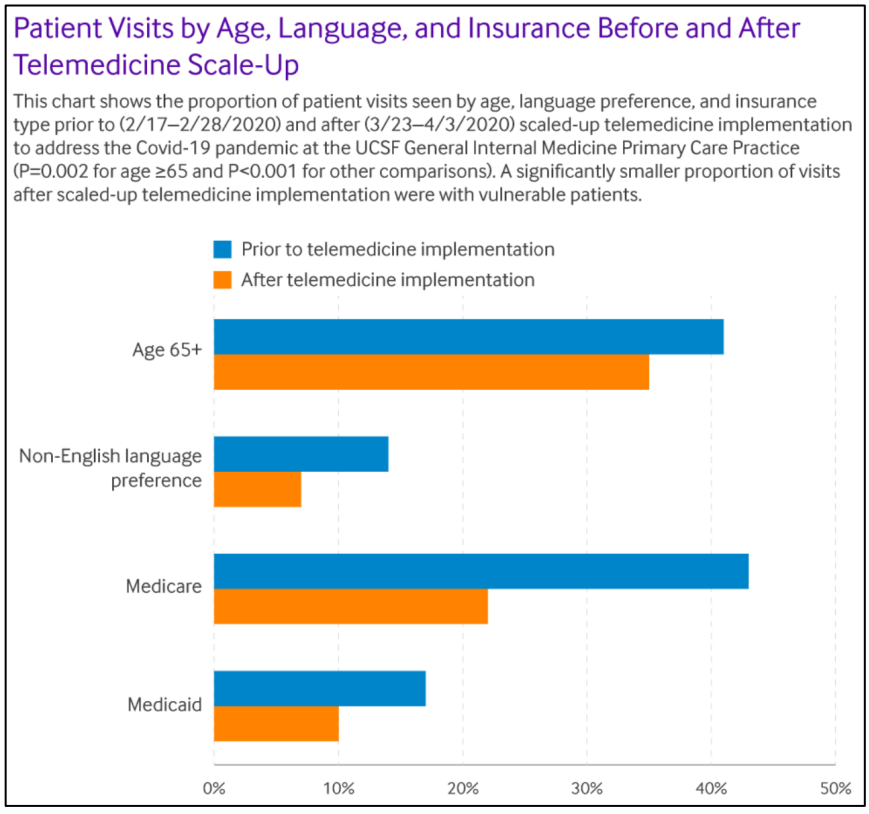


Figure 11 (a) - Telehealth visits by categories (i) (Adapted from Nouri *et al.*, 2020).

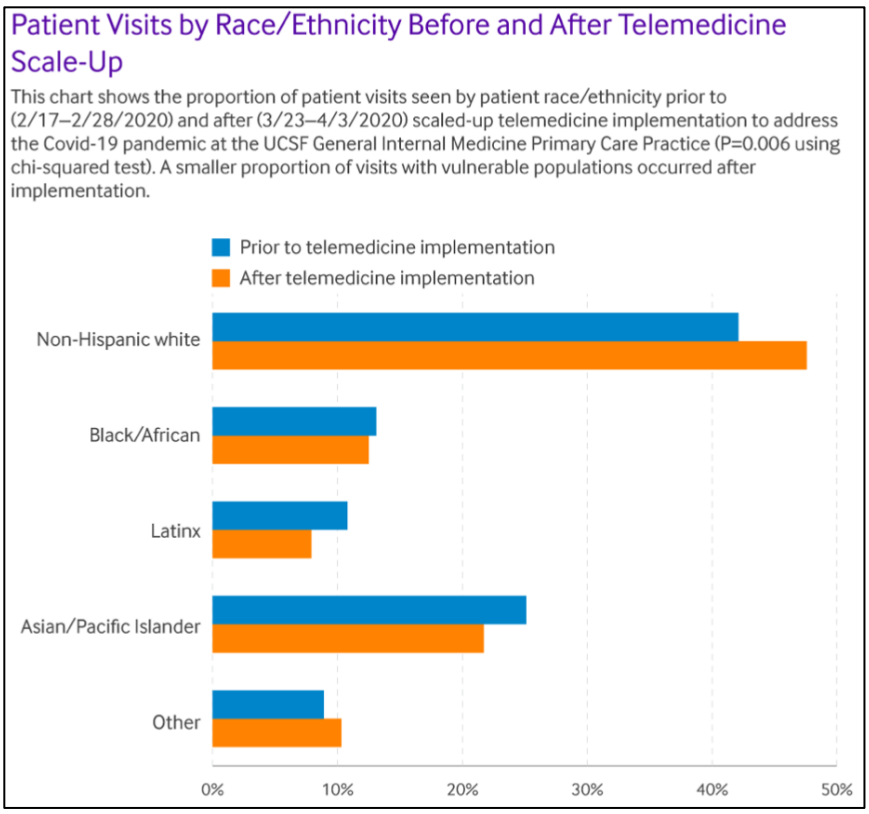


Figure 11 (b) - Telehealth visits by categories (ii) (Adapted from Nouri *et al.*, 2020).

Notwithstanding the reservations around the execution flaws that are bound to surface with the rapid deployment of telehealth across the U.S. (Bashshur *et al.*, 2020), the health system shift would not have occurred without radical public policy changes to telehealth services reimbursement. Prior to the pandemic, a fragmented policy environment around reimbursement of telehealth created inconsistencies across states. Trout *et al.* (2017) explain that there were no "widely accepted telehealth reimbursement policies across states. They contain diverse restrictions and requirements that present complexities in policy evaluation and in determining policy effectiveness across states" (p.805).

When assessing reimbursement policies, it is useful to recognize the three main telehealth classifications in use, which are (1) live video, such as remote outpatient appointments; (2) store-and-forward, such as radiology results stored and sent to a physician for later review; and (3) remote patient monitoring, such as applications that allow physicians to monitor patient progress remotely (Trout *et al.*, 2017). Figure 12 shows the number of states with reimbursement policies for these modalities pre-pandemic (as of 2017). These policies were on the rise even prior to the Covid-19 pandemic, as seen in Figure 13. Together, these graphs suggest that lawmakers were leaning favorably towards the reimbursement of live video appointments. That said, there were significant restrictions on reimbursement of telehealth services in these states, which included service type, provider type, facility type, health conditions, technology device requirements, and program plan (Trout *et al.*, 2017). Appendix 3 provides further analysis results on these restrictions (based on Medicaid data).

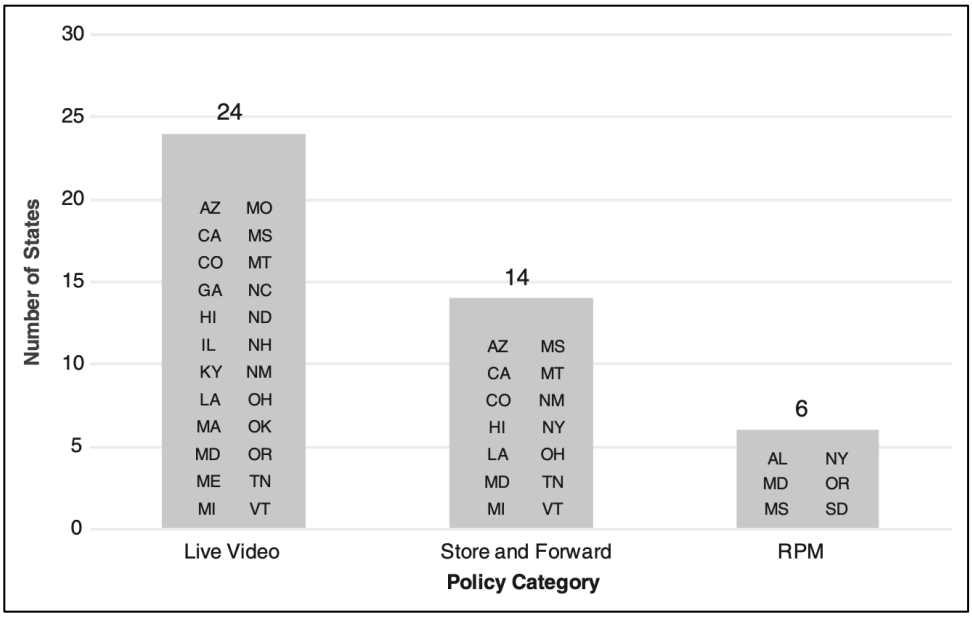


Figure 12 – Number of states that have any policy for live video, store-and-forward, and Remote Patient Monitoring (RPM) (Trout *et al.*, 2017).

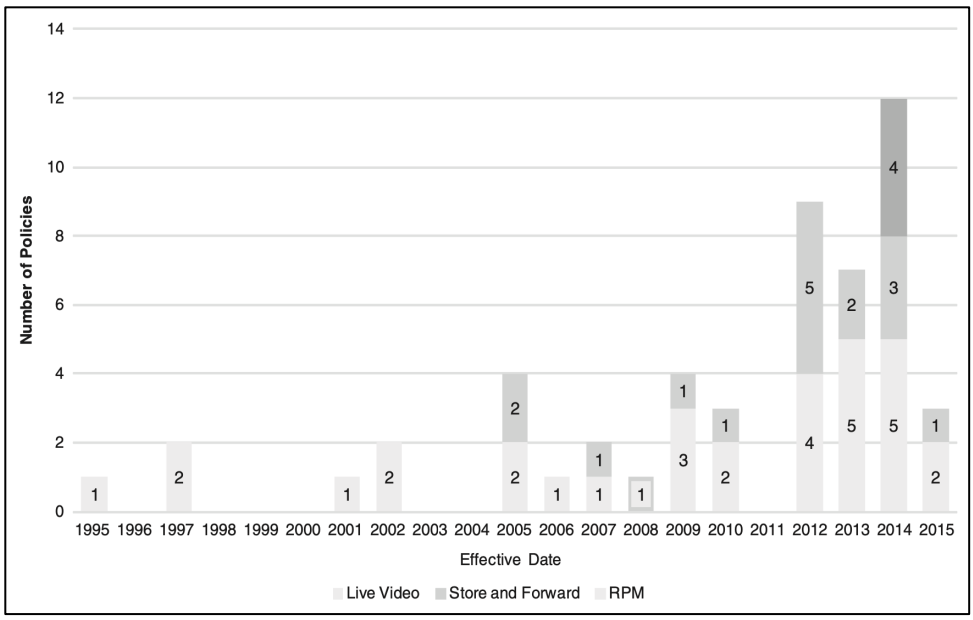


Figure 13 – Effective dates of statewide telehealth reimbursement policies (Trout *et al.*, 2017).

Notwithstanding, many healthcare providers offered telehealth to their patients without billing for services. A study surveyed 143 participants in telehealth in the U.S. and found the major reasons for not billing being No Medicaid Reimbursement (33%), Major Payors Did Not Pay (32.4%), and Practice in Urban Area [13] (19.3%) (Antoniotti, Drude, and Rowe, 2014). The study also found that some providers are unsure how to bill for telehealth and whether billing code modifiers are necessary, with several using traditional office CPT codes. Furthermore, barriers in the form of required pre-authorizations, case reviews before service, preferred provider status, and variation in coding requirements across payers made telehealth reimbursement a convoluted process (Antoniotti, Drude and Rowe, 2014).

[13] Practice in Urban Area refers to reimbursement restrictions on facilities located in urban settings.

The federal government enacted three pieces of legislation in response to the Covid-19 pandemic that impacted telehealth services: The Coronavirus Aid, Relief, and Economic Security (CARES) Act; the Families First Coronavirus Response Act; and the Telehealth Services During Certain Emergency Periods Act of 2020. The CARES Act and the Families First Coronavirus Response Act provided the secretary of the Health and Human Services (HHS) the authority to waive or modify existing telehealth requirements set by Medicare during the pandemic emergency period. The CARES Act released funds to facilitate telehealth, including a $200 million grant to the Federal Communications Commission to respond to technical barriers to telehealth utilization, $27 billion to the Public Health and Social Services Emergency Fund for Covid-19 response, and one billion dollars to Indian Health Services, both containing provisions for telehealth (Burris *et al.*, 2020).

Furthermore, the CARES Act eased regulatory restrictions on telehealth with respect to Medicaid requirements, including special payment rules for Federally Qualified Health Centers' (FQHC's) use of telehealth and allowing High Deductible Health Plans (HDHP) to provide coverage for telehealth services without a deductible. The Center for Medicare and Medicaid (CMS) also revised Medicare requirements, such as location requirements, to allow telehealth to replace in-person visits, as well as authorize providers to be reimbursed by Medicare for telehealth services. In addition, the TRICARE program and the Veterans Affairs (V.A.) both made changes that permit and facilitate reliance on telehealth. Finally, there have been numerous regulatory changes at the state level addressing barriers to telehealth access, telehealth coverage & cost, allowed telehealth modalities, telehealth provider types, and inter-jurisdictional telehealth provision rules (Burris *et al.*, 2020).

As one might expect, the combination of the Covid-19 pandemic and legislative changes had a profound impact on the number of telehealth visits rendered throughout the pandemic. In Massachusetts, for example, telehealth medical visits in community health centers rose from 506 to over 83,000, and telehealth behavioral health visits from 517 to 22,000 from January to April 2020 (Lannan, 2020). Several large health systems also quickly transitioned to telehealth. The academic tertiary care center, VCU Hospital System (VCUHS), in its efforts to "flatten the Covid19 curve," converted all elective ambulatory, low acuity urgent care, follow-up visits, and chronic care visits to telehealth. This raised daily telehealth visits from 25-30 to 1,700, i.e., a 5000% increase. This expansion has been sustained with telehealth visits averaging 1,500 a day between March and May 2020, representing 63% of total outpatient visits (Wijesooriya *et al.*, 2020). Similarly, the New York City Health + Hospitals, the largest safety-net health system in the United States, went from 500 billable tele-visits in February 2020 to almost 55,400 in March 2020 and 83,000 in April 2020. In addition, the system provided 31,000 behavioral health visits between March and April, which was "up from only a handful in the prior month" (Lau *et al.*, 2020).

While the HHS waived the originating site and geographic restrictions on telehealth coverage through the temporary authority it received from Congress, that authority is set to expire when the public health emergency (PHE) period expires. However, given the investments made in telehealth and the cultural shifts that have permeated the healthcare industry following the coronavirus pandemic, it is highly unlikely that a complete reversion to a pre-Covid-19 legislative environment is imminent when the public health emergency period expires. Furthermore, H.R. 8727, *Telehealth Modernization Act* (introduced in 11/2020), mirrors the Senate version of the bill

(introduced 07/2020) and aims to drop several telehealth reimbursement qualifiers for Medicare patients, who account for $750 billion of healthcare services each year. Both bills include the addition that qualifies "*any site at which the eligible telehealth individual is located at the time the service is furnished*" as the originating site and removes geographic restrictions on reimbursement (Dufault, 2020).

Furthermore, the federal government, as part of its coronavirus stimulus relief package, allocated a total of $300 million for the Telehealth Program and the Connected Care Pilot Program. The Telehealth Program supports non-profit and public healthcare providers in urban and rural areas in their coronavirus response by "maximizing provision of connected care services and devices" (National Law Review, 2020). The Telehealth Program will fund their purchases of telecommunication services, information services and devices necessary to provide critical "connected care services"; i.e., telehealth services that rely on broadband internet to deliver care to mobile locations of residences (National Law Review, 2020). The Connected Care Pilot Program allocated $100 million to cover 85% of costs for broadband connectivity technology needed to provide connected care services to low-income populations and veterans (National Law Review, 2020). Hence, while telehealth adoption rates should scale back somewhat after the pandemic, the long-term prospects for telehealth delivery and reimbursement are very encouraging for telehealth innovators.

2.2 Doctoral Project: Qualitative Methods Applied to an Entrepreneurial Effort

2.2.1 Doctoral Project Description

My pursuit of this doctoral project stemmed from my personal experience with the development of chronic back pain - a painful health problem that continues to impact my quality of life and, on some days, does so quite severely. Upon more research on the topic of back pain, it became clear that it is a public health problem of a tremendous burden in the United States and globally. Initially, the goal of the doctoral project was to develop a user-friendly mobile app that allows patients to adhere better to their prescribed therapeutic exercises through guided videos, as well as allow physical therapists to keep track of patient progress. However, deeper research created a pivot towards a more holistic approach to back pain care, as advised by the wide adoption of the biopsychosocial model of pain. Notwithstanding, the startup team (see Appendix 4) do bring the needed the skillsets required to build a prototype - for the time being.

Figure 15 presents an infographic of the ideal individualized, integrative treatment plan process for pain care. Individualized patient care begins with a thorough diagnostic

evaluation, typically requiring a physical exam, followed by a treatment plan that combines multiple elements from the pain management toolbox that is best suited for the patient's needs. Central to this process is a shared decision-making process that focuses on establishing, maintaining, and strengthening the therapeutic alliance (NIH, 2019). Hence, given any healthcare startup that strives to deliver value to pain patients and pain care providers alike would do so more by facilitating therapeutic alliance, as well as creating a culture conducive to interdisciplinary care.

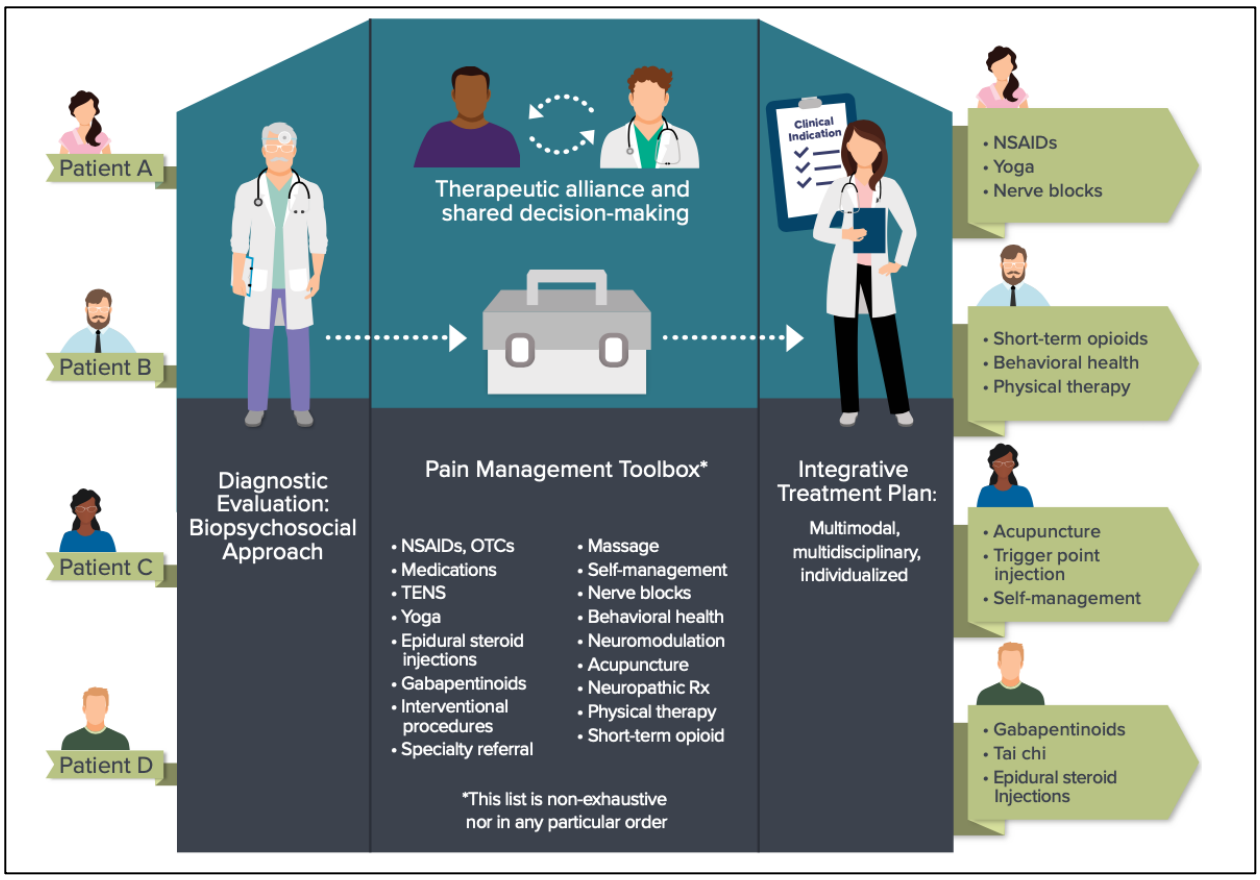


Figure 14 – Individualized patient care leading to an integrative treatment plan. (NIH, 2019)

Studying therapeutic alliance through qualitative methods evolved to become the primary aim of this doctoral project, the goal of which was to inform the design of a

musculoskeletal pain care service that relies on a blended model (i.e., telehealth plus physical location(s)). I conducted semi-structured interviews with physical therapists and patients with an experience of acute and/or chronic pain. The interviews were one-on-one and conducted either in person, video-call or by telephone, in that order of preference. All interviews were recorded upon receiving verbal approval to do so from interviewees.

The interviews were structured in parts (presented below) that are relevant to addressing the needs and preferences of potential future users of a telehealth pain care service. Qualitative data from 15 patient and 10 therapist interviews were coded with the aim of extracting salient themes, as well as implicit and explicit ideas, regarding therapeutic alliance from the perspective of patients and providers. Note that the ranking of these themes presented below does not reflect their relative importance to the central aim of the project but rather traces the projected flow of the conversation, i.e., starting with icebreakers and general information before moving on to a substantive discussion. Nevertheless, all listed themes are, in varying degrees, relevant to the entrepreneurial endeavor.

The qualitative methods approach was selected because it serves as a systematic and rigorous way to elicit detailed descriptions of complex phenomena. These not only describe but also help researchers (and readers) arrive at more meaningful conclusions by identifying patterns contained within the data, elicited from qualitative information on the context of events in addition to the events themselves (Sofaer, 1999). As described by Patton (1975), while quantitative analysis is the ideal approach to divide a phenomenon into discrete and manageable parts, it "does not always support understanding of complex, dynamic, and multidimensional whole" (as quoted in (Sofaer,

1999). Additionally, qualitative research tends itself to an entrepreneur as a method to "enhance peripheral vision, which is especially important at the early stage of inquiry" (Sofaer, 1999, p.1102).

Structure for Physical Therapist Interviews

Part 1 – Motivations to become a Physical Therapist

- Motivations for career choice
- Future goals as a P.T. practitioner
- Factor involved in choosing where to work (i.e., type of practice, location, payment structure, clinic culture, etc.).

Part 2 – Exploration of the P.T. practice experience

- Working hours
- Private clinic practice experience
- Franchise practice experience
- Compensation
- Administrative tasks

Part 3 – Therapeutic Alliance (Patient-Therapist Dynamics)

- Patient onboarding process (i.e., initial assessment)
- Treatment modalities used with patients.
- Persistent challenges that resurface with the diverse patient population.
- Therapist thoughts on drivers of successful alliance and positive patient experience.
- The use, if any, of telehealth modalities.

Structure for Patient Interviews

Part 1 – Patient experience with Musculoskeletal pain/injury

- Patient demographic information
- Cause of injury/pain
- History with pain
- Chronicity of issue

Part 2 – Patient experience with treatment options.

- Forms of care sought by patients: i.e., restorative therapies (e.g., physical therapy, massage therapy, etc.), osteopathic and chiropractic, interventional, or other forms.
- Patients' rationale and/or circumstances for choices of care sought.
- Patient descriptions of the care process.
- Drivers of (dis)satisfaction: i.e., patient priorities for a positive experience.
- Barriers, if any, to access care: i.e., difficulties scheduling appointments, delays in getting an appointment, transportation barriers, insurance coverage barriers, or others.
- Patient experience with doing therapeutic exercises at home.
- Self-management of pain (i.e., use of medications, changing previous habits,
- The use, if any, of telehealth services. If not, explore patient willingness to use telehealth, and if so, discuss important features they would like to have.

2.2.3 Limitations

Time constraints and an underdeveloped early understanding of the complexity of the public health problem that is chronic pain set significant limitations on the design of the research methods. Primarily, there are breadth limitations in the qualitative data collected. Only physical therapists (i.e., representing the restorative therapy component of multidisciplinary care) were interviewed, when instead it would be ideal to interview several other stakeholders involved in the pain care process, such as pain specialists, health insurers, and representatives in public institutions and advocacy groups (e.g., the National Center for Complementary & Integrative Health, the National Center for Pain Management & Research). Furthermore, resource limitations necessitated a snowball sampling strategy, which ceded control over the patient interviewees' sociodemographic factors, and prevented me from conducting interviews focused on people who suffer from chronic back pain, which is the intended 'beachhead' that the entrepreneurial effort had aimed to address.

2.2.4 Change Framework: Six Forces Alignment Framework

Regina Herzlinger is recognized as the godmother of consumer-driven healthcare. This comes in reference to her body of work, which "differed from conventional views of healthcare consumers, who were derogatorily described as non–compliant or patients. Instead, she portrayed them as busy people who are eager and capable of participating in managing their health, with appropriate, relevant, and respectful support." Her

philosophy centers on holding the patient as a consumer and key stakeholder in their own healthcare journey (HBS, no date).

In her recent book, *Innovating in HealthCare: Creating Breakthrough Services, Products, and Business Models*, Herzlinger presents a framework for healthcare innovation (Figure 16) that relies on analyzing six factors with which healthcare ventures must be aligned: structure; the nature of financing; consumers; public policy; technology; and accountability.

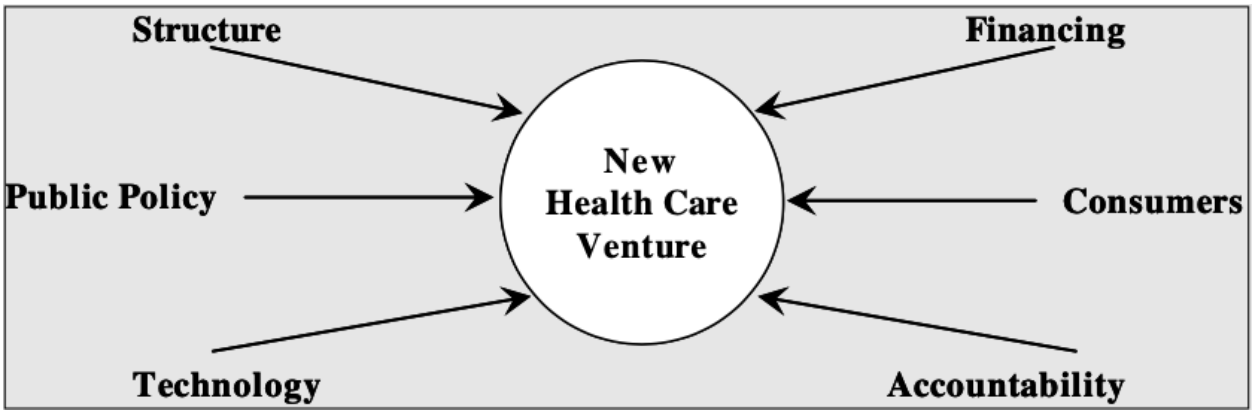


Figure 15 – The Six Factors framework for new healthcare ventures (Herzlinger, 2013).

Structure: refers to the friends and foes of new ventures lurking in the system, each with resources and power to attack or help the venture.

Financing: refers to the processes for generating revenues and acquiring capital, which includes reimbursement, determining prices, and assessing the sustainability of revenues.

Public Policy: refers to the regulations on the industry, including the political/economic environment, stakeholder dynamics (e.g., organized stakeholder groups), regulatory and legislative process dynamics, and the biases of key policymakers.

Consumers: refers to people who are more engaged consumers of healthcare, for whom the passive term "patient" is outdated. Two characteristics underlie their activities: (i) Empowerment and (ii) Lack of leisure time.

Technology: refers to the commercial viability of new healthcare technology, focused on two key questions: "when to invest in the technology?" and "who are my competitors?"

Accountability: refers to the demands for accountability from consumers and cost-pressured payers to design cost-effective, higher-quality care (Herzlinger, 2006, 2013).

Underlying the Six Factors framework is the assumption that any new healthcare venture that can deliver what is both better and cheaper must be one of the following three: it is either *Consumer-Focused*, *Technology-Based*, or an *Integrator*. Consumer-focused ventures are those that engage consumers in the healthcare delivery process to reduce expenditures and enhance quality and patient experience. Technology-based ventures refer to innovators in diagnostics, therapeutics, and care delivery systems. Finally, Integrators refers to ventures that focus on creating higher value for the money through vertical or horizontal integration (Herzlinger, 2013). While many ventures can feature all three types of activities, Prof. Herzlinger stressed the need for healthcare innovators to prioritize resource allocation toward one of those three.

A telehealth-first, pain care clinic that offers multimodal, interdisciplinary care features all three activities in that it involves consumers in the delivery process in new ways, relies on technology in the care delivery, and engages in some horizontal integration. However, the main identifier of this venture is it being a consumer-focused enterprise.

3. Results Platform

3.1 Qualitative analysis description

As described in the previous chapter, semi-structured interviews were conducted with physical therapists and patients who had undergone a physical therapy treatment. The research questions were:

(1) What are the therapeutic alliance themes within the context of musculoskeletal injury rehabilitation and pain management?

(2) What constitutes a positive patient experience with therapy (i.e., patient satisfaction) from patients' and therapists' perspectives? Can a telehealth modality fill some gaps?

The answers to these questions are relevant for the startup organization when the telehealth service is being designed. Can features of the telehealth service and healthcare personnel training be tailored to strengthen therapeutic alliance? Relying on Bordin, the assumption here is that a strengthened therapeutic alliance can be tailored through improvements in goal assignment, task assignment, and bond-forming between a patient and a healthcare team (Bordin,1979), and in measuring and encouraging progress

towards those goals. By understanding the themes of therapeutic alliance in an MSK rehab context, our startup team built a framework to brainstorm potential improvements to the status quo through our health service. In addition, the themes and sub-themes of therapeutic alliance help us by creating common language between the founding members of the team when we're building prototype features. Furthermore, the results guide our clinical service architecture, which aims to implement a consumer-driven model as per the Herzlinger framework. In particular, we were interested in learning how telehealth components of the service can potentially resolve some of the identified barriers and/or strengthen the identified facilitators of a streamlined care delivery between the outpatient clinic and home. Finally, it was equally important to identify elements that should not be delivered through telehealth.

The Bordin/WAI frameworks for the alliance were relied upon as the theoretical underpinning of the qualitative data analysis. It's important to note again that much of the research on the therapeutic alliance is rooted in psychotherapy, not musculoskeletal pain management. However, the Bordin/WAI framework (i.e., goals, tasks, and bond) was used given its high construct validity, internal consistency, and interrater reliability. Furthermore, the WAI has been shown to correlate with a variety of health outcomes[14] and is widely relied on given its predictive quality (Elvins and Green, 2008; Ardito and Rabellino, 2011). Finally, the value of a psychosocial dimension in musculoskeletal pain

[14] These studies assessed correlations with outcomes through meta-analyses. Hence, outcomes varied widely across studies. In psychotherapy, outcomes usually used the Client Posttherapy Questionnaire, which is considered to be a broad range psychotherapy outcome measure. In the WAI meta-analyses, the average effect size (ES) that linked alliance to therapy outcomes was a Pearson correlation coefficient of r = 0.26. The WAI has been used in several robust outcome trials, including those with account for prior change and patient characteristics (Klein et al., 2003, as quoted in Elvins and Green, 2008). Furthermore, evidence for discriminant validity is provided by its use in a large number of different populations with different levels of alliance (Raue et al., 1993; Samstag et al., 1998, as quoted in Elvins and Green, 2008).

management makes the psychotherapeutic frameworks of alliance suitable to the analysis. For those reasons, I reviewed the literature on the Bordin framework and studied the WAI questionnaire items to get an idea of the nature of questions posed to therapists and patients in the WAI.

For the analysis portion, a framework analysis (a form of thematic analysis), methodology was used for the analysis of interview data. The framework analysis methodology is composed of the following steps: (1) *Familiarization with the data* (2) *Identifying a thematic framework* (3) *Indexing* (4) *Charting data into framework matrix*; and (5) *Interpreting*. This form of qualitative analysis aims to answer specific questions from the data within a limited time frame and *a priori* issues (as is the case in this thesis paper[15]). The prime concern of framework analysis is to "describe and interpret what is happening in a particular setting" (Ritchie and Spencer, 1994; as quoted in (Srivastava and Thomson, 2009; Gale *et al.*, 2013).

For the purpose of this analysis, step 2 of the framework analysis (i.e., identifying a thematic framework) involved a combination of allowing the transcripts of the interview to dictate the themes and issues whilst maintaining the Bordin/WAI theoretical underpinning. That is not to say that the data was forced to fit the *a priori* issues identified from the literature on the therapeutic alliance, but rather that the data were analyzed with the Bordin/WAI theoretical underpinning guiding the identification, charting, and mapping of issues and themes. Step 3 - *Indexing* refers to coding the qualitative data

[15] The theoretical assumption made, which is that therapeutic alliance, assessed through the Bordin/WAI conception, is a reliable conception to use in the outpatient physical therapy context. This is based on the demonstrated reliability and validity of the WAI in psychotherapy (discussed above), as well as more recent studies that have demonstrated correlation with physical therapy outcomes (included above). In other words, given that therapeutic alliance is correlated to physical therapy outcomes, what are the therapeutic alliance themes under Goal, Task, and Bond (i.e., the foundation of Bordin's theory and the WAI) in the outpatient physical therapy context?

segments to particular themes. Step 4 - *Charting* refers to the process of arranging the coded themes in a framework matrix to summarize and analyze data and help the researcher in cross-referencing and assorting themes. Finally, Step 5 - *Interpreting* refers to translating the framework matrix results into theoretical models around the subject of interest, as well as providing written summaries of the qualitative analysis.

3.2 Presentation of Results

3.2.1 Part 1 - Therapeutic Alliance

Sub-theme identification logic

Sub-themes classified under the *Goal* theme refer strictly to expressed sentiments that were tied to a *desired future* from the therapy. Sub-themes classified under the *Task* theme refer to expressions on the quality of therapeutic activities in relation to therapeutic goals. Finally, sub-themes categorized under *Bond* refer to non-goal, non-task, psychological and relational dimensions of the therapeutic experience.

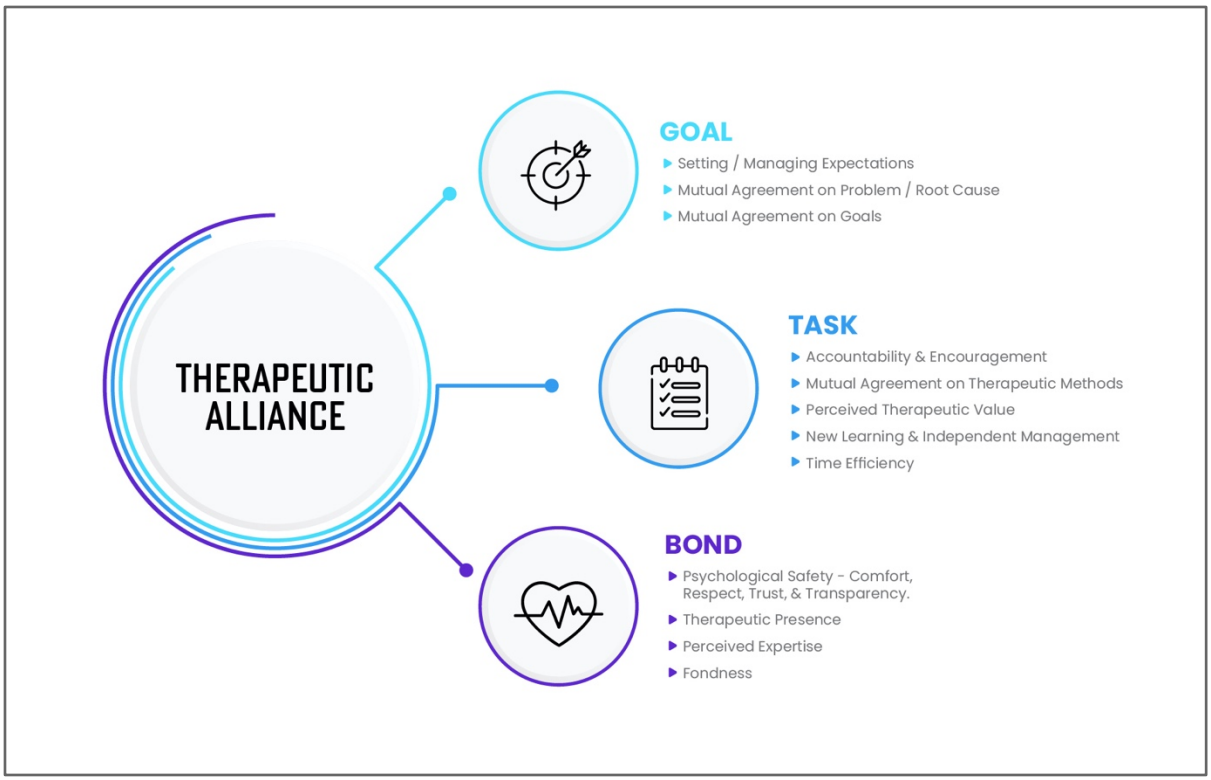


Figure 16 - Identified sub-themes on therapeutic alliance within the MSK rehab context.

Interpretative Discussion

The following section presents an interpretive discussion of the results of the framework qualitative data analysis, tying the results with the literature. The results are discussed one major theme at a time (i.e., Goal, Bond, and Task), and sub-themes are expanded upon alongside example quotations from patients and/or therapists' interviews, as well as ties to relevant literature when useful. As one might expect, there were numerous intersections among the sub-themes. However, the quotes presented here were chosen for their strong correlation with the sub-theme in which they are listed. Furthermore, I

refrain from relying on any single quote more than once, even if it had strong correlations with several sub-themes.

GOAL

Sub Theme 1: Mutual Agreement on Therapeutic Goals

Patient Excerpt(s):

A. "*I've seen two different physical therapists there for two different body parts. In both cases, the aim was to be able to do whatever activity I had been doing before, which was a circus-related thing. It wasn't just, "can I walk now?"*"

B. Interviewer: "*Okay. You are saying you wanted to 'fix' the injury, right? To get back on the [soccer] field. Is that so?*"

Patient: "*Yeah, because if I didn't fix it, I couldn't pivot and cut, and just knowing how I coach soccer, and I have children, I'm very active, I just thought I would want full mobility of my leg again.*"

Therapist Excerpt(s):

C. "*I think a lot of it is just being willing to listen to them, communicate with them and talk with them…and drive their care based upon what they want to do and not just make it all about what you want to do. Because I think a lot of providers get in like, "I need to get*

this done. I need to get [that] done," but don't take the time to listen to what the people actually want to do, and [they] make it about them."

While a mutual agreement on therapeutic goals is the most straightforward to understand, patients or therapists may have different assumptions on what the therapeutic goals are from the outset or diverge from mutual agreement somewhere throughout therapy due to a variety of factors. For example, therapists are often subjected to high patient load pressure, seemingly causing the continuous reassessment of patient goals to slip through the cracks as patients' desired goals evolve with time. As one therapist (quoted later) informs me in one interview, therapists can at times rush the initial assessment of the patient and go on to offer blanket treatments based on assumptions that are not rooted in a thorough recording of patient history, their needs, and their expectations from therapy.

These findings are echoed in the literature in that Bordin highlights the need for patients to take an active role in therapy. A therapist's job ought not to be to find what's "really" wrong with the patient and prescribe treatments that they, i.e., the therapists, believe will achieve desired results. Rather, the therapist must negotiate therapeutic goals that "most fully captures the patient's struggle with pains" (Bordin, 1994) p.15. In excerpt B above, the patient's use of the phrase "fix it" encapsulates an expectation of returning to the soccer field with a renewed ability to make quick pivots in the direction of her sprints in order to coach again – that was her therapeutic goal. She later describes how the tasks she was assigned and the treatment methods she experienced gave her the sense that the therapy team didn't appreciate just how important it was for her to get back on the field, leading her to seek care at a different facility. The learning from this is that 'recovery' can be defined differently by a patient and a therapist. Unfortunately, even

when a therapist takes the time to negotiate therapeutic goals with the patient, reimbursement policies get in the way, which in many cases are designed to halt reimbursement at baseline functioning.

The agreement on goals is linked to that of sub-theme 3: *setting expectations*, where some patients might be eager to achieve goals at a rate that is not clinically feasible, or where a patient deems persisting pains during the early stages of treatment as evidence of poor outcomes. In those cases, a therapist should negotiate goals and timelines for these goals while remaining sensitive to the patient's desire for a quick recovery. Part and parcel of setting expectations relates to the health insurance status of the patient. As described later, therapists often have to model the care delivery schedule according to the clinic visits caps of health insurance plans.

Sub Theme 2: Mutual Agreement on Problem / Root-causes

Patient Excerpt(s):

A. *"So, for instance, if I have a pattern or a habit like pulling my neck forward, even if I do the stretches in that position, I'm still going to be injured. The real issue is the fact that I pull my neck forward. So I need someone or something that helps me adjust my actual postures… I felt that they were treating the symptoms, not the actual problems, sort of."*

B. *"I'm saying really the stretches didn't help even though I did them at home. I felt that they weren't addressing the actual issue, which is the use of [my] body."*

Therapist Excerpt(s):

C. "*That's kind of my main obsession, at least, from the good PT's that I've talked to or even clinicians in general, whether it's physicians or, or whoever else in the healthcare field, that has to do some form of diagnosis with patients, that's number one.*"

D. "*My goal is figuring out what can get them to decrease their fear around pain or pain behaviors and start to reshape the way they perceive what their pain is, why their pain is there, how can they handle it, and how much of it is in their control.*"

Many patients come to their appointment with preconceived beliefs of their problem owing to their subjective experience of the musculoskeletal ailment and pain, as well as their own research and fact-finding. These beliefs also include the patient's perception of agency and self-worth. As excerpt D shows, patients might believe that their pain is an indication of being less-than and/or is not something that they can handle due to a predetermined lack of ability tied to their genetics and constitution. In other words, when the therapist says "my role is figuring out what can get them to…reshape…*<u>why</u>* their pain is there," he refers to his encounters of patient beliefs that falsely characterize the pain as to be totally unfixable given that it genetically predetermined. On the other hand, some patients might believe that their pain arises from a history of excessive physical activity and that exercise avoidance is the best approach for them to feel better. A related example is patients avoiding the activities that led to an injury longer than they need to due to fear of re-injury, which can lead to poor rehabilitation outcomes (Hsu *et al.*, 2017).

During the initial evaluation of the patient, as well as during the early visits post evaluation, a therapist may begin asking open-ended questions about their injury to elicit these beliefs. In many ways, the move towards adopting a biopsychosocial model of pain management is in line with what many physical therapists believe is important to improve outcomes for the patient. Many therapists collect "subjective data" from the patient, which relates to the psychosocial component of the biopsychosocial model. A failure to acknowledge psychosocial factors risks patients dropping out of treatment and has been shown to lead to poor outcomes (IOM, 2011). In one of the examples above, the patient

recounts that the sole reason for trying physical therapy was that it was covered by her health insurance plan. However, she soon dropped out of therapy because she did not believe the therapist was addressing the root-case of her ailment and was unconvinced with the treatment methods which the therapist intended for her. Having said that, it was clear that she went to her appointments with a preconception that physical therapy was not going to be helpful due to her own diagnosis, or that in hindsight, she felt she was not appropriately diagnosed. It is likely that the patient recounted this by comparing it to the manner by which she was diagnosed at a posture alignment clinic, which she continued to go to at the time that the interview was held and for which she paid completely out-of-pocket.

Therapists backed the patient-side evidence by highlighting the importance of co-diagnosis and continuous patient education (excerpts C & D). In addition, the literature points to the fact that establishing a mutual agreement on diagnosis is a predictor of successful completion of therapy. A study that reviewed the factors that interfere with adherence to therapy found that "patients' beliefs about the causes and meaning of illness, and motivation to follow the therapy were strongly related to their compliance with healthcare" in a variety of clinical settings (Jin *et al.*, 2008) p.276. Therefore, in the context of MSK rehab, therapists have the difficult task of identifying patient beliefs and assumptions around their injury, as well as providing education with the tact and emotional sensitivity needed to persuade them to adopt new beliefs and maintain an active role in therapy.

Sub-theme 3: Setting Expectations

Patient Excerpt(s):

A. "*What I liked most about her [is] she was realistic about it. She gave me the advice like, "Hey, this is not something that you could rush… you could be feeling great and feeling good, and then you could go out there and twist it [by] just walking down the stairs and be right back in here starting at square one." So it was one of those things [where] it wasn't just about physical therapy, it was the mental piece that she brought into that.*"

Therapist Excerpt(s):

B. "*Are they doing their exercises at home? If there are always excuses why they can't do it, but then they'll come in after one treatment session with you and say, "I don't feel any better. I don't understand why." I'll say, "Well, how long has this been going on?" They say, "Well, it's been going on for like a year." I'm like, "Do you think that's a realistic expectation to feel like you're cured in one treatment session?" And then they'll be like, "Well…" they always have a say, "the last PT I went to used to do this and that," and I say, "Did it get better?" – So you try to manage their expectations when you get those vibes early – where they're expecting you to 'fix' them. Sometimes it is something simple you can do with manual therapy, but most times, it's motivating the person to fix themselves and to treat themselves.*

While this sub-theme correlated strongly with the *mutual agreement on goals*, it qualified as its own sub-theme primarily due to temporal distinctions. That is, while the setting of expectations comes naturally during the initiation of therapy, the continuous act of setting and managing expectations along the patient's therapeutic journey is unique in that it constantly relates to the near future of therapy (i.e., the short-term goals), helping the patient understand that their overall goal will take time and effort to achieve. In contrast, the *agreement on goals* relates to the expectations of treatment in the far future, and the *agreement on problem / root-causes* relates to the patient's past experience with injury and pain.

Almost all therapists related to me that it is important to educate patients on their expected prognosis while remaining supportive and encouraging. The process serves as a way for the patient to re-evaluate their beliefs about the injury and temper their therapeutic expectations. In excerpt B, the therapist relays his experience with patients who may have a bias for manual therapy and are not engaged with their exercise prescriptions. He details the process of resetting expectations when they are not in line with the patient's prognosis and degree of engagement with exercise prescriptions. While this often occurs, the other side of the coin is presented in excerpt A. Many patients, like the one in the excerpt, expressed feeling empowered by the education they received around their injury, alongside an appreciation for having a therapist gauge their progress and temper their recovery expectations.

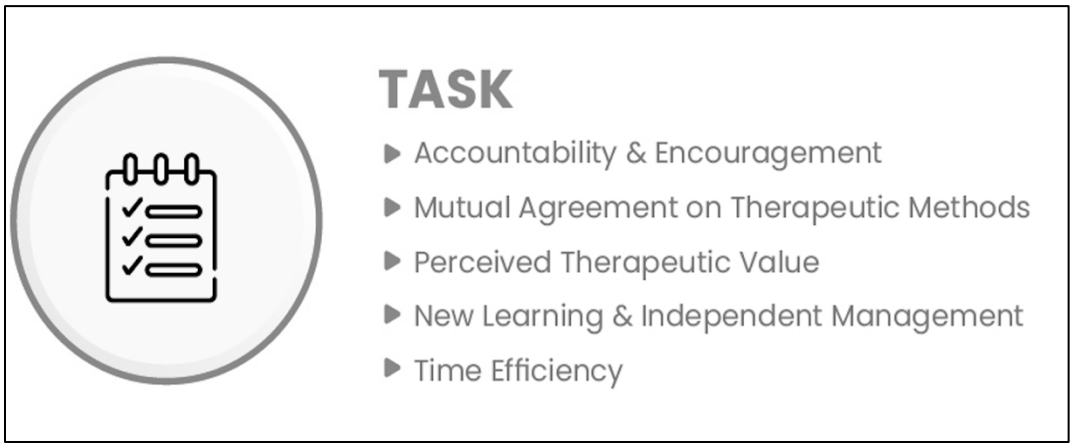
However, patients' expectations are determined not just by the nature of their injury and the education they receive from their therapist but are also shaped by the setting of the clinic itself. Several patients referred to the appearance and the culture of the treatment facility as a factor behind their liking or disliking treatment, which was unrelated to whether or not they agreed with the goals and tasks. For example, some patients preferred a clinic environment that was "homey," and others felt that a particular clinic design was ill-equipped for their privacy needs. Even therapists acknowledge the importance of clinic appearance and design. One of the interviewed therapists managed a physical therapy franchise branch in downtown Boston and had expressed great dissatisfaction with the poor appearance and degraded equipment at the clinic:

"*I understand that the rent is high in downtown Boston, but our clinic is very bad. It's a piece of trash [and] the layout of it is not good…we need more therapists to see more volume, which means we need a better space.*"

Similarly, a patient relayed her experience at one facility:

"*The culture of the place, I felt, was very old and stingy. It was not [sic] up-to-dated. I felt like the other PTs…One of them had made a comment one time like, "Oh, ladies. Oh, I'm sorry, I didn't mean to say ladies." I just… I liked my actual PT, and they were new, but I didn't like the overall environment of it.*"

Thus, expectations relate to therapists and patients alike and can be objective or subjective. Overall, expectations are linked to patient satisfaction with the treatment setting as being the right place for them to achieve their therapeutic goals. Other sub-themes interplay here, such as the patient's *perceived expertise* of therapist and/or *therapeutic presence* (i.e., patients perceiving focused attention from their therapist) – both described below – but meeting early expectations within the *Goal* dimension improves the chances for a successful therapeutic alliance down the road.



Sub-theme 1: Accountability & Encouragement

Patient Example(s):

A. Accountability – *"If there's a reason to be accountable, and if I know that I'm in a physical therapy program, I'm gonna do my work in between…So, if I know that I have to check in with someone, I'm probably more likely to say, "all right, I'm tired, but I'm gonna go over and do those 15 reps of something…"*

B. Accountability – "*I was determined that it was gonna get better…I know that a lot of people got so much better with physical therapy and determination. So much of what happens to people, to me, starts from how they think about what, what is gonna happen.*"

C. Encouragement – *"I have to be able to do things. I have to be able to live my life. So, in rehab, it's hard because it's incremental, and Kevin was always telling me…he would always say, "oh remember when you couldn't do this and remember when you couldn't do that?" And he would always remind me of that I, that I was making progress."*

D. Encouragement – *"I credit Mike. I mean, he's the one that I really credit with [my progress] because he was there for me. He just encouraged me.*"

Therapist Example(s):

E. Encouragement – *"So, it's not passive treatment, right? You go to the doctor, they give you medication typically…or when you go to the surgeon, it's passive, right? But with physical therapy, we really need to have the patient go ahead and be a part of it…and*

that's what comes with that first part of that subjective part of the interview [with the patient], "what do you want to get out of this experience?" is what I typically [ask] them. I try to always link all the exercises and things that they're doing to how it gets to the bigger picture."

F. Accountability – "*Quite often, I do see people who come back after six months to a year, where they tell me they stopped what they were doing, things felt fine initially, but then gradually they reverted back to where they were, just like The Biggest Loser [TV show].*"

This sub-theme relates to the degree to which patients feel motivated and engaged with their therapy, which is either intrinsic, socially/environmentally influenced, or both, depending on who you ask. The literature on the motivation of patients in rehabilitation is vast and leaps beyond the scope of this work. However, given its foundational place as a determinant of the therapeutic 'success' of tasks, it is important to present some of that literature in this interpretation.

One school of thought regards motivation as an internal personal quality at the exclusion of social factors, explaining variations in motivation on the basis of the psychological traits of the patient. In essence, it views motivation to be an individualistic dynamic of personality (Maclean *et al.*, 2000). What is interesting is that not only does this view of motivation feature often in the rehabilitation literature but that it is a belief that patients may themselves hold. In fact, a match of values around motivation, and hence the expected roles and responsibilities for both, would likely result in a good fit on *Accountability & Encouragement*. However, if the value-orientation of the therapist around motivation leans heavily on the individualistic paradigm, the resulting onus of responsibility that a patient may feel can lead to disillusionment, self-blame, and a 'sense of failure' (Maclean *et al.*, 2000).

The other school suggests motivation to be socially determined, explained by "structural features of the social contexts in which patients find themselves, both prior to and during the therapeutic encounter" (Maclean *et al.*, 2000) p.497. An example of these social factors includes cultural norms around 'appropriate' patient behavior, where patients who internalize these norms are deemed 'motivated' by the therapy staff. Other factors discussed include the nature of the patients' social support system, and environmental factors, such as the therapist's attitude or the degree to which the patient agrees with rehabilitation goals (Maclean *et al.*, 2000), a factor that was discussed in the sub-themes of *Goals* above.

Yet another school of thought takes into consideration both social and individual factors – with individual factors being those pertaining either to the clinical features of the diagnosis or personality characteristics of the patient (Maclean *et al.*, 2000). This view on motivation aligns well with the IOM recommendations for a biopsychosocial approach given its consideration for biological, psychological, and social dimensions of motivation. Furthermore, this definition of motivation was reflected in the qualitative analysis through several *Task* excerpts that are tied to an alignment of values on individual responsibility and self-determination between the patient and therapist. Hence, therapists should rely on the *accountability and encouragement* balance that fits well with the patient value system. As the excerpts above show, some patients rely on their self-determination and internal motivation as their source of accountability. On the other hand, some patients are better motivated when they experience an external source of accountability and or are motivated better in an environment that 'infuses' motivation through heightened encouragement. Thus, pacing treatment in accordance with the motivation structure of the patient is critically important.

As therapist excerpt F shows, many patients come back to the clinic because they had difficulties maintaining their recommended exercises and stretches. Patients shouldn't be blamed for doing so any more than those who set new year goals and quickly fail to pursue them. In fact, patients' tendency to discount the pain and inconvenience that will result from a recurrence of injury/ailment and a return to regular physical therapy mirrors numerous other behavioral economics problems. However, this does present anecdotal evidence for the need to rethink the continuum of care for chronic and high recurring MSK pain to arrive at solutions that provide care that is less episodic, more connected, and results in lasting health outcomes.

Sub-theme 2: Mutual Agreement on Therapeutic Methods

Patient Example(s):

A. *"My sense is that they look at one very small part of your body too much of the time. When I last saw that PT, it was for my low back; she didn't look at my upper back at all. When I go to the chiropractor, they say, "if you're mid-back's frozen, your low back is gonna feel terrible," and, you know, you have to look at all [of] that. And second, I feel that, at least in my case, if I have [internal] scar tissue that's keeping me from moving normally, then I can't strengthen [the muscle]; I have to address the alignment first..you know, the tightness sometimes [gave me] muscle spasms."*

Therapist Example(s):

B. *"People are not just black and white; they're not just a diagnosis or a machine. There are things going on, so, you know, I tell people if I had 20 patients with the same type of pain, like, they all had the same shoulder pain, same severity, same diagnosis, everything across the board was exactly the same, but the only difference was, you know, their occupation and their family life, like, you would treat all of those 20 people very differently, even though they had the same exact diagnosis, same severity, you know? One person might be a single mom that's got three kids."*

C. *"And then also, the patient's impressions of what they think is going to make them feel better. Sometimes that may not completely align with what you're going to do with the patient. If it's completely contraindicated or contradictory, then you know that you need*

to do a little bit more education with that potentially. But if it's something like, "well, I typically wouldn't do that, but this patient thinks that it's really going to help, and I think there's no contraindication that will make the patient worse if I did do that," then you potentially may go ahead and do that treatment."

As discussed above, one of the ways in which a patient makes a qualitative judgment on the therapeutic approach is the degree of accountability vs. encouragement in the environment in which they find themselves. Another feature of physical therapy that was identified often in the interviews was the tug between patient preferences for hands-on treatment and the prescriptions of exercises that facilitate self-management. While many patients valued independent management of their symptoms, others perceived it as evidence of poor care. Three causes for the tension between hands-on treatment and self-management strategies were identified in the interviews. It is either due to limited education, limited self-management support from the clinic and/or the patient's social circle or in some cases due to perverse incentives or an unwillingness to take an active role in treatment on the part the patient.

In excerpt A, the patient criticizes the therapeutic methods used at the rehabilitation facility she visited. Her remark relies on the previous education she received at a chiropractic clinic and asserts that the treatment methods did not take the holistic view that she desired, otherwise provided at the chiropractic. While it's not explicit in the excerpt, her focus on postural alignment and scar tissue relates to her needs for more manual therapy. Furthermore, regardless of whether her (or the chiropractic's) assessment is objectively true or not, it is clear that a patient is much more likely to continue treatment at the facility that offers treatment and education that makes sense to them.

Another factor, highlighted in excerpt C, is the necessity of designing therapeutic methods that are not only based on clinical evidence but that take into consideration social factors that a patient might be facing. If a relatively active single mother with three kids on the one hand, and a young athlete on the other, presented to a therapist with an identical injury, it is critical to set fitting goals, timelines, and treatment tasks for each. This reduces the barriers to adherence for the patient and increases the likelihood that they remain engaged in treatment. What this means is that even when the clinical symptoms are similar, the psychosocial factors may differ dramatically.

Finally, excerpt D is one of several examples that point to the fact that therapists might even allow for treatment modalities that are known to provide no significant demonstrable improvements according to the evidence-base, but that simply meet the needs of the patient and provide some relief to them. An example of such a modality is ultrasound, with studies showing that there was no significant difference between active therapeutic ultrasound and placebo ultrasound (Robertson and Baker, 2001).

Overall, this sub-theme presents evidence of the negotiation between a patient and physical therapist on the appropriate treatment tasks. Certain social and demographic factors dictate a plan that fits with the objective and subjective needs of the patients while remaining within the contraindication boundary. In essence, the negotiation of the treatment plan factors the treatment the patient desires, the treatments the therapist thinks they need, and what the social and demographic factors dictate.

Sub-theme 3: Perceived Therapeutic Value

Patient Excerpt(s):

A. *"I'm trying to be more well-rounded, whereas I think of physical therapy as just this one part. I'm going to pay a copay, and then I'm going to maybe do it at home, maybe not. I'm not going to remember if someone says, "do these 15 minutes or half an hour a day," I'm not going to do it. I have kids. I'm just not. So, I'd rather have time on my own at the gym to do it. But, yeah, I think if there was a class that focused on lower back and core, and I knew it was going to help, then I would do that."*

B. *"I probably felt I could have gone for a couple of additional sessions, but because of the way it was structured, um, well, I- I probably could have, it would have been out of pocket. So, I tried it on my own, and then as it turns out, it was fine, and I was able to maintain, um, my quality of wellness, I guess. I didn't slip back to the same situation that I was in prior to coming."*

Therapist Excerpt(s):

C. *If you give that person exercises at the very first visit, and then you see them for six more weeks without giving them an update on their exercises, that's not important to the person. So, every single visit, you end the session either updating their exercises or reiterating the importance of certain exercises that provided relief during your session that day. Also, you do a little check-in with the home exercises for sure, every single visit."*

D. *"In my personal experience, a lot of [the] time it's based on their valu[ation] of the therapy, like what their perceived value of it is. There's obviously the insurance thing, like if people need more and they can't get insurance, then okay. There are some people…like I find that the lower socioeconomic status there's more cancels and there's more difficulties scheduling, and they just don't come in as much."*

The question that may come to mind when reading the title of this sub-theme is: what is the distinction between *perceived value* and that the *agreement on therapeutic methods* described above? After all, shouldn't a negotiated treatment plan between the patient and the therapist be perceived to be valuable? The answer is not that simple, however. While there is significant overlap between perceived value and a mutual agreement on the treatment methods, the perceived value a patient gains from therapy is

diluted by the overall cost to the patient. That is, holding all factors constant, *perceived therapeutic value* is an appraisal of therapy that accounts for the financial and opportunity costs of therapy. These include the time it takes to travel to therapy and back, the out-of-pocket payments that are dispensed, lost time with family & friends, and/or the cost and conveniences of other options (e.g., gym, yoga, online videos, etc.) to which they may attribute equivalent (if not more) therapeutic value. There is evidence in the interviews to suggest a diminishing value of therapy as time moves forward, particularly if the severity of their pain and injury is approaching an acceptable or tolerable level for the patient.

In excerpt C, the therapist highlights that the diminishing value kicks in early and that continual modification to the treatment plan allow the patient to sense a form of progression, which he described as one way to sustain patient interest and perceived value in treatment. Regardless, when the costs associated with treatment surpass a subjective threshold value the patient credits to therapy, the patient will drop out. Notwithstanding, patients might drop out even when the value of therapy is within reasonable costs to them due to misalignments on *Goal* and *Bond* factors.

In several patient interviews, after pointing out to me that they felt the therapeutic environment was a good fit for them and that they understood how their physical therapy treatment plan was going to help them, they still dropped out of treatment earlier than originally scheduled, providing varying reasons that relate to perceived valuation. For some, the PT exercises modality was itself of low therapeutic value as a single isolated modality, i.e., the treatment was not 'holistic.'. To others, the costs (financial and non-financial) were too high despite adequate therapeutic value (i.e., assessed by reductions

in pain and/or improvements in mobility). In other words, perceived value is impacted by both denominator and numerator factors.

Essentially, the therapeutic environment and tasks may be agreeable to the patient in the early stages of physical therapy, but a patient is bound to assess the value of physical therapy with other modalities to which they have access. The inconveniences associated with going to therapy (and indeed of therapy itself) might pull patients toward other options in which they find equal therapeutic value with lower costs and/or inconveniences. One might expect that there is a significant overlap between perceived value and patient motivation levels and that as long as perceived value remains high for the patient, they are likely to remain motivated and engaged with treatment. Interestingly, in an article aimed at explaining the concept of motivation within a rehabilitation context, Kemp (1988) mathematically modelled motivation[16] for rehabilitation "to be "equal" to the product of the patient's wants, beliefs, and perceived rewards (to be derived from engaging in the treatment program), divided by their perception of the costs of engaging in rehabilitation" as quoted in (Maclean *et al.*, 2000) p.500.

The downside of this conception is that patients may remain 'engaged' with the manual therapy component and disengaged with exercises, which hinders the prospects of learning how to self-manage pain. This could occur if the patient continues to seek pain relief to 'feel better' instead of focusing on exercises to *get* better and reduce their need for therapy appointments. Indeed, it seems that creating an environment that fosters a focus on getting better (instead of feeling better) is difficult work, and even the word

[16] According to Bryan Kemp, modelling motivation mathematically served the purpose of providing health care practitioners with a better understanding of motivation from what was known about human behavior and to help them make practical interventions on the basis of a rational model.

"therapy" invites confusion due to the different meanings and definitions for what constitutes therapy and what does not, in the mind of patients.

Sub-theme 4: New Learning & Self-Management

Patient Excerpt(s):

A. *"I think it would have helped a little bit more for it to be explained to me what is going on with my body and what I need to do to just maintain health besides just the stretches. I feel like the chiropractor [compared to the physical therapist] explained to me a little bit more [on] what's going on with my body. So it's a little bit easier for me to know just in my daily [life] what [I can] do to kind of help prevent things."*

B. *"You know, you went, and they put ya on a bike, and they're like "warm-up here" and then… would just say to go and do little exercises. But…nobody was- I don't know, I didn't feel like they were explaining things, telling me what, what I was doing, why I was doing it. What it was going to do to help strengthen me".*

C. *"One thing I appreciate about my chiropractor, and this is probably just unique to my chiropractor, but my chiropractor actually helped introduce me to other things. I have a diagnosis of Crohn's disease, so he also helped me understand that disease-related to what's going on with my body structurally and also helps connect me with other things that really helped me a lot with my Crohn's disease."*

Therapist Excerpt(s):

D. *"We're trying to give patients control as much as possible too. So, if you understand and you've got control of your pain, then that's going to obviously help push you in the right direction. And then, as I've practiced and gone along, the more you can control your pain, and you're empowered, then it's less likely for you to come back and see me for the same issue. I don't want to try to prevent that chronicity of symptoms from coming back all over again…I'm going to teach you how… I'm going to do it for you first, then I'm going to teach you how to do it at home…and then I'm going to teach you how to maintain it, and then I'm going to teach you what to do to prevent it from coming back, or what activities you may be doing that are leading to it in the first place."*

Education is highly important from the perspective of both therapist and patient. Patients are eager to understand their diagnosis and treatments and are more likely to

engage with their therapy if they feel that they're receiving valuable education along the way. We not only learn from excerpts A and B that patients desire education and ascribe higher therapeutic value to facilities and therapists that provide effective patient education, but we can read between the lines just how difficult it is for physical therapists to provide patient education when subjected to high patient volume. In many cases, physical therapists have to attend to multiple outpatient visits, particularly before or after general working hours (i.e., before 9 am and after 5 pm). Given that most patients would visit the outpatient rehabilitation center before or after work, this tends to be the busiest hours for providers. Thus, valuable and continuous patient education might likely be hampered when therapists are overwhelmed by patient volume and/or are simply too tired to do so effectively by the end of the day. Furthermore, some therapists may be relying on aid staff (i.e., to accommodate volume) who are not as trained in patient education at the level needed to elicit changes in beliefs and behaviors.

Patient education should lead to practical learning that facilitates self-management, which has direct impacts on health outcomes and recurrence rates. Self-management, defined as "the ability to manage the symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition" (Bair *et al.*, 2009), is backed by the clinical literature and promoted by the IOM as the appropriate approach for chronic pain, including chronic MSK pain.

Self-management education goes beyond the mere distribution of educational pamphlets and requires developing patient skills to boost their confidence and self-efficacy to manage their symptoms and make changes to their lifestyle habits. In excerpt A, the patient complained that she wasn't adequately informed on the nature of her ailment and how the exercises were going to help, nor was she told what she could do on

her own to help self-manage the symptoms. Furthermore, the patient in excerpt C tells me how her chiropractic helped her by providing health information on "other things," i.e., information and resources related to her Crohn's disease diagnosis. The chiropractor relied on education to reduce the patient's anxiety, inform her how the diagnosis is impacting her musculoskeletal health, and helped connect her to resources that assisted her in learning how to self-manage. I suspect that these actions also helped strengthen the *Bond* the therapist had with the patient by showing genuine concern for her wellbeing. It's noteworthy to mention here that the patient in excerpt C continued to visit the chiropractor at the time of this writing, albeit less frequently given the improvements in symptoms she experienced.

Therefore, a therapeutic alliance must ideally develop self-management to transition patients to a role in which they actively manage their pain symptoms. They learn to monitor their symptoms, practice self-management techniques, and evaluate their benefits before trying other treatments, as well as learn to communicate with their therapists on their preferred treatments (Bair *et al.*, 2009). Therapists stressed the need for patients to be taught how to self-manage (as shown in excerpt D), pointing to the fact that preventing a recurrence of pain is not the goal. Instead, a recurrence with a repeat visit to the outpatient clinic was the negative outcome to avoid. Hence, back pain recurrence (that leads to repeat PT referral) is not simply determined by the chronicity of the ailment but by the degree to which the patient develops self-management skills. Therefore, repeat referrals to rehabilitation are a function of the degree to which self-management is developed during treatment, which itself is determined by both patient factors and therapist/therapy factors.

Therapist factors that impact self-management include the effectiveness of pain relief strategies they prescribe, the quality of interaction they have with the patient (i.e., therapeutic presence), the degree of encouragement provided to the patient, and the tailoring of strategies to meet patient needs and social life constraints. On the other hand, the patient also plays a role in how effectively they engage in self-management. For example, the literature points out that patients with mental health comorbidities like depression may have reduced self-efficacy and self-management abilities. Other patient factors include lack of support from friends and family, limited resources, time constraints, and activity avoidance due to fear of pain (Bair *et al.*, 2009). Several therapists referred to mental health as a significant factor leading to outpatient visits for chronic pain, as well as a predictor of health outcomes. As one of the therapists told me,

"*Often there are comorbidities, and so we wanna find out, you know, do you have diabetes or heart issues? And are you dealing with depression? Because there's a huge connection between low back pain and psychological trauma…and I treat low back patients with complete kindness because they tend to have some form of loss.*"

The impact of comorbidities at the individual and social level for the patient stresses the importance of having a therapist that appreciates the range of potential difficulties that a patient might be facing in their journey to learned self-management. Some patients are going to learn quickly, but many others will need more time and assistance due to no fault of their own.

It's also noteworthy, however, that many patients had a more favorable view of the education they received at the chiropractor compared to the education they received in physical therapy. This could be a reflection of the increased one-on-one time that patients get with their chiropractor, since a chiropractor can't treat more than one patient at a

time. In contrast, the physical therapist may instruct one patient then move to assist another, which they do to manage high patient volumes. Furthermore, the nature of chiropractic therapy presents a better environment for one-on-one communication. Unlike physical therapy, a chiropractic visit is not aerobically demanding, which allows patients to absorb information better and allows therapists to treat and educate patients at the same time.

Sub-theme 5: Time Efficiency

Patient Excerpt(s):

A. *"I thought I first had to go have an appointment with orthopedics to get a referral. Then I'd get a referral, and then I'd have to schedule an appointment, and maybe nobody in PT was available for a month or something like that. I would be faced with a six or eight-week delay between when I was looking for PT and when I could actually have it. If that length of time could be shortened, if there were some way of getting some kind of remote PT, I could see value in that."*

B. *"I would probably wish I had the help more readily available. I think things would have been taken care of quicker. I don't know. I think more aggressive PT and care right away within one, two weeks. The fact that it waited five weeks was actually bad."*

Therapist Excerpt(s):

C. *"So my company used to be all 40 minute [appointments]. We've started going to a 30-minute schedule in the afternoons. It's interesting to me that when our company actually researched the difference between the clinicians on the 30-minute schedule versus the 40-minute schedule, there was actually better quality [with] PTs that were on the 30-minute schedule. Patients got better faster. They were equally as satisfied."*

D. *"If you have 40 minutes with your new patient, if it takes you all 40 minutes or a majority of that time to make sure you feel as close to 100% as possible that you know what's going on, it is much more worthwhile to do that than to try to rush through it in 10 minutes and then maybe throw some treatments at them that [you think] are going to work, but most likely don't. Then they come back for their second visit, and they say they're not really*

better, or nothing changed, and now you have to spend more time to do your evaluation again, without making yourself look like, "Oh, sorry, I didn't really evaluate you the first time.""

This sub-theme refers to time efficiencies *to* therapy and *of* the therapy. It not only includes descriptions of how long it took for the patient to engage in a therapeutic encounter but pertains to the quality of time allocation from the perspective of patients and therapists. That idea is connected to the *therapeutic presence* (described under the *Bond* section below), where the quality of the time spent modifies the perception of time efficiency. As excerpt C highlights, the number of minutes spent with the patient is not the sole determiner of clinical quality and patient satisfaction with their treatment. From the perspective of the patient, fewer minutes of high levels of focused attention from an experienced therapist (i.e., therapeutic presence) is much more valuable than an equal amount of time with junior staff, or longer overall time during which the experienced therapist might be attending to one or two other patients – a common practice in outpatient settings.

From the perspective of the therapist, there are situations that warrant thoroughness and longer time allocations, such as the initial evaluation of the patient and the time spent on patient education. However, it seems that how much time is allocated to each therapeutic activity, as well as who performs said activity (i.e., physical therapist or their aides), is a variable factor. The variability stems not only due to differences in patient needs (as assessed by the therapist) but due also to complexities inherent to the industry that impact outpatient clinic operations, with factors like reduced reimbursement rates, limits to health insurance coverage, and the pressure for increased patient volume modifying the decisions.

Time efficiency assessments, along with sub-themes of *mutual agreement on goals*, *mutual agreement on therapeutic methods*, and *therapeutic presence* (under *Bond*), are all affected by the degree of empathy that a therapist presents and are prone to conscious prejudice and/or unintentional bias. As described in the literature review section of this thesis, racial discrimination is a documented issue in healthcare, including within the rehabilitation and pain management discipline. Hence, some patients might experience staff who are unfair with their time allocation, assessment of goals and tasks, or the amount of one-on-one time they spend with the patient. Another example would be an ageist attitude from therapy staff, deeming improved physical functioning as unnecessary and presenting goals that patients find to be lacking in ambition (Maclean *et al.*, 2000). This has been documented by several authors, and I expect it happens often, given that the risk of MSK injury increases with age.

Finally, this theme relates to situations where a therapist must consider the insurance limitations of the patient, and this is the most direct way in which racial inequities play out at the rehabilitation clinic, given the known inequities in health insurance coverage. Several therapists noted that they often have to adjust the schedule of patients' visits based on their insurance plan, where if the patient has an insurance plan with significant limitations in coverage, therapists will schedule appointments far in between to allow for a longer overall treatment period. This happens often, and insurance coverage has been the most highly detected barrier to physical therapy in the qualitative dataset.

To conclude the results of the analysis on *Goal* and *Task*, the interviews present anecdotal evidence of a negotiation that occurs between the patient and therapist on the

goals and tasks of therapy. To a large degree, the change in the nature of the relationship between a patient and a therapist, like that between a patient and a physician, has been altered by the democratization of clinical information. When it comes to goals, patients and therapists must reach a satisfactory level of consensus on the overall goal of therapy, constituting a shared understanding of the nature of the patient injury, its suspected causes and exacerbating factors, and the expected degree of recovery. As for tasks, the treatment plan is negotiated with the patient's interests in mind, taking into consideration the clinical, psychological, and social factors of the patient. Notwithstanding, even when there is an effective alliance on goals and tasks, patients might still drop physical therapy to seek out other modalities that meet their clinical, psychological, and social needs at a lower overall cost or because they are willing to pay out-of-pocket for treatment modalities that are focused on manual therapy.

BOND

Sub-theme 1: Psychological Safety – Comfort, Respect, Trust, & Transparency

Patient Excerpts(s):

A. Transparency – *"One of their locations is in Seattle, and I went to that person three or four times, and they told me to stop going to them because they said, "Usually like if we can't resolve this within a few visits, we recommend you see another specialist." And so I liked that approach."*

B. Comfort – *"Yeah. There's a lot of sports, kids from sports, and there's a lot of guys, and- and it's very friendly, and- and Mike is, you know, very experienced, but if I'm going to have somebody examining my back and doing anything, I don't really wanna be out in the middle of a big room."*

C. Comfort/Trust – *"I went to Beth Israel, which is a little further away. They were far more clinical. The reason why I went to the other one was they were more like at home if you know what I mean…homey, comfortable. You can talk to the people, and then [Beth Israel] are more mature, and you know that [they] are expected to be more clinical."*

D. Trust – *"When I first got there, there was a lot of hands-on, and then slowly [sic] she was…the things I didn't like…she was working with two of us at a time. The thing I didn't like was she was doing a couple of assessments a lot, so I'd come in, and she's like, "Well, I have an assessment." And then… like, a high schooler student one time was helping me, who… He was a former patient, and then I had another current patient who was… like, got shot. They clearly have no training whatsoever!"*

Therapist Excerpt(s):

E. Respect – *"And there's … I've, you know, seen other physical therapists where I'm like, 'how are you talking to that person that way right now when they're supposed to spend the next 20 weeks with you? You can't talk to him like that!' Like, "what is your tone of voice right now?""*

F. Trust – *"After meeting them once, they need to be able to trust me, and I think that's something that… You just have to just be a person, just show that you care, show that you're empathic, show that you're there to help them, and then it just comes naturally."*

Psychological safety refers to the ability to express oneself without fear of repercussion. While the concept is rooted in the literature on team dynamics, it fits well within the construct of a therapeutic alliance. After all, the patient and therapy staff form a team and work with each other on rehabilitation and pain management. The degree to which a patient feels included in decision making, and feels allowed to learn from, contribute with, and even challenge the therapy team throughout the process, provides an assessment of the degree to which they feel psychologically safe.

The identified features of psychological safety (i.e., comfort, respect, trust, & transparency) ought to be shared between patient and therapist, where a mutual sense of comfort with one another facilitates transparent and respectful communication which, by extension, harbors mutual trust. In excerpt A, the patient describes a situation where their treatment was halted because the patient's symptoms were not improving as expected. Despite the patient having insurance coverage that would allow for continued treatment at the facility, the clinic discontinued treatment and referred him to a specialist. While that meant that the patient would need to visit a different facility, likely an inconvenience – the patient appreciated the transparency from the therapy team.

Excerpts B & C present examples relating to the culture of the facility as a factor that facilitates or inhibits psychological safety. The patient in excerpt B was receiving her treatment at a facility that was predominantly seeing young athletes and had "a lot of guys," which made her uncomfortable due to her desire for a more private setting. The patient in excerpt C describes the difference in the culture between Beth Israel Medical Center and the outpatient clinic he visited prior. While the outpatient center felt more comfortable to him, the patient sought higher *expertise* at Beth Israel, which is another sub-theme identified under the *Bond* category of the therapeutic alliance.

Indeed, many of the psychological safety factors interplay with other features of the *Bond* dimension of the therapeutic alliance. For example, the sense of trust that a patient has in their therapist is impacted by the *therapeutic presence* and *perceived expertise*. In other words, even if a therapeutic experience is psychologically safe, i.e., does not induce a fear of speaking up due to potential negative repercussions (e.g., ridicule, mansplaining, etc.), patients still require an adequate level of touchpoints with clinical expertise, which in most instances is the experienced therapist managing their care. As described in excerpt D, the patient's trust in her therapist was shattered when the therapist began attending to other patients, having the patient cared for by junior interns on one occasion, and a therapist who was unfit to perform the therapy due to his own injury. Furthermore, excerpt C presents a patient example in which the trust in the clinical expertise at Beth Israel outweighed the comfort the patient felt in the previous therapy facility in which he first sought treatment.

Sub-theme 2: Therapeutic Presence

Patient Excerpts(s):

A. "*I mean, I liked the people there. That wasn't the issue. One of the issues is I felt that it's not necessarily the right exercises, and I don't know if they were really listening or she wasn't, because the head physical examiner was not there all the time…so I [felt] like I [was] in the wrong company.*"

B. *"So, the first person that I went with, they were pretty [attentive]… they gave me a lot of their attention, I think just because they didn't have a lot of patients…but that one person was pretty attentive to my needs."*

C. *"She was observant. The minute I even walk in there, they're looking at my leg. Sometimes they even come to the waiting room, and they are like, "Can you get up again?" The minute I walk in there, I'm in PT. It's not like, "Okay, [do] your exercises," but just, like…they're watching me the whole entire time. Even if they have another patient, they're eyeing me and yelling things out to me.*"

Therapist Excerpts(s):

D. *"So the system, sort of, starts to, kind of, form how you're going to be as a clinician, which, ultimately, from what I've read and other people that I've talked to that have worked in these bigger PT Corporations, it's just…you don't really have time to devote any kind of quality care or assessment of the patient. So, that was my number one goal…to be in a position where I could employ people to be able to work at a place where they had full autonomy to treat patients how they saw best."*

This sub-theme goes beyond time availability and ease of scheduling. It is a sense of presence and feelings of genuine concern from the therapist that the patient perceives, with patients often describing therapists as 'being there' for them. Furthermore, the sense of genuine concern serves a therapeutic purpose for the patients; they feel heard, supported, and appreciated. As much as the patient's engagement with their therapy impacts the *Bond* dimension and their health outcomes, the engagement of the therapist with their patient's progress plays an equally important role. If a patient feels

shortchanged for attention (e.g., a therapist is treating more than one patient at a time or low-quality education), fissures in the *Bond* are likely to arise.

As previously mentioned, *therapeutic presence* interplays with other sub-themes. For example, the *setting expectations* sub-theme under the *Goal* dimension of alliance can include setting expectations for the patients by informing them about the high volume of patients during rush hours. Thus, if a therapist informs their patient of the trade-off between the one-on-one time they may have with the therapist, and their preferred appointment time (i.e., that after work hours are very busy), then that might set proportionate expectations on the therapeutic presence for a particular appointment, or make an effort to schedule appointments at a less busy hour.

Another example would be the interaction between *therapeutic presence*, *agreement on problem* (under *Goal*), and *agreement on treatment methods* (under *Task*). If the therapist does not establish some understanding of the patient views on the problem/root-cause of their ailment, they risk fissures in therapeutic alliance down the road when they prescribe tasks that are not aligned with patient expectations, which in turn is perceived by the patient as a lack of attention. This could occur, for example, when the therapist prescribes exercises that promote self-management. Given that hands-on manipulation techniques 'feel good' to patients, those who receive little education on the clinical evidence supporting independent management over hands-on treatment might get the sense that their therapist is prescribing exercises to avoid the 'more beneficial' manual therapy. Therefore, while designing the patient's rehabilitation program should be rooted in clinical evidence, treatments ought to be tailored to match patient expectations through a combination of patient education and an appropriate level of modifications.

To a large degree, the level of empathy that the patient receives and perceives from their therapist plays a huge role in their assessment of therapeutic presence. A therapist who explains the nature of the trade-off between one-on-one time and the time of the appointment is being respectful of the patient's time and is demonstrating empathy by appreciating the potential feelings of disappointment that the patient might feel if they receive less time with their therapist than they expected.

Dr. Helen Riess, professor of psychiatry at the Harvard Medical School, wrote extensively on the subject of empathy in clinical care, stating in one publication that "the study of empathy is no longer a "soft science," but is increasingly grounded in empirical data…[where] studies suggested that patients and physicians were highly reactive to each other, producing physiological responses that could vary together in "concordance" or in "discordance"…[and] physiological concordance has been correlated with patient perception of physician empathy" (Riess, 2010) p.1604. In another paper, Riess presents evidence that illustrates how clinical care devoid of empathy results in patients who are dissatisfied and less likely to follow through with treatment.

While Riess' work focuses on physicians, it is safe to assume that patients under the care of physical therapists are similarly attuned to the levels of empathy they perceive from their caregivers. In fact, many of the complaints of patients about their therapy experience are rooted in a perceived lack of empathy. When a therapist fails to provide education about the injury, patients feel unheard, anxious, and confused. Furthermore, even if the exercises abided by clinical guidelines of the injury, patients rely on education to understand the process of healing. For example, when one patient described to me that their therapist did not take the time to explain the treatments that were prescribed to them, I asked whether or not they felt the exercises worked regardless of the poor

communication between her and the therapist, to which she responded rhetorically by saying "*I don't know – was it the treatment or just time?*"

Sub-theme 3: Perceived Expertise

Patient Example(s):

A. *"My PT in Seattle's take was that PTs are very different, and you're not always going to get the same kind of approach. So, approaches can vary a lot. And my take was that the PT in Seattle was better for two reasons. One, he had personal experience with disc herniation when he was a teenager. So, he really understood it from that perspective. But then also in his practice – He said, 30 or 40% of his patients have similar issues and 30% of the people that he sees come with this issue. And so he seemed to have a lot of experience treating this kind of issue. Any had developed his own approaches to resolving it. So, what's really cool with him was that he could predict a couple of weeks out what I would be feeling, and he told me in advance that you're …most likely, based on my experience of seeing this many cases…your pain might increase but don't worry, that's kind of normal."*

B. *"…But when you're a hand [injuries] specialist, you get special training. You have to have practiced for five years, and then you [receive] certification. You [know] a lot of stuff, and the guy [i.e., therapist] is brilliant, I think. I mean, he's like talking to a doctor to me.*"

Therapist Example(s):

C. *"I guess I can't speak for inpatient, but mostly in the outpatient orthopedic setting, is that you get there and you go, " ****, I don't know what to do." Like, if you want to be very good at it, there's a whole other level to go to…the company that I started with had its own internal advanced education program…all of it is for getting better and smarter…The easier my job is, and the more I can help people figure out kind of how to best help them, you know?"*

D. *"Yes. So I want to be really good at what I do, and when someone comes in front of me, I want to be able to help them. It's very tough just out of school not knowing what to do. Like you're the "expert," and when you don't feel like you know, that's really frustrating. So all these advanced educations … Like I get letters after my name, which is great. That's fantastic. Who cares. But it's more about like if I know more, I can help more people."*

Patients made assessments on the expertise levels of their therapists based on online reviews of the clinics online, word-of-mouth recommendations, and the therapist's

qualifications and years of experience. Unsurprisingly, patients value specialized experience in the condition for which they are attending rehabilitation, with several patients deciding to visit a different clinic following their own research, the recommendation of friends and family, or the direct referral from the clinic in which they were being treated. Similarly, therapists expressed the importance of continued education and specialization, although not from the desire to elicit perceptions of expertise, but rather to acquire the qualifications and skills that allow them to be specialized therapists.

It's clear from excerpt A that the therapist took the time to explain to the patient how their expertise was going to help them. It is likely that this conversation happened early on in the treatment when the therapist was assessing the patient's goals, highlighting how the dimensions of therapeutic alliance fluidly interact with each other from the moment the patient steps into the clinic. Excerpt A also presents evidence of the setting of expectations that the therapist applies, educating the patient about their symptoms and the degree to which they match the general trends seen during recovery. Hence, it's not just that the therapist is highly qualified, but it's also that the therapist is effective in relaying that expertise to the patient at the initiation and duration of therapy.

Sub-theme 4: Fondness

Patient Excerpts):

A. "*So, the PT person that I initially was matched with, they were pretty good. I have to say… So, they, right away, we… They identified as trans, and I'm a parent of a trans, so we had that instant bond and connection. I felt very sympathetic to my PT.*"

B. "*He made people laugh. I mean, I just think anybody who went there got his sense of humor…especially because a lot of times when he was massaging your hand, it hurt!*"

Therapist Excerpt(s):

C. *"I think some of it is people skills…just having a human that you can have a fun time with or like a good time spending time with [whom] you trust and things like that."*

Fondness refers to whether or not the patient enjoys the therapist's company and vice versa. While I first thought to include fondness as part of psychological safety, my assessment was that patient expressions of how they felt in their therapist's company, their assessments of the therapist's character, and/or expressions of having things in common with their therapist, were descriptions of friendliness between one another, with qualities that go further than psychological safety. Having said that, the *Fondness* relates strongly with an alignment of values between patient and therapist, particularly those relating to the roles and responsibilities of each party and the balance between accountability and encouragement that was described above.

To conclude, these excerpts on *Bond* illustrate the importance of cultivating a strong bond between therapist and patient and that this dimension of therapeutic alliance serves as a facilitator to completing tasks and achieving goals. Several factors interplay with each other in this dimension. After all, neither patient nor therapist could ever pinpoint the exact moment that their 'therapeutic alliance bond' was formed, for it is a description of a relational dynamic that grows (or weakens) "out of their experience of association in a shared activity" (Bordin, 1994) p.16. Regardless, the therapeutic bond is a significant factor in forming a successful therapeutic alliance in the MSK rehab context. Furthermore, the literature from psychoanalytic literature suggests that fractures in the bond are bound to happen, and it is safe to assume from the qualitative analysis results that these fractures may occur in MSK rehab, evidenced by several patient accounts of the

factors that led them to change their physical therapist, or distrusting the clinical discipline entirely. Hence, successful bonding requires a therapist's recognition of fondness, psychological safety, presence, and perceived expertise as factors that impact their bond with the patient.

3.2.2 Part 2 – Patient Experience

The interviews included many accounts of the facilitators and barriers to a successful therapeutic encounter from the perspective of patients and therapists, referred to as patient experience factors from here onwards. There is overlap with the therapeutic alliance discussion above, but the following presentation of results excludes the literature on therapeutic alliance and instead interprets the overall results by combining the learning from literature review, the qualitative interviews, and the patient experience themes listed below through an entrepreneurial lens that aims to align the six factors of Herzlinger's health innovation framework. I first present the themes of patient experience that were identified from the qualitative data by including example excerpts for each, followed by a discussion on these themes. In the sections that follow, I discuss the implications of findings on therapeutic alliance and patient experience by assessing the nature of alignment of the Herzlinger six-factors, as well as the recommendations for the startup organization.

The table below presents the identified patient experience factors that impact it either negatively or positively, alongside short example excerpts from patients, therapists, or both. This is the result of the fourth stage of framework analysis, in which I developed a framework matrix to help identify themes in the coding structure that would be relevant

to the six-factor framework conclusions. The table also differentiates among those factors that were strongly detected in the interviews and those less so by relying on the asterisks, as described in the key at the bottom of the table.

Table 3 – Framework matrix of identified factors related to the patient experience.

Experience Factors	**Description**	
BARRIERS	Four classes of barriers were identified that prevent patients from initiating or continuing physical therapy treatment in an optimal fashion.	
	Patient Excerpts	**Therapist Excerpts**
1. Insurance ***	"*The annoying thing about health insurance is that there's a cap on the number of provider-visits you can have in a year, and that's only six, and that's just frustrating in and of itself. So, anything beyond six visits is 100% out of pocket.*"	"*Insurance just judges it on, "this person had six visits…they've had ten visits… they need to be doing a home exercise program. My problem with that is while exercise is good, I think the value that I bring is more than just giving exercise - it is education and teaching people how to live with their pain and how to manage their pain and how to be in control of it.*"
2. Language	--	"*So I give 'em a physical therapy printout, um, which has photos in color…I can also do Spanish, and I think German, but. We see a lot of Chinese patients… and I don't have the ability to do Mandarin or Cantonese. So, it's up to them [tp bring] somebody with them [who] can translate.*"

Key: *** detected in 15 interviews or more | ** detected in 10 interviews or less | * detected in 5 interviews or less

Table 3 (continued)

3. Scheduling *	"*so… getting an appointment [for] my daughter with the therapist she wanted because, ya wanna try to stay with the same person, but when you get a good one, everybody wants that person.*"	"*a lot of States now have Direct Access, where you don't need a physician's referral to see a patient. So, a lot of therapists do try to just mention it [to the patient].*"
4. Transportation	"*Also, I had to Uber there, which financially was becoming a strain. I was going three times, and if I didn't get a ride… I'm paying [uber] on top of [copay]… It was becoming a really big expense.*"	"*Something to reach those patients who typically work jobs that are strenuous in the first place, have a lot of these musculoskeletal pain issues but are not well covered. They have high deductible plans. They have transportation issues.*"

ADHERENCE DETERMINANTS	This pertains to patient-specific factors that relate to the motivation to complete exercises at home and/or continue visiting the therapist at the outpatient clinic, excluding the barriers mentioned above.	
	Patient Excerpts	**Therapist Excerpts**
1. Competing priorities *	"*Yeah, well, they wanted me to do twice a week to start, and then… y-yeah, that's just too much. Especially [that] I have four kids, and… well, two of them are still at home, but back then, three of them were still at home…so it was a lot!*"	"*I'm a firm believer in the fact that what we do here is very much [the] tip of the iceberg. Our goal should be to educate patients to start making that change, but it's on the patient to continue and sustain that change.*"

Key: *** detected in 15 interviews or more | ** detected in 10 interviews or less | * detected in 5 interviews or less

Table 3 (Continued)

2. Motivation & Self-efficacy **	"*I'll have a really busy week where I'm not able to get to the gym, or if I get home late in the evening, I have all my little tools and my bands and, um, sometimes you just don't feel like it.*" "*I still have this thing. And I know my hand, my arm especially, would be better if I kept using it. But I haven't been. I haven't been so good at it.*"	"*It is harder for people to be compliant with their treatment. Taking, say, medication every day in the morning when you wake up is a little bit easier to do than a half-hour workout every other day. It's hard to maintain that.*" *"The big push is patient adherence and [the] patient's ability to do what they're doing [with us] on their own.*"
3. Patient's pain levels	"That's why I don't bother [with the stretches]. It's fine now; no pain!" "*I went back, I had some other recurrence, not quite as acute, but a similar recurrence…she showed me some other exercises…I only did them for a few days during the time that it was really bothering me. I was trying to just help my back be a little bit more mobile.*"	"*So I would say that those are the patients that I would want to see more often, because when you get past an acute stage and it's chronic, you're going to have centralization of the pain, hypersensitized nerves like for instance in a back injury, you have an initial injury, you have an inflammatory response. The injury itself is healed up, but a lot of times people will develop a fear of movement if it happened [following] a certain movement.*"

PATIENT PLEASERS	This element of patient experience refers to factors that patients and/or therapists pointed to when recalling a satisfactory experience.	
	Patient Excerpts	**Therapist Excerpts**
1. Convenience *	"*I quickly reached out to the woman that I went to previously [who] was local, and she took me.*"	"*I'm in downtown Boston in the financial district; 95% of our population is people who work there, not people who live there.*"

Key: ***detected in 15 interviews or more | ** detected in 10 interviews or less | * detected in 5 interviews or less

Table 3 (Continued)

2.	Culture and appearance **	"*So, it was great, and it was definitely a younger vibe and just felt like an updated PT place.*" "*PT, I felt from the little experience I had, just gives you exercises. So it was more like a doctor/patient relationship, but the doctor would come in and fix whatever it is, you know? And I didn't enjoy that anyway.*"	"*I'm not the boss of our clinic, so I'm not in control of the aesthetics of the clinic...But I'm seeing some clinics popping up more in like San Francisco, LA, New York, and they're boogie..they're getting rid of the norms of what a doctor's office or a physical therapy clinic is supposed to look like.*"
3.	Reputation & available expertise **	"*I liked that...they said that she works with a lot of ACL patients, and she's really good. She works with the soccer girls.*" "*For me, I realize the value...someone who has been working for 30 years versus somebody who's only been working for five. I haven't had that attitude previously, but I felt like I saw a huge difference [at the other facility], and I thought it was basically because of experience.*"	"*I do know [that] in the city, outpatient orthopedics is often one of the least well-paid. When you get to areas that people don't want to be as much...like we have clinics in our company that are more out in the suburbs and more kind of [in] deserted areas that are less desirable areas, [and so] they will pay more.*"
4.	Time spent 1-on-1 with therapist **	"*Yeah. I liked it. Satisfied. Mainly because they dedicated an entire hour to the visit. They were more hands-on with helping me do the exercises.*" "*Over the next two or three weeks, it surely evolved into a [frozen shoulder]... The problem [was] his PTA, his physical therapist assistant; she was the one working with me. She's a really nice person, but she just doesn't have the experience to treat it.*"	"*So the people who I think have bought the most in the therapy are the people who feel the most heard and the most valued. So we do a one-hour evaluation. I've gotten a lot of pushback from some of my administrators saying it should be 40 minutes or 30 minutes, but I think we can give better care with an hour evaluation. It's very often that I've heard someone say, "That was the most thoroughly I've ever been examined.""*"

Key: ***detected in 15 interviews or more | ** detected in 10 interviews or less | * detected in 5 interviews or less

BARRIERS

Insurance

There are several forms of insurance barriers that patients and therapists spoke to during the interviews. The most common insurance barrier detected in the interviews is where the needed treatment period extends beyond the patient's health insurance plan's allowable number of visits. This form of insurance barrier was identified in 14 of the 25 interviews. It is important to note that the need for continued treatment most often stemmed from both patient and physical therapist, i.e., the therapist believed the patient needed more outpatient visits based on their clinical diagnosis and prognosis for the patient.

While the caps vary with each insurance plan, it is evident that factors associated with need are not the only determinants of the utilization of physical therapy services. Physical therapists often have to submit requests to independent specialty medical benefits management companies asking for additional patient visits. These preauthorizations frustrate patients, particularly when they are under the impression that their plan would cover their MSK rehab needs. Furthermore, the preauthorization process often frustrates therapists, as well, who find it to interfere with treatment. As one therapist mentions:

"*For example, there's one Blue Cross plan that has 25 visits in a calendar year. That is their benefit. But because of these eviCore*[17] *constraints, they say you have six*

[17] eviCore is a benefits management company.

visits to start with PT… They're basically a stingy entity that makes sure that not a dollar leaves that doesn't have to leave."

The other insurance barrier patients discussed were the out-of-pocket payments they needed to make, either in the form of outpatient visit copayments, coinsurance payments, or even total visit payments when patients hit the insurance cap. Furthermore, while each copayment was not excessively high for the patients interviewed[18], it was the accumulation of copayments that creates a barrier for patients, particularly when therapists usually recommend patients come for two to three outpatient visits a week.

Another form of insurance barrier is where patients are unaware of their ability to access physical therapy care without a primary care referral, otherwise known as direct access, often causing a delay in treatment. Finally, given the barriers to interdisciplinary care, patients were often uncovered or under-covered for interdisciplinary care (e.g., behavioral health, complementary & integrative health). Furthermore, even in cases where patients do have coverage for such care or have the means to pay out-of-pocket, they're left to their own devices to integrate their care.

Scheduling & Transportation

As shown in the table above, scheduling outpatient appointments is another barrier faced. Patients and therapists are busy, and finding a time that works for both can pose a challenge, even more so with minors who need to attend therapy with their

[18] It's important to highlight that this is an indication of bias in the sample, likely caused by the snow-ball sampling strategy. Copayment for an outpatient physical therapy appointment in the US can reach as high as $ 75 – a high price tag for many Americans.

guardians. Furthermore, patients prefer to have one therapist attend to their care, which further complicated scheduling if they can only attend therapy during busy hours.

Transportation also surfaced as an issue for patients. MSK rehab patients are often unable to drive themselves to an appointment due to their injury. In other cases, the cost of transportation to the clinic and back creates yet another financial burden, adding up to the out-of-pocket payments that patients often needed to make with every visit. Hence, the cost of treatment does pile up when one accounts for the total costs of transportation, copayments, coinsurance, and missed work hours attributed to two outpatient visits a week.

Language

This theme was not detected much in the literature, but that is likely due to a bias in the sample and the small sample size. Language barriers are very relevant to minority and immigrant patients in the US, particularly considering that some take on jobs that require significant manual labor. Furthermore, as the excerpt in the table above illustrates, it's often up to the patient to schedule an appointment that both she and her English-speaking companion can attend. Also, patients who experience a language barrier are likely to experience many of the other barriers mentioned above regarding health insurance and transportation.

There are three distinct components of therapy to which an outpatient will need to adhere:

(1) Visiting the clinic for the scheduled therapy appointments

(2) Completing therapy exercises and stretches at home when still in-treatment

(3) Continued self-care post-treatment to prevent a recurrence

The themes identified in the qualitative data intersect with much of the literature on motivation for rehabilitation. For example, poor self-efficacy can be why patients would have difficulties adhering to components 2 and 3 listed above. That is, patients may feel a strong need to have their therapist encourage them and watch over them when they're performing exercises. While mental health comorbidities could be a contributing factor here, it does not have to be the only cause of a diminished sense of self-efficacy. An athlete may experience an injury in the same musculoskeletal region more than once, leading to reduced confidence in their ability to overcome the injury in the long term. Therapists may address these beliefs by asking questions like "How confident are you that you can overcome this injury/pain" or "Despite having relapsed, how confident are you to overcome this obstacle?" (Jack *et al.*, 2010)

On the other hand, patients may not have been particularly physically active in the past and may also struggle with doing exercises at home during treatment and post-completion. This clearly intersects with the therapeutic alliance sub-theme of

accountability & encouragement. However, even when the conditions are suitable for the patient during treatment, it's challenging to sustain behavioral change into the future. As one therapist (quoted above) highlights, patients "gradually reverted back to where they were, just like The Biggest Loser [TV show]." Therefore, patients would benefit from having some touchpoint with the care team post-discharge – an opportunity for telehealth solutions.

Pain levels are yet another factor that impacts treatment adherence. Patients may overcompensate when responding to pain, i.e., if their pain levels are mild, they may ignore therapists' activity recommendations and increase the likelihood of a recurrence injury. On the other side of the coin, patients may experience heightened pain when performing treatment exercises and conclude that they are harmful. As discussed previously, education plays a crucial role in changing patients' perceptions and beliefs on the causes and meanings of pain.

PATIENT PLEASERS

These are the factors that patients discussed as the reasons behind having had a good physical therapy experience but were not directly related to therapeutic tasks and goals. They are factors external to therapy-specific demands, i.e., two hypothetical outpatient clinics may provide the same clinical treatment to a patient. Still, they may differ on the provision of patient pleasers. For example, one clinic may provide therapists with more total years of experience than the other (i.e., reputation & available expertise),

or one might offer an intuitive mobile app for scheduling appointments without making phone calls (i.e., convenience).

Convenience, one-on-one time with therapists, culture, and clinic appearance are factors through which the startup organization can differentiate their service. For example, successful enterprises like *Hinge Health* [19] make MSK rehabilitation convenient by positioning themselves as a benefit from employment and by facilitating scheduling and therapy from home. Furthermore, a startup organization can create its own culture. It's clear from an interview with Hinge's CEO Daniel Perez that they created a culture of innovation (i.e., health coaches, motion sensor technology) and a strong focus on optimizing the delivery of clinical guidelines through telehealth in a manner that exceeds patients' expectations (*What's the Future*, 2021). Finally, they've controlled the digital clinic appearance by making sure that the digital therapy clinic's design makes it easy for patients to navigate their options and speak with the care team.

[19] My assessment of Hinge Health's success stems from their demonstration of reductions in pain by up to 57% and reductions in surgery interest by up to 67% (Smittenaar *et al.*, 2017). Furthermore, the organization has secured significant backing from venture capital firms which propelled the valuation of the company to $3 billion as of this writing.

3.3. Implications for the Startup Organization

3.3.1 Overview

Having presented the results above, this section will collate the overall learning resulting from the literature review (i.e., secondary research) and the semi-structured interviews (i.e., primary research). The section presents a list of recommendations to the startup and expands on each recommendation by making reference to the primary or secondary research data that led to this recommendation. Finally, I present a summary table on the requirements for an alignment in the six forces of the Herzlinger Framework.

3.3.1 Interpretations

Recommendation 1: Use a blended care model that relies on physical clinics and telehealth solutions.

The intended goal of the startup organization is to develop a patient companion mobile application that serves as a self-management platform. By integrating with physical outpatient clinics and, in the future, other facilities and entities involved in the pain care continuum, the platform can facilitate the IOM recommendations for individualized, multimodal, and multidisciplinary care. There are several reasons why a

blended approach is recommended for the startup. First, manual therapy is relevant as one of the several modalities of multimodal, multidisciplinary pain care and has its role in treating a particular subset of patients. Indeed, many patients need manual therapy, particularly in the early stages of treatment.

Furthermore, prior to receiving patient education on pain, patients seek treatment with preconceived beliefs on what constitutes therapy. The qualitative interview results suggest that manual manipulation is a common patient preference and that it can serve as a supporting modality for chronic care patients in their early progression towards active therapy and learned self-management. Furthermore, many of the complementary and integrative health modalities (e.g., acupuncture) will require physical visits. Thus, integrations with outpatient physical therapy clinics will allow the startup to learn the process of integration and the challenges associated with it, setting it up for other future integrations with other pain care modalities that require physical visits.

Also, the analysis on patient experience highlighted the importance of 1-to-1 interactions with therapists. As discussed above, patients were dissatisfied in therapeutic settings where they had been seen by physical therapy aides instead of physical therapists because they feel that they are not being seen by the experts. In the same regard, patients can be expected to be dissatisfied with models of telehealth that rely too heavily on automated modalities deficient in 1-on-1 interaction with human beings. Also, telehealth is inferior to personal interactions with regard to *Bond* elements of psychological safety (e.g., it is harder to establish trust online) and therapeutic presence (e.g., it is harder to relay empathy online).

Finally, as the qualitative data on therapeutic alliance *Tasks* reveal, patients are more likely to engage with therapeutic exercises when they are being held accountable by

their therapist at the clinic. Hence, we can expect that many patients are more likely to adhere to treatment when they are being held accountable by humans, not computer algorithms. Notwithstanding, telehealth can be used to improve certain elements of therapeutic alliance and patient experience in several ways and is described next.

Recommendation 2: Use telehealth to individualize care by strengthening the therapeutic alliance and improving patient experience.

We learn from the qualitative interviews that there are certain features that can be included to improve the patient experience with MSK care and strengthen the therapeutic alliance between patients and therapists. When it comes to the therapeutic alliance, telehealth modalities can serve the functions across all of its components (i.e., Goal-Task-Bond). Pertaining goals, telehealth can be used to improve intentionality with patient goals. Dashboards can be developed for patients which are made accessible to therapists (upon consent) that can display the long-term and short-term goals of therapy (i.e., the mutual agreement on goal), the progress made so far to achieving these goals (i.e., setting/managing expectations), and the progress patients have made in exploring educational modules related to the patients' ailment (i.e., mutual agreement on problem / root-cause).

For *Tasks*, telehealth modalities can help patients by creating an accountability factor at home that complements that which they experience from the therapy team at the clinic. Furthermore, therapists can also look into the progress patients have been making at home when they receive them for their next outpatient visit. Clearly, this creates time

efficiencies as well since many of the questions that therapists may pose to the patients pertaining to their home exercises can be posed through the mobile application. This has the potential to give time-pressured therapists the bandwidth to improve *Bond* elements of alliance (e.g., relay empathy, encourage patients more, etc.), which in return is expected to improve the patients' assessments of therapeutic presence, perceived expertise, and therapeutic value.

Telehealth modalities can also serve the purpose of providing patient education in engaging and memorable ways. For example, instead of distributing an educational pamphlet to patients, educational games can be developed. Indeed, even the treatment tasks and/or the progress made can be gamified to make it more engaging and encouraging. Another approach would be to include health coaches in the model, their role being to serve as a touchpoint with the clinical care team when at home (or after the conclusion of outpatient treatment), answer patient questions, and educate patients through their chat or video call conversations (as opposed to the store-and-forward formats).

When it comes to patient experience factors, telehealth modalities serve a clear role in facilitating scheduling and reducing transportation barriers for patients, as long as they have mobile devices and access to the internet. Furthermore, changes in the regulatory environment now allow patients with health insurance coverage to access telehealth services, and providers can bill for these services under telehealth parity laws enacted in response to the Covid-19 pandemic. Furthermore, for patients who experience patchy health insurance coverage and/or who cannot afford the copayments for physical visits, live telehealth visits can be used to reduce the cost burden of copayments. For example,

most of UnitedHealth's Medicare Advantage plans have no copayments for covered telehealth services for the year 2021 (UnitedHealthcare, 2021).

Perceived quality of care is related to convenience, appearance, and organizational culture, all of which can be enhanced through telehealth. For instance, very few clinics offer a continuous therapeutic experience from clinic to home. Offering integration with telehealth modalities should serve to improve their assessments of quality and value given the convenience of having access to the care team from home, as well as the competence that is relayed to patients when their outpatient visits and at-home tasks are connected. Furthermore, if the integration is executed well, patients would experience the ease with which they can perform administrative tasks such as scheduling appointments or requesting changes through a mobile phone as an indication of the clinic's competence. Finally, investments in design and a user-friendly interface would also serve as a welcome contrast to the standard pain care experience and can be expected to enhance the patients' assessment around culture and appearance.

Recommendation 3: Consider relying on physical outpatient clinics to reach patients

Table 3 above indicates that designing an MSK telehealth service that attempts to reduce barriers, improve adherence by facilitating self-management, and include several of the patient pleasers identified, should offer adequate value to patients. This by no means provides sufficient information to get a list of all the features and use cases that consumers of the service will need, nor does it clearly point to the most effective monetization strategy, but it does offer a blueprint to iterate on the mobile application

prototypes through the *build-measure-learn* feedback loops of the *lean startup* methodology[20].

The risk, however, is the fact that reaching healthcare consumers is a challenge and that patients are not accustomed to paying for healthcare directly, nor are funders and insurers historically known for backing consumer-focused healthcare enterprises. This is the key business issue for consumer-focused startups and the key issue for this startup. Several ventures in the MSK telerehabilitation space, the most successful being *Hinge Health*, have succeeded in reaching patients through employers, with their value proposition being a reduction in healthcare expenditures for these companies. While the startup organization is yet to decide on the revenue model, relying on a direct-to-employer model is likely to be met with fierce competition.

However, changes in the regulatory environment offer an opportunity to reach patients through a different channel. The literature review section presented a range of public policy changes in response to the Covid-19 pandemic that dramatically shifted the reimbursement environment for telehealth in a way that reduces the insurance barrier around telehealth. What's most relevant to the startup is that CMS now allows PTs and PTAs to fully use telehealth with patients under Medicare B. UnitedHealth, the largest commercial health insurer in the country, has also revised its policy and now reimburses physical therapy through telehealth. Therefore, the wider adoption of telehealth across clinics in the US offers a window of opportunity for the startup to reach patients through clinics instead of employers.

[20] The methodology refers to the idea that the fundamental activity of a startup is to turn ideas into products, measure how customers respond, and then learn whether to pivot or persevere and that startup processes should be geared to accelerate that feedback loop.

Furthermore, a recent industry report reveals that the physical therapy market remains of low concentration, with the top four companies accounting for less than 18% of revenue (IBISWorld, 2019). This alludes to the fact that there are many physical-therapy-clinic channels from which the startup can reach patients if it manages to establish a clear value proposition for clinics. However, if this strategy fails to gain traction, then the startup has the option of establishing its own physical clinic(s), which would likely mean slower growth for the startup. However, this option does present it with the advantage of increased control over physical therapy operations and lessens the interoperability and integration challenges that are bound to arise otherwise.

Recommendation 4: When the startup begins building interdisciplinary care, it should add mental health modalities as the first complement to its MSK rehab services.

Another advantage of the startup's timing is that reimbursement for mental health services delivered through telehealth has mirrored changes for physical therapy, i.e., consultations are covered by health insurance, and many insurance plans feature copayment waivers to telehealth visits. Thus, many mental health providers across the country have adopted telehealth consultations for the same reasons mentioned above, particularly after the Covid-19 pandemic.

Furthermore, given the biopsychosocial model of pain, it is logical to include mental health services early in the integration process. Patients go through tremendous personal and social challenges resulting from their pain, which partially explains the high correlation between pain and depression reported in the literature review above. With chronic pain, in particular, the ongoing signals strain the patient's nervous system and

increases its reactivity to incoming messages. Because the pain may not go away, patients experience distress, anxiety, and sadness, all of which can make the pain worse. Hence, it makes sense to consider behavioral health as the strongest candidate for an early integration with other disciplines and modalities in pain care.

There are several strategies for how the startup may implement tele-mental health services into its model of care. However, developing these services in-house by hiring or contracting with mental health providers specializing in assisting patients struggling with chronic pain symptoms may be the best option. This strategy's advantages are that it facilitates a mental health integration that keeps patients within its telehealth ecosystem and gives it more control over the quality of services. Furthermore, layering telehealth visits for mental health over an existing infrastructure for remote physical therapy would not be a heavy lift for the technology development team. Additionally, the startup may bill patients' health insurance for the services rendered to generate revenue. Finally, having these services covered and delivered through a platform they are familiar with would be valuable to patients.

3.3.2 Six-Forces Alignment Summary

Having discussed some of the relevant learnings for each of the alignment forces above, the table below provides a structured, summarized response for considerations under each of the six factors of aligned innovations per the Herzlinger framework. This offers a broad set of considerations for most forces but is a little more specific under the consumer force, given the focus of the qualitative research in this work. For a summary of the general considerations of the consumer-focused venture, see appendix 5 below.

Table 4 – Six factors alignment considerations for the consumer-focused startup.

Consumer-focused Orientation	
Consumers • Provides added value through a multidisciplinary clinical architecture. • Reduce or eliminate barriers (e.g., transport, scheduling) through telehealth features and/or business model.	**Technology** • The infrastructure to support investment in technology exists and is supported by changes in public policy. • Investment in development will occur after reviewing wireframes and features with patients, rehabilitation therapists, and pain specialists.

Table 4 (Continued)

• Improved therapeutic alliance by improving goal, task, and bond dimensions through features that are not yet determined. Organizational culture should promote therapeutic alliance. • Facilitates Self-management through features and access to multidisciplinary set of treatments.	• Main Competitors: Hinge Health, Physera, US Physical Therapy Inc (and other brick and mortar physical therapy clinics), Sword Health, Reflexion Health, Force Therapeutics. • Other competitors: Non-healthcare options (e.g., gyms, yoga studios, etc.) • There is a differentiation challenge to overcome. Competitors have developed differentiated products
Public Policy • Loosened regulations complements and lower resistance given evidence of telerehabilitation efficacy and the Covid-19 pandemic. • Compliance with new regulations can be facilitated through potential partner organizations (e.g., *WebPT*). • Assumption: Telerehabilitation will become more widely acceptable and reimbursable as the evidence on cost-effectiveness continues to be demonstrated.	**Accountability** • Patients and therapists will hold the organization accountable on the value they derive from using the service and the quality of care that is delivered. • Employers / private & public insurers will hold the company accountable for quality of care delivered and the attributable cost.
Structure • <u>Friends</u>: Patients, Telerehabilitation advocates (e.g., American Telemedicine Association, American Physical Therapy Association), Physical Therapists, Cognitive-Behavioral Therapists.	**Financing** • The industry has managed to attract financing from venture capital firms (e.g., $300 M for Hinge Health in Series D). Startup likely needs to seek financing beyond bootstrapped capital once the MVP is developed and tested.

Table 4 (Continued)

• Foes: Physical outpatient clinics, Technology competitors, State regulators against telemedicine parity regulation.	• Reimbursement from major payors is feasible and has been facilitated by public policy changes that followed the Covid-19 pandemic. Caveat: Sustainability of revenues vary by payer. • Competitors have successfully deployed a direct-to-employers business model, with patients receiving services as a job benefit. • Assumption: Patients are not willing to pay out-of-pocket for services

The rationale for a strict identification as one of the three Herzlinger classifications, i.e., consumer-focused, integration-focused, or technology-focused, relates to the variations in each of the three in how they align with the six factors in the framework, thus requiring different business models (Herzlinger, 2013). The main feature of consumer-focused innovation is that it involves the consumer in new ways to enhance quality and reduce costs, and while the startup intends to rely heavily on technology and clinical integration, the core of the enterprise lies in redesigning MSK rehabilitation with the consumer at the center of the process.

The figure in Appendix 5 presents relevancies to a consumer-focused enterprise under each of the six factors. Starting at the center, such an organization attempts a solution that prioritizes resource allocation to understand and offer high value to consumers by involving them in care delivery in new ways. In the case of this startup, the

qualitative interviews began the process of identifying what consumers want, which includes both therapists and patients in this case. Not only do patients receive individualized, multidisciplinary care, but therapists have access to continuous progress data on their patients and interact with them in new ways, as well. Hence, both patients and therapists are going to be the primary force of accountability on the startup, given that both these stakeholders work with each other on improving health outcomes.

Given that the startup has taken the consumer-focused orientation, this project focused on understanding the factors that dictate physical therapy's success from patients' and consumers' perspectives. In the steps ahead, the startup will focus on translating the learning on therapeutic alliance and patient experience through the development of prototypes, a process that begins the work on aligning the consumer, structure, accountability, and technology forces of the Herzlinger framework. The goal is to develop prototypes that we can test with back pain patients under the care of one therapist (Christian Reyes DPT, Co-founder) to generate a list of use cases and features to develop in the minimum viable product (MVP), i.e., the product model which the startup plans to commit to and into which it will invest bootstrapped capital and funds raised from friends and family. In doing the above, the startup ensures that it invests in technology after a thorough assessment (i.e., the technology force) and that the product will solve problems for patients and therapists, making them friends and satisfied users of the product (i.e., the structure force and consumer force). Finally, it sets the startup for developing a study to assess clinical effectiveness (i.e., the accountability force).

4. Conclusion

This thesis presented a description of a doctoral project that aimed to study the state of musculoskeletal (MSK) rehabilitation and pain care in the United States. The project took the positionality of a founder of a startup organization aimed at finding opportunities for telehealth modalities to improve the quality of care delivered to MSK pain patients. The thesis's analytic platform presented a literature review and description of the doctoral project's qualitative research methods. The literature review gave a thorough analysis of the public health burden of musculoskeletal pain in the United States and worldwide, highlighting MSK disorders as the leading causes of disability in the majority of countries. Furthermore, it pointed to low back pain as the most prevalent form of MSK disorders with a lifetime prevalence of 84 %, with chronic low back pain prevalence estimate at 23 %, making about 12% of the global population disabled by low back pain. The review then described the correlations between pain, mental health disorders, and the opioid epidemic in the United States, and pointed to the shortcomings of a well-intentioned but over-medicalized response to pain.

The review also distilled the conclusions of seminal reports by the Institute of Medicine (IOM) and the National Institute of Health (NIH) that have called for a cultural shift in how pain is diagnosed and treated. These reports called for addressing pain as a public health problem and designing care models that adopt a conception of pain as a complex condition with biological, psychological, and social determinants – otherwise known as the biopsychosocial model of pain. Under this conception, the NIH

recommends pain care to be individualized, multimodal, interdisciplinary, and that it relies on behavioral and integrative approaches in addition to the medical, restorative, and interventional modes of treatment. At the center of this care model is the therapeutic alliance and shared decision-making between the clinician and patient, where the therapeutic alliance is broadly defined as a strong patient-clinician relationship defined by mutual trust and respect, compassion, and empathy. Notwithstanding, there are several barriers to the needed changes to pain care at the system, provider, and patient level. An example at the system level is that pain features in several clinical disciplines creating a bystander effect given then no single entity has enough locus of control to institute change. At the provider level, many clinicians are not sufficiently educated on the importance of early pain management to prevent chronicity development. Finally, at the patient level, patients themselves are not educated on the importance of seeking care early for their acute pain symptoms.

Next, the review presented the state of telehealth adoption and regulation in the United States following the Covid-19 pandemic. It highlighted the recent federal and state telehealth parity laws which allowed providers to bill for services rendered through telehealth. Next, it presented the benefits and shortcomings of telehealth for chronic pain management. Some of the significant benefits include the increased convenience and efficiencies for patients and providers, such as improving access for patients in rural areas, reducing patient processing inefficiencies, and lowering overhead costs for providers. On the other hand, some of the shortcomings include the potential for reduced patient engagement with patients due to the lack of personal contact, the need to implement new workflows, and the potential to exacerbate health disparities due to existing differentials in people's access to the internet.

The doctoral project methods involved developing semi-structured interviews with 15 patients who have received outpatient physical therapy and 10 physical therapists, each interview lasting approximately 45 minutes. Snowball sampling was the strategy for data collection, where each interviewee referred me to another patient or physical therapist to interview. The interviews were then transcribed and analyzed with *NVivo* software using the Framework Analysis methodology - a form of thematic analysis. The analysis involves (i) data familiarization, (ii) identifying a thematic framework, (iii) indexing, (iv) charting a framework matrix, (v) interpreting. The analysis aimed to answer two questions:

1. What are the therapeutic alliance themes within the context of musculoskeletal injury rehabilitation and pain management?

2. What constitutes a positive patient experience with therapy (i.e., patient satisfaction) from the perspective of patients and therapists? Can a telehealth modality fill some gaps?

For step (ii) of the analysis, two theoretical frameworks were used, one for each research question. The Bordin (1979) Goal-Task-Bond framework of therapeutic alliance and the Herzlinger (2013) six-forces (Structure-Financing-Policy-Accountability-Technology-Consumer) framework of innovation was relied on to analyze patient experience, where the startup took the stance of a consumer-focused venture, i.e., one that focuses resources and research & development into addressing the consumer force of the framework.

Under the therapeutic alliance, several sub-themes were identified under each of the main themes of *Goal*, *Task*, and *Bond*. *Goal* represents the desired outcome of

therapy, *Tasks* refers to the in-therapy actions, behaviors, and cognitions that form the substance of therapy, and *Bond* refers to the complex network of positive personal attachments between the patient and the therapist. With *Goal* and *Task*, the qualitative results elicited the negotiations between patients and therapists on the goals and tasks of therapy, presenting a patient-therapist relationship that has been altered by the democratization of clinical information and increased patient empowerment. When it comes to goals, patients and therapists must reach a satisfactory level of consensus on the overall goal of therapy, constituting a shared understanding of the nature of the patient injury, its suspected causes and exacerbating factors, and the expected degree of recovery. As for tasks, the treatment plan is negotiated with the patients' interest in mind, taking into consideration the biological, psychological, and social factors constituting their overall experience with pain.

However, even when goals and tasks are well established, patients might still drop out of physical therapy to seek other modalities that meet their clinical, psychological, and social needs at a lower overall cost or because they are willing to pay out-of-pocket for treatment modalities that are focused on manual therapy. However, the therapists who were interviewed stressed the importance of having patients take an active role in therapy through learned self-management, pointing to the fact that while manual therapy does have its role as a passive form of treatment for pain, relying on it as a singular mode of treatment is ineffective for chronic pain patients in the long-term.

Under the *Bond* component of the therapeutic alliance, the results highlighted the importance of cultivating a strong bond between therapist and patient as a facilitator to completing tasks and achieving goals, with several accounts where patients decried their experience with physical therapy being rooted in a perceived lack of empathy. Hence,

bonding requires physical therapists' recognition of fondness, psychological safety, therapeutic presence, and perceived expertise as factors that impact their bond with the patient.

Next, patient experience factors were identified, classified into three main categories: Barriers, Adherence Determinants, and Patient Pleasers. Barriers referred to impediments that patients experience, which prevents them from initiating or continuing physical therapy treatment. Insurance and scheduling barriers were the most frequently detected in the interviews, but language and transportation barriers were other barriers that were detected and discussed. Adherence determinants referred to the patient-specific factors related to their ability to complete exercises at home and/or continue visiting the therapist at the outpatient clinic, excluding the barriers mentioned above. The identified adherence determinants included the patients' motivation and self-efficacy, the competing priorities they experience in their daily lives, as well as the levels of pain they experience. Finally, patient pleasers referred to the factors to which patients and/or therapists ascribed a satisfactory experience. Almost all patient pleasers were equally detected in the interviews, and they included culture & appearance, reputation & available expertise, time spent 1-on-1 with the therapist, and convenience.

The totality of the results led to presenting four recommendations for the startup organization and the reasoning behind those recommendations, with the addition of a summary table of considerations for the six forces of structure, finance, accountability, public policy, technology, and consumers. The recommendations were:

1. The organization should use a blended care model that relies on physical clinics and telehealth solutions.

2. It should use telehealth to individualize care by strengthening the therapeutic alliance and improving patient experience.
3. It should consider relying on physical outpatient clinics to reach patients.
4. When building towards interdisciplinary care, the startup ought to start with mental health.

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Appendices

Appendix 1

Table 5 – The American College of Physicians Guideline grading System

Table. The American College of Physicians Guideline Grading System*

Quality of Evidence	Strength of Recommendation	
	Benefits Clearly Outweigh Risks and Burden or Risks and Burden Clearly Outweigh Benefits	**Benefits Finely Balanced With Risks and Burden**
High	Strong	Weak
Moderate	Strong	Weak
Low	Strong	Weak
Insufficient evidence to determine net benefits or risks		

* Adopted from the classification developed by the GRADE (Grading of Recommendations Assessment, Development and Evaluation) workgroup.

Adapted from (Qaseem *et al.*, 2017).

Appendix 2

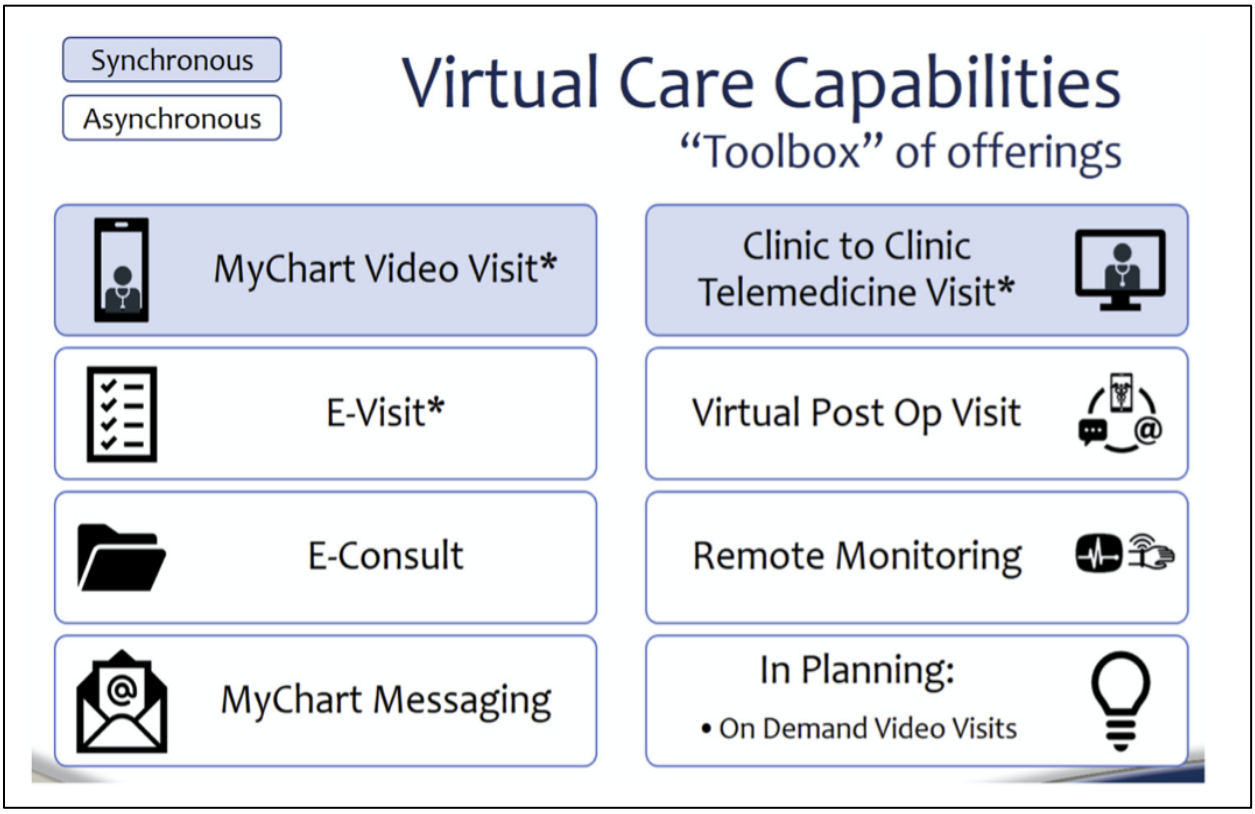

Figure 17 - The capabilities of virtual care (i.e., telehealth) (Lin *et al.*, 2020).

Appendix 2 – Continued

Table 6 – Telehealth terms and definitions. Adapted from (Wijesooriya *et al.*, 2020).

	Definition
Telehealth	Telehealth is defined as the use of electronic information and telecommunication technologies to support long-distance clinical health care, patient and professional health-related education, public health, and health administration. Technologies include video conferencing, the internet, store-and-forward imaging, streaming media, and terrestrial and wireless communications [18]
Telemedicine	Use of electronic technology or media, including interactive video conferencing technologies, for the purpose of diagnosing or treating a patient, providing remote patient monitoring services, or consulting with other health care providers regarding a patient's diagnosis or treatment [19]
Remote Patient Monitoring	Remote patient monitoring (RPM) uses digital technologies to collect medical and other forms of health data from individuals in one location and electronically transmit that information securely to health care providers in a different location for assessment and recommendations [20]
Store and Forward	Store-and-forward technologies allow for the electronic transmission of medical information, such as digital images, documents, and pre-recorded videos through secure email communication [21]
eConsults	Electronic consultations ("e-consults") as asynchronous, consultative, provider-to-provider communications within a shared electronic health record (EHR) or web-based platform [22]
eVisit	E-Visits broadly defined are electronic exchanges between a medical provider and their patients for delivery of health-care. This has taken many forms during it's evolution from secure e-mail or messaging between provider and patient to electronic communications via a secure portal from a provider's website [23]
mHealth	mHealth or mobile health as medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices [24]
Tele-education	The process of teaching and learning mediated by telehealth technologies, where teachers and students are separated [25]

Appendix 3

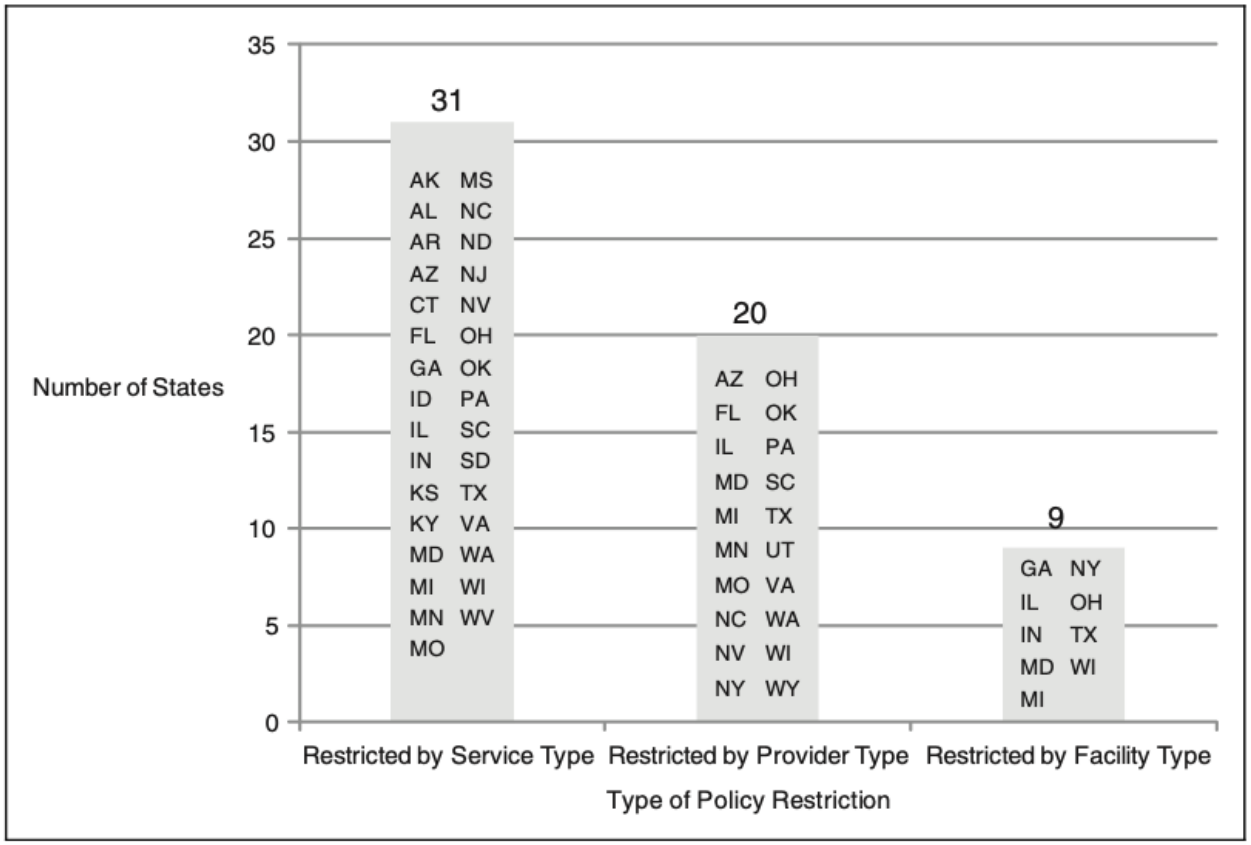

Figure 18 - Common restrictions in Medicaid live video reimbursement policies. Adapted from (Trout *et al.*, 2017).

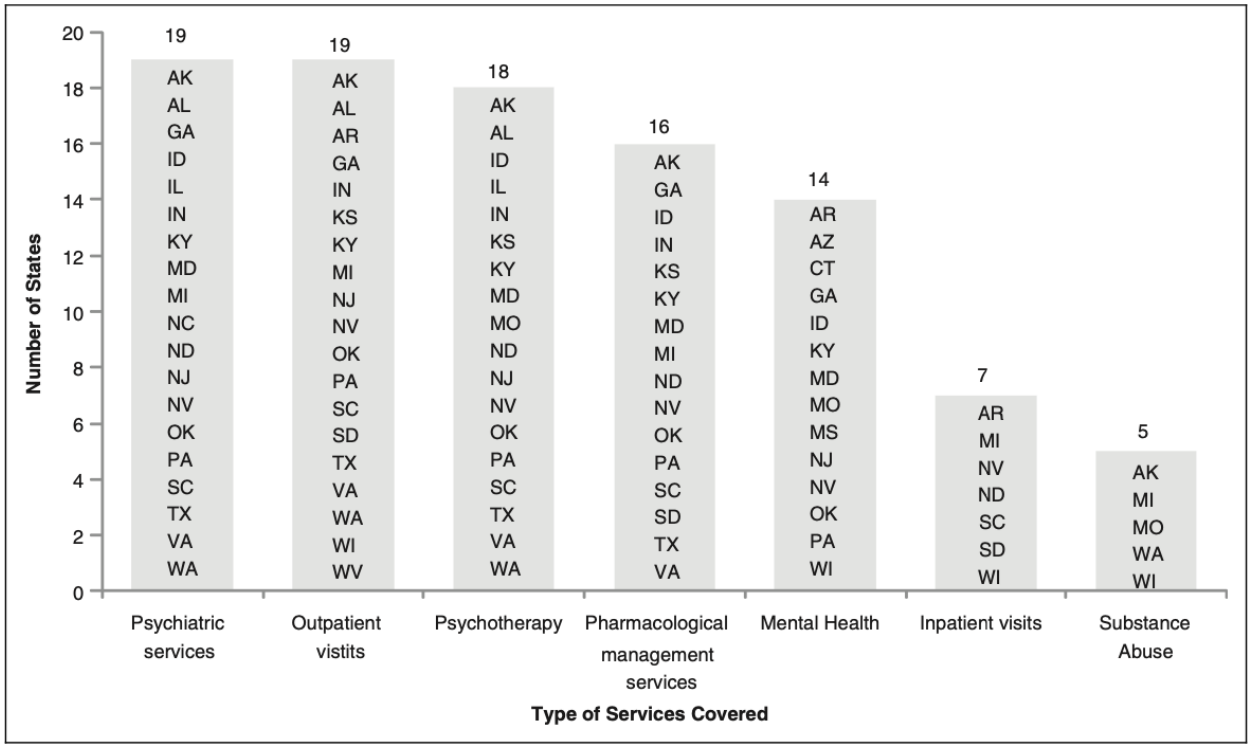

Figure 19 - Types of services covered by Medicaid when restrictions by service type are present. Adapted from (Trout *et al.*, 2017).

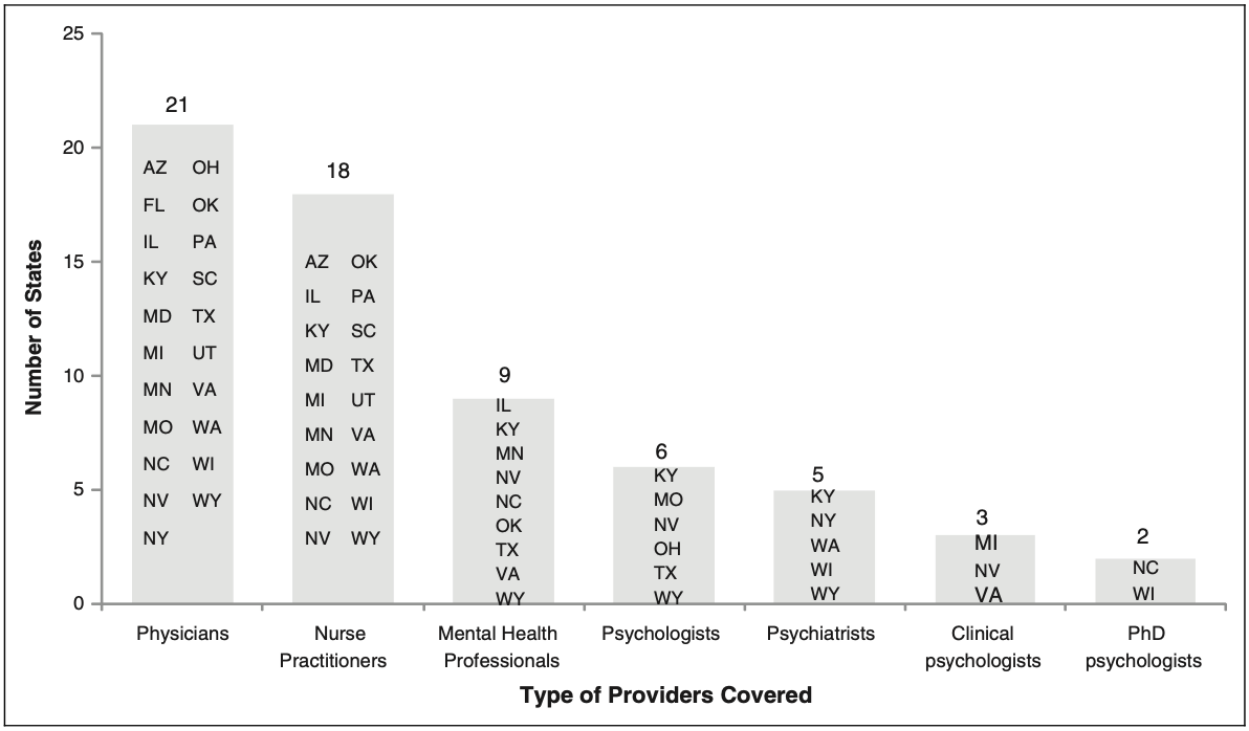

Figure 20 - Types of providers covered by Medicaid when restrictions by provider type are present. Adapted from (Trout *et al.*, 2017).

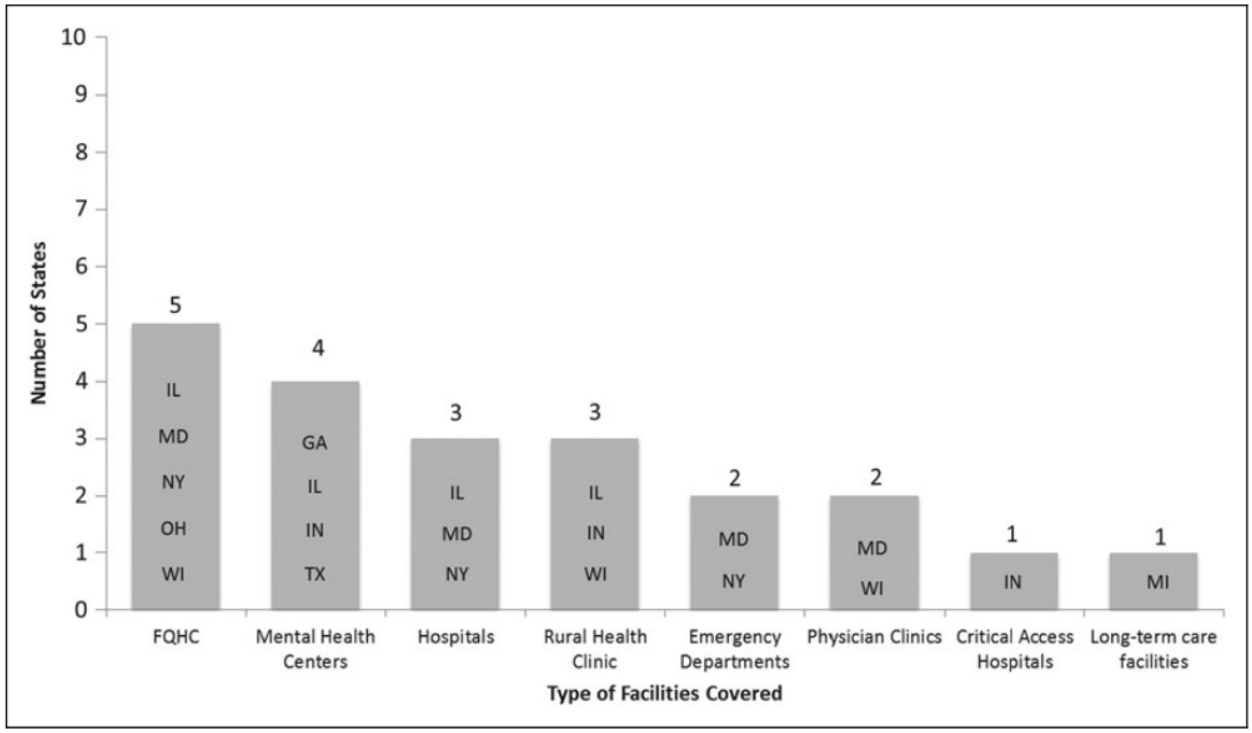

Figure 21 - Type of facilities covered by Medicaid when restrictions by facility type are present. Adapted from (Trout *et al.*, 2017).

Appendix 4

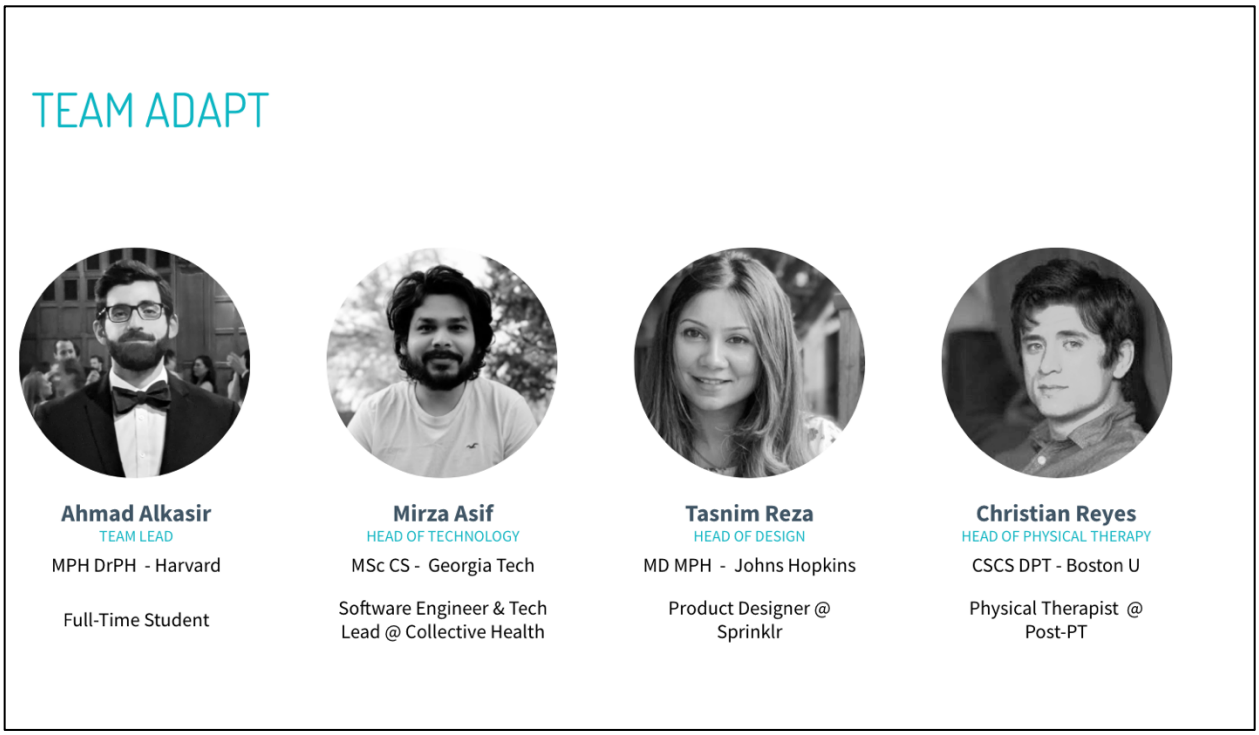

Figure 22 – Team Adapt: Cofounders of the startup organization.

Appendix 5

Considerations for the Consumer-Focused Enterprise

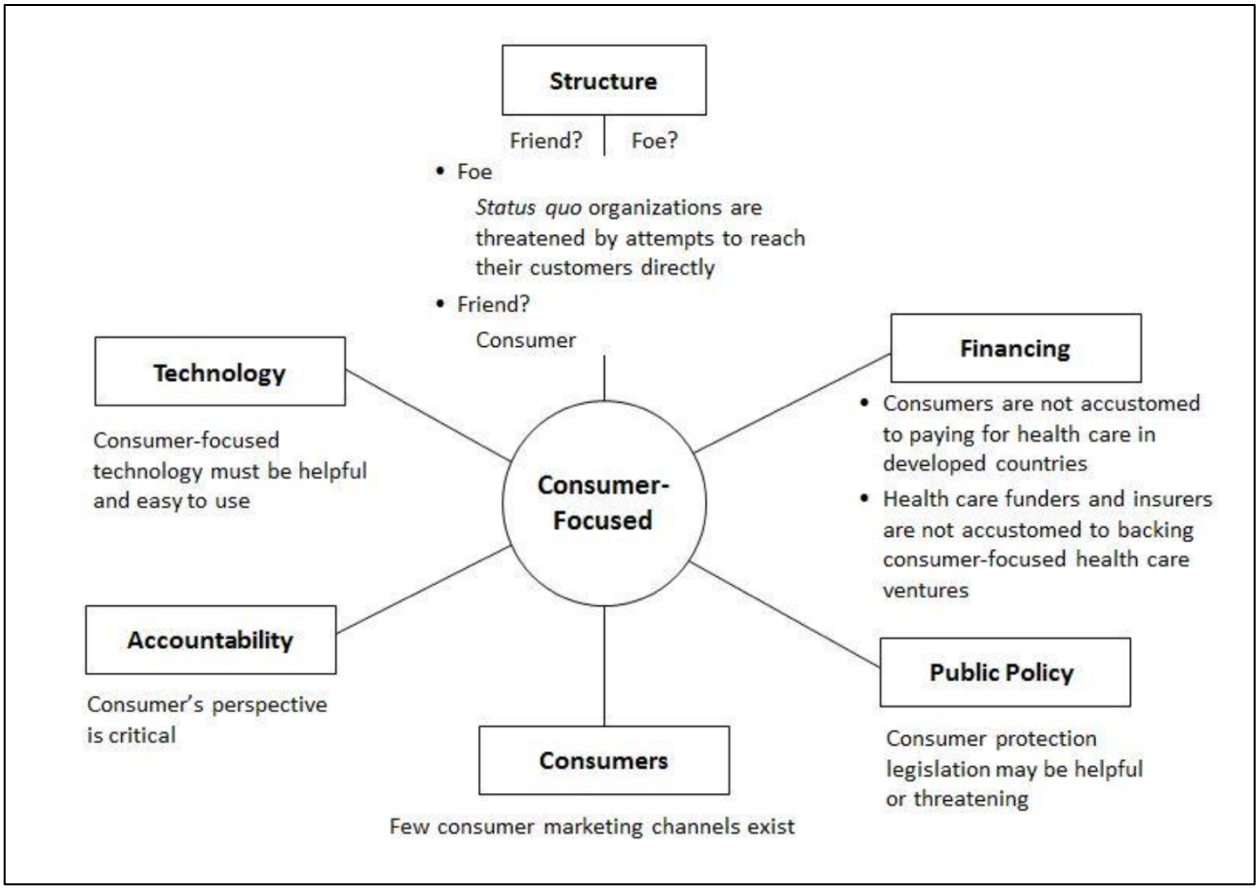

Figure 23 - Six factors relevant to consumer-focused healthcare ventures. Adapted from (Herzlinger, 2013).