Predictors of Retention in Physical Therapy:

Client-, Disease-, and Treatment-related Factors

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Physical Therapy

Physical therapy (also called physiotherapy) is a health care profession concerned with physical mobility and rehabilitation of movement dysfunction (Jette, 1989; Rose, 1989; Sahrmann, 1988; Sluijs, Kerssens, van der Zee, & Myers, 1998). A simple definition, provided by the *Merriam-Webster Medical Dictionary* (2009), defines physical therapy as "the treatment of disease by physical and mechanical means (as massage, regulated exercise, water, light, heat, and electricity)." However, the goals of physical therapy extend beyond treating the cause and symptoms of disease, which is evident in the mission statement of the American Physical Therapy Association (APTA), a national professional organization representing physical therapists in the United States, with a membership exceeding 72,000 (APTA, 2009). The organization expands upon the dictionary definition of physical therapy by stating the following:

> The mission of the American Physical Therapy Association (APTA), the principal membership organization representing and promoting the profession of physical therapy, is to further the profession's role in the prevention, diagnosis, and treatment of movement dysfunctions and the enhancement of the physical health and functional abilities of members of the public (APTA, 1993).

Purpose of Physical Therapy

Often used in concert with rehabilitative treatments from other health care specialties (e.g., occupational therapy, cognitive behavioral therapy), physical therapy is provided for patients in order to relieve pain, restoring physical functioning, and ameliorate or prevent disability.

Physical therapy is often indicated following illness, accident, or surgery (Matthews, 2000) primarily or indirectly affecting the musculoskeletal system.

For example, an illness such as diabetes may lead to neuropathy of the lower extremities. An automobile accident or fall may lead to broken bones. Anterior cruciate ligament reconstruction may cause trauma to the surrounding joints and muscles. Physical therapy is often necessary in these and many other cases to restore functioning to affected muscles as well as keep unaffected muscles strong.

Physical therapy is also used to help people effectively utilize assistive devices. For example, physical therapists help patients with spinal cord injuries, sports injuries, broken bones, and amputations to learn to use crutches, braces, wheelchairs, and artificial limbs. Physical therapy is also used for patients with neurological illnesses, such as multiple sclerosis, Parkinson's disease, and stroke, to restore movement and enhance independent living (Matthews, 2000).

Presenting Health Problems in Physical Therapy

Over 90% of patients referred for physical therapy suffer from diseases, disorders, or injuries affecting the musculoskeletal system (Kerssens & Groenewegen, 1990). Musculoskeletal disorders account for 17.2% of disorders and injuries leading to physical disability; among the 38 million Americans with disabling conditions, those related to the musculoskeletal system are the most prevalent (Matthews, 2000). The most common presenting problems in physical therapy involve symptoms and injuries of the back, neck, shoulder, and knee (Kerssens & Groenewegen, 1990). While many problems seen by physical therapists relate to acute episodes of dysfunction (e.g., accidental injury), according to Knibbe (1987), approximately one-third of disorders are chronic conditions with high rates of recurrence (as cited in Sluijs et al., 1998). One can surmise that such conditions vary widely in terms of onset, severity, duration, and recurrence.

Classification of Musculoskeletal and Movement Disorders

Disorders affecting the musculoskeletal system are systematically classified by the World Health Organization Family of International Classifications (WHO-FIC), which is a collection of classification systems related health information designed to facilitate the reliable description, storage, retrieval, analysis, and interpretation of health-related information at national and international levels (Madden, Sykes, & Usten, 2007). The WHO-FIC provides a conceptual framework for understanding and describing health conditions while providing a standardized language to improve communication between health care providers, researchers, and policy makers. The most well known classification in the WHO-FIC is the *International Statistical Classification of Diseases and Related Health Problems*, currently in its 10th revision *ICD-10*; World Health Organization, 2006). The ICD-10, and its companion, the *International Classification of Functioning, Disability, and Health* (*ICF*; World Health Organization, 2001), provide complimentary perspectives on disorders of the musculoskeletal system.

According to the *ICD-10*, diseases of the musculoskeletal system are divided into the following six categories: (1) arthropathies (i.e., disorders affecting predominantly the peripheral (limb) joints; (2) systemic connective tissue disorders; (3) dorsopathies (i.e., spine-related disorders); (4) soft tissue disorders (including disorders of the muscles, tendons, and other soft tissue diseases); (5) osteopathies and chondropathies (i.e., disorders of bone density and structure); (6) other disorders of the musculoskeletal system and connective tissue (e.g., acquired deformities, postprocedural musculoskeletal disorders). These six categories are further subdivided into hundreds of unique medical diagnoses, each represented by a 3- or 4-point alphanumeric code that identifies the specific disease or disorder within each category. Four-point codes provide greater specificity of diseases or disorders. For example, diseases of the

musculoskeletal system encompass codes M00 through M99; arthropathies encompass codes M00 through M25; and arthorosis disorders encompass codes M15 through M19. Coxarthrosis (arthrosis of the hip) is coded as M16 and is a specific disorder. A fourth digit adds further clinical information; for example, M16.4 refers to posttraumatic coxarthrosis, bilateral (World Health Organization, 2004).

In contrast to the *ICD-10*, a classification of disease states from an etiological framework, the *ICF* systematically categorizes states of health and health-related domains as they relate to functioning and disability (World Health Organization, 2001). Information contained within the *ICF* is organized according into four main components: (1) body functions (i.e., the physical and psychological functions of body systems); (2) body structures (i.e., anatomical body parts such as organs and limbs); (3) activities (i.e., task execution) and participation (i.e., involvement in life situations); and (4) environmental factors (i.e., factors external to the individual and that make up the physical, social, and attitudinal milieu in which the individual lives).

All four main components are relevant to understanding and describing functioning and disability due to disease, dysfunction, or injury involving the musculoskeletal system. *ICF* chapters that are most relevant to the treatment of musculoskeletal conditions include: (1) in body functions (a) sensory functions and pain and (b) neuromusculoskeletal and movement-related functions; (2) in body structures (c) structures of the nervous system and (d) structures related to movement; (3) in activities and participation (e) general tasks and demands, (f) mobility, and (g) self-care; and (4) in environmental factors (h) products and technology (World Health Organization, 2001).

ICF classifications are subdivided into hundreds of unique codes, each represented by a 4-, or 5-digit alphanumeric code. The first digit in the alphanumeric code refers to one of the four main

components (“B” for body functions, “S” for body structures, “D” for activities and participation, and “E” for environmental factors). This multiperspective framework permits a code to be assigned from each component for the same individual. The second digit refers to the chapter within the components; that is, “1” refers to chapter 1, “2” refers to chapter 2, and so on. The third and fourth digits refer to the associated body structures, body functions, activities and participation, and environmental factors.

Additional digits or qualifiers may be added to provide greater specificity within each standard 4-, or 5-digit code. These qualifier digits represent severity of functional impairment (for body functions and body structures), need for assistance during activities and participation, and environmental barriers and facilitators. Qualifiers may also be used to refer to the localization and change of a particular body structure (World Health Organization, 2001).

For example, an individual with an *ICD-10* diagnosis of Posttraumatic Coxarthrosis, Bilateral could be classified according to the *ICF* with the following codes: (1) B7101.3, which represents severe impairment in mobility of more than one joint; (2) S7401.3, which represents severe impairment of the joints of the pelvic region; (3) D4200.2, which refers to moderate difficulty transferring oneself while sitting (e.g., from wheelchair to another seat); and (4) E1201+3, which refers to a substantial facilitating environmental factor related to products and technology for personal indoor and outdoor mobility and transportation such as a walker (World Health Organization, 2001).

Another classification system that appears to be highly relevant for the assessment and treatment of movement disorders and functional impairment is the *International Classification of Musculoskeletal Disorders* (*ICMSD*). However, to my knowledge, the *ICMSD* has yet to be published. This classification system was reported as being developed by the International

League of Associations of Rheumatology (World Health Organization, 2004). However, my attempts to locate the *ICMSD* as well as any information on this system (e.g., via the Ovid Medline database, PsycINFO database, Marquette University Raynor-Memorial Library Reserves, Internet search) were not fruitful.

The strength of the *ICD-10* and *ICF* is the provision of a standard framework and language for describing conditions of health and disease. The *ICF* may be of greater utility in physical therapy, given its focus on the consequences of disease as it relates to the individual and their daily functioning (Wagstaff, 1982). The *ICF* also helps rehabilitation specialists such as physical therapists describe changes in body structure and function including what an individual can do in a standard environment (capacity) as well as what they can do in their usual environment (performance), with direct implications for treatment of musculoskeletal disorders (Jette, 1989; World Health Organization, 2001; 2002).

Role and Function of the Physical Therapist

Physical therapists (also called physiotherapists) treat patients with disorders that affect movement (e.g., physical mobility, joint range of motion, muscle strength, and endurance). They are practitioners whose scope of practice includes (1) evaluation and diagnosis of disorders and dysfunction related to physical mobility, and (2) clinical intervention such as direct treatment and patient education (American Physical Therapy Association, 1997). Physical therapists utilize classification systems such as the WHO-FIC such as the *ICD-10* and *ICF* to diagnosing musculoskeletal conditions and plan treatment interventions (Jette, 1989).

Diagnosis. Diagnosis in physical therapy "names the primary dysfunction toward which the physical therapist directs treatment. The dysfunction is identified by the physical therapist based

on the information obtained from the history, signs, symptoms, examination, and tests the [physical] therapist performs or requests" (Sahrmann, 1988, p. 1705).

Historically, physicians prescribed physical therapy treatment after diagnosing musculoskeletal disorders. The physician's diagnosis, based on the *ICD-10*, is based on a collection of relevant signs and symptoms. According to Sahrmann (1988), such general medical diagnoses, while important, were insufficient to inform physical therapy treatment.

To accommodate the needs of the physical therapy profession, Sahrmann (1988) proposed that physical therapists possess knowledge and training that should be utilized to form a classification scheme which would lead to more practice-relevant treatment. Specifically, Sahrmann stated that physical therapists' education and training in anatomy, physiology, pathophysiology, anatomy, kinesiology, and kinesiopathology allows them to identify key factors underlying movement dysfunctions. This function-centered perspective, as opposed to the medically-oriented disease-focused perspective, provides clinically useful way to classify diagnoses which in turn would better inform treatment, enhance physical therapy practice, and lead to better patient outcomes.

Like the complimentary nature of the *ICD-10* and *ICF*, physical therapy diagnoses are complimentary to medical diagnoses. An illustration of this complimentary relationship was described cogently by Sahrmann (1988), which is paraphrased here: A physician may diagnose the condition of the patient as a cerebrovascular accident and may even indicate the specific blood vessels involved, but the diagnosis provides limited information pertinent to the physical therapy treatment. In contrast, the physical therapist's diagnosis will address factors such as movement, range of motion, strength, and muscle tone.

Intervention. The ultimate goal of physical therapy is to restore physical functioning enough to enable patients to return to independent living. Interventions are designed to regulate muscle tone, reduce swelling, increase range of motion, improve muscle strength, improve gait and posture, reduce pain, improve aerobic capacity, teach patients how to use assistance devices, and reduce physically-related functional impairments (Dekker van Baar, Curfs, & Kerssens, 1993; Lindström et al., 1992; Matthews, 2000). Body locations involved frequently include the neck, back, shoulder, and knee (Philadelphia Panel Evidence-based Clinical Practice Guidelines on Selected Rehabilitation Interventions [Philadelphia Panel], 2001)

Myriad intervention strategies are utilized in physical therapy. Example include therapeutic exercise (Baskett, Broad, Reekie, Hocking, & Green, 1999; Cohen, Heinrich, Naliboff, Collins, & Bonebakker, 1983; Foster et al., 2007; Golby, Moore, Doust, & Trew, 2006; Lauridsen, de la Cour, Gottschalck, & Svensson, 2002; Lindström et al., 1992; Long, Donelson, & Fung, 2004; Lysack, Dama, Neufield, & Andreassi, 2005; Matthews, 2000; Michaelson, Sjölander, Johansson, 2004; Philadelphia Panel, 2001; Schachter, Busch, Peloso, & Sheppard, 2003; Smeets, Beelen, Goossens, Schouten, Knottnerus, & Vlaeyen, 2008; Smeets, Severens, Beelen, Vlaeyen, & Knotternus, 2009; Waling, Järvolm, & Sundelin, 2002; Wang, Wang, & Chen, 2004; Wilder & Barrett, 2005); manual therapies such as massage, soft tissue mobilization, joint manipulation, and joint mobilization (Cohen et al., 1983; Crockett, Foreman, Alden, & Blasberg, 1986; Matthews, 2000; Philadelphia Panel, 2001); coordination training (Lauridsen et al., 2002; Waling et al., 2002); relaxation training (Cohen et al., 1983; Michaelson et al., 2004); electrical nerve stimulation (Philadelphia Panel, 2001), and wound management (Matthews, 2000). In addition, patient education is a common component of physical therapy (Cohen et al., 1983;

Crockett et al., 1986; Foster et al., 2007; Golby et al., 2006; Klässbo, Larsson, & Harms-Ringdahl, 2003; Lindström et al., 1992; Matthews, 2000; Michaelson et al., 2004).

Efficacy of Physical Therapy

Several meta-analyses have demonstrated the effectiveness of physical therapy treatments across a variety of musculoskeletal disorders. For example, physical therapy helps to reduce pain and increase functioning for patients with conditions such as back pain (Bailey, 2002; Di Fabio, 1995; Fior, Fydrich, & Turk, 1992), intermittent claudication (Brandsma, Robeer, van den Heuvel, Smit, Wittens, & Oostendorp, 1998), plantar fasciitis (Lee, McKeon, & Hertel, 2009), rheumatoid arthritis (Beckerman, de Bie, Bouter, De Cuyper, & Oostendorp, 1992; Ottawa Panel, 2004), posttraumatic joint disorders and myofascial pain (Beckerman et al., 1992), upper extremity dysfunction in stroke patients (Moreland & Thomson, 1994), and age-related gait slowing (Lopopolo, Greco, Sullivan, Craik, & Mangione, 2006). In addition, meta-analytic research suggests that physical therapy following surgery (e.g., upper abdominal surgery) reduces the likelihood of postoperative pulmonary complications (Thomas & McIntosh, 1994).

Mortality

According to the World Health Organization (2004), the majority of musculoskeletal disorders are listed in the *ICD-10* as conditions unlikely to cause death, however there are exceptions (e.g., scoliosis with mention of pulmonary heart disease, heart failure, or heart disease; postprocedural musculoskeletal disorders not elsewhere classified). While most disorders seen by physical therapists are not life threatening, they may have a severely negative impact of patients' quality of life. Treatment is aimed at restoring movement, reducing or eliminating dysfunction and disability, and increasing functional independence. Physical therapy facilitates participation in activities of living, such as returning to work following sick leave

(Lindström et al., 1992). Given the potentially devastating impact of musculoskeletal disorders on daily living, it is peculiar that a large number of patients do not complete their recommended physical therapy treatment.

Treatment Retention

Generally speaking, treatment retention refers to engaging and staying in treatment. The term *retention* has been used interchangeably with terms such as *attrition* and *engagement* and is the conceptual opposite of *treatment dropout* (Cabral et al., 2007; Evans, Radunovich, Cornette, Wiens, & Roy, 2008; Herinckx, Kinney, Clarke, & Paulson, 2007; Mallinson, Rajabiun, and Coleman, 2007; McKay, Gonzales, Quintana, & Kim, 1999; Natale & Moxley, 2009; Padgett, Henwood, Abrams, and Davis, 2008; Thull, 2009; VandenBos, 2007). Although scarcely studied systematically in the physical therapy literature, investigation of treatment retention in HIV literature and substance abuse literature have examined whether patients attended treatment for a specific duration of time (Brunette, Mueser, & Drake, 2004; Cabral et al., 2007; Hser, Evans, Huang, & Anglin, 2004; Laudet, Magura, Cleland, Vogel, & Knight, 2003; Mallinson et al., 2007; Naar-King, Bradford, Coleman, Green-Jones, Cabral, & Tobias, 2007; Natale & Moxley, 2009; Simpson, 1979; Simpson, Joe, Rowan-Szal, & Greener, 1995).

Treatment Retention as a Predictor and Criterion

In the substance use literature, studies that have examined treatment retention as a predictor variable found that retention was positively associated with treatment outcomes (Dearing et al., 2005; Fiorentine, Nakashima, and Anglin, 1999; Hser et al., 2004; Simpson, 1979; Simpson et al., 1995). Studies examining retention as a criterion variable have shown that treatment retention was predicted by treatment satisfaction, treatment intensity, greater self-efficacy for recovery

from substance abuse, abstinence from drugs and alcohol, older age, greater income, and residing in supported housing (Hser et al., 2004; Laudet et al., 2003; Thull, 2009).

Individuals with comorbid mental illness (especially obsessive-compulsive disorder, panic disorder, posttraumatic stress disorder, and social phobia/social anxiety disorder) and substance use disorders were more likely to drop out of treatment compared to individuals without comorbid diagnoses (Brunette et al., 2007; Laudet et al., 2003; Thull, 2009). Individuals with mental disorders such as obsessive-compulsive disorder, panic disorder, posttraumatic stress disorder, and social phobia/social anxiety disorder, or substance use disorders were particularly at risk for dropping out, as were individuals with either opioid or cocaine use disorders. Compared to treatment completers, treatment dropouts also reported greater frequency of substance use as well as more negative life consequences due to substance use (Thull, 2009).

Treatment Retention in Physical Therapy

It is difficult to draw conclusions from research examining treatment retention in physical therapy because of wide variance in terms of treatment duration, session frequency, session length, specific interventions, and diagnosis being treated. Review of available research has shown that treatment duration may span between two weeks to two years (Long et al., 2004; Wilder & Barrett, 2005); session frequency typically ranged from one to five sessions per week (Cohen et al., 1983; Crockett et al., 1986; Foster et al., 2007; Golby et al., 2006; Lysack et al., 2005); and session length may last between 15 minutes to 6 hours (Lauridsen et al., 2002; Wilder & Barrett, 2005). Various types of diagnoses and interventions have already been discussed.

Given the wide variance in research studies reporting treatment retention statistics, it comes to no surprise that rates of completing physical therapy have ranged from 45.5% to 100%

(Lysack et al., 2005; Wilder & Barrett, 2005). The percentage of dropout is substantial (M = 18.81; SD = 13.59, for the studies I reviewed).

Patients' reasons for dropping out of treatment include, for example, time constraints (Crockett et al., 1986; Long et al., 2004; Schachter et al., 2003), intervening medical conditions which precluded physical therapy participation (Long et al., 2004; Wang et al., 2004), experiencing pain during physical therapy (Long et al., 2004; Schachter et al., 2003), believing physical therapy was not helpful (Cohen et al., 1983), stating that the travel distance was too far (Wang et al., 2004), and lack of privacy during physical therapy (Schachter et al., 2003). Reasons providers gave for patients dropping out of physical therapy included serious medical conditions precluded physical therapy participation (Baskett et al., 1999; Klässbo et al., 2003; Lauridsen et al., 2002; Robbins et al., 2003; Young & Forster, 1991) patient noncompliance or refusal to participate (Burns, Johnson, Mahoney, Devine, & Pawl, 1998; Lauridsen et al., 2002; Young & Forster, 1991), change in patient's insurance (Robbins et al., 2003), and scheduling problems (Smeets et al., 2008).

Review of objective data suggest that treatment dropouts have greater physical symptom severity and less functional ability compared to treatment completers. For example, patients with low back pain performed worse on tests of functional capacity, reported greater pain intensity, and had been on sick leave from work for a longer period of time (Lasinger, Nordholm, & Sivik, 1994). Klässbo et al. (2003) reported that among patients with hip dysfunction (e.g., impaired range of motion), dropouts had greater pain, more activity limitations, and experienced lower health-related quality of life compared to treatment completers. Among low back pain patients, Long et al. (2004) reported that treatment dropouts had higher depression scores and were more likely to be female compared to treatment completers. Among patients with osteoarthritis,

patients reporting use of arthritis medication were four and a half times more likely to drop out of the study. Robbins et al. (2003) reported that treatment dropouts were more likely to be taking opioid medication, although there were no statistically significant differences in benzodiazepine or antidepressant usage.

In contrast, Waling et al. (2002) found no statistically significant differences reported neck and shoulder pain between treatment completers and dropouts. Among women diagnosed with fibromyalgia, there were no significant differences between dropouts and completers with regard to age, duration since onset of symptoms, reported pain, disease severity, or physician rating of global severity (Schachter et al., 2003). Michaelson et al. (2004) reported that in a sample of patients with chronic neck and back pain, there were no statistically significant differences between dropouts and treatment completers in terms of age, gender, general heath condition, physical capacity (e.g., endurance), average pain intensity, severity of depression, optimism, and health-related quality of life.

Reasons for Studying Treatment Retention in Physical Therapy

Although research shows that physical therapy is effective in treating a variety of musculoskeletal disorders, many individuals drop out of treatment prematurely. Moreover, factors associated with premature treatment dropout remain unclear; systematic research on physical therapy treatment retention is scant, and available findings are inconsistent. This study will attempt to describe patient-, disease-, and treatment-characteristics that reliably predict who will drop out of physical therapy treatment before medically indicated.

Retention in Other Types of Treatment

Because research on treatment retention in physical therapy is limited, I reviewed literature on treatment retention in other forms of therapy. Form my review of the HIV and substance

abuse treatment research, I have come to the following conclusions: Demographically, treatment dropouts were more likely to be female (Cabral et al., 2007; Rumptz et al., 2007), Black (Rumptz et al., 2007; Simpson et al., 1995), and heterosexual (Bradford, 2007; Natale & Moxley, 2009). Psychiatrically, treatment dropouts were more likely to have untreated or inadequately treated mental illness (Bradford, 2007; Health Resources and Services Administration's HIV/AIDS Bureau, 2006; Natale & Moxley, 2009; Rajabiun et al., 2007), untreated or inadequately treated substance use disorder needs (Bradford, 2007; Natale & Moxley, 2009; Padgett et al., 2008; Rajabiun et al., 2007; Rumptz et al., 2007), co-occurring substance use disorders and mental illness (Simpson et al., 1995; Rajabiun et al., 2007), and had a recent history of crack-cocaine use, injection drug use, or other dug use (Bradford, 2007; Cabral et al., 2007; Health Resources and Services Administration's HIV/AIDS Bureau, 2006; Laudet et al., 2003; Natale & Moxley, 2009; Rumptz et al., 2007; Simpson et al., 1995; Sohler, Wong, Cunningham, Cabral, Drainoni, & Cunningham, 2007). Regarding practical needs, treatment dropouts were less likely to have health insurance, stable employment, and housing (Bradford, 2007; Natale & Moxley, 2009; Rajabiun et al., 2007; Rumptz et al., 2007; Simpson et al., 1995). While this research relates to different types of treatment, it is reasonable to suspect that factors associated with treatment dropout in this line of research might also apply to treatment retention in physical therapy. Moreover, it is reasonable to infer that individuals with mental illness, substance use disorders, and HIV may comprise a subgroup of patients in physical therapy. What is unclear is whether there are predictive relationships between these aforementioned factors and retention in physical therapy.

Overview of the Remainder of the Study

Chapter II begins with a detailed history of treatment retention in physical therapy, including and critique of the literature. Major findings and implications are reviewed with an emphasis on client-, disease-, and treatment-related characteristics.

Chapter III describes the methodology of this study including a detailed description of the sample, variables of interest, and procedures.

Definition of Terms

Activity: Execution of a task or action by an individual (World Health Organization, 2001; 2002).

Activity Limitations: Difficulties an individual has in executing activities (World Health Organization, 2001; 2002).

Arthropathy: A disease of the joint (*Merriam-Webster Medical Dictionary*, 2009).

Body Functions: Physiological functions of body systems, including psychological functions (World Health Organization, 2001; 2002).

Body Structures: Anatomical parts of the body such as organs and limbs (World Health Organization, 2001; 2002).

Capacity: A qualifier that describes an individual's ability to execute a task or action in a standardized environment (World Health Organization, 2001).

Coxarthrosis: Arthrosis of the hip (World Health Organization, 2001).

Diagnosis: (in physical therapy) names the primary dysfunction toward which physical therapists direct treatment and which is based on information obtained from the history, signs, symptoms, examination, and tests that the physical therapist performs or requests" (Sahrmann, 1988).

Disability: An umbrella term for impairments, activity limitations, and participation restrictions (World Health Organization, 2001; 2002) and often conceptualized as long-term patterns of behavior associated with limitations or lack of functional capacity typical for one's age and gender (Guccione, 1991).

Dorsopathy: Disease or disorders of the spine (World Health Organization, 2001).

Dropouts: See Treatment Dropouts.

Environmental Factors: Make up the physical, social, and attitudinal environment in which people live and conduct their lives; examples include (physical) temperature, air quality, ground texture; and (social/attitudinal) social attitudes, legal and social structures, and climate (World Health Organization, 2001; 2002).

Fasciae: Connective tissue which covers or binds together body structures (*Merriam-Webster Medical Dictionar*y, 2009).

Fibromyalgia: A chronic disorder characterized by widespread pain, tenderness, and stiffness of muscles and associated connective tissue structures that is typically accompanied by fatigue, headache, and sleep disturbances; also called fibromyalgia syndrome and fibromyositis (*Merriam-Webster Medical Dictionary*, 2009).

Functioning: An umbrella term encompassing all body functions, activities, and participation (World Health Organization, 2001).

Functional Limitation: An objective and measurable discrepancy between a person's performance compared to a standard or normative population, one without a similar health condition (World Heath Organization, 2001); an inability to perform a task or obligation of usual roles and typical daily activities as the result of impairment; often used interchangeably with *disability* (Guccione, 1991).

Handicap: [*obsolete*] the social disadvantage of a disability (Guccione, 1991).

Health Conditions: refers to diseases, disorders, dysfunction, and injuries (World Health Organization, 2002).

Impairment: Problems in body functions or body structures and constitute a significant deviation or loss (World Health Organization, 2001; 2002); any loss or abnormality of anatomic, physiological, or psychological structure or function which result in functional limitations or lead to disability (Guccione, 1991); deficit of bodily structure or function, either congenital or acquired (Matthews, 2000).

Intermittent Claudication: Cramping pain and weakness in the legs (especially the calves) when walking and that disappears after rest and is usually associated with inadequate blood supply to the muscles (*Merriam-Webster Medical Dictionary*, 2009).

Kinesiology: the study of the principles of mechanics and anatomy in relation to human movement (*Merriam-Webster Medical Dictionary*, 2009).

Kinesiopathology: the study of disorders of movement as they relate to human anatomy and mechanics (Sahrmann, 1988).

Limitation: see Functional Limitation.

Musculoskeletal: of, relating to, or involving both musculature and skeleton (*Merriam-Webster Medical Dictionary*, 2009).

Myofascial: Of or relating to the fasciae of muscles (*Merriam-Webster Medical Dictionary*, 2009).

Osteopathy: Disease of the bone, due chiefly to loss of structural integrity (*Merriam-Webster Medical Dictionary*, 2009).

Other Mental Health Disorders: For this study, other mental health disorders refer to *DSM-IV-*

TR diagnoses other than bipolar disorders and psychotic disorders.

Participation: Involvement in a life situation (World Health Organization, 2001; 2002).

Participation Restrictions: Problems an individual may experience during involvement in life situations (World Health Organization, 2001; 2002).

Pathophysiology: the physiology of abnormal states; specifically, the functional changes that accompany a particular syndrome or disease (*Merriam-Webster Medical Dictionary*, 2009).

Performance: A qualifier that describes person's ability to execute a task or action in one's current or typical environment (World Health Organization, 2001).

Person Factors: Refers to demographic factors such as age, gender, race, education, and social background (World Health Organization, 2001; 2002).

Physical Therapy: A health profession, whose primary purpose is the promotion of optimal health and function through the application of scientific principles to prevent, identify, assess, correct, or alleviate acute or prolonged movement dysfunction (American Physical Therapy Association, 1993)

Physical Therapist: A rehabilitation professional who works to restore one's movement abilities (Matthews, 2000).

Plantar Fasciitis: Inflammation involving the plantar fascia (connective tissue at the sole of the foot) especially in the area of its attachment to the calcaneus (i.e., large bone in the heel) and causing pain under the heel in walking and running (*Merriam-Webster Medical Dictionary*, 2009).

Rehabilitation: The science and art of enabling persons with physical, mental, or sensory impairments to attain the highest degree of self-sufficiency an equality leading toward usefulness, satisfaction, and full participation in community life (Matthews, 2000), and

which is aimed towards improving an individual's physical and mental quality of life.

Rehabilitation Outcome: Refers to gains in functional independence resulting from participation in rehabilitation treatment (Mosqueda, 1993).

Rehabilitation Potential: Refers to the prognostic indicator of how a patient will perform within a rehabilitation program and involves factors such as motivation, cognitive status, medical complications, and familial support; the appraisal of whether a patient's current functional abilities and quality of life can be improved upon; a patient's capability of making measurable functional gains in ambulation and self care during rehabilitation treatment (Rentz, 1991).

Retention: See Treatment Retention.

Severe Mental Health Disorder: For this study, severe mental health disorders include *DSM-IV- TR* diagnoses in the bipolar and psychotic spectrums.

Substance Use Disorder: Refers to the spectrum of substance-related disorders, encompassing both abuse and dependence as defined by *DSM-IV-TR*; for this study, substance use disorders include alcohol as well as drugs.

Transcutaneous Electrical Nerve Stimulation (TENS): An electrical stimulation of the skin to relieve pain by interfering with the neural transmission of signals from underlying pain receptors; also called transcutaneous nerve stimulation (*Merriam-Webster Medical Dictionary*, 2009).

Trapezius Myalgia: Pain in the muscles of the upper back near the shoulders (*Merriam-Webster Medical Dictionary*, 2009).

Treatment Completers: Refers to patients who begin and complete treatment in accordance with provider's recommendations during the initial evaluation.

Treatment Cyclers: Refers to patients who begin treatment, drop out of treatment before treatment is completed, and return or treatment for the same diagnosis.

Treatment Dropouts: Refers to patients who begin but do not complete treatment but against their provider's recommendation or in situations that continued treatment in considered beneficial to their physical functioning.

Treatment Retention: A blanket term referring to whether treatment is completed or not.

Treatment Retention Status: In this study, treatment retention status refers to whether patients successfully complete treatment, terminate treatment prematurely but in agreement with their provider, or drop out of treatment.

Treatment Terminators: Refers to patients who begin but do not complete treatment because continued treatment is judged to no longer be beneficial to the patient's physical functioning.

Review of the Literature

The purpose of this chapter is to provide a detailed review of the literature on retention in physical therapy. First, major findings are discussed below. Afterward, my argument for a more systematic investigation regarding factors that attribute to treatment retention is presented.

Prevalence and Correlates of Treatment Retention in Physical Therapy

Cohen et al. (1983) conducted a treatment outcome study to compare the effectiveness of physical therapy and behavioral therapy for treating chronic low back pain. Patients were eligible for this study if they were between 20 and 62 years old; had a documented history of chronic low back pain for at least six months; had no co-occurring medical condition, psychiatric illness, or substance use disorder; and were not currently involved in litigation related to their chronic low back pain. Patients were referred for the study from a veteran's hospital and private practice clinics in Southern California.

Thirty-six patients were assigned to either physical therapy (n = 20) or behavior therapy (n = 16). Both therapies were outpatient sessions which met for weekly, for two hours a session, over 10 weeks. Physical therapy consisted of pain control strategies, relaxation training, and therapeutic exercise; behavior therapy focused on psychoeducation, problem solving, assertiveness training, guided imagery, and relaxation. Treatment outcomes included physical capacity such as standard measures of range of motion, low back control, and walking speed, and walking distance; knowledge about body mechanics and back protection; self-reported functional limitations; standardized self-report measures of depression and psychosocial functioning; self-reported pain intensity; and self-reported activity limitations due to pain.

Cohen et al. (1983) reported that 13 physical therapy patients (60%) and 12 behavior therapy patients (81.3%) completed treatment, however the magnitude of the difference was not

statistically significant (χ^2 (1) = 0.46, p > 05). Patient-, disease-, and treatment-related differences between treatment completers and dropouts were not reported. However, the authors noted that the physical therapy patients had "an initial negative reaction" (p. 328) to physical therapy, had received physical therapy in the past, and believed that physical therapy would not help their low back pain.

Crockett et al. (1986) compared three treatments for chronic myofacial pain dysfunction among patients in British Columbia. Patients were eligible for this study if they were at least 19 years old, met criteria for myofacial pain dysfunction with symptoms for at least six months, had limitations or deviation of jaw mobility, and had no radiographic evidence of pathology of the joint resulting from disease or trauma.

Thirty females and three males met criteria, of which 28 consented to participate in the research and were randomized to either the dental program (DP), which consisted of an occlusal splint and weekly physical therapy; biofeedback-enhanced progressive muscle relaxation (BER), which included prerecorded progressive muscle relaxation exercises plus EMG feedback to obtain lower levels of jaw muscle tension; and transcutaneous electrical nerve stimulation (TENS), which consisted of weekly applications of subthreshold electrical nerve stimulations from electrodes placed bilaterally on the lower jaw muscles. The three subgroups met weekly, for one hour sessions plus 30 minutes of homework, over eight weeks. Outcome variables included self-reported pain ratings (intensity and frequency) and dentist-rated measure of pain in relation to jaw range of motion.

Crocket et al. (1986) reported that, for the entire sample, 21 patients completed treatment (75%). No males completed the treatment program. Disease-, treatment- and other patient-related differences between treatment completers and dropouts were not reported. However, the authors

noted that treatment dropouts stated that “time constraints” was the main reason for not completing treatment.

Young and Forster (1991) compared hospital-based with home-based physical therapy among patients over 60 years old and who had been discharged from hospital-based inpatient care following stroke. Patients were deemed eligible if they were at least 60 years old and had residual functional limitations, but not severe enough to warrant residential care.

Of the 124 patients recruited into the study, 61 patients were randomized to receive day-treatment hospital-based physical therapy, while the remaining 63 were randomized to home physical therapy. Day-treatment patients attended one of four hospitals twice a week for eight weeks. Home-based patients were treated by a community physical therapist for up to 20 hours across eight weeks (of varying frequency and duration of sessions). Outcome measures included measures of functional mobility, self-reported perception of health status, social functioning, and activities of daily living.

According to Young and Forster (1991), 107 patients completed treatment (86.3%). Visual analysis of data indicated that day-treatment patients were more likely to drop out compared to home-based patients (18% vs. 9.5%). The authors indicated that reasons for dropping out included death, medical illness that required hospital readmission, travel, and treatment refusal. Dropouts were not compared to treatment completers on pretreatment variables.

Lindström et al. (1992) compared the effectiveness of a graded activity program with standard medical care among blue collar workers on sick leave due to subacute low back pain. Patients resided in Sweden and were immigrants from Finland and 12 other countries. Patients were deemed eligible for the study if they were blue collar workers employed at the Volvo Company in Göteborg, Sweden, were on sick leave for at least 6 weeks because of their subacute

low back pain, had no medical conditions that would preclude participation in physical therapy, and were free from psychiatric illness and substance use disorders.

Fifty five patients were randomized to the graded activity group while 52 were allocated to standard medical care. Four graded activity patients withdrew from treatment prior to the first session, and two more withdrew before the follow up examination. Thus, 49 graded activity patients completed treatment (89.1%). No information on pretreatment differences between dropouts and completers was provided.

Lasinger et al. (1994) examined characteristics of treatment dropouts and a matched comparison group among Swedish patients with chronic low back pain. In their investigation of three treatments types, 112 patients (62.2%) completed treatment. Forty-six dropouts were compared to age and gender matched treatment completers. Results from this study indicated that, compared to treatment completers, dropouts performed worse on tests of functional ability, reported higher pain intensity, and had been on sick leave from work longer. However, there were no statistically significant differences among other variables tested, such as pain duration, sleep disturbance, depression, hypochondriasis, hysteria, job stress, or number of alternative medicine consultations.

Burns et al. (1998) examined changes in physical capacity (e.g., lifting and walking endurance), depression, pain helplessness, and other outcome variables among chronic pain inpatients enrolled in a multidisciplinary rehabilitation program in Midwestern United States. Patients were deemed eligible if they reported having experienced benign musculoskeletal pain, were without medical restrictions that would preclude their participation, could read English, and had no history of substance use disorders, psychotic disorders, or bipolar disorders.

All 112 patients received similar treatment which included physical therapy, occupational therapy, individual and group CBT, biofeedback, and pain psychoeducation. Sessions were five days a week for four weeks; patients participated in physical therapy five hours per day.

Of the 112 patients eligible for the study, 94 completed treatment (83.9%). Statistically significant favorable changes occurred for all variables tested: Pain helplessness, pain severity, depression severity, lifting, treadmill performance, and activity involvement. The authors did not report participants' reasons for dropout, but stated that there were no significant differences between dropouts and completers with regard to demographic and pretreatment variables.

Baskett et al. (1999) examined the effectiveness of hospital-based versus home-based physical therapy among post acute-stroke patients in New Zealand. Patients were deemed eligible if they resided in a private home or supervised residential setting, were able to travel to the hospital outpatient therapy departments, and were in need of ongoing physical therapy as judged by their treating clinicians. Patients requiring inpatient care or who were diagnosed with co-morbid conditions (the latter not defined by the authors) were not eligible.

Patients were randomized to either outpatient hospital physical therapy (n = 50) or home-based physical therapy (n = 50). Outpatient physical therapy consisted of five hour sessions, two or three times per week, for 13 weeks. For home-based physical therapy, patients and their physical therapist collaboratively designed an exercise program focused on functional restoration, and patients were instructed to practice their exercises several times a day, with the help of a caregiver if necessary. Patients were instructed to keep an exercise/activity diary. Home-based physical therapists visited once per week for 13 weeks. Outcome variables included measures of functional capacity (e.g., grip strength, fine hand-motor dexterity, walking speed), and measures of mood disturbance (e.g., anxiety and depression).

Ninety percent of patients completed treatment. Visual analysis of data revealed that patients receiving hospital-based physical therapy were more likely to complete treatment (92%) compared to the home-based group (88%). The authors reported that reasons for dropout included intervening medical conditions which precluded physical therapy participation, moving away, and personal choice. The authors did not report differences between dropouts and completers with regard to demographic or pretreatment variables.

Lauridsen et al. (2002) compared intensive physical therapy with standard treatment among patients with hip fracture in Denmark. Patients were deemed eligible if they were female, between ages 60 and 89, were fully mobile before hip fracture, underwent osteosynthesis or partial hip replacement after hip fracture, and had no concomitant disabling disorders or illnesses that would preclude physical therapy participation.

Patients randomized to intensive physical therapy (n = 44) participated in physical therapy for two-hour sessions, three times per week, for a total of six hours per week. Patients randomized to standard physical therapy (n = 44) participated in physical therapy for 15-30 minute sessions, five days a week, for a total of 1.25-2.50 hours per week. Both treatments consisted of the same types of interventions designed to improve strength, endurance, and range of motion. Outcome variables included measures of functional capacity.

Fifty-eight percent of patients completed treatment. Visual analysis of data indicated that patients in intensive treatment were more likely to drop out compared to those in the standard treatment (54.5% vs. 29.5%). Reasons patients provided for dropping out included fracture complications that precluded participation, pain, depression, and personal choice. Patient-related characteristics and other functional-related pretreatment differences between completers and dropouts were not reported.

Waling et al. (2002) examined the effectiveness of three specific aspects of physical therapy among women with work-related trapezius myalgia (i.e., neck and shoulder pain) in Umeå, Sweden. Patients were deemed eligible if they were female, younger than 45 years old, had neck and shoulder pain for at least one year and was work-related, and had taken sick leave for no longer than one month within the past year. One hundred and twenty six women were randomized to three physical therapy treatment groups, which included strength training (n = 34), endurance training (n = 34), and coordination training (n = 31), or a no physical therapy control group (n = 27). The physical therapy groups met three times per week, for one hour sessions, for 10 weeks. The control group met with an occupational nurse for stress management training, which occurred once per week, for two hours, across 10 weeks.

One hundred and three women (81.7%) completed treatment. Visual analysis of data indicated that drop out rates were fairly even across groups: Dropout rates were 14.7% for the strength training group, 17.6% for the endurance group, 19.4% for the coordination group, and 22.2% for the control group. No statistically significant differences were found between completers and dropouts in terms of age, pain duration (in years), or frequency of pain. At the 3-year follow up, dropouts were less likely to rate their health as the same or better than their peers, compared to ratings by the training groups.

Robbins et al. (2003) compared the effectiveness of interdisciplinary pain management with physical therapy only for patients with chronic pain in the United States. Patients were a heterogeneous group, with no exclusion criteria specified by the authors. One hundred and twenty seven patients completed the treatment (63.2%), although the authors did not report dropout rates for each group. Reasons for dropping out included patient noncompliance, intervening serious medical condition, change in insurance, and relocation. The authored

reported no statistically significant differences between dropouts and completers in terms of demographic variables or coping style. In contrast, dropouts had less favorable outcomes in terms of mental health quality of life, functional impairment, depression, pain level, and pain-related disability, which were all statistically significant. In addition, dropouts were more likely to be taking opioid medication compared to treatment completers, and this held true at both pretreatment and one-year follow up.

Schachter et al. (2003) compared the effectiveness of short bouts and long bouts of exercise among sedentary women with fibromyalgia in Saskatchewan, Canada. Patients were deemed eligible if they were female, between the ages of 25 and 55, resided in Saskatoon, Sashatchewan, were diagnosed with fibromyalgia, and were sedentary, defined as "no participation in regular physical activity more strenuous than slow-paced walking a maximum of 2 times per week over 4 months prior to study entry" (p. 342). Patients also were required to be free of medical conditions that would preclude participation in moderate-intensity exercise.

Treatment consisted of 16 weeks of a home-based low-impact exercise program of progressive intensity. One hundred and forty three women were randomly assigned to long bouts of exercise (LBE; n = 51), short bouts of exercise (SBE; n = 56), or a no-exercise control group (NE; n = 36). The LBE and SBE programs were identical except for time spent engaging in exercises. The NE group attended small group support meetings and was asked to refrain from exercising.

One hundred and two patients completed the study (71.3%); considering the two treatment groups, the rate of completion was 66.4%. Visual analysis of data indicated that SBE patients were more likely to drop out compared to the LBE patients (37.5% vs. 29.1%). Reasons for dropping out included work- or family-related commitments, exercises were too time consuming

or boring, increased pain or fatigue, lack of privacy when performing exercises, and intervening medical conditions. The authors reported no statistically significant differences between dropouts and treatment completers regarding age, duration since symptom onset, self-reported pain, fibromyalgia symptom intensity and associated functional impairment, and physician-rated global severity.

Klässbo et al. (2003) explored the effectiveness of hip school (i.e., body mechanics and therapeutic exercise education) among patients with hip dysfunction in Sweden. Hip dysfunction was defined as "pain in the hip region lasting more than 3 months and manifestations of impaired hip joint range of motion and/or muscle function (p. 322). Patients were excluded if there was evidence of fracture, trauma, congenital malalignments, inflammatory joint or neuromuscular diseases, or dysfunction severe enough to warrant total hip replacement.

One hundred and seventy one patients were randomized to hip school (n = 94) or the no-treatment control group (n = 77). Hip school patients met individually with a physical therapist for their initial session, attended three group hip school meetings which lasted one hour each, and attended an individual follow up session two months later. Control group patients were instructed not to attend physical therapy for the duration of the study.

One hundred and forty five patients completed the study (84.8%). The dropout rate in the physical therapy group was 18.1%. The authors reported that dropouts reported greater pain, more activity limitations, and lower health-related quality of life compared to treatment completers.

Wang et al. (2004) compared the efficacy of three treatments in the management of overactive bladder among Taiwanese women. Patients were eligible if they were female, between the ages of 16 and 75 years old, voided at least eight times per day, had overactive

bladder symptoms for at least 6 months, and were free of medical conditions such as diabetes mellitus, urinary tract infection, and neurologic disorders, and did not use a pacemaker or intrauterine device. Patients were randomized for to either pelvic floor muscle training (PFMT; n = 40), biofeedback-assisted pelvic floor muscle training (BAPFMT; n = 38), or electrical stimulation (ES; n = 42). PFMT were instructed to practice their exercises three times daily; BAPFMT and ES patients met with a physical therapist twice weekly.

One hundred and three women completed treatment (85.8%). Visual analysis of data indicated that BAPFMT patients were less likely to drop out compared to PFMT and ES patients (10.5% vs. 15% vs. 16.7%). Reasons for dropout included long travel distance to physical therapy, intervening serious medical conditions, discomfort or pain during treatment, and pregnancy. The authors did not report whether dropouts differed from completers regarding pretreatment variables.

Long et al. (2004) compared the effectiveness of three treatments for chronic low back pain among patients with directional preference in Alberta, Canada. Directional preference was defined as "posture or repeated end-range movements in single direction ([which] decrease or abolish lumbar midline pain or cause referred pain emanating from the spine to appear to progressively retreat in a proximal direction back toward the lumbar midline" (p. 2593). Patients were deemed eligible if they were between the ages of 18 and 65, had low back pain without medical cause (e.g., spinal fracture, osteoporosis, inflammatory conditions), were free of uncontrolled medical conditions (e.g., angina, diabetes mellitus, hypertension), and were free of neurological conditions. Patients were randomized to three therapeutic exercise treatment groups: Matched direction (MD; n = 80), in which patients were instructed unidirectional exercises matching their directional preference; opposite direction (OD; n = 70), in which

patients were taught unidirectional exercises opposite of their directional preference; and evidence-based care (EBC; n = 80), in which patients were taught multidirectional exercises and stretches. Patients met for 3 to 6 sessions over two weeks.

Two hundred and one patients completed the treatment (87.4%). Visual analysis indicated that the dropout rate was fairly even between groups, with 13.8% of EBC, 12.5% of MD, and 11.4% of OD patients dropping out. Reasons for dropping out included pain during treatment, intervening medical conditions, work conflicts, travel conflicts, financial problems, psychological referral, and no reason provided. The authors reported that there were no statistically significant differences between dropouts and completers regarding age, directional preference status, time since symptom onset, pain intensity, pain location, and disability. However, females were significantly ($p \leq .05$) more likely to drop out (65.5% of dropouts) than complete treatment (44.9% of completers). Dropouts also reported significantly ($p \leq .01$) greater depression severity compared to treatment completers.

Michaelson et al. (2004) examined the effectiveness of multidisciplinary rehabilitation for patients with chronic leg or back pain in Saxnås, Sweden. Patients were deemed eligible if they were between the ages of 18 and 65, reported pain intensity of at least 25 on a 100-point visual analog scale, experienced pain for at least 6 months, and were free of neurological diseases, brain damage, rheumatic diseases, and psychiatric disorders. All 315 patients were assigned to the same treatment program which consisted of physical therapy and CBT. Treatment occurred for 6 hours per day, 5 days a week, across 4 weeks.

Three hundred and three patients (96.2%) completed treatment. The authors did not report whether there were statistically significant differences between completers and those who

dropped out after the four-week treatment program. Likewise, reasons for participant dropout were not reported.

Wilder and Barrett (2005) examined the relationship between medication usage and physical therapy dropout status among patients with osteoarthritis in Southeast United States. Patients were deemed eligible if they were at least 40 years old, were eligible to attend treatment at least 3 times per week, and were sufficiently mobile and healthy to participate in therapeutic exercise. Patients attended sessions three times per week, and completed a standardized exercise program which included supervised aerobic exercise and weight training. All 143 patients who were eligible for and consented to the study were assigned to the same treatment program.

Seventy eight patients completed treatment (54.5%). Visual analysis of data indicated that dropouts similar in age and body mass compared to treatment completers, and were less likely to be married or rate their health as good or excellent. In addition, dropouts were more likely to be using pain medication compared to completers (54% vs. 20%). Individuals who reported taking arthritis medication were 4.5 times more likely to drop out compared to those not taking such medication, and this relationship was stronger for men (risk ratio = 4.9, 95% CI = 1.1 – 15.6) then for women (risk ratio = 3.0, 95% CI = 1.3 – 7.0).

Lysack et al. (2005) compared two treatments for home-based physical therapy among postoperative orthopedic rehabilitation patients in Midwestern United States. Patients were deemed eligible if they had a total hip or knee replacement, were free of dementia and other neurodegenerative diseases, and had daily access to a television and VCR at home. All patients received routine inpatient care which included one 30-minute individual physical therapy session each day, plus 30 minutes of 2-hour group exercise every day. At discharge, patients were randomly assigned to one of two treatment groups: The control group (n = 22) was asked to

continue their exercises at home, and were provided with verbal and written instructions on exercise techniques; the video-assisted therapeutic exercise group (video group; n = 18) received the same instructions as the control group plus a videotape exercise instructions customized to the patients needs. Patients were contacted four weeks later to assess outcomes. All participants completed the study, thus there was no data to present regarding dropout characteristics.

Golby et al. (2006) compared the effectiveness of three treatments among patients with chronic low back pain in England. Patients were eligible if they were between the ages of 18 and 65, had back pain onset of at least 12 weeks prior, had less than two back pain-related operative procedures, were medically suitable to exercise participation, and were free of neurologic diseases and anxiety disorders.

Patients were randomized to spinal stabilization treatment (n = 121), manual therapy (n = 121) or education (n = 60). Spinal stabilization consisted of exercises selectively training the transversus abdominis, pelvic floor muscles, multifidus, and diaphragm muscles; these patients also attended back school. Manual therapy patients were prescribed therapeutic exercises other than the aforementioned selective training exercises; they also attended back school. The spinal stabilization and manual therapy groups met with a physical therapist for one-hour sessions across 10 weeks. The education group attended back school only.

Two hundred and thirteen patients completed treatment (70.5%). Dropout rates for each group were not reported, but the authors stated that those in the education group were more likely to drop out of treatment. No information was reported on pretreatment variable differences between dropouts and treatment completers.

Foster et al. (2007) compared three treatments for patients with osteoarthritis of the knee in the United Kingdom. Patients were deemed eligible if they were at least 50 years old, had a

clinical diagnosis of osteoarthritis of the knee, had not undergone nor were awaiting total knee replacement, and had never before had acupuncture. Patients were randomized to exercise and advice (n = 116), exercise, advice, and true acupuncture (n = 117), or exercise, advice, and nonpenetrating acupuncture (n = 119). Therapeutic exercises included, for example, strength training, stretching, and balance. Advice was provided in written educational booklet from the Arthritis Research Campaign. True acupuncture adhered to traditional Chinese acupuncture protocols and 10 specific points on the body, with 5 mm to 25 mm depth of insertion and lasting approximately 25 to 35 minutes. Nonpenetrating acupuncture procedures were equivalent to true acupuncture, except that blunt tip needles that collapsed into their handle were used. Treatments occurred across two weeks.

Three hundred participants completed treatment (96.2%). A visual analysis of data indicated that patients in the exercise and advise group were more likely to drop out of treatment compared to the true acupuncture and the nonpenetrating acupuncture groups (6% vs. 2.6% vs. 1.7%). Information on reasons for dropout and pretreatment differences between dropouts and completers was not reported.

Smeets et al. (2008) examined the factor structure of a treatment expectancy and credibility measure in Netherlands patients with chronic low back pain who were randomly assigned to either physical therapy (n = 53), CBT (n = 58), combined physical therapy plus CBT (n = 61), or a no-treatment waiting list (n = 51). Patients were deemed eligible if they were between the ages of 18 and 65, had chronic nonspecific low back pain for at least 3 months and which resulted in disability, and were able to walk at least 100 m. Patients were asked to cease all other treatments for their back conditions with the exception of pain mediation. Physical therapy interventions

consisted of strength and endurance training of the back muscles plus aerobic exercise. Patients attended sessions for approximately 2 hours each session, 3 times per week, for 10 weeks.

Of the 172 patients in active treatment group, 158 completed treatment (94.9%). Dropout rates were 5.7% for the physical therapy group, 6.9% for the CBT group, and 11.5% for the combined treatment group. Some patients never presented for treatment following randomization; logistic problems were also cited as reason for dropout. Data on pretreatment differences between treatment completers and dropouts were not reported.

Smeets et al. (2009) compared three treatments for patients with chronic low back pain in the Netherlands. Patients were deemed eligible if they were between the ages of 18 and 65, had nonspecific low back pain for at least three months and which resulted in disability, were able to walk at least 100 m, were free from medical illnesses which would preclude treatment (e.g., cardiovascular disease) and had no substance use disorders. In addition, patients were excluded if psychopathology was suspected based on patients' scores on the Symptom Checklist 90 (SCL-90; Arrindell and Ettema, 1986). Specifically, patients were excluded if they scored very high (compared to the normative psychiatric population) on the following scales: Insufficient Thinking and Behavior; Distrust and Interpersonal Sensitivity; and total SCL-90 score. Additionally, patients were excluded if they scored high (compared to the normal Dutch population) on the following scales: Rigidity; Hostility; and Self-satisfaction/Egoism. Eighteen patients were excluded due to suspected psychopathology.

Two hundred and twenty three patients were randomized to one of three treatments (active physical therapy, n = 53; graded activity with problem solving training, n = 58; combined treatment, n = 61) or a no-treatment waiting list (n = 51). Physical therapy interventions consisted of strength training, endurance training, and aerobic exercise. Patients met in groups of

four with a physical therapist for 2 hour sessions, 3 times a week, for 10 weeks. No information was reported regarding treatment dropouts.

Summary of Physical Therapy Treatment Retention Findings

Few conclusions about factors associated with treatment retention in physical therapy can be gleaned from the limited available research because findings were inconsistent and seldom replicated. For example, Young and Forster (1991) reported that patients in hospital-based physical therapy were more likely to drop out of treatment compared to patients in home-based physical therapy, while Baskett et al. (1999) reported the opposite. Similarly, Klässbo et al. (2003) and Lasinger et al. (1994), reported that dropouts we more likely to experience greater pain intensity and functional or activity limitations, however other researchers did not observe this finding (e.g., Long et al., 2004; Waling et al., 2002). Greater depression severity was associated with dropout in one study (Long et al., 2004), while no depression severity differences were found between dropouts and treatment completers in another study (Lasinger et al., 1992). Finally, Long et al. (2004) reported that females were more likely to drop out of treatment compared to males, while others found no gender differences regarding treatment retention (Burns et al., 1998; Robbins et al., 2003). These discrepant findings could be associated with the wide variance in populations, diagnoses, interventions, and length, frequency, and duration of treatment across studies.

Although research findings are limited, a few tentative conclusions can be drawn from the previously reviewed research. First, dropout rate appears to increase along with time in treatment (see Appendix A). For studies reporting such data ($N = 14$), I correlated average dropouts rates with weeks in treatment; the correlation was positive, statistically significant, and of moderate magnitude ($r = .60$, $p < .01$). This relationship makes sense; intuitively, patients involved in

treatment for longer periods of time have greater opportunity to drop out of treatment, whether by personal choice or due to extenuating circumstances (e.g., illness, moving away, death). It should be noted that several authors reported medical illness, travel or moving, and death as reasons for patient dropout (e.g., Baskett et al., 2003; Long et al., 2004; Robbins et al., 2003; Wang et al., 2004; Young & Forster, 1991). Such reasons seem rational; patients with serious medical conditions for which physical therapy is contraindicated should not be expected to participate in physical therapy; it is unreasonable for patients to travel hours to a treatment center if there is adequate treatment available closer to the patient's residence; and deceased patients obviously will not be attending physical therapy. For this study, I am concerned with patients who dropout of treatment for whom physical therapy is indicated and appropriate.

Second, treatment retention does not appear to be predicted by age (Burns et al., 1998; Long et al., 2004; Robbins et al., 2003; Waling et al., 2002; Wilder & Barrett, 2005), or pain duration (Lasinger et al., 1994; Long et al., 2004; Waling et al., 2002). Third, research suggests that patients in more intensive treatment (i.e., longer sessions and subsequently longer task engagement) are more likely to drop out compared to patients with the same diagnosis but in less intensive treatment (i.e., shorter sessions and subsequently shorter task engagement) (Lauridsen et al., 2002; Schachter et al., 2003). In addition, one study reported that married patients were less likely to drop out of treatment compared to single patients (Wilder& Barrett, 200). Finally, patients taking prescribed pain medication are more likely to drop out of treatment compared to patients not taking such medication (Robbins et al., 2003; Wilder & Barrett, 2005).

Caution should be exercised when generalizing research findings because of methodological flaws, such as inadequate sample sizes and subsequent lack of power to detect statistically significant group differences (e.g., Cohen et al., 1983; Crockett et al., 1986; Lysack et al., 2005).

Additionally, findings have not been replicated across physical therapy populations or treatment programs. Few studies examined treatment retention as a primary focus (see Lasinger et al., 1994; Wilder and Barrett, 2005, for exceptions). Most studies did not report whether there were statistically or clinically significant differences between dropouts and treatment completers (e.g., Baskett et al., 1999; Cohen et al., 1983; Crockett et al., 1986; Foster et al., 2007; Smeets et al., 2008; Golby et al., 2006; Lauridsen et al., 2002; Lindström et al., 1992; Michaelson et al., 2004; Wang et al., 2004; Young & Forster, 1991). This study will fill in a gap in the literature by systematically investigating factors associated with treatment retention in physical therapy.

In particular, I will describe characteristics of patients who drop out of treatment, according to demographic information (e.g., gender, age, ethnicity, martial status), disease-related characteristics (e.g. diagnosis, degree of functional impairment, prescribed medications), co-occurring disorders (e.g., other medical illnesses, mental illness, and substance use disorders), and treatment-related variables (e.g., number of sessions, amount of service connection). More importantly, I will investigate the relationships between physical therapy retention and (1) mental illness and (2) substance-use disorders. Physical therapy research has often excluded patients with either mental illness or substance-use disorders (e.g., Burns et al., 1998; Cohen et al., 1983; Golby et al., 2006; Keus, Bloem, van Hilten, Ashburn & Munneke, 2007; Lindström et al., 1992; Michaelson et al., 2004; Smeets et al., 2009). HIV and addiction research has consistently found that individuals with either substance use disorders or active mental illness are less likely to remain stable (i.e., consistent attendance) in treatment (Bradford, 2007; Brunette et al., 2007; Cabral et al., 2007; Gresenz & Sturm, 1999; Health Resources and Services Administration's HIV/AIDS Bureau, 2006; Laudet et al., 2003; Natale & Moxley, 2009; Padgett et al., 2008; Rajabuin et al., 2007; Rumptz et al., 2007; Simpson al., 1995; Sohler et al., 2007;

Thull, 2009). I suspect that the presence of mental illness and substance use disorders will be positively associated with dropout in physical therapy.

My Assumptions based on Previous Research

Based on the previously discussed research, I present the following assumptions:

(1) Treatment dropouts are more likely to have a history of mental illness.

(2) Treatment dropouts are more likely to have a history of substance abuse or dependence.

(3) Physical therapy patients with active mental illness or substance use disorders but not in treatment will have dropout rates greater than patients in treatment for mental illness or substance use disorders

Research Questions

In addition to these assumptions, which were informed via review of relevant literature, I will examine how other factors relate to retention in physical therapy. This study is largely exploratory and descriptive, so I will cast a wide net and look at the relationship between a variety of predictor variables and treatment retention. Specifically, I will attempt to answer the following:

(1) How are demographic factors, such as age, gender, marital status, and race/ethnicity associated with treatment retention?

(2) How are practical factors such as distance from VA and amount of service connection related to treatment retention?

(3) How are factors such as degree of functional impairment, rehabilitation potential, and medication usage related to treatment retention?

Method

Participants

Review of Patient Records. This study will entail a review of the medical records of patients seen for physical therapy at the Clement J. Zablocki Veterans Administration Medical Center in Milwaukee, Wisconsin (hereafter referred to as the Milwaukee VA). Thus, participants will not be recruited as is typical with a prospective design. A retrospective design was chosen because this study is exploratory and a large variety of variables already are tracked and available in the medical records database. These variables, described in a later section, have potentially utility in predicting treatment retention status.

Patient Records Content and Format. The Milwaukee VA stores and maintains patient medical records electronically on a secure network available to Milwaukee VA employees and trainees. Information in this electronic system is organized in a manner that allows one to scan for data relatively easily (compared to written records). The medical records database is accessible from VA computers, thus patient records can be accessed at any day and time, provided there are no network server problems. Data available in medical records are in typed format instead of written, which facilitates readability. Information available in these records includes, for example, diagnoses, medications, admission date, physical therapy initial evaluation results, number of physical therapy treatment sessions, and physical therapy discharge summaries. In addition, records are organized so that different types of information are stored on different tabs or windows, so one can select if he or she wishes to view only diagnoses, lab results, or progress notes.

A reasonable concern with such relative easy access to patient records relates to patient privacy. As a doctoral student in the Counseling Psychology PhD program at Marquette

University, I have completed formal coursework in professional ethics and legal issues, which included training on privacy, confidentiality, and appropriate use of patient records. In addition, I have completed the required Milwaukee VA trainings in information security awareness and usage of the electronic medical records system.

Description of the Milwaukee VA. The Milwaukee VA is located on the west side of the City of Milwaukee, and is part of an integrated health services delivery network which also includes facilities in Iron Mountain, Michigan, Tomah, Wisconsin, Madison, Wisconsin, North Chicago, Illinois, Chicago, Illinois, and Hines, Illinois. The Milwaukee VA delivers primary, secondary, and tertiary medical care, with 168 acute care operating beds and over 500,000 outpatient visits, annually. The nursing home care unit of 113 beds offers older adult programming. There are also 356 domiciliary beds for residential-type substance abuse rehabilitation, psychiatric rehabilitation and posttraumatic stress disorder treatment. Specialty programs at the Milwaukee VA include, for example, cardiac surgery, comprehensive cancer care, spinal cord injury care, geriatric evaluation and management, and palliative care program (U. S. Department of Veterans Affairs, 2009).

Description of Inpatient Units. From a brief scan of medical records, I found that patients receiving inpatient physical therapy tended to be admitted on to the following units: Comprehensive Integrated Inpatient Rehabilitation, Geriatric Evaluation and Management, Palliative Care, and Transitional Care.

Comprehensive Integrated Inpatient Rehabilitation (CIIR) is a 10-bed unit which provides rehabilitative services for patients with acute and subacute conditions. Patients on this unit present with a variety of medical ailments, such as orthopedic problems (e.g., joint replacements, fractures, or amputations), stroke, other brain dysfunction, and physical dysfunction resulting

from multiple medical complication. Patients typically remain on the CIIR unit for approximately two weeks for orthopedic rehabilitation and up to three months for neurologic-related problems (Hart, 2008).

Geriatric Evaluation and Management (GEM) is an interdisciplinary assessment and treatment unit that emphasizes rehabilitation for geriatric patients with acute and chronic physical conditions. Patients typically remain in this 10-bed unit for approximately one month (Hart, 2008).

Palliative Care is a 24-bed unit for veterans with end-stage diseases. Typically, patients residing on the Palliative Care unit are admitted for end-of-life care. However, some patients are admitted for palliative radiation and/or chemotherapy with the expectation of returning to community living upon completion of treatment. Recruitment will focus on the latter subgroup to remain consistent with the rehabilitative inpatient population from the other units. Length of stay on the Palliative Care unit varies, but is typically less than six months (Hart, 2008).

Transitional Care is a 20-bed unit which addresses rehabilitative concerns such as wound healing, post-surgical care, and complicated medical convalescence. Length of stay in Transitional Care is typically 1 to 3 months (Hart, 2008).

Eligibility Criteria. Patient cases will be eligible for inclusion if they were referred for inpatient physical therapy and completed an initial physical therapy evaluation. Patient cases will be ineligible if they have substantial cognitive dysfunction during the time these patients received physical therapy. Substantial cognitive dysfunction is defined here as having an activated durable power of attorney for health care (thus deemed unable to make one's own health care decisions).

Patient cases will also be ineligible if medical records indicate that patients were considered medically unfit for physical therapy as indicated by the Karnofsky Performance Scale (KPS; Karnofski & Burchenal, 1949), which is an instrument frequently used to evaluate the medical status of patients on the Palliative Care unit at the Milwaukee VA. The KPS is a provider-rated scale designed to measure functional impairment and survival potential. The scale is rated on an 11-point scale ranging in deciles from 0 (dead) to 100 (normal, no complaints, and no evidence of disease). The scale has demonstrated high interrater reliability among physicians and mental health providers (rs .89 - .97), and superior construct validity and predictive validity (Crooks, Waller, Smith, & Hahn; 1991; Mor, Laliberte, & Wiemann, 1984; Schag, Heinrich, & Burchenal, 1984).

Patients admitted for inpatient rehabilitation will likely carry KPS scores at or below 70, which indicates that patients require varying degrees of assistance in daily activities. Scores at or below 20 suggest rapid disease progression in the patient accompanied by the inability to care for oneself. Patients with scores in this range usually require the equivalent of institutional or hospital care; death may be near or imminent (Doyle, Hanks, & MacDonald, 1993; Karnofski & Burchenal, 1949). In light of this information, patients with KPS scores at or below 20 at the time they were referred for inpatient physical therapy will not be included in this study.

Sample Size. Sample size for this study actually refers to the number of cases (i.e., unique patients) that will be included in the analysis. Cases will include between 200 and 800 veterans who were admitted to the Milwaukee VA for inpatient or residential care, referred for physical therapy, and complete an initial physical therapy evaluation. The sample size in this study is in the hundreds range because multinomial logistic regression requires larger sample sizes in comparison to less sophisticated statistical techniques such as *t*-tests and ANOVAs.

Examples of studies using multinomial logistic regression in the empirical literature often have sample sizes between 200 and (approximately) 800 (e.g., Chan, 2005; Hosmer & Lemeshow, 1989; Kozachik & Bandeen-Roche 2008; O'Donnell, Creamer, & Phillipa Pattison, 2004; Thorpe, Bryson, Maciejewski, & Bosworth, 2009; University of California-Los Angeles, Academic Technology Services, n.d.a; University of California-Los Angeles, Academic Technology Services, n.d.b). For this study, I will examine at least between 200 and 800 cases to remain consistent with sample sizes reported in the literature.

Treatment Time Frame. Records will be reviewed for patients seen for inpatient physical therapy between the years 2001 and 2009. This time frame was chosen because Federal Policies regarding healthcare for veterans changed markedly during the George W. Bush administration. Specifically, since 2001, (1) a presidential task force to improve veterans' health care was established; (2) funding for veterans' health care has more than doubled; (3) funding for veterans' health care is the highest it has ever been; and (4) combat veterans' eligibility to enroll for lifetime VA health care has increased from 2 to 5 years (*George W. Bush*, n.d.; U. S. Office of the Press Secretary, n.d.; Woolley & Peters 2001). It is my assumption that, due to increased funding for veterans' health care during the Bush administration, access to health care among this population was substantially different than prior to 2001.

Variables

Variables to be extracted from patient medical records include, for example, demographic variables, general health care-related variables, medical diagnoses, psychiatric diagnoses, psychiatric illness treatment status, medications, treatment attendance, and variables specific to physical therapy diagnosis and treatment. A complete list of variables and their levels are provided in table-format in Appendix B.

Demographic Variables. Variables related to demographic factors include the following: Age, gender, race/ethnicity, marital status, and distance. *Age* is the patient's chronological age in years, at the time the initial physical therapy evaluation. *Gender* refers to whether the patient is male, female, or transgender. Male-to-female and female-to-male transgendered individuals will be coded under the umbrella of transgender. *Race/Ethnicity* is whether the patient is White, Black, Hispanic, Asian, or Native American. *Marital status* refers to whether the patient was never married, married, divorced, widowed, or separated at the time of the initial physical therapy evaluation. *Distance* refers to the distance between the patients' residence, in miles, from the Milwaukee VA.

General Health Care Related Variables. General health care variables relate to primary care and health care access and include the following: Service connection, health insurance status, primary care physician, inpatient provider, durable power of attorney for health care (DPOA-HC), inpatient unit, and hospital room roommates. *Service connection* refers to the degree of health care costs covered at no expense to the patient and that are tied to disability caused to the patient during their active duty in the military. Service connection ranges from 0 to 100%. *Health Insurance Status* refers to whether the patient has public, private, or no health insurance. *Primary Care Physician* is the patient's outpatient primary care physician. *Inpatient Provider* is the patient's primary physician while inpatient. DPOA-HC refers to whether the patient has an activated, inactivated, or no DPOA-HC paperwork on file at the VA. *Inpatient Unit* refers to the hospital unit the patient was residing on during the time they completed the initial physical therapy evaluation. *Hospital Room Roommate* refers to whether the patient has two, one, or no roommates while inpatient.

Physical Therapy Variables. Physical therapy variables are those that relate to physical therapy referral, evaluation, and treatment. *Referring Provider* is the health care provider who formally refers the patient to physical therapy for a consultation and initial evaluation. *Physical Therapy Intake Evaluator* refers to the physical therapist who conducts the initial evaluation with the patient. *Physical Therapy Treatment Episodes* refers to the number of times the patient has received a course of physical therapy treatment at the Milwaukee VA. *Physical Therapy Diagnoses, Number* refers to the number of health conditions for which the patient was referred for the most recent course of physical therapy. *Physical Therapy Diagnoses, Type* refers to the types of conditions the patient was referred for the most recent course of physical therapy; *ICF* language will be used when such information is provided. *Problem Onset* refers to the number of weeks since onset of the physical therapy diagnoses being treated in the most recent treatment course. *Onset Method* refers to whether the onset of presenting physical problems were abrupt (e.g., hip fracture due to falling) or insidious (e.g., back pain due to poor standing and sitting posture). *Rehabilitation Potential* refers to clinician judgment regarding the impact of environmental conditions and patient-related variables on physical therapy service provision (e.g., patient motivation, severity of presenting problem, access to treatment). *FIM Score* is the score yielded by the Functional Independence Measure (FIM; Granger, Hamilton, Keith, Zielezny, & Sherwin 1986; Hamilton, Granger, Sherwin, Zielezny, & Tashman, 1987; Keith, Granger, Hamilton, & Sherwin, 1987). *FIM Status* refers to whether the patient is judged by clinicians as needing (dependent) or not needing (independent) assistance in performing essential tasks and activities of daily living. The FIM is an 18-item clinician-rated measure designed to assess severity of functional disability and progress during medical rehabilitation. Further

information about the FIM including an evaluation of its psychometric properties is provided in the next section.

Physical Therapy Plan: Session Frequency refers to the frequency of treatment sessions per week that is recommended during the initial evaluation. *Physical Therapy Plan: Treatment Duration* refers to the duration of the course of treatment that is recommended during the initial evaluation. *Physical Therapy Attendance* refers to the percentage of appointments attended during the most recent treatment course. *Physical Therapy Appointments Missed, Current Episode* refers to the number of appointments missed during the most recent treatment course. *Physical Therapy Appointments Missed, Past Episode* refers to the number of appointments missed during previous courses of physical therapy treatment.

Comorbid Disorder Variables. Comorbid disorder variables are factors related to the patient's physical and medical health conditions that are diagnosed concurrently to their physical therapy-related conditions. *Medical Diagnoses, Number* refers to the number of medical conditions the patient has been diagnosed with at the time of their most recent physical therapy treatment course. *Medical Diagnoses, Type* refers to the types of medical conditions the patient has been diagnosed with at the time of their most recent physical therapy treatment course, and includes only those disorders categorized according to the *ICD-10*. *Severe Mental Health Disorders, Number* refers to the number of severe psychiatric disorders the patient has been diagnosed with at the time of their most recent physical therapy treatment course. *Severe Mental Health Disorders, Type* refers to the types of psychiatric disorders the patient has been diagnosed with at the time of their most recent physical therapy treatment course, and includes only those disorders categorized according to the *Diagnostic and Statistical Manual of Mental Disorders*, which is currently in its fourth edition (*DSM-IV-TR*; American Psychiatric Association, 2000).

Other Mental Health Disorders, Number refers to the number of psychiatric disorders, other than severe, that the patient has been diagnosed with at the time of their most recent physical therapy treatment course. *Other Mental Health Disorders, Type* refers to the types of psychiatric disorders, other than severe, that the patient has been diagnosed with at the time of their most recent physical therapy treatment course, and includes only those disorders categorized according to the *DSM-IV-TR*. *Substance Use Disorders, Number* refers to the number of substance use-related diagnoses that the patient has been diagnosed with at the time of their most recent physical therapy treatment course. *Substance Use Disorders, Type* refers to the types of substance use-related diagnoses that the patient has been diagnosed with at the time of their most recent physical therapy treatment course, and includes only those disorders categorized according to the *DSM-IV-TR*.

Prescribed Medications, Total refers to the total number of medications the patient was prescribed at the time of their most recent physical therapy treatment episode. *Prescribed Medications, Pain* refers to whether the patient was prescribed pain medication (e.g., oxycodone hydrochloride, acetaminophen) at the time of their most recent physical therapy treatment episode. *Prescribed Medications, Severe Mental Health* refers to whether the patient was prescribed antipsychotic medication and/or mood stabilizers at the time of their most recent physical therapy treatment episode. *Prescribed Medications, Other Mental Health* refers to whether the patient was prescribed medication for a mental disorder other than antipsychotics and mood stabilizers at the time of their most recent physical therapy treatment episode and includes, for example, antidepressants or anxiolytics.

Current Treatment-Severe Mental Health refers to whether the patient was receiving psychotherapy for a severe mental illness concurrently with the last physical therapy treatment

course. *Current Treatment-Other Mental Health* refers to whether the patient was receiving psychotherapy for other mental illnesses concurrently with the last physical therapy treatment course. *Current Treatment-Substance Use Disorders* refers to whether the patient was receiving psychotherapy for a substance use-related problem concurrently with the last physical therapy treatment course. *Severe Mental Health Treatment Attendance* refers to the percentage of psychotherapy appointments for a severe mental illness that the patient attended. *Other Mental Health Treatment Attendance* refers to the percentage of psychotherapy appointments for other types of mental illness that the patient attended. *Substance Use Disorder Treatment Attendance* refers to the percentage of psychotherapy appointments for a substance use problem that the patient attended. *Severe Mental Health Appointments Missed* refers to the number of psychotherapy appointments for a severe mental illness that the patient did not attend. *Other Mental Health Appointments Missed* to the number of psychotherapy appointments for other types of mental illness that the patient did not attend. *Substance Use Disorder Appointments Missed* refers to the number of psychotherapy appointments for a substance use problem that the patient did not attend.

Psychometric Properties of the FIM. The FIM describes and measures a patient's functional limitations, specifically those required for the physical aspects of daily living, and the associated burden of care (Deutsch, Braun, & Granger, 1997; Fucile, 1992; Granger, 2008; Granger, Hamilton, Linacre, Heinemann, & Wright, 1993; Hamilton et al., 1987; Keith et al., 1987). The FIM was created by the American Congress of Rehabilitation/American Academy of Physical Medicine and Rehabilitation Task Force as a method to uniformly measure the severity of disability, particularly activity restrictions that are associated with disability (Granger et al., 1986; Keith et al., 1987). The FIM was designed to measure functional abilities considered

essential (i.e., the minimum number of key activities of daily living) and that are reflective of disability regardless of the underlying pathology (Byrnes & Powers, 1989; Granger et al., 1986; Hamilton et al., 1987). The current version of the FIM contains 18 items which are rated on a 7-point, ordinal scale (Hamilton et al., 1987; Keith et al., 1987).

The FIM has frequently been employed in medical rehabilitation settings and has been used with a variety of patient populations including patients with cancer, spinal cord injuries, osteoarthritis, orthopedic injuries, multiple sclerosis, stroke, and brain trauma (Adachi, 1996; Dodds, Martin, Stolov, & Deyo, 1993; Fucile, 1992; Good et al., 2006; Granger, 2008; Granger, Cotter, Hamilton, Roger, Fiedler, & Hens, 1990; Granger, Divan, & Fiedler, 1995; Granger et al., 1986; Granger, Hamilton et al., 1993; Granger, Ottenbacher, & Fiedler, 1995; Marciniak, Sliwa, Spill, Heinemann, & Semik, 1996; Watson, Kanny, White, & Anson, 1995). It is widely used for tracking rehabilitative outcomes among medical patients (Fiedler & Granger, 1996; Granger, Cotter, Hamilton, & Fiedler, 1993; Granger, Hamilton et al., 1993; Owczarzak, 2003) and is frequently used by physical therapists to evaluate the amount of assistance required by a patient to perform basic activities of daily living safely and effectively (Adachi, 1996; Granger et al., 1986; Owczarzak, 2003; Watson et al., 1995).

The FIM's 18 items span six domains: (1) self care, (2) sphincter control, (3) mobility, (4) locomotion, (5) communication, and (6) social cognition (Hamilton et al., 1987; Keith et al., 1987). Higher scores reflect greater functional independence; scores 1-5 indicate that a helper is required in order to perform the activity safely and effectively, while scores 6 and 7 indicate that no helper is required. Scores reflect a patient's *typical* performance rather than *best* performance. The 18 items are summed to yield the total FIM score, which range from 18 to 126.

Alternatively, the FIM can be divided into two subscales, the Motor FIM (items 1 to 13) and the Cognitive FIM (items 14 to 18). The Motor FIM subscale ranges from 13 to 91 and Cognitive FIM ranges from 5 to 35 (Deutch et al., 1997; Granger 2008; Granger, Hamilton et al., 1993). Because the Motor and Cognitive FIM scores are not typically reported in the records, the total FIM will be examined as a potential predictor variable.

Because the FIM is an ordinal measure at the raw score level, Rasch analyses were performed to transform ordinal raw scores into a linear ratio scale (Fiedler & Granger, 1996; Granger, Hamilton et al., 1993; Heinemann, Linacre, Wright, Hamilton, & Granger, 1994; Linacre et al., 1994). As mentioned prior, the FIM raw scores are numerically labeled behavioral ratings, and although increases are associated with greater functional independence, distances between raw scores do not necessarily represent equal units. Rasch analysis was conducted by researchers in order to transform FIM raw scores into interval level data to meet statistical requirements for parametric data analysis (Heinemann, Linacre, Wright, Hamilton, & Granger, 1994; Linacre et al., 1994). Interval level scores with Rasch transformations provided by Heinemann et al. (1994) will be used in the current study.

The FIM has standardized administration procedures and its psychometric properties have been extensively tested (Fiedler & Granger, 1996). Among a sample of over 11,000 patients with a variety of medical diagnoses (e.g., spinal cord injury, stroke, orthopedic conditions), internal consistency for the total FIM was excellent for the overall sample at admission and discharge (αs were .93 and .95, respectively), and when grouped by impairment (Dodds et al., 1993).

The FIM was shown to have excellent interrater agreement across a variety of studies. Regarding the 4-point pilot version of the FIM, Hamilton et al. (1987) reported that among 303 pairs of clinicians, interrater agreement for the total FIM score was high (ICC ranged from .86 to

.88, average κ across the 18 items was .54). However, most studies on the psychometric properties of the FIM use the official 7-point version of the scale. For example, Hamilton, Fiedler, Laughlin, and Granger (1994), examined FIM data from 89 rehabilitation and acute hospitals and over 1000 patients; they reported excellent interrater reliability for the motor, cognitive, and total FIM (ICCs were .96, .91, and .96, respectively. Among inpatients with head injuries, the FIM demonstrated interrater agreement over .90 and test-retest stability over .80 (Byrnes & Powers, 1989). In a systematic review of 11 studies from the 1990s (Ottenbacher, Hsu, Granger, & Fiedler, 1996), interrater reliability of the total FIM was consistently high (ICCs ranged from .83 – .99), and test-retest stability was likewise high (ICC = .93; *r*s = .84 – .90). The average reliability across all studies was excellent for the Cognitive FIM (*M* = .93, *SD* = .10), Motor FIM (*M* = .97, *SD* = .04), and Total FIM (*M* = .95, *SD* = .05). Furthermore, the authors reported that that reliability was consistently high across medical populations (e.g., spinal cord injury patients, *M* = .86, *SD* = .24; stroke patients, *M* = .90, *SD* = .14; multiple sclerosis patients, *M* = .91, *SD* = .18; mixed medical populations, *M* = .93, *SD* = .19).

In terms of its precision, the FIM was shown to be sensitive to change (i.e., functional improvement) over time (Dahmer et al., 1993; Dodds et al., 1993) and was more sensitive to change when compared to the Barthel Index (Dahmer et al., 1993), another widely used measure of functional ability.

Turning to validity, construct validity was supported in a study by Dodd et al. (1993). Specifically, FIM scores were negatively correlated as expected with age and comorbid conditions related to functional impairments. Said differently, patients older than 75 and patients with coexisting comorbid conditions such as stroke, spinal cord injuries, and orthopedic

conditions required more assistance compared to younger patients and patients without comorbid medical conditions.

The FIM also discriminated functional status differences among patients based on severity of comorbid conditions. Discharge FIM scores were also significantly lower than admission scores, which implies that patients' functional status improved as a result of treatment or natural recovery. In sum, Dodd and colleagues demonstrated that the FIM was able detect differences in functional status in a dose-dependent manner.

Construct validity was also supported by Granger, Divan, and Fiedler (1995). In their study of 22 brain-injured individuals and their caregivers, individuals with higher motor, cognitive, and total FIM scores were less likely to require supervision and help as reported by their caregivers. That is, those requiring constant supervision and help had, on average, the lowest FIM scores; those needing daily supervision had higher FIM scores; those needing weekly supervision and help had even higher FIM scores; and those needing no supervision and help had the highest FIM scores.

Factorial validity was supported in several studies (e.g., Granger, Hamilton et al., 1993; Linacre et al., 1994; Heinemann, Linacre, Wright, Hamilton, & Granger, 1994). Specifically, Rasch analyses indicated that, compared to a one-dimensional model, the FIM was better explained by a two-dimensional factor structure, with cognitive and motor items forming independent linear subscales (Granger, Hamilton et al., 1993; Linacare, Heinemann, Wright, Granger, & Hamilton 1994). Results from Rasch analyses also indicated that the Motor and Cognitive subscales were each unidimensional, with items within each subscale forming a clear interval continuum of functional ability (Fiedler & Granger, 1996; Granger, Hamilton et al., 1993; Heinemann et al., 1994; Linacre et al., 1994).

Additionally, the FIM has demonstrated predictive validity. Several studies have shown that FIM scores are a better predictor of functional improvement among multiple sclerosis, stroke, and head injury patients when compared to similar measures such as the Environmental Status Scale, Incapacity Status Scale, and Sickness Impact Profile (Granger, Cotter et al., 1993; Granger, Divan, & Fiedler, 1995; Granger et al., 1990). Scores on the FIM predicted the amount of help measures in minutes per day (Granger, Cotter et al., 1993; Granger, Divan, & Fiedler, 1995; Granger et al., 1990). Specifically, higher scores on the FIM (reflecting greater independence) were associated with less need for assistance from a helper. The FIM's motor items had particularly strong effect sizes (*r*s ranged from -.70 to -.84). Research by Stineman, Escarce, Goin, Hamilton, Granger, and Williams (as cited in Fiedler & Granger, 1996) reported that FIM scores were significant predictors of length of inpatient stay. Moreover, FIM scores predicted whether inpatients were discharged back into the community, with higher FIM scores indicating greater likelihood that inpatients were discharged back into the community versus discharge to a nursing home or acute care, or death (Granger, Hamilton, & Fiedler, 1992). Finally, Dodds et al. (1993) reported similar findings. In their study of over 11,000 inpatients, FIM scores were higher for patients transferred to supervised living settings compared to those transferred to a nursing unit. FIM scores also predicted self-reported general life satisfaction (Granger, Divan, & Fiedler, 1995; Granger et al., 1990). In sum, the FIM has demonstrated satisfactory psychometric properties across medical rehabilitation populations and is firmly established as a measurement of functional improvement.

Outcome Variable. The independent variables (described above) will be examined to ascertain the degree to which they predict treatment retention. In this study, treatment retention is

nominally scaled with three levels: (1) treatment completers; (2) treatment terminators; and (3) treatment dropouts.

Treatment completers is defined here as patients who complete the course of their physical therapy treatment (the course which was determined by their physical therapist during the initial evaluation). *Treatment terminators* are patients who end physical therapy before the previously agreed upon end-date because the provider considers continued treatment to be no longer beneficial to the patient's physical functioning. Reasons may include, for example, intervening medical illness such as influenza, intervening mental illness such as a psychotic episode or acute suicidality, and provider judgment that physical therapy is contraindicated. Patients who die during this time frame are also included in this category. In contrast, *treatment dropouts* are patients who leave treatment against their provider's recommendation or in situations that continued treatment in considered beneficial to their physical functioning. Patients who provide no reason or rationale for leaving treatment are included in this category.

Statistical Design

Rationale for Statistical Design. I will analyze data using multinomial logistic regression, which is an appropriate statistical technique to use when one has multiple predictor variables and a nominal scale dependent variable (Hosmer & Lemeshow, 1989; Long, 1997; Norušis, 2005), which is the case in this study. Another method for predicting to a categorical variable, discriminant analysis, was considered for this study but ultimately decided against because of assumptions and requirements of discriminant analysis which this study likely does not meet. For example, discriminant analysis requires interval-level, normally distributed, and linearly related variables (Garson, 2008; Stevens, 1996). Independent variables in this study are both categorical and continuous, and are not assumed to be interval-level, normally distributed, nor linearly

related. Therefore, multinomial logistic regression, which does not have such requirements, is preferred for this study. Specifically, I will examine how well a set of categorical and continuous variables (described above) predict treatment retention in physical therapy, a nominally-scaled with three levels.

The goal of logistic regression models is "to find the best fitting and most parsimonious, yet biologically reasonable model to describe the relationship between an outcome (dependent or response variable) and a set of independent (predictor or explanatory) variables" (Hosmer & Lemeshow, 1989). This design fits well for this study; I want to find the reasonable, good fitting, and parsimonious model to explain the relationship between a set of predictor variables (described above) and retention status in physical therapy (i.e., who completes treatment, who drops out of treatment prematurely, and who leaves treatment in agreement with their health care providers).

Logistic regression is comparable in some ways to more common linear regression. In logistic regression, the outcome variable is categorical, as opposed to linear regression, in which the outcome variable is continuous (Hosmer & Lemeshow, 1989; *SPSS Regression Models™ 13.0*, 2004). In logistic regression, predictor variables may be categorical or continuous. In *univariate logistic regression* (also called binary logistic regression, Chan, 2005; Norušis, 2005), there is one predictor variable and one outcome variable which is dichotomous. In *multiple logistic regression*, there are multiple independent variables and a dichotomous outcome variable. In *multinomial logistic regression*, which will be used in this study, there are multiple independent variables and a single outcome variable; however, the outcome variable may have more than two levels (Chan, 2005; Hosmer & Lemeshow, 1989; Norušis, 2005; *SPSS Regression Models™ 13.0*, 2004). In this study, there are three levels in the outcome variable.

Procedure

I will visit the Milwaukee VA at least once per week to review records and extract data. I have access to a VA computer and a unique user name and password to access patient records. I will begin reviewing records systematically once I receive official IRB approval from Marquette University and the Milwaukee VA. I have completed the required computer-based trainings (e.g., research ethics) for both Marquette University's and the Milwaukee VA's IRBs; my timeline for completed the IRB documents is two weeks upon receipt of approval of this dissertation proposal. I plan to submit the IRBs for expedited review, because this study's retrospective design using archival data presents minimal to no risk to participants: The data already exists, there are no direct interventions being conducted, and there is no response- or time-burden placed on participants. I expect to receive IRB approval within 6 to 8 weeks post-submission. Following approval from both institutions, I will begin data review and extraction.

Data will be recorded into an SPSS database. Variables and their levels are listed in Appendix B. The database will be stored on the Milwaukee VA's secure network. The data file will be saved with the file name "ptstudy" with the date of each updated file following the file name. For example, if the file is updated on January 15, 2010, the file name will be named "ptstudy01152010." The file will be updated at least weekly, with a new file saved to the network each time. In the unfortunate event that a data file is corrupted and irretrievable, I will use the file saved from the previous week, with minimal time lost in the data review process. Once data entry is complete, I will attend to missing data and then begin data analysis.

Missing Data

Missing data points occur frequently in research, often because of factors that are outside of the researcher's control, such as attrition, or incomplete questionnaires (Kline, 2005; Vriens &

Melton, 2002). Relatively few missing observations may be of little concern, whereas many missing observations may cause problems.

According to Kline (2005), when incomplete cases differ from complete cases in a given data set, results based only on complete cases may not generalize to the population. Said differently, when the pattern of missing data is systematic, analysis of just the complete cases may not adequately represent the population to which the researcher is trying to infer results.

Because substantial missing data is common (30% to 60% reported by Vriens & Melton, 2002), methods have been developed to replace missing values. Most methods for dealing with missing data assume that the pattern of missing data is not systematic and therefore ignorable (Kline, 2005). Ignorable missing data patterns may be either *missing at random* (MAR), or *missing completely at random* (MCAR). When missing observations on a given variable differ from the observed scores on the same variable by chance only, the pattern of missing data is said to be MAR. When missing observations on a given variable differ from observed scores on the same variable by chance only, *and the presence versus absence of data on a given variable is unrelated to other variables*, the pattern of missing data is said to be MCAR (Kline, 2005; Vriens & Melton, 2002).

Various methods for dealing with missing data have been proposed. Of these, multivariate estimation methods generally outperform more traditional methods which impute a single value based on available cases (Kline, 2005; Vriens & Melton, 2002). That is, multivariate estimation methods impute values based on observed responses from combinations of multiple variables; essentially, regression equations are used to predict values for missing data points. Multivariate estimation methods are superior to less sophisticated methods, such as replacing missing values with simple arithmetic means. Thus, multivariate estimation methods will be used to replace

missing data points in this study. Methods for imputing missing data are available in Rubin (1987) and Schafer (1997), for example.

Data Analysis

Following replacement of missing data, I will analyze data using multinomial logistic regression.

Descriptive Statistics

Examination of central tendency and variability of data will be conducted using SPSS. Descriptive features to be described include, for example, frequencies, means, medians, modes, and standard deviations.

Evaluating the Overall Model.

Chi-square Likelihood Ratio Test. When conducting multinomial logistic regression, model fit is commonly assessed using chi-square likelihood ratio tests (Chan, 2005; Norušis, 2005; Petrucci, 2009). The null hypothesis being tested is that all coefficients in the model are zero. Said differently, a model with none of the independent variables (called the intercept only model), is statistically compared to a model with all the independent variables (called the final model). The final model will be considered significantly different from the intercept model if alpha is equal to or less than .05. This procedure answers the question, "Does this model fit my data?"

As an example, suppose *gender* and *race* are hypothesized to predict treatment retention status (i.e., treatment completer, treatment terminator, treatment dropout). If the observed significance test is at or below .05 for each predictor variable, we can reject the null hypothesis that all coefficients for *gender* and *race* are zero. One concludes from this result that, for the

final model, *gender* and *race* contribute significantly to treatment retention status, and that this contribution is greater than what would be expected due to chance.

One can also examine whether there are interaction effects. For example, suppose that the effect of race is not the same for males and females. It is possible that Black males drop out of treatment more than one would expect given coefficients associated with *race* and *gender* individually. If the observed significance test is at or below .05 for the interaction variable, we can reject the null hypothesis that all coefficients associated with the interaction effect are zero. One concludes from this result that, for the final model, there is a statistically significant *gender* and *race* interaction effect on treatment retention status, and that this contribution is greater than what would be expected due to chance.

Calculating Predicted and Expected Frequencies. One procedure for evaluating how *well* the model fits the data is estimating the probability that a person will fall into one of the outcome variable categories and comparing predicted frequencies with observed values (Norušis, 2005). For example, one can predict how many males and females of each race will complete treatment, terminate treatment, or drop out of treatment. Standardized Pearson residuals (the difference between observed and predicted cell counts divided by an estimate of the standard deviation) are calculated and used to assess how well the model fits the observed data. Cells with Pearson residuals greater than the absolute value of 2 suggest that the model does not fit well (Norušis, 2005).

Classification Tables. Classification tables are used to compare observed and predicted group classification and are a second method for evaluating how well the model fits the data (Chan, 2005; Norušis, 2005). For example, we can compare how many individuals are predicted to complete treatment, terminate treatment, or dropout of treatment, and compare these

frequencies with observed data frequencies. Correct classification percentages are calculated for each level of the outcome variable. Suppose that 50% are correctly classified as treatment completers, 35% are correctly classified as treatment terminators, and 5% are correctly classified as treatment dropouts. Such results would indicate that, based on this model, one can predict who will complete treatment at a rate greater than chance and one can also predict who will terminate treatment, but at a rate just slightly greater than chance. However, in this hypothetical model, the accuracy of predicting who will drop out of treatment is poor.

A caveat about classification tables should be specified: It is possible to have a correct model but for classification to be poor (Norušis, 2005). Unequal sample sizes can contribute to this problem, because cases have a greater probability to be classified to the larger groups regardless of how well the model fits. Because of this, classification tables can be used to provide ancillary information about the data, but should not be used in isolation to describe how well the model fits the data (Hosmer & Lemeshow, 2000; Norušis, 2005). Changes in classification accuracy can be reevaluated during model building and adding of parameters (Chan, 2005).

Goodness of Fit. Degree of model fit is also assessed with goodness-of-fit tests. Goodness-of-fit is concerned with how well the model fits the data in an absolute sense (Hosmer & Lemeshow, 1989). Said differently, goodness-of-fit tests are concerned with how well the model fits the data as a whole, as opposed to the contributions of each predictor variable.

In multinomial logistic regression, goodness-of-fit tests include the Pearson chi-square (χ^2) and Deviance chi-square (D) statistics. In this case, the final model (here called the observed model) is compared to a fitted model; the fitted model is one in which the independent variables are expected to predict the outcome variable (Hosmer & Lemeshow, 1989; Norušis, 2005; Petrucci, 2009).

Although there are slight differences between χ^2 and *D*, they are guided by similar theory. Pearson χ^2 is used "to assess the discrepancy between observed and expected counts in a multidimensional crosstabulation" (Norušis, 2005, p. 56). Said differently, observed cell counts (i.e. the arrangement of actual data in each cell of the table) are compared to expected cell counts (i.e., arrangement of hypothetical data in each cell of the table, which is based on the assumption that the model predicts the outcome). The χ^2 statistic is then used to assess whether observed differences (between the hypothetical model and the data-based model) exceed that which would be expected give 95% probability that the distributions are equivalent. In contrast, *D* compares the observed model to a saturated model, which is a model that has all main effects and interactions (Norušis, 2005), and tests whether there is a statistically significant difference between the two models.

When assessing goodness of fit, nonsignificant χ^2 and *D* (i.e., $p > .05$) statistics indicate that the expected or "perfect" model fits the data adequately. Interested readers are referred to Hosmer and Lemeshow (1989; 2000), and Norušis (2005) for further detail about these two statistics.

A caveat regarding goodness-of-fit tests deserves mention: Goodness-of-fit tests should only be conducted and evaluated when there are multiple cases in each cell (Chan, 2005; Norušis, 2005). Goodness-of-fit statistics are based on comparing observed and expected cell counts, and the number of cells is the product of the levels of the grouping variable (e.g., gender) by the covariates (e.g., age, rehab potential, FIM score). The myriad cells yielded by covariate patterns which include continuous variables often result cells with few or zero counts, which result in unstable prediction of values. In this study, goodness-of-fit tests will be interpreted only when

cell counts are sufficiently large. SPSS issues a warning when cell counts are insufficiently large (Chan, 2005).

Effect Size. Pseudo R^2 can be used assess effect sizes for the independent variables in the model. There is disagreement about whether pseudo R^2 can be interpreted in a manner similar to R^2 in linear regression (Petrucci, 2009). Some authors state that pseudo R^2 approximates the same variance interpretation as R^2 in linear regression (Tabatchnick & Fidell, 2007). In contrast, others have stated that pseudo R^2 are not equivalent to R^2 in linear regression (Hosmer & Lemeshow, 2000; Norušis, 2005), that various types of pseudo R^2 can provide contradictory information, and thus should be interpreted with caution R^2 (University of California-Los Angeles, Academic Technology Services, n.d.a). Others suggest that pseudo R^2 may be useful in model building only (Hosmer & Lemeshow, 2000). Nonetheless, pseudo R^2 indices tend to be much lower than R^2 in linear regression (Norušis, 2005; Petrucci, 2009). Because this study is exploratory, and there are no viable alternatives to pseudo R^2, I will examine and interpret pseudo R^2 statistics, keeping in mind the controversy and association limitations of these indices.

There are three pseudo R^2 effect size indices typically reported in multinomial logistic regression: Cox and Snell pseudo R^2, Nagelkerke pseudo R^2, and McFadden pseudo R^2 (Chan, 2005; Norušis, 2005; Petrucci, 2009; *SPSS Regression Models™ 13.0*, 2004; University of California-Los Angeles, Academic Technology Services, n.d.a).

McFadden's formula is a transformation of the likelihood ratio statistic (Petrucci, 2009). Values between .2 and .4 are considered "highly satisfactory" (Tabatchnick & Fidell, 2007). Cox and Snell's formula is also based on the log likelihood ratio statistic, but takes into account sample size (Petrucci, 2009). While higher scores indicate greater magnitude, Cox and Snell scores cannot reach a value of 1. Nagelkerke's formula adjusts the Cox and Snell pseudo R^2 so

that a value of 1 is possible; again, higher scores indicate greater magnitude (Petrucci, 2009). For this study, all three pseudo R^2 will be examined.

Model Building and Variable Selection

Hierarchical Model. Hierarchical variable entry will be used for this study. A model is considered hierarchical "if, for any interaction in the model, all lower-order interactions and main effects involving those variables are also included" (Norušis, 2005). For example, if the interaction between gender, substance use, and mental illness is in the model, the main effects of each must also be in the model, and the bivariate interactions (e.g., gender with substance use, gender with mental illness) must also be in the model.

The default option for determining hierarchy will be used in this study. The default option in SPSS specifies that there is no distinction between predictor factors (e.g., gender, race) and covariates (Norušis, 2005). Also, options other than the default should not be selected unless there is a theoretical basis for such a selection. This study is exploratory, and no theory is being tested, thus I will select the default option.

Forward Variable Specification. A forward variable selection will be specified in this study. In a forward stepwise analysis, the first model contains only the intercept (i.e., all predictor variables are assumed to have values of zero). At the first step, the variable that results in the largest change in the model and that is statistically significant is entered, followed by the variable with the next largest change, and so on (Norušis, 2005). Variable entry stops when no more variables meet entry criteria (i.e., $p \leq 05$).

Evaluating Individual Effects

Estimates of individual effects (i.e., each level of predictor variables) on an outcome variable are conducted using logit equations via SPSS. One of the outcome variable levels serves as a

reference category to which all other levels are compared. For example, suppose that *treatment dropout* is selected as the reference category in a model that includes *gender* as the predictor variable. In this example, indices are calculated which help to determine the likelihood of a male completing treatment versus dropping out is compared with the likelihood that a female will complete treatment versus dropping out. Similarly, the indices are calculated which help to determine the likelihood of a male terminating treatment versus dropping out is compared with the likelihood that a female terminating treatment versus dropping out. The indices used include tests of statistical significance and *odds ratios* (Norušis, 2005). Odds ratios are values that indicate the change in odds in the outcome for a one unit change in the predictor variable. A one unit change in age, for example, would be one year, whereas a one unit change on the FIM would be a unit of 1 (remember that the FIM is a 7-point ordinal-scale instrument). Considering this information, odds ratios indicate the likelihood of completing treatment (or terminating treatment) versus dropping out for each increase in age by one year or increase in functional independence by one unit. As variables are added to the model (e.g., FIM score), one can evaluate whether the added variable significantly predicts outcome (i.e., treatment retention status) at each level of the outcome (e.g., FIM score might significantly predict who completes treatment versus drops out, but may not significantly predict who terminates treatment versus who drops out).

A favorable feature about odds ratios is the ease with which they can be interpreted. Suppose that Black females are compared to White females on treatment retention status, where White females are the reference category. Also suppose that one is examining who terminates treatment compared to who drops out. An odds ratio of 2.0 would indicate that Black females are twice as

likely to terminate treatment versus drop out compared to White females; an odds ratio of 3.0 would indicate that Black females are three times as likely to terminate treatment, and so on.

The Final Model

Parameter estimates, classification tables, odds ratios, and pseudo R^2 indices are used to evaluate the final model, which is compared to the previous tables and indices.

Looking Forward

Chapters 4 (results) and 5 (discussion) will be added following completion of data analysis. The expected deadline for completing data analysis is May 31, 2010. The expected deadline for completing the final draft of this dissertation is July 31, 2010.

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Appendix A

Summary of Studies Reporting Treatment Duration and Dropout Rates

Table A1. ***Summary of Studies Reporting Treatment Duration and Dropout Rates***

Citation: Author(s) and year	Sample: Diagnosis and size	Treatment duration	Dropout rate
Baskett et al. (1999)	Post-acute stroke patients (*N* = 100); 50 randomized to hospital-based PT, 50 to home PT	13 weeks	12% home PT 8% hospital PT
Burns et al. (1998)	Chronic pain patients (*N* = 112);	4 weeks	16.1%
Cohen et al. (1983)	Chronic low back pain patients (*N* = 36); 20 randomized to PT	10 weeks	40%
Crockett et al. (1986)	Myofacial pain patients (*N* = 28), randomized to either DP, BER, or TENS	8 weeks	25%
Foster et al. (2007)	Older adults with knee osteoarthritis (*N* = 352); 116 to exercise/advice, 117 to true acupuncture, and 119 to sham acupuncture	2 weeks	6.0% E/A 2.6% TA 1.7% SA
Golby et al. (2006)	Chronic low back pain patients (*N* = 302); 121 randomized to spinal stabilization, 121 to manual therapy, 60 to PT education	10 weeks	29.5%
Klässbo et al. (2003)	Hip dysfunction patients (*N* = 171); 94 randomized to hip school	8 weeks	18.1%
Long et al. (2004)	Chronic low back patients with directional preference (*N* = 230); 80 randomized to matched direction, 70 to opposite direction, 80 to evidence-based care	2 weeks	13.8% EBC 12.5% MD 11.4% OD
Lysack et al. (2005)	Postoperative (knee or hip) patients (*N* = 40); 22 were randomized to routine PT, 18 to video-assisted PT	4 weeks	0% both groups

Michaelson et al. (2004)	Chronic leg or back pain patients (N = 315)	4 weeks	3.8%
Schachter et al. (2003)	Sedentary women with fibromyalgia (N = 143); 51 were randomized to long bout exercise, 56 to short bout exercise	16 weeks	37.5% SBE 29.1% LBE
Smeets et al. (2008)	Chronic low back pain patients (N = 223); 53 randomized to PT, 58 to CBT, 61 to combined PT and CBT, and 51 to no treatment	10 weeks	11.5% Combined 5.7% PT
Waling et al. (2002)	Women with trapezius myalgia (N = 126); 34 were randomized to strength training, 34 to endurance training, 31 to coordination training	10 weeks	19.4% CT 17.6% ET 14.7% ST
Young & Forster (1991)	Post-acute stoke older adults with functional limitations (N = 124); 61 randomized to hospital-based PT, 63 to home-based PT	8 weeks	18% hospital PT 9.5% home PT

Appendix B

Variables to be Collected during Systematic Chart Review

Table B1: ***Demographic/Person Variables***

Variable Label	Variable Name	Scale	Levels[1]
Age	Age	Ratio	18+
Gender	Gender	Nominal	1-Male 2-Female 3-Transgender
Race	Race/Ethnicity	Nominal	1-White 2-Black 3-Hispanic 4-Asian 5-Native American
Marital	Marital Status	Nominal	1-Single 2-Married 3-Divorced 4-Widowed 5-Separated
Distance	Distance from VA (Miles)	Ratio	Variable

Table B2: ***General Health Care Related Variables***

Variable Label	Variable Name	Scale	Levels[1]
ServiceConn	Service Connection (%)	Ratio	0-100%
Insurance	Health Insurance	Nominal	0-None 1-Private 2-Public (Medicare)
PCP	Primary Care Physician	Nominal	Variable
InpatientDOC	Inpatient Provider	Nominal	Variable
DPOA	Durable Power of Attorney for Health Care	Nominal	0-No 1-Yes, not activated 2-Yes, activated
Unit	Inpatient Unit	Nominal	1-GEM[2] (9AN1) 2-Acute Rehabilitation (9AN2) 3-Extended Rehabilitation (9AN-EXT) 4-Transitional Care (9ANH)
Room	Hospital Room	Ratio	1-Single 2-Double 3-Triple

Table B3: ***Physical Therapy Variables***

Variable Name	Scale	Levels[1]	Levels[1]
ReferrDOC	Referring Provider	Nominal	Variable
ReferrCLINIC	Referring Service/Clinic	Nominal	Variable
IntakeSTAFF	PT[3] Intake Evaluator (PT Staff)	Nominal	Variable
PTepisodes	PT[3] Treatment Episodes (#)	Ratio	Variable
PTdxn	PT[3] Diagnoses (#)	Ratio	Variable
PTdxt	PT[3] Diagnoses (type)	Nominal	Variable
Onsettime	Problem Onset, Current Episode	Ratio	Variable
Onsetmethod	Onset Method, Current Episode	Nominal	1-insidious 2-abrupt
RPotential	Rehab Potential (current episode)	Ordinal	1-poor 2-fair 3-good
FIMpre	FIM[4] Score (pretest)	Ordinal	0-7
FIMpost	FIM[4] Status (pretest)	Ordinal	1-dependence 2-independence
PTsfcur	PT[3] Plan: Session Frequency	Ratio	Variable
PTdurcur	PT[3] Plan: Treatment Duration	Ratio	Variable
PTattcur	PT[3] Attendance, Current (%)	Ratio	0-100%
PTmisscur	PT[3] Appointments Missed, Current (#)	Ratio	Variable
PTattpast	PT[3] Attendance, Past Episode (%)	Ratio	0-100%
PTmisspast	PT[3] Appointments Missed, Past Episode (#)	Ratio	Variable

Table B4: ***Comorbid Disorder Variables***

Variable Name	Scale	Levels[1]	Levels[1]
MDdxn	Medical Diagnoses (#)	Ratio	Variable
MDdxt	Medical Diagnoses (type)	Nominal	Variable
SEVdxn	Severe[6] MH[7] Diagnoses (#)	Ratio	Variable
SEVdxt	Severe[6] MH[7] Diag. (type)	Nominal	Variable
SUdxn	Substance Use Diagnoses (#)	Ratio	Variable
SUdxt	Substance Use Diag. (type)	Nominal	Variable
MHdxn	Other MH[7] Diagnoses (#)	Ratio	Variable
MHdxt	Other MH[7] Diagnoses (type)	Nominal	Variable
RXtn	Prescribed Meds, Total (#)	Ratio	Variable
RXpain	Prescribed Meds, Pain	Nominal	0-No 1-Yes
RXsev	Prescribed Meds, Severe[6] MH[7]	Nominal	0-No 1-Yes
RXmh	Prescribed Meds, Other MH[7]	Nominal	0-No 1-Yes
TXsev	Current TX[5] for Severe MH[7]	Nominal	0-No 1-Yes, Past 2-Yes, Concurrent
TXmh	Current TX[5] for Other MH[7]	Nominal	0-No 1-Yes, Past 2-Yes, Concurrent
TXsu	Current TX[5] for Substance Use Disorders	Nominal	0-No 1-Yes, Past 2-Yes, Concurrent
lengthTXsev	Length of Current or Most Recent Severe MH[7] TX[5]	Ratio	Variable
lengthTXmh	Length of Current or Most Recent Other MH[7] TX[5]	Ratio	Variable
lengthTXsu	Length of Current or Most Recent Substance Use TX[5]	Ratio	Variable
sevTXatt	% Attendance, Severe MH[7] TX[5]	Ratio	0-100%
mhTXatt	% Attendance, Other MH[7] TX[5]	Ratio	0-100%
suTXatt	% Attendance, Substance Use TX[5]	Ratio	0-100%
missedTXsev	# missed appointments, Severe MH[7] TX[5]	Ratio	Variable
missedTXmh	# missed appointments, Other MH[7] TX[5]	Ratio	Variable
missedTXsu	# missed appointments, Substance Use TX[5]	Ratio	Variable

1-Missing variables coded as 999; 2-GEM=Geriatric Evaluation Management; 3-PT=Physical Therapy; 4-FIM=Functional Independence Measure; 5-TX=Treatment; 6-Severe=Psychotic Disorders and Bipolar Disorders; 7-MH=Mental Health