RELATIONSHIPS BETWEEN PHYSICAL THERAPIST MOTIVATION SCORES, PATIENT MOTIVATION SCORES, AND PATIENT FUNCTIONAL OUTCOMES

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ABSTRACT

RELATIONSHIPS BETWEEN PHYSICAL THERAPIST MOTIVATION SCORES, PATIENT MOTIVATION SCORES, AND PATIENT FUNCTIONAL OUTCOMES

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Purpose: The purpose of this research was to assess the relationship between patient motivation levels, physical therapist motivation levels, and functional outcomes, using an integrative motivation tool. This motivation tool addressed five motivation sources: intrinsic motivation, instrumental motivation, internal self-concept motivation, external self-concept motivation, and goal internalization. **Methodology**: The Motivation Sources Inventory (MSI) and the Cincinnati Knee Scale (CKS) were administered to patients at the initiation of physical therapy intervention and at the point of discharge from intervention. The patients' physical therapists were administered the MSI at the initiation of data collection. The predictive value of patient motivation levels on changes in patient functional outcomes (as measured by post – pre CKS scores) was examined

with a linear regression procedure. A descriptive analysis of the physical therapist motivation scores was conducted. T-tests were used to compare both pre- and post-treatment MSI means and pre- and post-treatment CKS means. **Results**: There was no significant difference between pre- and post treatment MSI means. There was a significant difference between pre- and post-treatment CKS means. The significant predictor of positive changes in CKS scores was internal self-concept motivation. Both physical therapists had the highest motivation scores in internal self-concept motivation. **Conclusion and Discussion:** Internal self-concept motivation was found to be the strongest predictor of positive changes in functional outcomes for patients with knee pathology treated by physical therapists. These results underscore the importance of understanding patient motivation sources in planning physical therapy intervention programs that can best lead to positive functional outcomes.

CHAPTER I

INTRODUCTION

Patient motivation has been suggested to be a strong predictor of patient compliance levels and overall outcome status after receiving medical treatment.[1] However, researchers in the physical medicine field have been unable to link patient motivation levels to long-term compliance and task involvement.[1,2,3] Physical therapy researchers have also not assessed the relationship between physical therapist motivation scores and their patients' functional outcomes.[4,5,6] Researchers hypothesize that the inability to find more complete links between patient motivation and physical therapy outcomes may be based on the types of motivational assessment tools being used. Friendrich et al[2] state that many motivational assessment tools differ in the aspects of motivation that they measure, thus making it difficult to validate levels of motivation. Commonly used motivation assessment tools such as the Beck Depression Inventory,[7,8] Rosenberg Self-Esteem Questionnaire,[9] Self-Handicapping Questionnaire,[10] and Task and Ego Orientation Questionnaire[1] are uni-dimensional in their measurement of the variables associated with motivation in that they do not consider more than one source of motivation. Thus, the purpose of this research was to assess the relationships between

patient motivation, physical therapist motivation levels, and functional outcomes, using a comprehensive motivational survey that examines five levels of motivation.

The Motivation Sources Inventory (MSI)[11] examines five sources of motivation such as: intrinsic process motivation, instrumental motivation, external self-concept motivation, internal self-concept motivation, and goal internalization motivation. Each of these sources of motivation is linked to well-known theories of motivation found in psychological literature. Table 1 illustrates the five motivation source categories.

Table 1: *Five Sources of Motivation Presented in Motivation Sources Inventory*

Intrinsic process motivation	Category of motivation associated with need theories that focus on maintaining internal locus of control-based behaviors in order to increase self-esteem levels and maintain high levels of self-actualization.[12]
Instrumental motivation	Category of motivation associated with behavioral constructs of motivation that base behaviors on an individual's interactions with and perception of external events.[13]
External self-concept motivation	Category of motivation that is based on how individuals compare themselves to others [1]
Internal self-concept motivation	Category of motivation that describes individuals driven by perceptions of their competency levels that are based on personal standards.[1]

Goal- internalization motivation	Category that describes individuals that place a strong emphasis on their personal standards and the details of the behaviors in which they are engaged.[11]

This study assesses the motivational and functional outcome levels of patients in two outpatient physical therapy clinics. The patients' respective physical therapists' motivation levels were also examined. Patient and physical therapist motivation levels were assessed with the Motivation Sources Inventory. Changes in patient functional outcome levels after receiving physical therapy treatment for knee pathology were measured with the Cincinnati Knee Scale.[14]

CHAPTER II

LITERATURE REVIEW

The following discussion highlights the importance of psychological factors in association with medical outcomes and the relevance of motivation in assessing such psychological contributions. Included is a general overview of the construct of motivation, common theories associated with motivation, motivational scales used to examine individual motivation levels, and past motivation based studies.

Researchers have shown that psychological factors have an important influence on physiological outcomes, especially when considering rehabilitation and recovery efforts. In fact, full recovery is often not complete until the patient has recovered both psychologically and physically.[1] One aspect of psychology that is often linked with physiological outcomes is motivation. Friendrich et al [2] reported that low back patients who attended a motivational group, consisting of counseling, reinforcement strategies, and informational strategies, were more likely to attend their exercise therapy appointments than those who did not attend. The patients in the motivational group also showed greater increases in strength and flexibility four months after treatment compared to the control group. Mayer et al [3] also reported that patients referred for chronic low back pain who attended a functional restoration program (focusing on behavioral-stress

management, cognitive-behavioral skills, and work-hardening training) were more likely to be working after two years compared with those who did not attend the functional restoration program. In addition, a study by Lampton et al [1] reported that patients in a sports medicine clinic categorized as ego-involved, or motivated by external inputs, missed more appointments than those who were classified as task-involved, or motivated by internal standards.

Motivation is a theoretical construct that has many definitions and facets, and is unique to each individual. However, it has generally been defined as 'the act of arousing interest' or 'the degree of resilience one possesses in adapting to new situations and learning from them.[15] In order to capture all aspects of motivation, each dimension of motivation will be explored beginning with the categories associated with the Motivational Sources Inventory (MSI) and concluding with additional theories of motivation.

INSTRUMENTAL MOTIVATION

The concept of motivation can be interpreted using nonmotivational theories, such as the behavioral or instrumental approach. This aspect of motivation is regarded as *instrumental motivation* in the MSI scale.[11] Rather than referring to internal constructs, the focus of the behavioral approach is placed on external contingencies such as material rewards and privileges. Fundamentally, behavioral theorists follow the tenet that human responses are provoked by external stimuli. Increases in motivation, according to the behavioral theorists, are caused by behaviors that are positively reinforced from the environment. Decreases in motivation, on the other hand, are due to associations with

negative incentives, such as threats and penalties.[15] Even though the behaviorist approach was one of the first theories in the psychological literature to help define motivation, it does not explain how individuals associated with institutions and practices not linked with a high degree of external rewards, such as the military or religious affiliations, are motivationally driven and successful.[15] Thus, the theory of instrumental motivation cannot be considered in isolation when defining factors or concepts of motivation.

INTRINSIC MOTIVATION

A second theory used in explaining motivation focuses on the influence of intrinsic motivators on behavior. Maslow, in his theory of motivation and personality, highlights the importance of intrinsic needs that are vital in increasing self-esteem levels and self-actualization.[12] This aspect of motivation is referred to as *intrinsic process motivation* in the MSI scale.[11] Intrinsic motivation leads people to engage in activities for inherent pleasure or satisfaction. Thus there is an inherent connection between the activity and the rewards, unlike extrinsic motivators. It has been postulated that all human beings need to feel 'effective' or self-determining, and possess a sense of personal causation.[16] According to White [16] and Deci, [17] it can also be assumed that individuals prefer to engage in activities that provide challenges that suit their competence levels and provide opportunity for exploration. Self-perpetuating rewards for engaging in such behaviors include feelings of effectiveness and autonomy. Thus, engaging in certain activities poses a 'functional significance' for intrinsic needs. In order for an activity to be intrinsically motivating, it must be interesting, challenging, include feedback, and give an individual a

sense of freedom to experiment with what he or she is doing.[17] Interestingly, intrinsic and extrinsic motivators often interact with each other, leading to variable results. For example, research has shown that being involved in an internally stimulating activity for the purpose of obtaining an extrinsic reward can cause decreases in intrinsic motivation levels.[19] Also, some external rewards, such as material rewards and verbal feedback, can frequently increase intrinsic motivation as long as the external rewards are not presented in a controlling manner.[18]

SOCIALLY-BASED MOTIVATION

Another method of evaluating motivation levels is through the examination of social interactions. Depending on the individual, individuals may be either *task-involved or ego-involved* when comparing themselves to a reference group. Ego-involved individuals are often described as having an external locus of control. Such individuals express aspects of external self-concept motivation, according to the MSI scale.[11] External forces, such as trophies and social pressures, often motivate these individuals. Ego-involved individuals often base their behaviors on how they believe to be perceived by others and are eager to conform to the groups' standards, often despite the beliefs of the group. Such individuals accept a groups' influence because they believe that a favorable reaction from the group will result. However, the effort levels of ego-involved individuals are often dependent on their self-esteem levels. For example, if an individual determines that achieving success at a certain task is unlikely, his or her self-esteem level will be lowered, and the individual's initial goals of gaining competence and achievement will change to avoid the task at hand. This avoidance reaction is associated with a self-

handicap, which is often created as an excuse for failure or avoidance behaviors. Examples of self-handicaps include withdrawal from an activity and complaining of physical symptoms. These self-handicaps help protect self-esteem by placing the blame on more external constructs rather than lack of ability.[19]

Other individuals, however, are task-involved. Their competence levels are based on their own perceived levels of achievement. Such individuals possess characteristics of those with internal self-concept motivation, according to the MSI scale.[11] Task-involved individuals have an internal locus of control which allows their motives to be powered by internal motivations.[1] Task-involved individuals often place a high value on effort expenditure in order to gain improvements and mastery. They also let their internal standards, beliefs, and values guide their behaviors. They want to participate in behaviors that support such standards and, thus, improve their competency levels.

GOAL INTERNALIZATION MOTIVATION

A more complex form of internal self-concept based motivation is *goal internalization motivation*. It is considered to be more complex because it is associated with individuals who have reached the highest level of cognitive reasoning within both the Piaget Developmental Model and the Kohlberg Stages of Moral Development.[20] The Piaget classification most closely associated with the goal internalization construct is the last and highest stage of cognitive development, formal operational thought. Individuals within this developmental level base their behaviors on their theories and interpretations of the world as they see it. Thus, their behaviors often follow their personal values. Goal internalization is also associated with Kohlberg's final level of moral development, the

post-conventional stage. Individuals in this stage follow universal ethical principles. In other words, their behaviors are guided by such standards, rather than ego-concentric wants and needs. Goal internalization regulates behaviors when individuals harbor beliefs and attitudes that are similar to their personal value systems. Goal-internalization differs from internal self-concept motivation in that the individuals are more focused on the content of the behaviors they adopt versus the act of adopting a behavior that supports their standards, beliefs, and values.[11] In other words, such individuals place more of an emphasis on the details of the behaviors they are going to engage in versus the consequences of their behaviors.[11]

Another way to tie the MSI categories together is to consider them in a linear progression. Individuals whose behaviors are mostly guided by instrumental processes, or more simplistic variables, are driven by lower levels of motivation compared to those individuals who rely on more complex sources of motivation, such as goal internalization motivation. These theories can also be defined in developmental terms. Developmental models state that an individuals progress through each of these stages, starting with the most simplistic sources of motivation and optimally reaching the more complex, goal internalized behavior, as they reach higher levels of maturity and emotional well-being.[20] Thus instrumental and self-concept motivation can be classified as the more simplistic forms of motivation and the intrinsic, self-concept external, and goal internalization based motivation sources can be classified as more complex.

COGNITIVE MODEL

Another, more current, approach to understanding motivation is the cognitive approach. Cognitive theories emphasize perceptions and thoughts, such as expectations concerning reinforcements and inferences about why one participates in particular behaviors. Expectancy theory and self-perception theories are used in order to help explain the more intrinsic aspects of motivation. Expectancy theory states that people will participate in a behavior if they believe that this behavior will lead to a positive valued reinforcement and, secondly, that they will have competence in carrying out the behavior. Such positive competence is highly correlated with the individual carrying out a similar activity again, because the behavior affects her or his expectation about having the ability to regain reinforcement.[21] On the other hand, decreases in intrinsic motivation are linked to self-perception theories. These theories suggest that people attribute internal states and feelings to external factors that may account for the behavior, according to their perceptions, thereby discounting intrinsically motivating factors. Thus, a loss of intrinsic motivation results.[22] Although the cognitive approach is prevalent in motivational literature, it still disregards some of the more complex, interactional aspects of motivation such as contextual, temporal, and goal-based constructs.

CONTEXTUAL MODEL

In addition, motivation can be affected by events and contexts. If an individual is self-determined, or has an adequate amount of control over his or her life, events and contexts will function to increase competence levels. If these factors decrease competence, motivation levels will decrease. The *cognitive evaluation theory* also considers the

multidimensional aspects of various inputs. Two of the most influential aspects of inputs on motivational levels are controlling and informational aspects. Controlling aspects of input pressure individuals toward certain outcomes. These inputs decrease self-determination levels and, therefore, decrease intrinsic motivation. Informational aspects, however, do not use aspects of control. Informational aspects rely on one's perceived levels of competence. Such reliance directly effects and increases levels of intrinsic motivation.[17]

TEMPORAL MODEL

Motivation is also affected by temporal constructs. Peoples' perceptions about both past, present and future events may have a powerful impact on their behavior. The past and future are often viewed as *social cognitive constructs.* For many individuals, the sum of these constructs is viewed as a subjective evaluation of one's goals and environment. Therefore, researchers have often defined goals as cognitive schemes that people strive to reach.[23] Sociologists have discovered that people's expectations for the future influence how they decide to achieve their specific goals. A person's expectations for the future can differ along three dimensions: positivity, controllability, and temporal distance.[24] The dimension of positivity is related to whether individuals view the future as having either positive or negative outcomes. Values may have a strong influence on the desirability of future events. Controllability is connected to the degree to which an individual is able to have an influence on future events. The temporal distance construct refers to the amount of time it takes before one expects to achieve his or her goal and, quite often, may have a strong impact on one's motivation levels.[24]

Current knowledge, attitudes, and mood have a strong influence on how people view their future. Therefore, people connect the present with their future. This connection between the future (represented through goals) and current motivation levels is very strong. Many people, in attempting to accomplish their goals, first imagine several future scenarios, weigh the advantages and disadvantages of each scenario and, then, formulate methods in order to achieve their potential future outcomes without producing negative outcomes.[25]

Views of the future also, in turn, can affect current moods, attitudes, and knowledge levels. People often try to analyze other individuals' goals and intention directed behaviors. This process is undertaken to evaluate another person's goal and determine if these goals are compatible with one's own goals. At times, people will also project their motivations onto others when attempting to evaluate another person's goals or intentions. Emotions may play a strong role in goal perceptions and attainment. People experience positive emotions when they view an event as a possible way of furthering their goals, and often experience negative emotions when they consider events as obstacles to the attainment of their goals. Emotions help individuals to determine whether certain events should receive attention, or if these goals should no longer be considered.[23]

GOAL-BASED MODEL

In addition, goals may be classified as either immediate goals or long-term goals. Research has shown that goals are often chosen based on a *positive time preference*. A positive time preference is the phenomenon in which there is a higher degree of motivational pull related to an immediate goal versus a long-term goal.[26] Long-term

goals often lose their value. In order to overcome this *positive time preference*, individuals often engage in self-control processes. These processes include changes of one's mindset that either deter or enhance the union of perceived value of proximal and distal outcomes. Individuals choose what type of goals they want to attain by determining how much they value their goals and how they expect to value the goals in the future. Once people realize that their proximal and distal goals are inconsistent in nature, they will formulate strategies in order to prevent the influence of time from affecting the attainment of their distal goals. For example, people may commit to certain activities or behaviors, thereby 'holding them to' the accomplishment of their distal goals. People also may, through self-control processes, change autonomous situations into no-choice situations. This change in situation may often help people maintain their priorities.

Thus, motivation can be described from many view points. Sources of motivation have been found to include instrumental, intrinsic, social, and goal derived influences. Motivation has also been described by constructs including cognitive, contextual, temporal, and goal-based models. These varying constructs and definitions have become the basis of many motivational surveys.

According to Friendrich et al,[2] few relationships have been identified between motivation levels and long-term compliance in current studies. These studies hypothesize that results obtained may be due to the use of motivation scales across studies that are based on different definitions and theories of motivation. There are numerous scales that are currently being used to measure motivation levels. The Beck Depression Inventory (BDI), for example, is commonly used to evaluate motivation when assessing compliance levels.[7,8] Depression is considered to be an important variable to assess when measuring

individual motivation levels because it measures an individual's lack of motivation. The BDI is a 21-item self-report inventory used to assess the severity of depressive symptoms. The items measure cognitive, affective, and somatic symptoms. Subjects select statements that best represent their current condition. These statements refer to physiological factors such as weight, appetite, and insomnia, as well as mood and cognitive factors that are associated with self-image and self-esteem factors.[8]

The Rosenberg Self Esteem Scale, like the BDI, focuses on self-image and self-esteem cognitive factors.[7] It uses a 10-item scale to assess whether an individual has high or low self-esteem levels. According to the authors of this scale, self-esteem was chosen as an important variable to assess in psychological studies because of its link to depression. The authors conducted a study examining the relationship between self-esteem self reports and the level to which observers characterized the subjects' affect and behavior. A significant relationship was demonstrated between subjects with low self-esteem reports and characterizations indicating that the subjects appeared depressed upon observation. Subjects select sentences on the questionnaire that best describes their emotional state. These sentences refer to self-worth, positive/negative attitudes, satisfaction levels with self, and personal respect. Scores are then tabulated and the subjects are given a classification of having either high or low self-esteem levels.[9]

The assessment of self-handicapping behavior and attributions has also been used to measure subject motivation levels. Self-handicaps have been defined as obstacles for displaying behaviors successfully that are used to protect one's self image.[10] People who use self-handicapping coping skills typically do not attribute personal failures to lack of ability, thus serving as an attempt to protect their self-esteem. Like the scales previously

discussed, the Self-Handicapping Scale links the indirect measurement of self-esteem levels to motivation levels.[10] Self-handicapping behaviors are often elicited when the subjects anticipate a threat to their self-esteem. These self-preserving behaviors can present themselves in the form of excessive alcohol and drug use, test anxiety, a reduction in effort, and traumatic life events. The Self Handicapping Scale[10] is a 25-item questionnaire that assesses the subjects' likelihood to engage in such self-handicapping behaviors. This scale has been shown to correlate highly with self-esteem measurement tools.[10]

In addition, the Task and Ego Orientation Questionnaire[27] measures an individual's motivational tendencies towards behaviors. This questionnaire includes 14 items that assess whether or not individuals attribute their self-competency levels to their own perception of personal skill and mastery (task-orientation) or to their perception of how they compare to others (ego-orientation). Thus, those individuals who chose a higher percentage of statements associated with task orientation are classified as having an internal locus of control as compared with those people who are ego-oriented and thus derive their motivation from external sources.[1]

However, each of these scales is based on only one's theoretical interpretation of motivation (with relation to cognitive variables), such as self-esteem, task or ego-orientation, or self-handicapping behaviors. Complete associations between patient motivation levels, patient functional outcomes, and treatment adherence were not found in studies that used these scales to assess motivation. Therefore, a scale that is based on more than one theoretical interpretation of motivation may be able to assess motivation

more comprehensively and thus allow us to examine relationships between patient motivation levels and functional outcomes from medical treatment more accurately.

The Motivation Sources Inventory [11] takes into account the multidimensional aspects of motivation measurement. This tool considers the following five unique, but intertwined, sources of motivation: instrumental motivation, intrinsic process motivation, external self-concept motivation, internal self-concept based motivation, and goal-internalization motivation. Each facet of motivation is measured and a profile of the sources of one's motivation is depicted in the final analysis. Therefore, the use of this measurement tool permits the researcher to assess the degree to which each measured component/source of motivation contributes to the individual's overall motivation level.

In addition, the influence of physical therapist motivation levels on patient motivation levels has been neglected in the literature. Motivation factors such as recognition, achievement, opportunity for advancement, and possibility of growth have been found to be common in work-related environments.[4,5,6] Since physical therapists experience varying types and degrees of recognition, achievement, opportunities for advancement and growth possibilities, it follows that their motivation levels may differ. However, the effect of the resulting motivation levels of therapists on their patients has not been quantified. Therefore, the MSI[11] also can be used to compare patient motivation levels with their physical therapists' motivation levels.

As mentioned previously, many researchers have been unable to find complete connections between patient motivation levels and their consequent behaviors when assessing patient compliance and motivation levels. For instance, Friendrich et al [2] were unable to find a link between motivation levels and long-term changes in exercise therapy

attendance, muscle strength, and flexibility. In this study the impact of a combined exercise and motivation program on the compliance of patients with chronic low back pain was examined. Patients attended ten outpatient physical therapy treatments and a concurrent motivation program that consisted of five compliance-focused interventions, including extensive counseling, use of reinforcement techniques, use of treatment contracts, posting of treatment contracts in patients' homes, and use of exercise diaries. Control group patients did not attend the motivational program. The patients' disability and pain intensity levels, flexibility, and strength were reassessed at three and a half weeks, four months, and twelve months. After four and twelve months, a significant decrease in disability and pain levels was reported between those who attended the motivational sessions and patients in the control group. There was also a significantly higher degree of muscular strength and flexibility exhibited in the patients who attended the motivational program four months post treatment. However, there were no differences reported in the motivation scores between the patients who had improved along these variables and the control group participants. No significant differences in self-reported compliance with long term exercise were found between treatment groups.[2] As indicated by these results, either factors other than motivation produced temporary exercise gains or the instruments used to assess motivation were unable to accurately assess motivation. The motivational sessions also had no effect on long-term compliance.

Lampton et al [1] were unable to identify a relationship between task-involved individuals and treatment adherence. In this study, a sample of injured athletes and workers who had received on-the-job injuries were examined for relationships between

their achievement motivation, self-esteem, and physical therapy treatment adherence. Adherence levels were based on the number of missed appointments and physical therapist ratings of the patient's effort and progress with relation to treatment. Even though patients with high levels of ego-involvement missed the most treatment sessions, a significant relationship between task-involvement and treatment adherence was not identified.

Lastly, in the Mayer[3] study improvements in functional restoration were only brought forth by allowing low back patients to participate in a multifaceted program that focused on physical rehabilitation and psychological treatment. Patients in the experimental group received three weeks of rehabilitative treatment and psychological intervention involving behavioral stress management training, cognitive-behavioral skills training, individual and group counseling based on a crisis intervention model, and family counseling. The control group received only physical rehabilitative treatment. In the experimental group 87% percent of patients who attended both types of treatment were back to work after two years. In the control group only 41% of the patients returned to work after two years. The control group also attended five times as many visits to health care providers two years later as compared to the experimental group. Control subjects had a higher level of re-injury after the study had concluded. Even though a psychological intervention program helped improve patient outcomes, it is not possible to infer that it was improvements in motivation that increased these outcomes. Several psychological variables were targeted in the program, thus causing one to question how much influence motivation levels had on the end results.

The importance of psychological factors in physical rehabilitation can easily be inferred from the previous discussion. Motivation, as highlighted in current studies, is an important psychological variable to address when assessing the relationship between patient motivation levels and functional outcomes after receiving physical therapy intervention. There are many theories in the psychological literature that define and explain motivation. Previous studies have relied on motivation scales that are often based on only one theory of motivation. Researchers have been unable to find complete associations between patient motivation level and functional outcomes after physical therapy intervention when such uni-dimensional scales have been used. The Motivational Sources Inventory,[11] however, utilizes several theories of motivation to assess motivation profiles. It examines the degree to which each patient derives his or her motivation from the following sources: instrumental motivation, intrinsic process motivation, external self-concept motivation, internal self-concept motivation, and goal internalization motivation. The association between patient motivation levels and respective physical therapist motivation levels also has not been assessed. Therefore, the purpose of this study was to examine the relationships between physical therapist motivation levels, patient motivation levels, and patient functional outcomes.

CHAPTER III

METHODS

A pre-treatment, post-treatment design was used to compare Motivation Sources Inventory (MSI) scores and Cincinnati Knee Scale scores at the initiation of the patients' physical therapy intervention and at the point of discharge from physical therapy intervention. The patients' respective physical therapist scores were measured with the MSI at the initiation of data collection.

Subjects:

Nineteen patients and their respective physical therapists were recruited from two HealthSouth outpatient clinics in the Austin area. Inclusion criteria involved selecting patients between the ages of 18 to 45 with acute knee pathology. These inclusion criteria were utilized to help target patients without chronic orthopedic problems and/or systemic pathologies since factors associated with such pathologies may alter functional outcome measures.[28] Thus subject criteria for exclusion were those patients who suffered from chronic knee joint pathologies, such as rheumatoid arthritis and degenerative joint disease, and patients with multiple or systemic orthopedic pathologies. The physical therapists who agreed to participate in this study were licensed to practice by the Board of Physical Therapy Examiners.

Materials:

Motivation Sources Inventory

Past motivational surveys have been unable to evaluate motivation using an integrative approach that bases the definition of motivation on more than one theory. The Motivation Sources Inventory[11] (Appendix A) utilizes an integrative approach that examines motivation from five sources that combine the concepts of motivation previously discussed. The sources include intrinsic process motivation, instrumental motivation, external self-concept motivation, internal self-concept motivation, and goal-internalization motivation.[11]

The abbreviated Motivation Sources Inventory[11] used in this study includes 30 items that evaluate the five sources of motivation previously discussed in the literature review. The initial MSI contained 60 items. A varimax –rotated component pattern analysis was performed on the results from the initial 60-item scale. Thirty items were selected that had factor loadings of .40 or greater. This procedure was performed by the authors of this survey to insure that the goodness of fit values for each source were high. The survey also incorporates demographic questions that determine each patient's age, sex, and education level. Respondents selected their answers from a Likert scale of choices from 0, entirely disagree to 6, entirely agree. Each category of motivation is scored by the sum of the responses to 6 of the 30 items represented in the scale. The selected responses for each sum represent the same motivation category. The scores possible for each sum range from 0 (lowest sum) to 6 (highest sum). Items for the full format were chosen based on factor analysis results. The average factor loading for the items that were

retained was 0.58. The goodness of fit level was found to be 0.92.[11] Reliability, and sensitivity to time, was shown to be acceptable, based on results employing the K1 or Bartlett test rule.[29]

Cincinnati Knee Scale:

The Cincinnati Knee Scale [30] (Appendix B) is a self-report 50-point scale that evaluates the symptoms associated with knee pathology and the functional abilities of the patient. The symptom assessment accounts for 50% of the total score. This portion includes pain, swelling, and giving-way components. The functional subscale accounts for the remaining 50 % of the total score. It assesses the overall activity level of the patient, and the patient's abilities in walking, stair climbing, running, and jumping/twisting. For each variable to be assessed, the subject selects the sentence that best describes his or her symptoms or functional abilities. For the pain, giving-way, and overall activity level variables, responses are recorded using a Likert scale in which "0" represents severe symptoms of knee pathology and "20" represents the absence of symptoms. Subject responses to the swelling and walking variables are also based on a Likert scale in which a score of "0" represents severe symptoms and "10" represents the absence of knee pathology symptoms. Running and jumping activity levels are recorded using a Likert scale with "0" representing severe symptoms and "5" representing no knee symptoms. Thus, the total sum of scores can range from "0"(severe symptoms) to "100" (absence of symptoms). If patient responses are not complete for all variables, the scores for each category can be examined individually or combined with other symptom or functional ability categories. Criterion validity for the scale has been reported in the

literature. In a study by Wilk et al [31] self-reported Cincinnati Knee Scale scores of patients who had undergone anterior cruciate ligament reconstructive surgery were found to be associated with favorable functional outcomes. Also, researchers have indicated that the Cincinnati Knee Scale has been sensitive to changes over time. In a study by Riseberg et al,[32] patients who had undergone ACL reconstruction were assessed three months, six months, one year, and two years after surgery. The CKS was the most sensitive instrument utilized and indicated improvements at each follow up.[32,33]

Procedure:

The procedure involved using a pre-test/post-test design for the assessment of the relationship between patient motivation scores and changes in functional outcome scores. A pre-test/post-test design was also used to evaluate the relationship between physical therapist motivation scores and changes in patient functional outcomes. Questionnaire packets, including the Cincinnati Knee Scale [30] questionnaire and the Motivation Sources Inventory,[11] were distributed to two HealthSouth outpatient facilities during the first week of July 1, 1999. Each physical therapist was given an instruction form (Appendix C) stating the inclusion/exclusion criteria of the patients to be assessed and instructions on the testing procedures. Each patient first completed the questionnaire packet prior to the initiation of the intervention. After each patient's final treatment session, each patient again completed both surveys. The treatment time frames generally ranged from four to six weeks. The anonymity of patients was maintained by numbering the questionnaire packets in a consecutive sequence. In addition, each physical therapist completed the Motivation Sources Inventory [11] questionnaire prior to the initiation of data collection.

The therapists' results were also recorded anonymously using a similar consecutive numbering format. After the completion of the surveys, the patient's number and his or her respective physical therapist number were matched for comparison.

Data Analysis:

Statistical analysis was performed on an IBM personal computer using the SPSS[34] statistical package. The outcome variable assessed was the change in the functional outcome score (post-treatment versus pre-treatment) for each patient derived from the Cincinnati Knee Scale.[30] The predictor variables were the profiles motivation scores (pre and post treatment) for each patient and his or her respective physical therapist. Other variables included in the data set were demographic information concerning the age range, sex, and education level of each subject. Relationships between the potential predictor variables (patient and physical therapist Motivation Sources Inventory scores) and the change in outcome variables (Cincinnati Knee Scale functional outcomes scores) were examined using a linear regression procedure. Variables for each group with p values of .05 or less were retained to ensure that they would represent motivation sources that had a statistically significant relationship with the outcome variable.[35] T-tests were conducted to compare pre and post Motivation Sources Inventory[11] category scores and pre and post Cincinnati Knee Scale [31] scores. A p value of .05 or less was used to signify significant differences between means.

CHAPTER III

RESULTS

Nineteen adult patients referred to outpatient physical therapy for knee pathology completed the Motivation Sources Inventory[11] and Cincinnati Knee Scale[30] prior to the initiation of treatment and after discharge from physical therapy services. Of the nineteen patients who participated, fifteen patients completed both sections of the survey. The remaining four patients stopped attending treatment sessions prior to their planned discharge.

DEMOGRAPHICS

Thirty-seven percent of the fifteen participants were male and sixty-three percent were female. The age of range of the subjects was as follows: 18-21 years (5.3%), 22-25 years (10.5%), 26-35 years (15.8%), and 36-45 years (36.8%). Since the age variable was measured by categories, the mean and standard deviation associated with age will be indicated by category levels with level 1 equal to 18-21, level 2 equal to 22-25, level 3 equal to 26-35, and level three equal to 36-45. Thus the mean age was 3.35 (SD= 1.08).

PHYSICAL THERAPIST MOTIVATION SCORES

The summed motivation scores per category for physical therapist A and physical therapist B are listed in Table 2.

Table 2: *Summed Motivation Sources Inventory Scores, per category, for Participating Physical Therapists*

Motivation Sources	Summed Scores for Physical Therapist A	Summed Scores for Physical Therapist B
Intrinsic motivation	23	22
Instrumental motivation	16	19
External self-concept motivation	19	21
Internal self-concept motivation	30	24
Goal internalization motivation	20	19

The mean change in functional outcome scores for patients that were treated by physical therapist A was 27.4 (SD=23.99). The mean change in functional outcome scores for patients that were treated by physical therapist B was 31.5 (SD=20.04).

PRE AND POST-PHYSICAL THERAPY INTERVENTION PATIENT MOTIVATIONAL LEVELS

Table 3 contains the pre and post Motivation Sources Inventory (MSI)[11] score means by category. Paired t -tests comparing the means of pre and post MSI scores, per category, revealed no significant differences between pre and post MSI scores.

Table 3. *Mean and Standard Deviation Scores of Pre- and Post- Treatment Motivation Sources Inventory values*

	Pre-test means	Post-test means
Intrinsic Motivation	24.80 (SD=3.69)	25.20 (SD=5.37)
Instrumental Motivation	23.43 (SD=5.04)	21.23 (SD=3.94)
External Self-Concept Motivation	16.27 (SD=7.62)	17.03 (SD=6.93)
Internal Self-Concept Motivation	27.73 (SD= 2.91)	27.50 (SD=3.08)
Goal- Internalization Motivation	21.70 (SD=3.55)	22.03 (SD=3.65)
Cincinnati Knee Scale Scores	35.47 (SD=24.74)	65.07 (SD=19.58)

PRE AND POST PHYSICAL THERAPY INTERVENTION KNEE FUNCTIONAL STATUS

The mean of the pre-physical therapy treatment Cincinnati Knee Scale (CKS)[30] score was 35.47 (SD= 24.74). The mean post-physical therapy treatment CKS [30] score was 65.07 (SD=19.58). A paired t-test comparing pre and post CKS [30] scores revealed a significant difference between scores, p=.001.

MULTIPLE LINEAR REGRESSION ANALYSIS

The multiple linear regression procedure, predicting changes in functional outcome based on patient sources of motivation, revealed that the pre-treatment internal self-concept motivation score was a significant predictor of positive changes in functional outcome scores, as measured by the change in Cincinnati Knee Scale[30] scores (comparing post-treatment scores to pre-treatment scores), ($p=0.046$, $R^2=.913$). The significance values for the pre- and post-treatment motivational sources are listed in Table 4.

Table 4. *Significance Values (p-values) for Pre- and Post-Treatment Motivation Sources*

Motivation Sources	Pre-treatment significance values	Post-treatment significance values
Intrinsic Motivation	0.163	0.078
Instrumental Motivation	0.192	0.189
Internal self-concept motivation	0.046	0.086
External self-concept motivation	0.203	0.132
Goal internalization motivation	0.119	0.605

There were no significant post-treatment motivation source values that predicted changes in functional outcome. Reliability analyses comparing pre and post MSI[11] scores revealed that there was a difference between the reliability of MSI [11] scores. Pre-physical therapy MSI [11] scores had an alpha level of 0.7653 and post-physical therapy MSI [11] scores had an alpha level of 0.8170. Due to the small subject number a multiple

regression analysis comparing physical therapist motivation scores and changes in their respective patient functional outcomes was not conducted.

CHAPTER IV

DISCUSSION

The relationship between high motivation levels and positive medical outcomes has been thoroughly detailed in medical literature.[1,2,3] Researchers have also emphasized the importance of this psychological variable in relation to the area of physical medicine and other rehabilitative disciplines. For example, Friendrich et al [2] reported that patients with low back pain who attended motivational sessions were more likely to regularly attend their physical therapy appointments and also exhibited increases in flexibility and strength four months after discharge from treatment. In addition, a study by Mayer et al [3] revealed that patients with low back pain who participated in a functional restoration program emphasizing behavioral-stress management, cognitive-behavioral skills, and work-hardening training, were more likely to be working two years after the end of study compared to those who did not participate in the functional restoration program. Another study reported that physical therapy patients that were classified as ego-involved, or driven by external standards, were more non-compliant in that they missed more therapy appointments than those classified as task-involved.[1] However, researchers have been unable to establish correlations between patient motivation levels, long-term compliance, and task involvement levels. Friendrich et al [2] were unable to show significant relationships between long-term changes in exercise therapy participation, strength,

flexibility and patient motivation levels. Lampton et. al [1] were also unable to demonstrate a correlation between task-involved or internally-motivated patients and treatment adherence. Lastly, in the Mayer [3] study, researchers were only able to find a relationship between positive changes in functional restoration in patients who attended a multifaceted program that emphasized both physical and psychological rehabilitative treatments. In other words, it was not possible to conclude from the Mayer[3] study that motivation was the key psychological element allowing these individuals to improve functionally.

The lack of more definite relationships between motivation levels and medical outcomes has been attributed to the type of motivational scales being used in current studies. It has been suggested that the results previously discussed may be due to the high degree of inconsistency between motivation scales.[2] Most motivation scales currently used are based on different definitions or theories of motivation. The Motivation Sources Inventory, [11] however, examines motivation from a multidimensional approach. Rather than basing the assessment of motivation only on one variable or theory, the MSI incorporates several psychological theories of motivation that encompass a more comprehensive definition of motivation. Based on research indicating that individuals who are motivated by more internal standards are more likely to succeed and follow through with their behaviors, a hypothesis was formulated assuming that subjects guided by more internal sources of motivation such as intrinsic motivation, internal self-concept motivation, and goal-internalization motivation would have higher functional outcomes after physical therapy interventions.[17]

Previous literature concerning the Motivation Sources Inventory [11] includes discussion about the development and validation of the assessment tool. Other studies have not been

conducted to compare the effects of contextual factors on the sources of motivation. Upon examination of the data gathered from this study, one can describe the motivational profile of the subjects assessed. The pre-treatment MSI [11] score means indicate that the subjects were highest in internal self-concept motivation, followed (from higher mean values to lower mean values) by intrinsic motivation, instrumental motivation, goal-internalization motivation, and external self-concept motivation. These results indicate that the subjects in this study characterized themselves as being impacted the most by internal self-concept motivation. The subjects described themselves as being driven by internal constructs and the desire to match their behaviors with their personal competencies and values and not the standards of others. The analysis of MSI [11] scores post-treatment revealed the following subject profile (from higher means to lower means): internal self-concept motivation, intrinsic motivation, goal-internalization motivation, instrumental motivation, and external self-concept motivation. This information about the motivational sources of physical therapy patients may be useful to physical therapists in planning intervention programs. The difference in pre and post-physical therapy MSI [11] means, however, was not significant.

There are several possible reasons for the lack of significant change between pre-treatment MSI [11] scores and post-treatment MSI [11] scores. There was no attempt made by the researcher in this study sto manipulate motivation levels. The subjects did not participate in any psychological interventions that coincided with physical therapy treatment. Since the subjects' motivation profiles remained consistent over time, it can also be inferred that the subjects were not impacted by other contextual and temporal constructs reported to have possible influences on motivation levels.[17,23,24]

Literature has shown that the Cincinnati Knee Scale [30] is sensitive to changes in functional outcomes over time. The Cincinnati Knee Scale (as compared to the Lysholm[31] scores) has been noted to be one of the most sensitive instruments by being able to detect significant improvement between follow ups (post-treatment) over time.[31] An additional study also highlighted the effectiveness of the Cincinnati Knee Scale. Borsa et al [36] concluded that the Cincinnati Knee Scale was one of the best estimates of disability in patients with anterior cruciate ligament-deficient knees. The Cincinnati Knee Scale scores in the present study indicate that the subjects began physical therapy intervention with relatively low functional capabilities (mean CKS[30] score = 35.47). There were, however, increases in function at the time of discharge from physical therapy intervention (mean CKS[30] score = 65.07). Cincinnati Knee Scale[30] results underscore the efficacy of physical therapy intervention in improving the functional status of patients between the ages of 18 and 45 with knee pathology. These scores changed, unlike the MSI scores, because the intent to improve functional outcome levels was inherent in the physical therapy intervention. This aspect of the research design allowed the relationship between changes in functional levels and sources of motivation to be examined.

Results indicated that the strongest predictor of changes in functional outcome levels for physical therapy patients with knee pathology was pre-treatment internal self-concept motivation. Individuals who rely on internal self-concept motivation base their competency levels on their own perceived levels of achievement, rather than basing their self-image on group comparisons. They are task-involved in that they are guided by internal motivations. Such internal motivations include their personal standards, beliefs, and values. Participation in behaviors that coincide with these standards, in turn, increase

and/or maintain individual's competency levels. While individuals guided by internal self-concept motivation take into account the manner in which others perceive them, they do not allow the public's expectations and evaluation of their actions to guide their behaviors. Their behaviors are based on their own self-image, self-competency levels, and personal standards and values.[1]

There are a number of reasons why pre-treatment internal self-concept motivation could have had the strongest impact on positive changes in the functional ability of knee patients after physical therapy intervention. First, researchers have determined that individuals directed by more internal social influences than external social influences are more likely to follow through with behaviors, as long as these behaviors match their personal standards and beliefs.[1] For example, an individual guided by internal self-concept motivation would be more likely to improve his or her functional status through physical therapy in order to maintain or increase self-esteem levels and participate in inherently challenging and pleasurable activities. Secondly, individuals who are guided by internal self-concept motivation have also been reported to have higher self-esteem levels than those who are guided by external social influences.[1,17] Thus, those with higher self-esteem levels would have more positive outlooks and expectations concerning their physical therapy outcomes. Having high expectations and optimistic outlooks towards medical treatments often has been shown to have a strong impact on medical outcomes.[1,2,3]

The data from this study indicate that the more external sources of motivation, such as instrumental motivation and external self-concept motivation, were not strong predictors of functional outcomes after physical therapy intervention. Instrumental motivation may

not have had a significant affect on functional outcomes in this study because research has shown that individuals guided by this source of motivation are less likely to engage in behavior unless they have expectations of receiving more external rewards for their behaviors.[15,17] Since the subjects who participated in this study were not given any financial incentives or material rewards, they were less likely to find motivation from these sources in the physical therapy outpatient environment. Researchers have also demonstrated that individuals guided by external influences are more likely to have lower self esteem levels than those guided by a more internal locus of control. [15,17] Therefore, subjects guided by instrumental motivation are less likely to participate in activities that do not include a material reward and they tend to have lower levels of self-efficacy, both limitations to increasing one's functional status through physical therapy.[17]

It can also be assumed that external self-concept motivation does not predict positive changes in functional outcome. This finding may be due to similarities between instrumental motivation and external self-concept based motivation. Individuals with external self-concept motivation are similar to those individuals influenced by instrumental motivation, guided by external concepts.[19] In this self-concept form of motivation, the individuals are influenced by how they believe others perceive them. Their perception of how others interpret their behaviors and actions is given more merit than their own internal standards of how they should carry out their lives. Such individuals, in developmental terms, do not have a strong sense of self. Instead of basing their self-esteem and self-image on their own internal standards, their idea of self is based on how others react towards them. As seen with individuals driven by instrumental motivation, these individuals also suffer from low self-esteem and self–efficacy

levels.[17,19] Thus, it can be assumed that such individuals would be less likely to show greater increases in functional outcomes after physical therapy intervention as compared to those individuals guided by intrinsic motivation.

However, two sources of motivation similar to internal self-concept motivation, intrinsic motivation and goal-internalization motivation, were not identified to be strong predictors of positive functional outcomes for physical therapy patients in this study. Intrinsic motivation and goal-internalization motivation are both similar to intrinsic motivation in that individuals guided by these sources of motivation base their actions on their need to feel self-determined and to possess a sense of personal causation. These individuals engage in activities that they find personally challenging and provide opportunities for self-exploration. They are less influenced by more tangible rewards, such as monetary and material gains. Intrinsic motivation, however, unlike internal self-concept motivation, does not incorporate how social influences affect an individual's behavior.[1,11] It simply differentiates between individuals who are motivated by more internal factors versus external factors. Those individuals who base their behavior on goal-internalization motivation also match their behaviors to their personal value systems. They, however, place more of an emphasis on the details of the behaviors in which they choose to engage versus simply carrying out the behaviors based on the perceived consequences. [11]

There are several possible reasons why intrinsic motivation and goal internalization motivation were not identified to be predictors of positive functional outcomes. First of all, intrinsic motivation and internal self-concept motivation categories tend to overlap in definition. An individual who is guided by internal self-concept motivation is also

motivated intrinsically. As a consequence of this overlap, it may have been difficult for the subjects to differentiate between questions targeting the two sources. Secondly, since the significance value of post-treatment intrinsic motivation was relatively high (p=.076), a larger subject sample may have indicated a stronger relationship between intrinsic motivation and functional outcomes. Lastly, since literature indicates that a large percentage of the population does not reach the cognitive/moral developmental stage associated with goal-internalization, it can be assumed that this form of reasoning is not fundamental to obtaining improvements in functional status.[9]

It was noted, however, that the post-treatment internal self-concept motivation scores did not significantly predict positive changes in summed Cincinnati Knee Scale[30] scores. There are several possible reasons for this discrepancy. First of all, reliability analyses comparing pre and post-treatment MSI means revealed that there were differences in the reliability values of the pre and post scores. Factors associated with physical therapy intervention could have had an effect on the consistency of internal self-concept scores between the beginning of intervention and the point of discharge. Previous literature has only discussed the development and validation of the Motivation Sources Inventory.[11] Unfortunately, assessment of the impact of external constructs on the motivation sources has not been studied. Thus, a change in internal self-concept ratings over time could have reduced the predictive value of this post–treatment variable. Secondly the significance of the post internal self-concept variable was still relatively high (p=.086). A larger subject sample may have resulted in more significant results. Lastly, it may have been possible that internal self-concept motivation scores slightly decreased, although not significantly, because the patients were no longer focused on the physical therapy intervention at hand.

The patients may no longer have been focused on the goal of improving their functional status, since they were at the point of discharge. This situation may have lead to a decreased need for internal self-concept based motivation levels.

Although a linear regression procedure was unable to be performed on the physical therapists and their respective patients' change in knee scores, the two physical therapists had similar motivation profiles, as assessed by the Motivation Sources Inventory.[11] Both physical therapists' motivation profiles indicated the highest scores were in internal self-concept motivation, followed by intrinsic motivation. These profiles are similar to the patient profiles previously discussed. However, the standard deviations of the change in knee scores of their respective patients' were so large that associations between the two variables could not be established.

There were many limitations associated with this study. First of all, the subject number was small. A larger sample size could have provided a more comprehensive analysis. Secondly, the patients with a classification of knee pathology that were chosen for the study were not limited to a specific diagnosis. The inclusion criteria only specified subjects aged 18 to 45 with acute knee pathology. Thus, the functional outcome levels of patients with varying knee pathologies were being assessed. Since different types of knee pathologies are associated with different functional outcome potentials, an accurate assessment of the relationship between motivation levels and functional outcomes may not have been assessed. In other words, at the time of discharge, patients with certain diagnoses may have not reached higher functional outcome levels due to time and financial constraints associated with therapeutic treatment sessions. In addition, extraneous variables such as subject personality type, overall health status, social status,

and social desirability levels associated with self-report surveys were not measured. These variables could have affected the subjects' functional outcome status levels and interacted with motivational variables.

There were many other extraneous factors not measured that are related to a more macroscopic interpretation of the results. First of all, the issue of the subjects' resources of payment may have impacted the results. For instance, subjects receiving payment from workers' compensation may have different motivation levels than those who pay out of pocket, and those with insurance. The main distinction between workers' compensation patients and other types of patients that must be considered is that workers' compensation patients are required by law to attend an intervention program or they have the potential of losing their benefits. Other individuals sent to clinics through referrals, however, come seeking treatment.[37] Thus, their motivation levels can be different. In addition, the level of chronicity associated with the impairment may have had an impact on overall outcome level. Di Fabio et al [37] reported that improvements in disability status were two to three times greater for workers' compensation patients with acute low back pain compared to subjects with more chronic symptoms. Even though the criteria for the present study excluded individuals that were suffering from chronic knee conditions, a distinct length of time that the person had to have been suffering from the condition was not provided. Therefore, overlaps in the severity of the impairment could have affected the results in an erroneous manner. In addition the type of intervention provided by the physical therapists may have had an impact on functional outcome levels. Since this study included two physical therapists, it can be assumed that they did not utilize identical methods in treating their patients. Thus interactions between forms of physical therapy intervention,

patient motivation levels, and overall outcomes could have resulted. Another factor to consider is the work environment associated with the two participating physical therapy clinics and its affect on motivation levels and functional outcomes. Both clinics were affiliated with the HealthSouth Corporation, often associated with high volume, high paced clinics and thus, could make these results less generalizable to other clinics that are based on different standards and procedures. Also, differences in race may have influenced the results in an extraneous manner. In addition, the subjects' perceptions of the respective physical therapist providing intervention, and perceptions associated with possible prior experiences with injuries may have had an influence on outcomes.

Another significant limitation to the study included characteristics of the scales used to assess motivation and knee functional outcomes. Although the Motivation Sources Inventory[11] is classified as an 'integrative' measure of motivation, it cannot be all-encompassing. Several theories, such as the cognitive, contextual, temporal, and goal-based models, were not addressed in this survey. Many questions also targeted individuals that were employed, thus not applicable to the unemployed (Appendix A). As previously discussed, the motivation source variables also overlapped each other in definition and description. It was difficult to differentiate between categories such as goal- internalization motivation, intrinsic motivation, and internal self-concept motivation. The concepts of instrumental motivation and external self-concept motivation also overlapped in definition. In addition, the Cincinnati Knee Scale [31] was possibly limited in applicability to some of the subjects assessed because of several sports-oriented questions (Appendix B). For example, non-athletic patients, not involved in running and jumping/twisting activities, may have been unable to adequately answer

questions assessing their ability to carry out such activities since they do not perform these activities on a regular basis.

Lastly, the assessment of sources of motivation associated with specific functional outcomes may have been inaccurate due to possible interactions between different sources of motivation. For example, research has indicated that participating in an internally stimulating behavior with the goal of obtaining an extrinsic reward may actually lead to decreases in intrinsic motivation. Also, external rewards have been reported to cause increases in intrinsic motivation if not presented in a controlling manner.

Although the amount of research highlighting the impact of motivation on medical outcomes is abundant, further research assessing the influence of motivation and physical therapy outcomes is warranted. A replication of this study including a larger sample size, different subject samples (focusing a specific diagnoses), and motivation/functional outcome surveys that can be generalized to larger sample types is recommended.

The results from this study provide further insight into the influence of motivation on the Disablement Model.[38] This model serves as a framework to aid in understanding how pathological conditions relate to function. The definition of function is unique to each individual. It is associated with activities that an individual deems necessary to maintain his or her physical, social, and psychological well being. The Disablement Model[38] is based on four constructs: pathology, impairment, functional limitation, and disability. Pathology refers to a biological or psychological change that results in a malfunction of a body organ or system. Impairment refers to any physiological, structural, or psychological deficit and/or abnormality. A functional limitation can be defined as a

decrease in an individual's ability to carry out tasks and behaviors in an efficient and capable manner. Disablement is considered to be a limitation in an individual's ability to participate in age, gender, and sex-specific roles related to particular social and physical environments.

Motivation influences many aspects of the model. First of all, since motivation is a psychological factor, it can be categorized under the pathology and impairment categories. As indicated by the link between depression and motivation, it can be understood how depression can possibly have a pathological effect on body systems or organs. However, based on the results from this study motivation can also have an impact on an individual's functional capabilities. Even though the affect of motivation on the roles associated with the disablement aspect of the Disablement Model[38] was not measured in this study, it has been shown that motivation is related to one's interpretation of common roles and expectations of the world around him/her and, thus, how an individual acts upon the world.[12,17,20,21] Such multiple categorizations of motivation in this model underscore the need for examining psychological variables holistically, as demonstrated by the pervasive effect motivation has on many dimensions of life.

The results derived from this study, however, are applicable to present-day physical therapist practices. For example, noting the relationship between pre-treatment internal self-concept motivation and positive functional outcomes can affect how interventions are presented to the patient. Since internal self-concept motivation is associated with individuals who are directed by challenging and inherently interesting/pleasurable activities, physical therapists can focus on formulating treatment approaches that match these descriptions. This approach is based on the premise that individuals' motivation

levels can change with contextual and temporal influences. Thus, assuming that even if a patient's motivation sources are not linked to intrinsic levels of motivation, placing these individuals in an intrinsically stimulating environment may help elicit more internally intrinsic forms of motivation. Further research is needed to assess how populations that rely on other types of pre-treatment motivation sources change in functional status after receiving physical therapy interventions. Specific treatment approaches could possibly be formulated for these individuals. In sum, the results from this study underscore the need for physical therapists to individualize their treatment approaches for each patient.

APPENDICES

Appendix A

***MSI** (motivation sources inventory)* © **Name**_____

Use the following scale to rate your level of agreement with each of the following statements. There are no right or wrong answers.

Entirely Agree	Somewhat Agree	Neutral	Somewhat Disagree		Entirely Disagree
6	5	4	3	2	1	0

_____ 1. I would prefer to only do things that are fun.
_____ 2. Job requirements will dictate how much effort I give at work.
_____ 3. It is important to me that others approve of my behavior.
_____ 4. Decisions I make will reflect high standards that I've set for myself.
_____ 5. I would not work for a company if I didn't agree with its mission.
_____ 6. If I didn't enjoy doing my job at work I would probably look for another job.
_____ 7. A days work for a days pay.
_____ 8. I make decisions based on what others will think of my choice(s).
_____ 9. It is important that my work requires me to use my unique skills.
_____ 10. I have to believe in a cause before I will work hard to achieve it.
_____ 11. I often put off work so that I can do something else which is more exciting.
_____ 12. I would work harder if I knew that my efforts would lead to higher pay.
_____ 13. I would work harder on a project if its completion would earn me praise or recognition.
_____ 14. Decisions I make are consistent with my personal standards.
_____ 15. Unless I believe in the cause, I will not work hard.
_____ 16. When choosing jobs I choose the job with the most interesting activities and tasks.
_____ 17. When choosing jobs I choose the job with the best financial package.
_____ 18. When choosing jobs I choose the job that is most visible or prestigious.
_____ 19. When choosing jobs I choose the job that offers the greatest challenge.
_____ 20. When choosing companies to work for I look for one that supports my personal values.
_____ 21. I choose to spend my time with those people who are the most fun to be with.
_____ 22. At work, my favorite day is 'payday'.
_____ 23. Those who make the most friends in their lifetime have lived the fullest life.
_____ 24. I like to do things that give me a sense of personal achievement.
_____ 25. An organization's mission needs to speak to my values for me to work hard.
_____ 26. If choosing between jobs, I will always consider which job will be most fun.
_____ 27. People should always keep their eyes and ears open for better job opportunities.
_____ 28. I give my best effort when I know that the most influential people will notice.
_____ 29. It is important to me that my skills are impacting an organization's success.
_____ 30. If I believe in a cause and the cause is successful, it doesn't matter to me if I helped it succeed.

Demographics (check all that apply):
_____Male _____Female
Age: ___ 18-21 ___ 22-25 ____ 26-35 ____ 36-45 _____46-55 ____56-65 ____66+
Education: ____High School ____Assoc. _____BA/BS ____MS/MBA ____PhD

Appendix B

The Cincinnati Rating System

*reproduced with permission

Instructions: Please check only one box per section.

Left	Right	Section 1. Pain
❑	❑	No pain, normal knee, performs 100%
❑	❑	Occasional pain with strenuous sports or heavy work, knee not entirely normal, some limitations but minor and tolerable.
❑	❑	Occasional pain with light recreational sports or moderate work activities, frequently brought on by vigorous activities, running, heavy labor, strenuous sports.
❑	❑	Pain, usually brought on by sports, light recreational activities or moderate work. Occasionally occurs with walking, standing, or light work.
❑	❑	Pain is a significant problem with activities as simple as walking. Relieved by rest. Unable to do sports.
❑	❑	Pain present all the time, occurs with walking, standing, and at night-time. Not relieved with rest.

		Section 2. Swelling
❑	❑	No swelling, normal knee, 100% activity.
❑	❑	Occasional swelling with strenuous sports or heavy work. Some limitations but minor and tolerable.
❑	❑	Occasional swelling with light recreational sports or moderate work activities, frequently brought on by vigorous activities, running, heavy labor, strenuous sports.
❑	❑	Swelling limits sports and moderate work. Occurs infrequently with simple walking activities or light work (about 3 times/year).
❑	❑	Swelling brought on by simple walking activites and light work. Relieved with rest.
❑	❑	Sever problems all of the time, with simple walking activities.

		Section 3. Giving-way
❑	❑	No giving-way, normal knee, performs 100%.
❑	❑	Occasional giving-way with strenuous sports or heavy work. Can participate all sports but some guarding or limitations are still present.
❑	❑	Occasional giving-way with light recreational activities or moderate work. Able to compensate, limits vigorous activities; sports or heavy work; not able to cut or twist suddenly.
❑	❑	Giving-way, limits sports and moderate work, occurs infrequently with walking or light work (about 3 times/year).
❑	❑	Giving-way, with simple walking activities and light work. Occurs once per month. Requires guarding.
❑	❑	Severe problem, with simple walking activities, cannot turn or twist while walking without giving-way.

Appendix B

Section 4. Overall Activity Level

❑	❑	No limitation, normal knee, able to do everything including strenuous sports or heavy labor.
❑	❑	Performs sports including vigorous activities, but at a lower performance level, involves guarding or some limits to heavy labor.
❑	❑	Light recreational activities possible with rare symptoms, more strenuous activities cause problems. Active but in different sports, limited to moderate work.
❑	❑	No sports or recreational activities possible. Walking activities possible with rare symptoms, limited to light work.
❑	❑	Walking, activities of daily living cause moderate symptoms, frequent limitation.
❑	❑	Walking, activities of daily living cause severe problems, persistent symptoms.

Section 5. Walking

❑	❑	Normal, unlimited.
❑	❑	Slight/mild problem.
❑	❑	Moderate problem: smooth surface possible up to 800 meters.
❑	❑	Severe problem: only two to three blocks possible.
❑	❑	Severe problem: requires cane, crutches.

Section 6. Stairs

❑	❑	Normal, unlimited.
❑	❑	Slight/mild problem.
❑	❑	Moderate problem: only 10 – 15 steps possible.
❑	❑	Severe problem: requires bannister, support.
❑	❑	Severe problem: only 1 – 5 steps possible.

Section 7. Running Activity

❑	❑	Normal, unlimited: fully competitive, strenuous.
❑	❑	Slight/Mild problem: run half-speed.
❑	❑	Moderate problem: only 1 – 2 miles possible.
❑	❑	Severe problem: only 1 – 2 blocks possible.
❑	❑	Severe problem: only a few steps.

Section 8. Jumping or Twisting Activities

❑	❑	Normal, unlimited, fully competitive, strenuous.
❑	❑	Slight/Mild problem: some guarding, but sports possible.
❑	❑	Moderate problem: gave up strenuous sports; recreational sports possible.
❑	❑	Severe problem: affects all sports, must constantly guard.
❑	❑	Severe problem: only light activity possible (golf, swimming).

Appendix C

Survey Administration Instructions

1. **You will be administering the questionnaire packet (including the Motivation Sources Inventory and the Cincinnati Knee Score survey) to each knee patient prior to the initiation of treatment and after the final treatment session.**
2. **Only administer the survey packets to knee patients who meet the following criteria:**
    a. **are between the ages of 18 and 45**
    b. **are not suffering from chronic knee conditions, such as rheumatoid arthritis and degenerative joint diseases.**
    c. **are not suffering from other pathologies (excluding the knee) and/or systemic problems.**

3. Remind the patients that the results are anonymous.

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