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THE MEDIATING ROLE OF SELF-EFFICACY EXPECTATIONS AND SELF-EVALUATION IN THE REHABILITATION PROCESS

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THE MEDIATING ROLE OF SELF-EFFICACY EXPECTATIONS AND SELF-EVALUATION IN THE REHABILITATION PROCESS

By

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TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

THE MEDIATING ROLE OF SELF-EFFICACY EXPECTATIONS AND SELF-EVALUATION IN THE REHABILITATION PROCESS

BY

Daniel Wayne Malloy

University of New Hampshire, September, 1986

Bandura (1977) has argued that the consideration of cognitive mechanisms is central to the understanding of behavioral change and the maintenance of these behavioral patterns. More specifically, Bandura (1977, 1982) has proposed two cognitive mechanisms, self-efficacy and self-evaluation, that mediate the initiation of and persistence toward behavioral change. The purpose of the present study was to assess whether the medium through which feedback is presented to patients participating in rehabilitation would have an effect on their future expectations of performance for motor tasks encountared in therapy and the actual performance of strength and endurance tasks. It was hypothesized that knee injury patients who were provided with detailed color graphic feedback intended to facilitate self-evaluation would develop higher self-expectations of performance and subsequently display better motor functioning. The sample consisted of twenty-three patients who had incurred a knee injury. All patients participating were judged capable of regaining 85% of their functional capacity with the injured extremity within 16 therapy sessions. Patients who met selection criterion were randomly assigned to one of two treatment conditions. The experimental condition included color graphic feedback at points throughout the patients' rehabilitation. Patients in the control condition received standard feedback only (i.e., discussion of progress with the therapist). The results showed that the graphic feedback intervention had a significant effect on patients' expectations of performance on a Cybex at 60 and 180 degrees per second but did not have an effect on expectations for weight lifting, performance on an exercise bike, or walking. The graphic feedback intervention did not have an effect on motor performance. Although the intervention did not show a significant effect, the means for each of the five performance tasks were in the hypothesized direction. Finally, the results showed a strong association between patients' expectations of performance and future motor functioning. In general, the results provided support for the predictions of Bandura's (1977) self-efficacy theory. The implications and applications of the principles of efficacy theory for the administration of health services are discussed.

I. THEORETICAL INTRODUCTION

Proper health maintenance is contingent on individuals having knowledge of appropriate health behaviors and the ability to execute these actions. While informational support is a necessary condition for proper health behavior, it does not guarantee the display of appropriate health actions. In fact, empirical research has shown that health care recipients do not always comply with medical advice and often engage in self-destructive behaviors despite knowledge of their detrimental effects (Stone, 1979; Kirscht & Rosenstock, 1979; Matarazzo, 1980; 1982). Social scientists are confronted with the challenge of describing and explaining these inconsistencies in behavior and with developing strategies that will facilitate appropriate health actions.

The focus of the present work is to examine the utility of Bandura's (1977,1982) model of self-efficacy as a conceptual framework to describe and explain behavioral change in health care. Bandura (1977) has argued that the consideration of cognitive mechanisms is central to the understanding of behavioral change and the maintenance of these behavioral patterns. More specifically, Bandura (1977, 1982) has proposed two cognitive mechanisms, self-efficacy and self-evaluation, that regulate the initiation of and persistence toward behavioral change. Bandura (1982) and his colleagues (Bandura & Cervone, 1983) have provided empirical support for the effects of these cognitive mechanisms on motivation and performance. The purpose of the present study is to assess the effectiveness of an intervention strategy designed to increase patients' self-expectations of functional capacity and actual motor performance in a rehabilitation setting. The intervention strategy was intended to facilitate self-evaluation by focusing patients' attention toward their own performance record. It will be suggested that self-efficacy and self-evaluation mechanisms provide the essential link between knowledge of appropriate health behaviors and patients' motivation toward and commitment to health actions.

Bandura's Theory of Self-Efficacy

Bandura (1977) has defined self-efficacy as a self-belief about one's capabilities to perform a required action in order to achieve some desired outcome. Efficacy theory predicts that self-expectations will determine the degree of motivation and persistence individuals will display toward a performance task. When individuals are confronted with situations that exceed their expectations of functional capacity, they will cease their coping efforts prematurely or avoid the situation altogether (Bandura & Adams, 1977). In contrast, individuals with high self-expectations will persist longer and undertake more challenging tasks encountered in their environment (Brown & Inouye, 1978; Weinberg, Gould, & Jackson, 1979).

According to efficacy theory, self-efficacy expectations also have a direct effect on the emotional and cognitive responses that individuals experience prior to and during the execution of a performance task. For individuals with low self-expectations, self-doubt results in anticipatory arousal that distracts the individual's attention from the execution of the task. Emotional responses in conjunction with the inability to focus on the necessary criterion for goal attainment lead to poor performance. In contrast, individuals with high self-expectations orient themselves to the task at hand without the detracting effects of self doubt. Individuals with high self-efficacy focus on the demands of the situation and execute the performance task with persistence and confidence, which in turn leads to better performance.

While the relationship between self-referenced thought and behavior has been explored in other psychological theories (Lefcourt, 1976; Rotter, Chance, & Phares, 1972), the distinguishing characteristic of efficacy theory is the specificity of expectations of performance mastery. From this perspective, expectations are defined in terms of specific tasks rather than as global indicators of functional style. The advantage of this approach is that it enables a more precise analysis of the psychological functioning being examined and provides increased predictive validity between thoughts and actions. Inherent to the assumptions of the efficacy model is that self-assessments of functional capacity can vary across performance tasks and situations.

<u>Sources of Efficacy Expectations</u>

Consistent with the social learning perspective, efficacy theory suggests that self-efficacy judgments are based on internal and external sources of information. These include: performance accomplishments, vicarious experiences, verbal persuasion, and physiological or emotional arousal. Through the integration of information derived from these sources, an individual is capable of making judgments of functional capacity for a particular performance task in a given situation. The ability to make accurate assessments of operational capabilities is functionally adaptive (Bandura, 1982).

Although each of the four sources of information can be relevant to the formation of efficacy expectations, performance accomplishments or enactive mastery provides the most direct influence on judgments of functional capacity. The successful performance of a task will strengthen efficacy expectations, while the experience of failure will reduce them. The influence of success or failure on judgments of functional capacity is dependent on the individual's learning history with similiar performance tasks.

For example, If the individual has experienced repeated success and suddenly is confronted with failure, the impact of failure will probably be minimal or act as a motivator to overcome the obstacle that prevented goal attainment. In contrast, an individual who has experienced multiple failures may interpret the additional setback as an indicator of lack of competence and abandon the pursuit of future goal attainment. The effects of failure on efficacy expectations must be considered in light of the timing and pattern of previous outcomes.

When individuals experience repeated success with a particular performance task, they develop heightened expectations of personal mastery for that task. Efficacy theory predicts that with continued success, expectations of personal mastery will generalize beyond a particular performance task. This progression results in increased motivation and persistence toward a range of behavioral tasks that are similiar in nature.

Individuals do not rely solely on information derived from personal mastery. Vicarious experiences also provide individuals with information that can be utilized when assessing their functional capacity. Empirical research has shown that observing a model successfully perform a task will lead to heightened self-expectations of performance for that task by the observer. Other research has shown that observing a model who is unsuccessful at a performance task will result in a decrease in self-expectations of performance by the observer (Brown & Inouye, 1978). Vicarious learning provides the observer with strategies for goal attainment that make performance tasks more predictable. Although vicarious experiences are effective at altering judgments of functional capacity, enactive mastery is still a more dependable source of information about one's capabilities.

Social persuasion is the third source of information that influence efficacy expectations. Although verbal persuasion can be effective in altering expectations of performance, the stability of this change is contingent on the experience of performance accomplishments. If verbal persuasion can facilitate persistence and motivation that lead to successful task performance, heightened self-expectations will be maintained and will result in the pursuit of additional skills and performance mastery. While the effectiveness of altering expectations of performance with verbal persuasion alone is limited, it is a powerful tool with which to change behavior in conjunction with guided mastery.

The final component considers the role of emotional arousal for judgments of self-efficacy. In threatening situations, the influence of arousal on subsequent performance is mediated by the individual's self-apprasial of functional capacity. Physiological arousal acts as a gauge of vulnerability in threatening situations. Heightened arousal signals greater vulnerability, while lower levels of arousal represent greater levels of competence. The magnitude of the emotional response will alter efficacy expectations which in turn influence the approach or avoidance of stressful activities. The avoidance of threatening situations prevent the attainment of coping skills that will lead to performance mastery. Avoidance will substantiate perceived performance deficits and result in additional arousal (Sarason, 1976). The successful performance of a threatening task will disconfirm perceived deficits and reduce the level of emotional arousal. This reciprocal relationship between performance and arousal is particularly important for endurance and strength tasks. The interpretation of fatigue and pain associated with strenuous motor tasks could be interpreted as indicators of physical inability. The accurate appraisal of these physical components are central to maintaining and developing heightened self-efficacy expectations.

Cognitive Appraisal of Efficacy Information

While judgments of self-efficacy are derived from information obtained through enactive mastery, vicarious experiences, verbal persuasion, and physiological arousal, only information actively processed and integrated will influence judgments of functional capacity. The cognitive appraisal of efficacy information is a byproduct of the types of cues individuals have learned to use when assessing self competence and the inference rules applied when integrating information from various sources (Bandura, 1981).

Efficacy judgments are also influenced by situational factors that qualify information derived from experience. For example, the successful performance of a strenuous endurance task under the supervision of trained professionals may not generalize to endurance tasks outside the medical setting. By erroneously attributing performance accomplishments to external factors rather than to one's capabilities the potential benefits of performance mastery are not attained. The more extensive the situational support, the greater the likelihood that performance accomplishments will be attributed to external factors (Bem, 1972).

The perceived difficulty of performance tasks encountered in one's environment also provides information that influences judgments of functional capacity. Performance accomplishments with challenging tasks provide support for perceived competence, while successes at less challenging tasks do not substantiate heightened self-efficacy judgments. The rate and pattern of goal attainment with tasks that vary in difficulty also influence judgments of competence (Bandura, 1977).

Although heightened efficacy expectations and increased performance can be induced by various sources of information (e.g., guided mastery, vicarious learning) the stability of these changes are contingent on the availability of future self-directed performance accomplishments. The reciprocal nature of self-expectations and performance necessitates continued opportunities for goal attainment. As external sources that helped induce heightened expectations are removed, self-directed mastery becomes more crucial for future goal attainment. This progression places the responsibility of continued performance accomplishments on the individual. The opportunity to display personal mastery enables the individual to refine his/her strategies for goal attainment and to experience performance accomplishments that will further substantiate his/her judgments of functional capacity. Interventions that promote self-directed mastery and guarantee continued exposure to challenging performance tasks will be most successful in maintaining behavioral change (Bandura, Adams, Hardy & Howells, 1980).

<u>Self-Evaluation Mechanism</u>

Self-Evaluation is the other cognitive mechanism proposed within the efficacy model that is relevant to behavioral change. According to the model, self-evaluation has a direct effect on the level of motivation an individual will display toward a performance task and on his/her future self-efficacy expectations. Self-evaluation refers to the comparison of one's internal standards or goals with the actual performance of a goal directed behavior.

Bandura and Cervone (1983) have suggested that the magnitude of the discrepancy between one's actual performance and what he/she sought to achieve will have differential effects on motivation toward a performance task. For example, when the actual performance of a task is highly discrepant from the desired outcome, the self-dissatisfaction produced by this comparison will result in discouragement and possible goal abandonment. If the actual performance is moderately discrepant from the desired outcome but the possibility for future goal attainment remains, the self-dissatisfaction produced through self-assessment would result in enhanced effort to bring performance in line with the desired outcome. Finally, if one's performance is consistent with the desired outcome or exceeds it, the successful performance will motivate the individual to pursue more challenging performance tasks. Thus, motivation toward a performance task is a by-product of the magnitude of the discrepancy between one's actual performance and his/her desired outcome (Bandura & Cervone, 1983).

The self-evaluation mechanism also influences an individual's future expectations of performance. The appraisal of how well one has performed a task provides information in which to base future judgments of functional capacity. How one interprets a given outcome may be crucial to the types of tasks an individual will undertake in the future.

Central to the self-evaluation mechanism is the availability of accurate information about one's performance and a clear understanding of the desired outcome. The absence of either component prevents self-assessment and eliminates the possibility of the motivational effects (Becker, 1978; Strang, Lawerence & Fowler, 1978). Setting goals without proper feedback or providing feedback without a clear standard of performance to appraise the performance will not result in enhanced effort. In contrast, under conditions where both goals and feedback are present motivational effects will be observed (Bandura & Cervone, 1983).

Efficacy Expectations and Motor Performance

According to Bandura's model, the performance of a particular behavioral response and the amount of effort one puts into that behavior is mediated by self-efficacy and self-evaluation mechanisms. Central to the efficacy framework is that expectations and performance must be defined in terms of a specific behavioral task and should be measured independently. With this level of specificity, it provides a basis for predicting the occurence of a particular behavior and the level of motivation that will accompany it.

Kaplan, Atkins & Reinsch (1984) demonstrated the utility of the efficacy model in predicting exercise compliance among patients with chronic obstructive pulmonary disease (COPD). Kaplan et al. (1984) found that patients' compliance with a walking program designed to enhance their overall fitness was mediated by patients' self-efficacy expectations. They found that when patients were required to monitor their performance in the program, they displayed a positive association between self-expectations for walking and actual physical performance on a treadmill. At a three month follow up, efficacy judgments for walking and motor tasks analogous to walking were significantly correlated with patients' overall physical tolerance on the treadmill and their general fitness.

Kaplan and his colleagues (1984) also assessed patients' general expectancies with the health locus of control scale. They found that patients' health locus of control was unrelated to compliance with the program or physical performance at the initial screen or at the three month follow up. They concluded that specific efficacy expectations provided greater predictive validity than generalized expectancies for compliance and physical performance.

Other empirical work has also demonstrated that heightened self-efficacy expectations for specific types of motor tasks have an influence on the performance of those tasks. Weinberg, Gould, & Jackson (1979) manipulated subjects' expectations for success at a competitive leg endurance task. They found that participants with heightened self-efficacy expectations for the task displayed greater muscular leg endurance than a matched control condition.

Wilkes and Summers (1984) employed a cognitive preparation strategy designed to raise participants self-efficacy expectations for an isokinetic strength test. Their results showed that the intervention had a significant effect on participants' strength performance compared to a control group. In their conclusion, Wilkes and Summers (1984) noted that self-directed attention resulting from the cognitive intervention seemed to provide the best explanation for performance differences.

The utility of assessing specific efficacy judgments has been demonstrated in other studies unrelated to physical performance. Perceived efficacy has been effective in predicting: changes in social behavior (Kazdin, 1979), success at eliminating phobic responses (Bandura & Adams, 1977; Bandura, Adams, & Beyers, 1977; Bandura, Adams, Hardy, & Howells, 1980; Biran & Wilson, 1980), the self-regulation of addictive behaviors (Condiotte & Lichtenstein, 1981; DiClemente, 1981), and decisions about career choices (Betz & Hackett, 1981). In each of these situdies, efficacy judgments were highly postively correlated with the performance of the behavior under consideration.

Sources of Efficacy Expectations: Empirical Support

Efficacy theory makes specific predictions about the sources of information that people utilize when making judgments of functional capacity. In turn, individuals' self-expectations help determine the types of tasks they will attempt, the effort they will exert, and the performance accomplishments they will achieve. One of the strengths of Bandura's model (1977) is that it enables the direct assessment of these predictions. The sources of efficacy information can be varied systematically and their effects measured. A growing body of empirical research is providing support for the predictions of efficacy theory (Bandura, 1982).

Bandura and his colleagues (Bandura & Adams, 1977; Bandura, Adams, & Beyers, 1977; Bandura, Adams, Hardy, & Howells, 1980) have provided empirical support for the proposed sources of efficacy judgments. In these studies, phobics who had extreme reactions to snakes received treatments that relied on enactive, vicarious, emotive, or cognitive modes of influence. The results in each of these studies confirmed that the four sources of information had an effect on judgments of functional capacity. Consistent with the theory, enactive mastery was most influential for self-percepts of efficacy. Heightened expectations were also closely associated with subsequent changes in behavior. Increased self-efficacy expectations resulted in the initiation of approach responses previously feared by the phobic. Phobics also persisted at these approach responses until they were successful. In contrast, phobics with low self-efficacy avoided these tasks or abandoned their efforts when they believed the task exceeded their functional capacity.

Other researchers have provided empirical support for the sources of efficacy judgments and their effects on judgments of functional capacity. Feltz, Landers, and Raeder (1979) compared the effectiveness of participant, live, and videotaped modeling on the learning of a high-avoidance springboard diving task (back dive). Efficacy theory would predict that participation with guidance during the learning process would be more effective than vicarious experiences with a live or videotaped model. Feltz et al. (1979) found that students in the participant-modeling condition developed stronger efficacy expectations toward high avoidance motor tasks (back dives) and performed the task more effectively than students in either the live or videotaped modeling condition. These results are consistent with the proposed hierarchy of efficacy information that serves as a source for judgments of functional capacity.

<u>Self-Evaluation and Performance</u>

Although the influence of self-efficacy expectations on motivation and performance has been supported, the role and importance of the self-evaluation mechanism has received less attention in the literature (Bandura & Cervone, 1983). Efficacy theory predicts that self-appraisal will enhance performance motivation. According to the social learning perspective, the discrepancy between one's desired outcome or goals and one's actual performance of a task will serve to induce enhanced effort. Fundamental to the self-evaluation mechanism is the availability of standards with which to compare one's performance and accurate information about the performance itself.

Bandura and Cervone (1983) have provided empirical support for the proposed motivational effects resulting from self-evaluation. Since self-reactive influences are activated through cognitive comparison of goals and performance, Bandura and Cervone (1983) reasoned that only under conditions where both components were present would the motivational effects be demonstrated. Bandura and Cervone (1983) had subjects perform a strenuous motor task under conditions with goals and feedback, feedback alone, goals alone, or without either component. The results showed that when goals and feedback were both present, enhanced motivational effects were observed. In contrast, setting goals without feedback or providing feedback without comparison standards had no effect on subjects' level of motivation. These results are consistent with other empirical research that has compared the presence or absence of goals and feedback on motivation and performance (Becker, 1978; Strang, Lawerence, & Fowler, 1978).

Bandura and Cervone (1983) concluded that self-efficacy and self-evaluation mechanisms operate differently on performance motivation but are also highly interdependent. The goals or standards one establishes to compare his/her performance are contingent on the strength of his/her expectations of success. In turn, the magnitude of the discrepancy between goals and performance will alter future efficacy expectations (Locke, Frederick, Lee, & Bobko, 1984). Bandura and Cervone (1983) found that subjects with high self-efficacy expectations who had experienced moderate self-dissatisfaction with their performance displayed the most intense effort on future performance tasks.

Additional support for the independent effects of the self-evaluation mechanism can be extracted from more recent empirical research. Feltz (1982) and her colleagues (Feltz & Mango, 1983) have tested the predictions of efficacy theory with a path analysis technique that considered the performance of a high avoidance motor task (back diving). Feltz et al. (1982; 1983) found that self-efficacy was the best predictor of performance on the first attempt at a back dive. After the first trial, however, previous backdiving performance was a better predictor of future performance than self-efficacy. Although Feltz (1982) did not discuss the cognitive appraisal of past performance directly, it would seem plausible that the effects of past performance are reflecting the influence of the self-evaluation mechanism. Other researchers have presented data that also demonstrates the influence of past performance achomplishments (Locke, Frederick, Lee, & Bobko, 1984). Locke et al. (1984) found that past performance in conjunction with self-efficacy expectations had a direct effect on future performance. These studies seem to support the contention that self-efficacy and self-evaluation have separate effects on motivation and performance.

The Present Study

The motivational effects derived from the self-evaluation mechanism are contingent on a clear understanding of the desired outcome and the availability of accurate information about how well one has performed the task. The motivational effects produced by self-appraisal would appear crucial for patients involved in a long and tedious rehabilitation. In the present study, knee injury patients participating in rehabilitation provided the necessary criterion to evaluate the influence of self-appraisal on expectations and performance. The purpose of rehabilitation with knee injuries is to provide patients with the strength and stability required for normal physical functioning. Standards of performance are established from patients' functional capacity prior to the injury. The success of rehabilitation is contingent on patients' abilities to regain their previous level of functioning. Isokinetic equipment enables an accurate assessment of patients' progress in regaining strength and endurance with the injured extremity. This level of precision provides specific criterion with which to evaluate performance accomplishments.

The purpose of the present study was to assess whether the medium through which performance feedback is presented to patients in rehabilitation would have an effect on their future expectations of performance for motor tasks encountered in therapy and the actual performance of strength and endurance tasks. It is believed that the medium through which performance accomplishments are presented to patients will influence their orientation to rehabilitation. Feedback that is vivid and tangible provide patients with the necessary components for self-assessment to take place. It will be suggested that the strong informational support provided by the color graphic feedback will direct patients' attention toward their own performance record enabling them to accurately assess their progress in rehabilitation. As a by-product of coupling accurate feedback with the clear objectives of rehabilitation, patients will exhibit enhanced effort toward the motor tasks involved with rehabilitation.

As a logical extension of the principles of the self-evaluation mechanism, it is hypothesized that patients who receive detailed color graphics that summarize their progress in rehabilitation will manifest greater efficacy expectations and will exhibit better performance than patients in a control condition who only receive standard feedback (i.e., discussion of progress with the therapist). Coupling the clear goals of rehabilitation with the tangible graphic feedback should produce stronger efficacy expectations and motivation toward the performance tasks involved in rehabilitation.

The present study also enables a general test of the efficacy model by considering the relationship between patients' expectations of performance for motor tasks involved in rehabilitation and actual physical performance. The second prediction of the present study is that self-efficacy expectations will be positively correlated with both objective and subjective assessments of functional capacity. Consistent with the predictions of efficacy theory, It is hypothesized that efficacy judgments for specific motor tasks will show the strongest association with the actual physical performance of that task. The magnitude of the relationship between self-expectations and performance will be determined by the similiarity of the motor task for which patients make judgments and the task they are asked to perform.

The present study is intended to assess the effectiveness of an intervention strategy (graphic feedback) designed to increase patients' expectations and performance during a lengthy rehabilitation. This study also tests efficacy theory's prediction that expectations will be positively correlated with physical performance. The results of this study will have implications for the utility of the efficacy framework as a means to influence behavioral change in health care.

II. METHOD

Subject Selection Criteria

Participants for the study were recruited from a physical therapy/sports medicine clinic located in a small city in eastern Pennsylvania. The clinic is an out-patient facility with three full time physical therapists (all men). The patients who seek treatment at the clinic are predominantly working class people who live in the surrounding rural areas.

All knee injury patients referred to the clinic were considered as possible candidates for participation in the study. Throughout the duration of the study, twenty-nine knee injury patients were referred for treatment at the clinic. From this group, twenty-three patients met the selection criteria described below and were included in the study. During the first consultation, the therapist diagnosed the injury and determined what treatment regimen was most appropriate. Baseline measures on the injured and noninjured extremities were recorded (see Appendix A). These assessments are part of the standard procedure for knee injury patients referred to the clinic.

After the patient's first session, the therapist completed a survey on the severity of the patient's injury (see Appendix B). This screening was intended to eliminate patients whose injury would require more than 16 sessions to reach 85% of their functional capacity. If the therapist determined that recovery would require more than 16 sessions to regain 85% of the patient's functional capacity or the patient's potential for recovery was uncertain, the patient was excluded. All patients who were judged capable of regaining 85% of their functional capacity within 16 therapy sessions were randomly assigned to one of the two treatment conditions. A coin toss procedure was used to assign patients to conditions. In all cases the therapist was blind to the conditions to which the patients were assigned. To protect against experimental bias, each of the measurement and feedback sessions were conducted in a private interview with the principal investigator. At the end of the study, the therapists were asked if they were aware of the condition to which each of their patients had been assigned. In all cases the therapists reported being unaware of the distribution of patients to conditions.

Subjects

The sample consisted of twenty-three patients (17 men and 6 women) who had incurred a knee injury. All patients who met the selection criteria were randomly assigned to one of the two treatment conditions. The men and women participating in the study were equally distributed across the two treatment conditions. The majority of the patients participating had experienced some form of ligament damage. Approximately one third of the participants had incurred a tear in either the medial or lateral collateral ligament. An additional third of the patients had medial or lateral meniscus tears. Other injuries included anterior cruciate ligament tears (4) and dislocated patellas (2). Participants ranged in age from 15 to 71 with a mean age of 37.91. Patients' educational backgrounds also varied with six having some college or a college degree, ten had attained a high school diploma, four had not completed high school, and three were in the process of completing high school. Only patients whose treatment was covered by health insurance were included in order to control for concern over ability to pay for treatment.

Instruments

Demographics and Background Information. Participants were asked to provide information on their educational background, marital status, physical condition and exercise patterns prior to the injury, and their health care coverage. In addition, patients were asked to describe how the injury had affected their daily activities, financial status, and dependence on others (see Appendix C).

Self-Efficacy Measure. Efficacy expectations refer to patients' assessments of their expected performance on various motor tasks encountered in therapy and their daily lives. The efficacy scale involves judgments of expected performance on five motor tasks (lifting weights, performance on the Cybex at 60 and 180 degrees per second, distance traveled on an exercise bike, and walking). Each motor task was presented as a continuum that represented different degrees of difficulty (six assessments per task). For each task, patients indicated the strength of their expectations of performance on a 100-point probability scale ranging in 10-point intervals from complete uncertainty, through moderate certainty, to complete certainty (adapted from Bandura, 1977). Patients were instructed to make their assessments based on their expectations of performance for the session in which the scale was being completed. Self-efficacy expectations were assessed at the beginning of the 3rd, 7th, and 11th sessions (see Appendix D). Listed below are the motor tasks and the range of difficulties presented. The reliability coefficients for each of the efficacy measures are provided in Table 1.

Motor Task	Range
Lifting weights with the injured extremity	2 lb. to 16 lbs.
Performance on the Cybex at 60 Degrees per second	5 Repetitions to 40 Repetitions
Performance on the Cybex at 180 degrees per second	10 repetitions to 60 repetitions
Walking	1/4 of a mile to 5 miles
Exercise Bike	1/2 Kilometer to 7 Kilometers

Satisfaction Scale. Patients were asked to indicate their level of satisfaction with their performance to date on three motor tasks encountered in therapy (Cybex at 60 and 180 degrees per second and weight lifting) and with three indicators of overall functional capacity (walking, range of motion, and climbing steps). These satisfaction items were presented in a Likert type format ranging from highly dissatisfied (1) to highly satisfied (7). Patients' satisfaction with progress was assessed at the 3rd, 7th and 11th sessions (see Appendix E). The reliability coefficients for the measures of satisfaction are provided in Table 1.

Motivation Scale. Patients were asked to indicate their level of agreement with seven items pertaining to their motivation toward rehabilitation. These items referred to the amount of effort the patient was putting into his/her rehabilitation. These items were presented in a Likert type format ranging from strongly disagree (1) to strongly agree (5). A motivation score was produced by summing these items. Patiemts' self-assessments of motivation were recorded at the 3rd, 7th, and 11th sessions (see Appendix F). The reliability coefficients for the motivation scale are provided in Table 1.

Therapist Expectations of Performance and Satisfaction. The physical therapists participating in the study also completed expectation of performance and satisfaction with performance measures for each patient at the 3rd, 7th, and 11th sessions. These instruments were identical to the efficacy and satisfaction measures described above except the items were worded so that the therapists were making judgments about their patients (see Appendix G).

Therapist's Assessment of Patient Motivation. Each therapist was asked to indicate his level of agreement with six items pertaining to the patient's motivation toward the rehabilitation process. These items referred to the degree of effort the patient was putting into his/her rehabilitation. Each item was presented in a Likert-type format ranging from strongly disagree (1) to strongly agree (5). The therapists assessed their patients' level of motivation at the 3rd, 7th, and 11th sessions (see Appendix H). The reliability coefficients for each of therapist assessments (i.e., expectations of performance, satisfaction, and motivation are provided in Table 1.

<u>Therapist Affect Toward the Patient</u>. The therapists were asked to indicate their affect toward their patients. These items considered how much the therapist enjoyed working with the patient and how the therapist viewed his/her attitudes toward treatment. These items were presented in a Likert format ranging from strongly disagree (1) to strongly agree (5). Therapists' affect toward their patients was recorded at the 3rd, 7th, and 11th (see Appendix H).

<u>Performance Measures</u>. Patients' physical performance measures were recorded at the 5th and 9th sessions. These measures included the amount of weight used during their daily exercise program, the distance traveled on an ergometer (In kilometers), and the average peak torque produced by the quadricep and hamstring muscle groups on the Cybex at 60 (strength test) and 180 (endurance test) degrees per second (see Appendix I).

The CybexII is an isokinetic dynamometer (Cybex, Division of Lumex Inc., Ronkonkoma, N.Y. 11779) that is used to record force output during maximal voluntary contractions. A torque dynamometer allows the assessment of two opposing muscle groups during reciprocal movement. The isolated joint movement of interest in the present study was knee extension and flexion at two different angular velocities or test speeds. The angular velocities used in the present study were 60 and 180 degrees per second. The velocity regulates the amount of isokinetic resistence placed on the injured joint during the exercise procedure.

All patients performed each of these motor tasks in the same sequence beginning with standard exercise program, proceeding to the Cybex testing and finishing with the exercise bike. Each patient was given a 10-minute rest period between each performance task to control for fatigue.

Procedure. All patients who were not eliminated because of anatomical constraints were approached about participating in the study during the second session. Patients who agreed to participate were asked to provide background information and to sign an informed consent form (see Appendix J). At this time, patients were informed that they would be asked to provide information on their expectations of performance and satisfacton with their progress at three points throughout their rehabilitation. No further information about the study was provided at this time. A schedule of the points of measurement is provided in Appendix K.

Prior to the beginning of the 3rd, 7th, 11th sessions, participants and their therapists completed the efficacy, satisfaction, and motivation measures described above. All patient assessments were conducted in an interview format to eliminate potential problems resulting from differences in verbal abilities among patients. Patients were instucted to indicate their expectations of performance for "TODAY'S" session only. Patients' responses to the items presented were confidential and at no point did the therapist have access to this information.

Patients who reported 90% certainty or greater on each of the performance tasks presented in the efficacy scale at the third session were excluded from the study. Since the intervention was intended to raise expectations of performance, patients with 90% certainty or greater could not provide information that would enable an accurate assessment of the effectiveness of the intervention. Only one patient was excluded based on this criterion.

Concurrent with the patient's assessment of his/her expectations of performance, the therapist completed an expectation of performance measure for the patient. The therapist was instructed to make his assessments for "TODAY'S" session only. The therapist was also asked to indicate his satisfaction with his patient's progress to date, his affect toward the patient, and to assess how motivated he felt the patient was toward rehabilitation. These measures (efficacy, satisfaction, and motivation) were repeated at the beginning of the 7th and 11th sessions. In all cases efficacy expectations were for the session under consideration only and satisfaction and motivation reflected cumulative indices.

Patients' motor functioning was assessed at the 5th and 9th sessions. These assessments included the weight a patient used during his/her standard exercise program for that session, the distance traveled on an ergometer, and the amount of torque produced as measured by the Cybex during extension and flexion at 60 and 180 degrees per second with the injured extremity. All subjects first performed the strength test on the Cybex and did not proceed to the endurance test until they reported feeling rested.

All Cybex testing involved maximal effort and was reciprocal in nature, beginning with knee extension and involving approximately 105 degrees of knee motion. All subjects were strapped securely around the ankle, distal thigh, waist, and chest. A constant hip angle of 90 degrees was maintained throughout the testing.

The slow speed test (60 degrees per second, strength test) consisted of five repetitions with maximal effort in reciprocal motion. The fast speed test (180 degrees per second, endurance test) involved continuous reciprocal motion until the patient reached fatigue. Fatigue was defined as the point where the patient was producing less than 50% of maximum peak torque. The physical therapist visually inspected a graphic display of neuromuscular performance produced on an analog recorder to determine when this point of fatigue was reached.

The average peak torque at 180 degrees per second was computed by taking the average of the 2nd through 6th repetitions. Peak torque was measured from the second peak to exclude potential mechanical artifacts produced by the first repetition. Subjects were instructed before each testing to move their leg as hard and fast as possible throughout the whole range of motion. No additional verbal encouragement was given, apart from counting each repetition aloud to the subject during the strength test.

<u>Feedback Manipulation</u>. The feedback manipulation involved the medium through which performance information was presented to patients in rehabilitation. Each patient in the experimental group was provided with detailed color graphics that depicted his/her performance on each

of the motor tasks (Cybex at 60 and 180 degrees per second, weight lifting, and exercise bike) encountared in therapy (see Figure 1). The graphic representation included the patient's performance measures at baseline and at the 5th and 9th sessions. The percent of increase in performance for each motor task since baseline was also presented as part of the graphic reports. Feedback was provided to patients in the experimental group at the 6th and 10th sesions. In contrast, the control condition received standard feedback only (e.g., discussion of progress with the therapist). To control for potential differences that may have resulted due to attention, patients in the control condition were provided with general information on injuries and rehabilitation in a graphic format (e.g., a breakdown of injuries treated at the clinic, most common causes of injury). This information was presented to members of the control group at those sessions when the experimental group was receiving performance feedback.

The graphic feedback was produced with a graphics software package that accompanies the Apple Color Plotter. Patients in the experimental group were provided with a graphic report for each of the performance tasks they participated in during rehabilitation. The graphic feedback was presented as bar graphs on seperate sheets of paper. The dimensions of the bars were held constant in order to maintain a consistent visual representation of progress for all patients. The only aspect of the graphs that changed was the values on the vertical axis. This manipulation was intended to control for individual differences in performance. By altering the values on the vertical axis, all patients received a report that was similiar in appearance. The physical dimensions of the graphic information presented to the control condition was identical to that of the experimental group.

Upon completion of the final efficacy, satisfaction, and motivation measures (beginning of 11th session), patients participating in the study were debriefed about the purpose of the study. The therapists also recorded their final expectations of performance, satisfaction with progress, and assessment of motivation for each patient at the beginning of the 11th session. In addition, the therapist provided a retrospective account of the seriousness of the patient's injury, their perception of the patients's dependence on them during rehabilitation, and the overall success of rehabilitation.

III. RESULTS

The preliminary step in data analysis was to determine how self-efficacy judgments for each of the performance tasks at the various degrees of difficulty (six levels of difficulty per motor task) could be reduced to individual measures of self-efficacy for each performance task. Individual measures of self-efficacy were obtained by taking the average of patients' expectations across the various degrees of difficulty. This approach provided an overall assessment of efficacy expectations for each of the performance tasks. Cronbach alpha coefficients were computed for the five efficacy judgments at both the 7th and 11th sessions. The alpha coefficients for the five efficacy measures ranged from .87 to .93. The strong internal consistency among the items that comprised the composite efficacy measure validated the appropriateness of this data reduction technique. The individual alpha coefficients for each of the efficacy measures are provided in Table 1.

Efficacy Expectations: The primary purpose of the present study was to evaluate the effectiveness of the feedback intervention in altering patients' expectations of performance for motor tasks encountered in rehabilitation. The means and standard deviations for patients' expectations of performance are presented in Table 2. It is worth noting that the experimental group reported higher expectations of performance than the controls for each of the performance tasks. This pattern was consistent at both the 7th and 11th sessions.

[Insert Table 2 Here]

To assess the influence of the graphic feedback intervention on patients' efficacy expectations for motor tasks, a repeated measures analysis of variance was conducted separately on each measure of expectations of performance at the 7th and 11th sessions. The repeated measures analysis was conducted using a multivariate technique in order to avoid potential bias caused by violating the assumptions contained within the analysis of variance program. The results showed that the graphic intervention had a significant effect on patients' expectations of performance on the Cybex at 60 and 180 degrees per second but did not have an effect on expectations for weight lifting, performance on the exercise bike, or walking (see Table 3). The measures of effect size (*r*, the point biserial correlation) computed from the significance test for the main effects and the interaction estimate the strength of the association between the intervention and expectations of performance on the Cybex at 60 and 180 degrees (Rosenthal, 1984). The effect size for the main effects and the interaction for the efficacy judgments for each of the motor tasks are provided in Table 3.

[Insert Table 3 Here]

Patients' expectations of performance for the third session were not included in the repeated measures analysis of variance. The majority of the patients were unable to use the Cybex or the ergometer at this point in rehabilitation. Patients were only asked to make estimates for tasks they were presently participating in during rehabilitation. The number of patients who were able to use the Cybex and exercise bike at the third session was insufficient to include in the analysis. A breakdown of the number of patients participating at each point of measurement is provided in table 4.

Performance Tasks. The second question addressed in the present study concerned the effects of the graphic feedback intervention on physical performance. It was predicted that patients who received graphic feedback would exhibit better motor performance. The means and standard deviations for patients' physical performance are provided in Table 5. As was the case for patients' expectations, the pattern of the means suggested that patients in the experimental group were achieving better motor performance than the controls.

[Insert Table 5 Here]

To test for these effects, a MANOVA was conducted on each of the six performance measures (average torque produced by the quadricep and hamstring muscle groups at 60 and 180 degrees per second, the amount of weight used during the patient's standard exercise program, and the distance traveled on an ergometer). A multivariate test of significance (Wilks Lamda) [F (1,22)=1.56, p=.228] showed that patients in the graphic feedback condition did not significantly differ from the control group on the performance measures. The univariate F-Tests also showed that the treatment condition did not significantly differ from the control condition on any of the individual performance measures (see

Table 6). The measures of effect size computed from the univariate tests of significance also suggested that the effect of the intervention on physical performance was weak. The effect size for each of the performance measures is provided in Table 6.

[Insert Table 6 Here]

Although the results do not warrant the rejection of the null hypothesis in the present study, the question remains whether the consistent pattern in the means for expectations and performance are reflecting differences in the groups but the power of the design with the small sample size is unable to detect them. Also, large within group variances suggest many other uncontrolled variables are affecting performance (e.g., sex differences, pain tolerance, etc).

Expectations of Performance and Physical Performance: The second purpose of the present study was to provide a general test of the predictions of efficacy theory. Based on the model, it was hypothesized that expectations of performance would be positively correlated with physical performance. To test this proposition Pearson product moment correlation coefficients were computed between patients' expectations of performance and actual motor functioning for both strength and endurance tasks. The results provided support for the predictions of efficacy theory.

The correlation coefficients between patients expectations' for weight lifting and the three measures of physical strength (the average torque produced with the quadricep and hamstring muscle groups on the Cybex at 60 degrees per second and the amount of weight used during the standard exercise program) were significantly positively correlated. As patients' expectations for weight lifting increased, so did their actual performance of the three strength measures. It is worth noting that the strongest association among the strength measures was between expectations for weight lifting and the amount of weight used during patients' standard exercise program. The magnitude of this correlation provides support for Bandura's (1977) contention that specific efficacy judgments are reliable predictors of performance. Patients' expectations of performance on the Cybex at 60 degrees was not significantly related to any of the measures of physical strength.

The results with the endurance tasks showed that patients' expectations of performance for walking and on the exercise bike were significantly positively correlated with physical performance measures of endurance. Expectations for walking was highly correlated with the average torque (foot pounds) produced by the quadricep and hamstring muscle groups on the Cybex at 180 degrees. It is worth noting that the Cybex at 180 degrees per second is functionally equivalent to the motor movements required for walking. In addition, the correlation coefficient between expectations for walking and performance on the exercise bike was highly positively correlated and approached significance (see Table 7).

Expectations for the exercise bike also showed a significant relationship with physical performance measures of endurance. The correlation coeffients between expectations of performance on the exercise bike and the average peak torque (foot pounds) produced by the quadricep muscle group at 180 degrees per second and the distance traveled on the ergometer were significant. The correlation coefficient between expectations of performance on the bike and the average peak torque produced by the hamstring muscle group was positively correlated and approached significance (see Table 7). Again, it is worth noting that expectations of performance on the exercise bike was most predictive of actual performance on the bike compared to the other two endurance measures. Finally the correlation coefficients between expectations of performance on the Cybex at 180 degrees per second were not significantly related to any of the physical performance measures of endurance.

[Insert Table 7 Here]

IV DISCUSSION

The present study has considered the influence of the medium through which information on progress is presented to patients in rehabilitation. More specifically, it examined whether patients who were provided with detailed graphic feedback intended to facilitate self-evaluation would develop higher self-expectations of performance and subsequently display better motor functioning. The present study also provided a general test of the self-efficacy framework. By evaluating the relationship between expectations of performance for motor tasks encountered in rehabilitation and the future performance of these motor tasks, one can evaluate the predictive utility of self-efficacy expectations. In general, the results provided support for the predictions of Bandura's (1977) self-efficacy model.

The results showed that the graphic feedback intervention had a significant effect on patients' expectations of performance for the Cybex at 60 and 180 degrees but not for weight lifting, walking, or the exercise bike. A possible explanation for the strong effects of the graphic feedback intervention on patients' expectations of performance on the Cybex could be attributed to patients' lack of familiarity with isokinetic performance equipment. Making an accurate assessment of one's performance on the Cybex can be a difficult task especially for patients recovering from an injury. The strong informational support provided by the color graphics enabled patients to make better judgments of their capabilities on the Cybex. When patients were provided with performance feedback that demonstrated consistent progress, they formed heightened expectations of performance. Bandura and Cervone (1983) have demonstrated that the motivational effects derived from self-evaluation are contingent on the presence of accurate information about one's performance and standards or goals. It is believed the graphic feedback facilitated self-assessment, which in turn, led to heightened expectations of performance.

Although the graphic feedback had a significant effect on patients' expectations of performance for the Cybex, it did not have a significant effect on expectations for other motor tasks (walking, weight lifting, exercise bike). At first these results would seem inconsistent with the proposed influence of the self-evaluation mechanism. To accurately evaluate these nonsignificant findings, it is necessary to consider the sources of information available for efficacy judgments and the hierarchy of their importance for these decisions. According to efficacy theory, performance accomplishments are the most important source of information for judgments of functional capacity. In the present study, the motor task for which the intervention did not have an effect were common motor activities. It would seem plausible that personal experience with these motor activities (walking, exercise bike, and weight lifting) or through vicarious experiences, would provide a better source of information for judgments of personal competence than the graphic reports.

Although the intervention did not have a significant effect on expectations for weight lifting, performance on the exercise bike, or walking, the effect size computed for the main effects for these motor tasks suggest that a relationship between the intervention and expectations is present (see Table 3). This pattern is also reflected in the means for each of these motor tasks compared to the control condition at both the 7th and 11th sessions (see Table 2). It would seem plausible that the consistent pattern among the means and correlations reflect an effect for the graphic intervention but the power of the design with the small sample was unable to detect it.

It is assumed that the feedback intervention is accounting for less variance than the other sources of efficacy information for the more common motor activities. In contrast, expectations for the Cybex are greatly influenced by the feedback intervention. Based on this pattern, it would seem most appropriate to provide strong informational support for performance tasks that are unique to rehabilitation and medical settings. By facilitating accurate self-appraisal, patients could benefit from the motivational effects derived from self-evaluation and heightened self-efficacy expectations. The graphic feedback provides a strategy with which to raise the expectations of patients whose self-doubt inhibits their progress or performance.

It was also hypothesized that the intervention would have an effect on actual physical performance. The results of the present study did not support this prediction. The intervention did not have a significant effect on patients' motor functioning. Although the results were non-significant, the pattern of the means (see Table 5) and the effect size computed for the main effects (see Table 6) were all in the hypothesized direction. Although the conclusion for the present data is clear, the consistent pattern among the means raises questions about how the data should be interpreted. It is plausible that the power of the design with the small sample is unable to detect the effects of the intervention. It would seem necessary to replicate the present findings with a larger sample before a conclusion about the effectiveness of the intervention on physical performance can be drawn.

Efficacy Expectations and Performance

The present study was also intended to provide a general test of the efficacy model. Bandura (1977) has proposed that specific efficacy expectations are predictive of future performance. According to the model, self-efficacy expectations mediate how well one execute a particular behavioral response. The results of the present study, strongly support the proposed association between self-expectations and future performance. The results showed a clear association between patients' expectations for strength and endurance tasks encountered in rehabilitation and their success at performing these tasks. The strongest associations were for those tasks were efficacy judgments were being made for the exact task the patient was being asked to perform. For example, expectations for weight lifting was significantly related to all three measures of physical strength but the strongest association occured between expectations for weight lifting and actual performance with weights. This pattern was also consistent for the endurance tasks. Patients' expectations for the exercise bike and walking were most predictive of their actual performance for these tasks (see Table 7).

Central to efficacy theory is the idea that specific efficacy expectations are the best predictor of behavior. In contrast with other social learning theorists (e.g., Lefcourt, 1973; Rotter, 1966), Bandura

(1977) claims that expectations of personal mastery must be considered for specific behavioral tasks and not as a general measure of functional style. Although experiences of personal mastery can facilitate the development of general expectancies across a range of behavioral responses (e.g., a range of endurance tasks), the strength of the model lies in its ability to predict the occurence and motivation displayed toward a particular behavior. The results of the present study supported this component of the model.

The nonsignificant relationship between patients' expectations of performance on the Cybex and actual performance of strength and endurance tasks can be interpreted as reflecting the importance of the level of specificity required for predictive validity to be obtained. In the present study, patients' expectations for the Cybex involved the number of repetitions they were capable of performing at a particular angular velocity. The performance measure was the average torque produced within the first five repetitions. It would seem that the way expectations were defined is different from the actual performance task. This discrepancy provides a possible explanation for the inconsistency between the results with expectations for the Cybex and the measures of strength and endurance. If this line of reasoning is valid, it would further support the contention that predictive validity increases as judgments of functional capacity become more specific.

Self-efficacy expectations have been clearly linked to the tasks individuals will attempt, the amount of effort they will display, and their success at performing a behavioral task (Bandura, 1982). The application of the principles of efficacy theory to the rehabilitation setting further supports its generalizability across various domains of functioning.

Although the influence of self-expectations on motivation and performance has been substantiated, the role and form of the self-evaluation mechanism has been less clearly defined. For example, efficacy theory does not clearly distinquish between the direct effect of previous performance (see Feltz, 1982) and the self-evaluation of that performance. The model needs to address whether previous performance has a direct effect on motivation and performance in the absence of self-evaluation. If a direct effect can be established, the self-evaluation meachanism may operate under limited situational constraints. The influence of self-assessment on future performance may occur only under conditions where performance accomplishments are ambigious. Future research needs to determine if previous performance and the assessment of that performance operate independently of each other.

According to efficacy theory, self-evaluation is facilitated in the presence of goals or standards of performance and accurate information about performance accomplishments. If the self-evaluation mechanism is to serve as a target of intervention intended to influence motivation toward behavioral responses, a more precise measure of this cognitive mechanism will be required. Since the magnitude of the discrepancy between goals and performance has differential effects on motivation, the measurement of the outcome of this cognitive comparison is essential. A self-report instrument designed to assess the magnitude of dissatisfaction with performance in comparison to goals would help quantify the self-evaluation mechanism. This instrument would also enable the comparison of the influence of self-efficacy expectations and self-evaluation on future performance. Researchers concerned with the utility of the efficacy framework in describing behavioral change should develop a measure that summarizes the cognitive comparison involved in self-evaluation.

Self-Efficacy and Health Care

In contemporary society behavioral patterns have been implicated as a major contributing factor to the onset and development of disease and illness (Matarazzo, 1982; Krantz, 1985). Behaviors such as smoking, lack of exercise, and improper diet have been clearly linked to heart disease and cancer. The self-regulation and control of these behaviors could prevent the development of chronic illnesses. Psychological variables, such as self-efficacy expectations, provide a potential explanation for health care recipients' behaviors.

For example, Ewart, Taylor, DeBusk, and Reese (1983) found that efficacy expectations were predictive of the physical activities heart patients would attempt following a heart attack. They also found patients' efficacy expectations for physical activity could be altered by manipulating the sources of efficacy information available to patients (e.g., vicarious experiences: enlisting the aid of former patients). From their results it was clear that the restoration of regular physical activity for patients recovering from heart problems can be thwarted by inappropriate self-percepts of efficacy for physical and recreational activities.

Other researchers have also suggested that efficacy expectations are important for the actions of health care recipients. Kaplan et al. (1984) found patient compliance with a prescribed exercise program and their overall physical endurance was mediated by efficacy expectations. Empirical research has documented that patients have difficulties following medical advice (Kirscht & Rosenstock, 1979). Efficacy theory and its potential as a basis for intervention strategies could prove useful by facilitating patients' compliance with prescribed medical regimens. The challenge for social scientist is to develop strategies that will promote self-responsibility among health care recipients (Schulman, 1979). Self-efficacy theory provides a framework with which to describe this progression toward self-care.

Conclusion

The results of the present study have provided support for the predictions of efficacy theory within a specific health care setting. More specifically, the intervention strategy intended to facilitate self-evaluation did have an effect on patients' expectations of performance for certain motor tasks. Furthermore, patients' self-expectations of performance were highly correlated with the future performance of motor tasks encountered in rehabilitation. The intervention strategy did not have an effect on patients' motor performance. Although the data does support efficacy theory, it is necessary to caution that the present results are based on a small sample size. In addition, uncontrolled variables, such as differences in pain tolerance among patients represent a potential alternative interpretation of the results. Furthermore, it is possible that attentional differences unrelated to the intervention could be contributing to the observed effects. More extensive research is needed in other health settings to substantiate these results. The influence of self-expectations and self-evaluation for other types of injuries in other health settings remains to be demonstrated.

For example, it would be advantageous to demonstrate that the principles of efficacy theory are applicable to the initiation of and persistence toward preventive health behaviors. Empirical work on efficacy theory in health care settings has focused on behavioral change for patients who have already experienced symptoms. The question remains whether these cognitive mechanisms are important to the development of preventive health habits. The utility of efficacy theory as a means to describe health actions is contingent on additional support across a broader range of health behaviors.

Finally, Bandura and Cervone (1983) have demonstrated that self-efficacy and self-evaluation mechanisms operate differentially on motivation. They found that under conditions with high perceived self-efficacy and moderate dissatisfaction with substandard performance, participants increased their efforts for goal attainment (Bandura & Cervone, 1983). Future research needs to clarify the influence of variations in the levels of self-efficacy and self-reactive mechanisms and how changes in one alter the other. Social learning theory has postulated a positive linear function between self-efficacy and motivation, but a non-linear function between self-dissatisfaction and effort, as mediated through self-evaluative reactions. Before a systematic application of efficacy theory can be obtained, a clear understanding of the interrelationship between these two cognitive mechanisms must be established. An understanding of how these two components combine and compensate for each other over time is essential to the development of intervention strategies that seek to motivate health actions. Although the individual effects of self-efficacy and self-evaluation mechanisms are important, the interaction represents a more realistic approximation of how cognitive components operate on behavior.

Preliminary results in health settings have supported the predictions of efficacy theory. Its utility as a framework with which to describe and predict other health behaviors remains to be demonstrated. In addition to the beneficial effects produced through interventions derived from the efficacy framework, its application to health care would further highlight the importance of considering psychological and social factors within medicine.

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Table 1

Reliabilities For Patients' and Therapists' Measures of Expectations of Performance, Satisfaction with Recovery, and Motivation at the 7th and 11th Sessions

	Cronbach Alpha Coefficients	
	7th Session	11th Session
<u>Patient</u> <u>Measures</u>:		
I Self-Efficacy Judgments		
1) Weight Lifting	.875	.938
2) Cybex at 60 Degrees	.930	.936
3) Cybex at 180 Degrees	.910	.921
4) Walking	.887	.908
5) Exercise Bike	.924	.876
II Self-Satisfaction Measure:	.757	.768
III Self-Assessment of Motivation:	.700	.849
<u>Therapist</u> <u>Measures</u>:		
I Expectations of Performance:		
1) Weight Lifting	.881	.901
2) Cybex at 60 Degrees	.919	.897
3) Cybex at 180 Degrees	.897	.903
4) Walking	.831	.884
5) Exercise Bike	.948	.946
II Therapist's Satisfaction With His Patient's Recovery	.598	.772
III Therapist's Assessment of The Patient's Motivation	.981	.968

Table 2

Patients' Expectations of Performance by Group

	Mean	S.D.	N
1. Cybex at 60 Degrees:			
Time 2 (7th Session)			
Experimental	7.03	2.30	12
Control	4.58	2.48	11
Time 3 (11th Session)			
Experimental	7.81	2.25	12
Control	4.81	3.17	11
2. Cybex at 180 Degrees:			
Time 2 (7th Session)			
Experimental	7.88	2.08	12
Control	5.41	2.24	11
Time 3 (11th Session)			
Experimental	8.14	1.52	12
Control	5.47	2.94	11
3. Weight Lifting:			
Time 2 (7th Session)			
Experimental	6.85	1.72	12
Control	5.18	2.77	11
Time 3 (11th Session)			
Experimental	6.83	2.73	12
Control	5.97	3.40	11
4. Walking:			
Time 2 (7th Session)			
Experimental	7.93	3.18	12
Control	6.86	2.24	11
Time 3 (11th Session)			
Experimental	7.97	2.96	12
Control	7.57	2.58	11
5. Exercise Bike:			
Time 2 (7th Session)			
Experimental	7.36	2.48	12
Control	6.87	3.18	11
Time 3 (11th Session)			
Experimental	8.70	1.52	12
Control	7.09	3.15	11

* Range of Values for Expectation Items are from 0 to 10.

Table 3

Repeated Measures Analysis of Variance With Patient's Expectations of Performance at the 7th and 11th Sessions

	F Value	Significance of F Value	*r*
1 <u>Cybex at 60 Degrees</u>:			
Group	8.325	.009	.52
Time	.991	.331	.20
Group x Time	.283	.600	.11
2 <u>Cybex at 180 Degrees</u>:			
Group	10.130	.004	.56
Time	.115	.738	.07
Group x Time	.046	.832	.04
3 <u>Weight lifting</u>:			
Group	1.431	.245	.24
Time	.962	.338	.20
Group x Time	1.065	.314	.21
4 <u>Walking</u>:			
Group	.456	.507	.14
Time	.830	.373	.19
Group x Time	.685	.417	.17
5 <u>Exercise Bike</u>:			
Group	1.094	.307	.21
Time	2.804	.109	.33
Group x Time	1.483	.237	.25

Group: Treatment vs. Control
Time : 7th Session vs. 11th Session

Table 4

Breakdown of The Number of Patients Participating
At Each Point of Measurement

	Number of Subjects		
	3rd Session	7th Session	11th Session
I Expectations of Performance:			
Weight lifting	23	23	23
Cybex at 60 Degrees	11	22	22
Cybex at 180 Degrees	13	22	22
Walking	23	23	23
Exercise Bike	8	17	17

	5th Session	9th Session
II Performance Measures:		
Weight Lifting	23	23
Cybex at 60 Degrees	21	22
Cybex at 180 Degrees	21	22
Exercise Bike	17	17

Table 5

Performance Measures at the 9th Session by Group

Performance Task	Mean	S.D.	N
Cybex at 60 degrees: Quadricep:			
Experimental	101.8 Ft. Lbs.	39.72	11
Control	84.8 Ft. Lbs.	33.82	11
Cybex at 60 degrees: Hamstring:			
Experimental	75.9 Ft. Lbs.	29.32	11
Control	72.0 Ft. Lbs.	29.63	11
Cybex at 180 degrees: Quadricep:			
Experimental	73.0 Ft. Lbs.	25.96	11
Control	66.3 Ft. Lbs.	28.94	11
Cybex at 180 degrees: Hamstring			
Experimental	66.2 Ft. Lbs	24.56	11
Control	57.5 Ft. Lbs.	22.54	11
Weight Lifting:			
Experimental	9.13 Lbs.	2.19	12
Control	9.00 Lbs.	2.56	11
Exercise Bike:			
Experimental	4.28 Kms.	.78	9 *
Control	3.68 Kms.	1.98	8

* Note: Patients' performance on the exercise bike at the 9th session was not recorded for all patients, thus resulting in a different sample size for this motor task.

Table 6

Analysis of Variance with Patients' Motor Performance by Group at the 9th Session

Univariate Test of significance	*F* Value	Significance of F Value	*r*
Group:			
Cybex at 60 Degrees: Quadricep	1.167	.293	.229
Cybex at 60 Degrees: Hamstring	.096	.759	.067
Cybex at 180 degrees: Quadricep	.320	.578	.122
Cybex at 180 degrees: Hamstring	.753	.396	.186
Weight Lifting:	.017	.895	.027
Exercise Bike	.730	.406	.208

Table 7

Pearson Product Moment Correlation Coefficients between Patients' Expectations of Performance and Physical Performance

Physical Performance (9th Session)

Strength Tests:

Expectations of Performance (7th Session)	Cybex at 60 Degrees (Average foot pounds) Quadricep	Hamstring	Weight Lifting (Pounds)
Cybex at 60 Degrees	r=.102 p=.324 (n=22)	r=.137 p=.270 (n=22)	r=.236 p=.112 (n=23)
Weight Lifting	r=.400 p=.032 (n=22)	r=.375 p=.043 (n=22)	r=.581 p=.002 (n=23)

Endurance Tests:

Expectations of Performance (7th Session)	Cybex at 180 Degrees (Average foot pounds) Quadricep	Hamstring	Exercise Bike (Kilometers)
Cybex at 180 Degrees	r=.119 p=.299 (n=22)	r=.023 p=.458 (n=22)	r=.376 p=.068 (n=17)
Exercise Bike	r=.437 p=.021 (n=22)	r=.291 p=.094 (n=22)	r=.520 p=.016 (n=17)
Walking	r=.544 p=.004 (n=22)	r=.667 p=.0001 (n=22)	r=.402 p=.055 (n=17)

APPENDIXES

Appendix A

Patient's Performance Measures At The First Session

(Baseline Measures)

Social Security # _________ - _________ - _________

Please record the patient's performance measures for each of the following tasks. If the patient is unable to perform the task, Please explain why this assessment is unavailable. If possible, please estimate at what point in the treatment performance on this task will be assessed. If the performance task will not be used during the patient's treatment regimen, please mark the space provided.

1) Performance On The Cybex At 60 Degrees Per Second:

		Foot Pounds
Injured Extremity	Quadricep	___________ft. lbs.
	Hamstring	___________ft. lbs.
Noninjured Extremity	Quadricep	___________ft. lbs.
	Hamstring	___________ft. lbs.

2) _________ The patient's baseline performance on the Cybex at 60 degrees per second for the injured extremity can not be assessed at this time.

Please Explain. ________________________________

____

3) Can You estimate at what point in the treatment an assessment with the Cybex at 60 degrees per second will be made?

Yes No

If Yes, __________ Approximate Session Number

4) __________ The patient will not use the Cybex throughout his or her rehabilitation.

II) <u>Performance On The Cybex At 180 Degrees Per Second</u>:

		Foot Pound
Injured Extremity	Quadricep	_________ft. lbs.
	Hamstring	_________ft. lbs.
Noninjured Extremity	Quadricep	__________ft. lbs.
	Hamstring	__________ft. lbs.

2) __________ The patient's baseline performance on the Cybex at 180 degrees per second for the injured extremity can not be assessed at this time.

Please Explain. ____________________________________

____

____

3) Can You estimate at what point in the treatment an assessment with the Cybex at 180 degrees per second will be made?

Yes No

If Yes, __________ Approximate Session Number

4) __________ The patient will not use the Cybex throughout his or her rehabilitation.

III) <u>Lifting Weights With the Injured Extremity:</u>

	Injured Extremity	Noninjured Extremity
The Amount Of Weight Lifted	_________lb(s)	_________lb(s)

2) The patient's ability to lift weights with the injured extremity can not be assessed at this time.

Please Explain.____

____

____

3) Can you estimate at what point in the treatment an assessment with a weight program will be made?

YES NO

If Yes, __________ Approximate Session Number

4) _________ The patient will not use a weight program throughout his or her rehabilitation.

IV Exercise Bike:

The Amount Of
Distance Traveled __________ km(s)

2) The patient's is unable to exercise on the bike with the injured extremity at this time.

Please Explain. ____

____

____

3) Can you estimate at what point in the treatment an assessment on the exercise bike will be made?

YES NO

If Yes, __________ Approximate Session Number

4) _________ The patient will not use the bike throughout his or her rehabilitation.

Appendix B

Therapist's Assessment Of The Severity of the Injury and Length of Rehabilitation Required

Session Number One

Name ______________________________

Social Security #_________ - __________ - ___________

I) Background Information: (PLease Circle The Appropriate Response)

1) Has this patient ever been in rehabilitation before? Yes No
(If No, go to number 3)

2) If yes, Did this rehabilitation involve the injured extremity? Yes No

3) Does this patient have medical insurance that will cover the cost of treatment? Yes No

If no, Please explain.______________________________

____

4) Have financial considerations influenced the proposed treatment schedule in anyway? Yes No

If Yes, Please explain.______________________________

____

____

5) Do you feel this patient's orientation toward the rehabilitation program is influenced by financial considerations (e.g., workmen's compensation)? Yes No

II) <u>Severity Of The Injury</u>:

6) Which leg is the Injured extremity? Right Left

7) What is the diagnosis for this patient? ____________________

8) Does this patient have other health conditions that could aversely affect his or her rehabilitation process? Yes No

If Yes, PLease explain. ____________________

____

9) Will the injury leave the patient permanently disfigured or handicapped? Yes No

10) Do you believe this patient will regain at least 85% of his or her functional capacity with the injured extremity? Yes No

11) Do you anticipate any possible difficulties that would complicate the rehabilitation process? Yes No

If Yes, Please explain. ____________________

____

III) <u>Length of Rehabilitation</u>:

Based on your observations and diagnosis during today session, which classification listed below most accurately describes this patient's condition.

1) To reach 85% functional capacity this patient will require less than 16 sessions (approximately) at the clinic. (3 to 5 weeks)

2) To reach 85% functional capacity this patient will require more than 16 sessions (approximately) at the clinic. (5 to 8 weeks)

Appendix C

Name ______________________ Age ________

Social Security #______ - _____ - ________ Sex ________

<u>Background Information</u>: (Please Circle the appropriate response)

1) How much formal education have you had?

   1) Less than eight years
   2) More than eight years but did not graduate from H.S.
   3) High School Graduate
   4) Some College
   5) Associates Degree
   6) College Graduate
   7) Graduate School

2) What is your marital status?

   1) Single
   2) Cohabitation
   3) Married
   4) Separated
   5) Divorced

3) How many dependents do you have?

   1) None
   2) One Dependent
   3) 2 or 3 dependents
   4) 4 or 5 dependents

4) Do you have insurance that will cover the cost of the treatment program?

   1) YES
   2) NO

5) Did your injury occur while on the job?

   1) YES
   2) NO

6) If yes, Are you entitled to workman compensation benefits throughout your rehabilitation?

   1) YES
   2) NO

7) Have you ever been in rehabilitation before?

   1) YES
   2) NO

8) If Yes, Did this rehabilitation involve the injured leg?

   1) YES
   2) NO

9) How much financial hardship have you entailed since your injury?

1) None

2) Little

3) Moderate

4) Severe

10) How much additional help and support from family and friends have you required since your injury?

1) None

2) Very Little

3) Moderate Amount

4) A great deal

11) How restricted has your social life been since your injury?

1) Not at all

2) Slightly restricted

3) Moderately restricted

4) Extremely restricted

12) Overall, How active have you been since your injury?

1) Completely Inactive

2) Somewhat Active

3) Moderately Active

4) Very Active

13) How supportive has your family been since your injury?

1) Not supportive

2) Slightly supportive

3) Moderately supportive

4) Very supportive

14) How often did you exercise prior to your injury?

1) Never

2) Rarely

3) Occasionally

4) Once a week

5) More than once a week

15) How would you describe your physical status at the time of the injury?

1) Poor

2) Less than average

3) Average

4) Good

16) Do you intend to play organized sports after your rehabilitation?

1) YES

2) NO

17) What is your dominant hand?

1) Right hand
2) Left hand

Appendix D

Social Security # _____ - _____ - ______   Session #_____

Listed below are the various types of activities you participate in during your rehabilitation program. Each activity is presented as a continuum that represents different degrees of difficulty. For each of the activities listed below, please indicate how confident you are that you will achieve that level of performance in TODAY'S session. Indicate this degree of certainty by circling a number from 0 to 100 that corresponds to your expectations of performance for that task.

0 10 20 30 40 50 60 70 80 90 100

Unable to Perform	Moderately Certain	Complete Certainty

*** Remember: Your ratings of your self-expectations of performance are for TODAY'S session only.

I) Lifting weights with your injured leg:

How confident are you that you can:

1) Lift 2 pounds of weight with your injured leg:

0 10 20 30 40 50 60 70 80 90 100

2) Lift 4 pounds of weight with your injured leg:

0 10 20 30 40 50 60 70 80 90 100

3) Lift 7 pounds of weight with your injured leg:

0 10 20 30 40 50 60 70 80 90 100

4) Lift 10 pounds of weight with your injured leg:

0 10 20 30 40 50 60 70 80 90 100

5) Lift 13 pounds of weight with your injured leg:

0 10 20 30 40 50 60 70 80 90 100

6) Lift 16 pounds of weight with your injured leg:

0 10 20 30 40 50 60 70 80 90 100

II <u>Performance on the Cybex Exercise Machine at 60 degrees per second</u>

Note: 60 degrees per second corresponds to a slower speed

How confident are you that you can:

1) Complete 5 repetitions at 60 degrees per second on the Cybex

0 10 20 30 40 50 60 70 80 90 100

2) Complete 10 repetitions at 60 degrees per second on the Cybex

0 10 20 30 40 50 60 70 80 90 100

3) Complete 15 repetitions at 60 degrees per second on the Cybex

0 10 20 30 40 50 60 70 80 90 100

4) Complete 20 repetitions at 60 degrees per second on the Cybex

0 10 20 30 40 50 60 70 80 90 100

5) Complete 30 repetitions at 60 degrees per second on the Cybex

0 10 20 30 40 50 60 70 80 90 100

6) Complete 40 repetitions at 60 degrees per second on the Cybex

0 10 20 30 40 50 60 70 80 90 100

III Performance on the Cybex Exercise Machine at 180 degrees

Note: 180 degrees corresponds to a faster speed

How confident are you that you can:

1) Complete 10 repetitions on the Cybex at 180 degrees

0 10 20 30 40 50 60 70 80 90 100

2) Complete 20 repetitions on the Cybex at 180 degrees

0 10 20 30 40 50 60 70 80 90 100

3) Complete 30 repetitions on the Cybex at 180 degrees

0 10 20 30 40 50 60 70 80 90 100

4) Complete 40 repetitions on the Cybex at 180 degrees

0 10 20 30 40 50 60 70 80 90 100

5) Complete 50 repetitions on the Cybex at 180 degrees

0 10 20 30 40 50 60 70 80 90 100

6) Complete 60 repetitions on the Cybex at 180 degrees

0 10 20 30 40 50 60 70 80 90 100

IV Walking

How confident are you that you can:

1) Walk a Quarter Of a Mile

0 10 20 30 40 50 60 70 80 90 100

2) Walk One Half Of a Mile

0 10 20 30 40 50 60 70 80 90 100

3) Walk One Mile

0 10 20 30 40 50 60 70 80 90 100

4) Walk Two Miles

0 10 20 30 40 50 60 70 80 90 100

5) Walk Three Miles

0 10 20 30 40 50 60 70 80 90 100

6) Walk Five Miles

0 10 20 30 40 50 60 70 80 90 100

V <u>Exercise Bike</u>

How confident are you that you can:

1) travel 1/2 kilometer on the exercise bike

0 10 20 30 40 50 60 70 80 90 100

2) travel 1 kilometers on the exercise bike

0 10 20 30 40 50 60 70 80 90 100

3) travel 2 kilometers on the exercise bike

0 10 20 30 40 50 60 70 80 90 100

4) travel 3 kilometers on the exercise bike

0 10 20 30 40 50 60 70 80 90 100

5) travel 5 kilometers on the exercise bike

0 10 20 30 40 50 60 70 80 90 100

6) travel 7 kilometers on the exercise bike

0 10 20 30 40 50 60 70 80 90 100

Appendix E

Social Security # _______ - _____ - _______ Session #__________

At the last session you were given graphic feedback on your progress in rehabilitation to date. Please indicate below how satisfied you are with your progress for each of the activities you have participated in during rehabilitation.

1) How satisfied are you with your weight lifting performance to date?

1	2	3	4	5	6	7
Highly Dissatisfied			Neutral			Highly Satisfied

2) How satisfied are you with your performance on the Cybex at 60 degrees per second to date?

1	2	3	4	5	6	7
Highly Dissatisfied			Neutral			Highly Satisfied

3) How satisfied are you with your performance on the Cybex at 180 degrees per second to date?

1	2	3	4	5	6	7
Highly Dissatisfied			Neutral			Highly Satisfied

4) How satisfied are you with your range of motion with the injured leg?

1	2	3	4	5	6	7
Highly Dissatisfied			Neutral			Highly Satisfied

5) How satisfied are you with your ability to walk?

1	2	3	4	5	6	7
Highly Dissatisfied			Neutral			Highly Satisfied

6) How satisfied are you with your ability to climb stairs?

1	2	3	4	5	6	7
Highly Dissatisfied			Neutral			Highly Satisfied

Was any of the information presented in the progress report unclear?

Yes No

Would you like the information in your progress report to be explained in more detaii?

Yes No

Appendix F

For each of the items listed below, please indicate how much you agree or disagree with the statement. Please indicate this by circling the number that corresponds to your level of agreement.

I exert a great deal of effort when I am exercising at the clinic.

1	2	3	4	5
Strongly Disagree				Strongly Agree

I am always eager to get to the clinic and start the exercise program.

1	2	3	4	5
Strongly Disagree				Strongly Agree

I feel my persistence with the exercise program is helping me get better

1	2.	3	4	5
Strongly Disagree				Strongly Agree

I am very enthusiastic toward my participation in a rehabilitation program.

1	2	3	4	5
Strongly Disagree				Strongly Agree

I am dedicated to successfully completing my rehabilitation program.

1	2	3	4	5
Strongly Disagree				Strongly Agree

If I had to classify myself, I would say that I am very motivated toward my rehabilitation program.

1	2	3	4	5
Strongly Disagree				Strongly Agree

I find it hard to get motivated toward the exercises involved with my rehabilitation.

1	2	3	4	5
Strongly Disagree				Strongly Agree

Appendix G

Social Security # ______ - ______ - ______ Session #______

Listed below are the various types of activities your patients participate in during their rehabilitation. Each activity is presented as a continuum that represents different degrees of difficulty. For each of the activities listed below, please indicate how confident you are that this patient can achieve that level of performance in TODAY'S session. Indicate this degree of certainty by circling a number from 0 to 100 that corresponds to your expectations of performance for that task.

0	10	20	30	40	50	60	70	80	90	100
Unable to Perform					Moderately Certain					Complete Certainty

*** Remember: Your ratings of your patient's performance are for TODAY'S session only.

I) Lifting weights with the injured leg:

How confident are you that your patient can:

1) Lift 2 pounds of weight with the injured leg:

0 10 20 30 40 50 60 70 80 90 100

2) Lift 4 pounds of weight with the injured leg:

0 10 20 30 40 50 60 70 80 90 100

3) Lift 7 pounds of weight with the injured leg:

0 10 20 30 40 50 60 70 80 90 100

4) Lift 10 pounds of weight with the injured leg:

0 10 20 30 40 50 60 70 80 90 100

5) Lift 13 pounds of weight with the injured leg:

0 10 20 30 40 50 60 70 80 90 100

6) Lift 16 pounds of weight with the injured leg:

0 10 20 30 40 50 60 70 80 90 100

II <u>Performance on the Cybex Exercise Machine at 60 degrees per second</u>

Note: 60 degrees per second corresponds to a slower speed

How confident are you that your patient can:

1) Complete 5 repetitions at 60 degrees per second on the Cybex

0 10 20 30 40 50 60 70 80 90 100

2) Complete 10 repetitions at 60 degrees per second on the Cybex

0 10 20 30 40 50 60 70 80 90 100

3) Complete 15 repetitions at 60 degrees per second on the Cybex

0 10 20 30 40 50 60 70 80 90 100

4) Complete 20 repetitions at 60 degrees per second on the Cybex

0 10 20 30 40 50 60 70 80 90 100

5) Complete 30 repetitions at 60 degrees per second on the Cybex

0 10 20 30 40 50 60 70 80 90 100

6) Complete 40 repetitions at 60 degrees per second on the Cybex

0 10 20 30 40 50 60 70 80 90 100

III <u>Performance on the Cybex Exercise Machine at 180 degrees</u>

Note: 180 degrees corresponds to a faster speed

How confident are you that your patient can:

1) Complete 10 repetitions on the Cybex at 180 degrees

0 10 20 30 40 50 60 70 80 90 100

2) Complete 20 repetitions on the Cybex at 180 degrees

0 10 20 30 40 50 60 70 80 90 100

3) Complete 30 repetitions on the Cybex at 180 degrees

0 10 20 30 40 50 60 70 80 90 100

4) Complete 40 repetitions on the Cybex at 180 degrees

0 10 20 30 40 50 60 70 80 90 100

5) Complete 50 repetitions on the Cybex at 180 degrees

0 10 20 30 40 50 60 70 80 90 100

6) Complete 60 repetitions on the Cybex at 180 degrees

0 10 20 30 40 50 60 70 80 90 100

IV <u>Walking</u>

How confident are you that your patient can:

1) Walk a Quarter Of a Mile

0 10 20 30 40 50 60 70 80 90 100

2) Walk One Half Of a Mile

0 10 20 30 40 50 60 70 80 90 100

3) Walk One Mile

0 10 20 30 40 50 60 70 80 90 100

4) Walk Two Miles

0 10 20 30 40 50 60 70 80 90 100

5) Walk Three Miles

0 10 20 30 40 50 60 70 80 90 100

6) Walk Five Miles

0 10 20 30 40 50 60 70 80 90 100

V Exercise Bike

How confident are you that your patient can:

1) Travel 1/2 kilometer on the exercise bike

0 10 20 30 40 50 60 70 80 90 100

2) travel 1 kilometers on the exercise bike

0 10 20 30 40 50 60 70 80 90 100

3) travel 2 kilometers on the exercise bike

0 10 20 30 40 50 60 70 80 90 100

4) travel 3 kilometers on the exercise bike

0 10 20 30 40 50 60 70 80 90 100

5) travel 5 kilometers on the exercise bike

0 10 20 30 40 50 60 70 80 90 100

6) travel 7 kilometers on the exercise bike

0 10 20 30 40 50 60 70 80 90 100

Social Security # ______ - _____ - ______

Session #________________ Date________

At the last session your patient was given graphic feedback on his/her progress in rehabilitation to date. Please indicate below how satisfied you are with your patient's progress for each of the activities they participate in during their rehabilitation.

1) How satisfied are you with your patient's weight lifting performance to date?

1	2	3	4	5	6	7
Highly Dissatisfied			Neutral			Highly Satisfied

2) How satisfied are you with your patient's performance on the Cybex at 60 degrees per second to date?

1	2	3	4	5	6	7
Highly Dissatisfied			Neutral			Highly Satisfied

3) How satisfied are you with your patient's performance on the Cybex at 180 degrees per second to date?

1	2	3	4	5	6	7
Highly Dissatisfied			Neutral			Highly Satisfied

4) How satisfied are you with your patient's range of motion with the injured leg to date?

1	2	3	4	5	6	7
Highly Dissatisfied			Neutral			Highly Satisfied

5) How satisfied are you with your patient's ability to walk?

1	2	3	4	5	6	7
Highly Dissatisfied			Neutral			Highly Satisfied

6) How satisfied are you with your patient's ability to climb stairs?

1	2	3	4	5	6	7
Highly Dissatisfied			Neutral			Highly Satisfied

Appendix H

For each of the items listed below, please indicate how much you agree or disagree with the statement. Please indicate this by circling the number that corresponds to your level of agreement.

I believe this patient exerts a great deal of effort when exercising at the clinic.

1	2	3	4	5
Strongly Disagree				Strongly Agree

I believe this patient is very enthusiatic toward participation in a rehabilitation program.

1	2	3	4	5
Strongly Disagree				Strongly Agree

This patient is always eager to get started with the exercise program when he/she arrives at the clinic.

1	2	3	4	5
Strongly Disagree				Strongly Agree

I believe this patient's persistence is helping him/her recover at a reasonable rate of progress.

1	2	3	4	5
Strongly Disagree				Strongly Agree

I believe this patient is dedicated to participating in and completing the rehabilitation program.

1 2 3 4 5

Strongly Disagree — Strongly Agree

I believe this patient is very motivated toward the rehabilitation program in general.

1 2 3 4 5

Strongly Disagree — Strongly Agree

For each of the items listed below, please indicate how much you agree or disagree with the statement. Please indicate this by circling the number that corresponds to your level of agreement.

I respect this patient.

1 2 3 4 5

Disagree — Agree

I enjoy working with this patient.

1 2 3 4 5

Disagree — Agree

I feel indifferent toward this patient.

1 2 3 4 5

Disagree — Agree

I feel friendly and warm toward this patient.

1 2 3 4 5

Disagree Agree

I feel impatient with this patient at times.

1 2 3 4 5

Disagree Agree

I don't find this patient all that interesting to talk too.

1 2 3 4 5

Disagree Agree

I really care about this patient's recovery.

1 2 3 4 5

Disagree Agree

I dislike this patient's attitude toward therapy.

1 2 3 4 5

Disagree Agree

Appendix I

Patient's Daily Performance Record

Social Security #________-_______-_________ Session #__________

I) Cybex AT 60 Degrees Per Second:

Session Number	Number Of Repititions With The Injured Leg	Feet Per Pound
________	__________	Quadricep _______Ft. lbs.
		Hamstring _______Ft. lbs.

II) Cybex AT 180 Degrees Per Second:

Session Number	Number Of Repititions With The Injured Leg	Feet Per Pound
________	__________	Quadricep _______Ft. lbs.
		Hamstring _______Ft. lbs.

III) Lifting Weights With The Injured Leg:

Session Number	Amount Of Weight Lifted With The Injured Extremity
_________	__________lb(s)

IV) Distance Traveled on the Exercise Bike

Session Number	Distance Traveled on the Exercise Bike
_________	__________Km(s)

1) Do you feel your patient's performance in today's session was influenced by factors unrelated to the original injury (e.g., An additional injury, Illness, Etc.)?

YES NO

2) Were there any changes in the patient's condition that could have affected the results of today's session?

YES NO

3) Do you have any additional comments about today's Session?

____

____

____

Appendix J

Informed Consent Form

Description: The purpose of the study is to monitor patients' attitudes toward their rehabilitation and to learn more about the rehabilitation process. Participation in the study involves completing surveys at five points throughout your rehabilitation. It will take approximately five minutes to complete the survey at each session. Your participation will require a total of thirty minutes of your time.

All information provided during your participation in this study is strictly confidential and will remain completely anonymous. Providing this information will in no way influence the therapy process. Only the principle investigator will have have access to the information that you provide.

The principle investigator will be available throughout the duration of your rehabilitation to answer questions concerning the research or your participation in it. Your participation in the study is completely voluntary and that your refusal to participate will not result in any prejudice, penalty, or loss of benefits to which you are entitled.

If you originally consent to participate but decide to discontinue your participation at any point in the treatment, you will not be penalized or lose any benefits to which you are entitled.

This research has been approved by the University of New Hampshire Institutional Review Board (IRB) and it has authorized the use of human subjects.

If you have any questions pertaining to your participation in this research project, please call Daniel Malloy at 717-366-2371. You are entitled to discuss the project in confidence at your earliest convenience.

I have read the above statement and understand all my rights and responsiblities involved with participation in this project.

__________ I agree to participate in this study.

__________ I do not agree to particpate in this study

Signature of Participant ____

Social Security #________ - __________ - ________ Date __________

Appendix K

Procedural Outline of the Present Study

1st Session

Therapist Measures:

- Basline measures on both the injured and noninjured extremity

- Questionnaire on the severity of the patient's injury

2nd Session

Patient Measures:

- Request for Participation
- Demographics
- Informed Consent Form

3rd, 7th, 11th Sessions

Patient Measures:

- Self Efficacy Scale
- Self Satisfaction Scale
- Motivation Scale

Therapist Measures:

- Expectation of Performance Measure
- Satisfaction Scale
- Motivation Scale
- Therapist Affect Toward The Patient

6th and 10th Sessions

Feedback Intervention:

- Experimental Group received graphic feedback on their progress in rehabilitation (progress reports were generated from the patient's daily performance records)
- Control Group received general information on knee injuries and rehabilitation

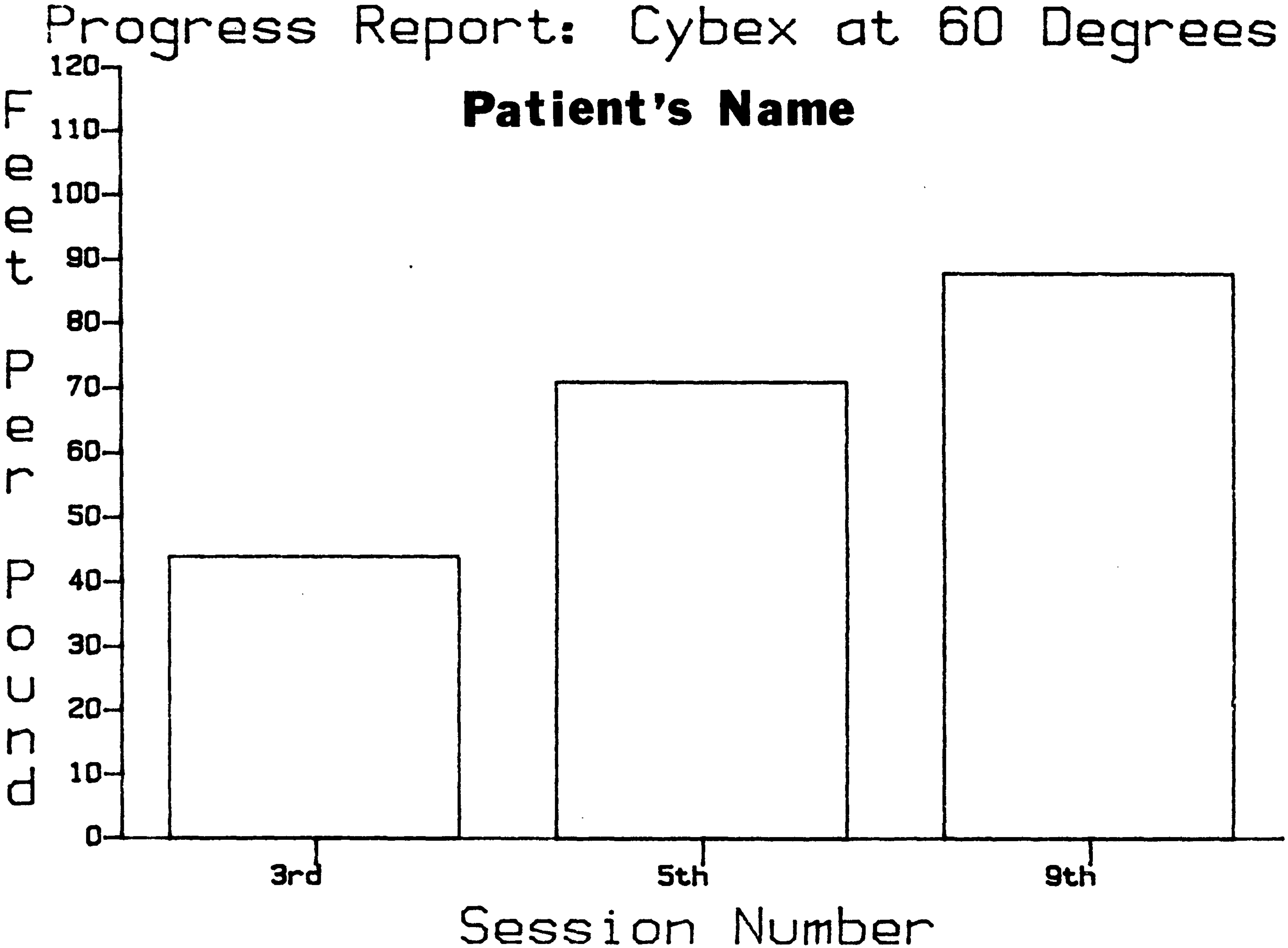
5th and 9th Sessions

Performance Measures:

Strength Tests:
- Cybex at 60 Degrees: Quadricep
- Cybex at 60 Degrees: Hamstring
- Weight Lifting

Endurance Tests:
- Cybex at 180 Degrees: Quadricep
- Cybex at 180 Degrees: Hamstring
- Exercise Bike

Figure 1


Progress Report: Cybex at 60 Degrees
Patient's Name
Feet Per Pound
120
110
100
90
80
70
60
50
40
30
20
10
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Session Number