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The effects of modeling on the movement confidence of individuals with spinal cord injuries

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THE EFFECTS OF MODELING ON THE MOVEMENT CONFIDENCE OF INDIVIDUALS WITH SPINAL CORD INJURIES

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CHAPTER ONE

STATEMENT OF THE PROBLEM

According to the National Spinal Cord Injury Statistical Center (University of Alabama-Birmingham, 2004), there are approximately 247,000 persons in the United States with a spinal cord injury. The annual occurrence of spinal cord injuries is forty cases per million in the United States. There are more injuries among adults than children, with the average age of injury being 38 years. As of 2000, motor vehicle accidents accounted for 50.4% of the reported spinal cord injuries in the United States.

Depending upon the neurological level and extent of lesion on the spinal cord, individuals with spinal cord injuries must perform a variety of situation specific movement tasks. One of the most widely used tasks is the wheelchair transfer. The wheelchair transfer provides individuals the independence needed to perform additional daily living activity skills. A wheelchair transfer may consist of an individual transferring either to or from a wheelchair to a bed, exercise mat, car seat, or floor. Depending upon the severity of the injury, some individuals may perform a transfer with no assistance. In most cases, an individual diagnosed as a paraplegic may demonstrate the ability to transfer independently to and from all surfaces. In contrast, a tetraplegic may require one or more persons to assist in transferring from various surfaces (Nixon, 1985).

Unfortunately, many individuals with spinal cord injuries may lack the confidence to attempt and perform situation specific movement tasks, regardless of neurological level and extent of lesion on the spinal cord. Movement confidence is important for individuals with spinal cord injuries when attempting to attain effective motor behavior in lieu of movement limitations. Movement confidence is a person's sense of adequacy in a movement situation. It serves as both a mediator of personal decisions and performance behavior as well as a consequence of evaluation relative to the demands of the task (Griffin & Keogh, 1981). Movement confidence as a mediator functions to influence participation choice, participation performance, and participation persistence (Crawford & Griffin, 1986). In most cases, an individual may perceive a task as unsafe because of a lack of competence to complete the task. As a result, the individual may not choose to attempt the task. A possible solution to the problem of the lack of movement confidence among individuals with spinal cord injuries is the use of modeling (Crocker & Leclerc, 1992).

Bandura (1986) suggests that much of human behavior is learned by observation through modeling. By way of observing others, individuals may form rules of behavior that serves as a guide for future action. Observational learning is most effective when models display novice patterns of behavior that observers' do not possess prior to observation (Pintrich & Schunk, 2002).

Bandura's research (1986) has shown that when models display new patterns of behavior, observers may experience inhibitory or disinhibitory beliefs when attempting the identical task. Inhibitory effects occur when observers' reduce their performance of the modeled behavior because the model is experiencing negative consequences. Disinhibitory effects occur when observers' increase their level of performance because the model does not display any negative effects. Likewise, the modeled behavior may serve as a social prompt for observers who show a lack of incentive to complete the task.

Socially acceptable modeled behavior such as volunteering for admirable causes and showing affection for others may initiate similar behavior by the observers' because of the social significance of the behavior.

Pintrich and Schunk (2002) indicate that model characteristics such as competence and perceived similarity may have a positive influence upon an observer's behavior. Individuals' may attend more to models who perform successfully as compared to unsuccessful models. Competent models display skills that reduce the probability of students learning incorrectly. The perceived similarity that an observer has toward a model may enable the observer to identify with behavioral appropriateness and form positive outcome expectations.

Mastery and coping models are model types that are effective in producing appropriate behavior and positive outcomes. Mastery models perform tasks faultlessly and show no signs of a negative attitude. Mastery models are important for an individual who desires the ability to perform a task without any difficulty. Coping models, on the other hand, initially demonstrate fear but gradually improve their performance. Coping models are important for individuals who may have difficulty with performing a task. By way of observing a coping model, the observer may learn to overcome initial difficulty or fear when attempting to perform a task (Pintrich & Schunk, 2002).

According to Bandura's Social Learning Theory (1977) and Griffin and Keogh's Movement Confidence Model (1981), many individuals with spinal cord injuries may lack the confidence and demonstrate difficulties when attempting to perform situation movement tasks. As a result of observing a peer model in comparison to a teacher model, many individuals with spinal cord injuries may demonstrate more confidence and less difficulty when attempting to perform a situation specific movement task.

Purpose of the Study

The purpose of the study was to observe the effects of peer modeling and teacher modeling on the movement confidence of individuals with spinal cord injuries. From this research, it is reasonable to assume that modeling may have a more powerful effect on individuals with spinal cord injuries learning a wheelchair transfer task than able bodied individuals. To date, there is no research on the influence of modeling characteristics upon individuals with spinal cord injuries when learning a wheelchair transfer task. The assumption was that individuals with spinal cord injuries, when observing a peer model (an individual with a spinal cord injury) performing four wheelchair transfer tasks, would demonstrate more movement confidence in comparison to observing a teacher model (an adapted physical education instructor) performing the same four tasks.

Thirty-four adults with spinal cord injuries from five community sites in northern California participated in the study. There were respectively 10 participants at the first site, 6 participants at the second site, 5 participants at the third site, 2 participants at the fourth site, and 11 participants at the fifth site.

Participants were randomly assigned to two treatment conditions: peer model and teacher model. The peer modeling condition consisted of 17 participants (14 paraplegics, 3 tetraplegics) viewing a 5-minute video of an individual with spinal cord injury performing four wheelchair transfer tasks in an adapted physical education gymnasium. The teacher modeling condition consisted of 17 participants (15 paraplegics, 2 tetraplegics) viewing a 2-minute video of an adapted physical education instructor demonstrating how to perform the same four wheelchair transfer tasks in the identical room. Prior to observing the videos, all participants were given a 5-minute period to complete a modified version pretest for movement confidence (Griffin & Keogh, 1981). Also, after observing the videos, all participants were given a 5-minute period to complete a modified version posttest for movement confidence (Griffin & Keogh, 1981). In conjunction with the posttest for movement confidence, all participants were given a questionnaire concerning demographic information, the videos, and related wheelchair transfer tasks to complete. Performance on the pretest and posttest for movement confidence was assessed to find any possible differences in movement confidence among both modeling groups. For the purposes of the study, the movement confidence pretest and posttest was modified by the researcher to reflect movement confidence as it relates to performing four wheelchair transfer tasks.

The adapted physical education instructor who served as the teacher model in the teacher model video, and as a teacher in the peer mastery model video, has had several years of experience teaching wheelchair transfer techniques to individuals with spinal cord injuries at a northern California community college. The individual who served as the model in the peer mastery model video is a 26 year old male T2 complete paraplegic who is a student/volunteer in an adapted physical education program at a northern California community college.

Significance of the Study

This study was important because it may assist adapted physical educators, physical and occupational therapists, and recreational specialists in augmenting the level of movement confidence of individuals with spinal cord injuries. Many individuals with spinal cord injuries may experience a number of health problems that may affect their movement confidence. Therefore, adapted physical educators, physical and occupational therapists, and recreational leaders may recruit other individuals with spinal cord injuries to act as peer models to demonstrate specific tasks that observers may learn and subsequently perform. Recruiting individuals with spinal cord injuries as peer models may increase the level of movement confidence for students, patients, athletes, etc. Also, individuals with spinal cord injuries may be able to increase their level of fitness in areas such as muscular strength, cardiovascular, joint mobility as well as general mobility. The confidence gained by observing peer models may afford individuals with spinal cord injuries the opportunity to become self-sufficient concerning employment, school, recreational and social activities, and other daily living activity skills.

Theoretical Rationale

Bandura's Social Learning Theory (1977) and Griffin, and Keogh's Movement Confidence Model (1981) provided the theoretical rationale for this study.

Social Learning Theory

Social learning theory postulates that much of human behavior is learned observationally through modeling. Observational learning through modeling improves the probability of a new behavior being displayed by the observer. There are four component processes that govern observational learning are attention processes, retention processes, motor reproduction processes, and motivational processes (Bandura, 1977).

Attention processes are determinants that are perceived as either important or irrelevant. Actions that are important for the individual may command greater attention. In the case of observing a model performing a wheelchair transfer, the learner may select important actions such as the positioning of the wheelchair and the placement of the hands prior to transferring. In addition, the learner may attend to certain aspects of the model such as their gender, overall muscular development, and attitude. For example, when observing a peer model performing a wheelchair transfer, the individual may initially attend to the gender, the upper-body musculature, and the attitude of the peer model.

Retention processes pertains to information which is stored and mentally rehearsed in memory. Information is stored as imagery and/or verbal form. Imagery coding is important for activities that are not described in words. For example, learning various motor skills (e.g., a tennis serve) that are a part of a larger sequence may involve imagery coding (Pintrich & Schunk, 2002). Verbal coding may involve cognitive strategies such as retaining detailed route instructions. The visual information given for a specific route may be transformed into a verbal code describing a series of right (R) and left (L) turns (e.g. RLRRL) (Bandura, 1977). When observing a peer model performing a transfer, the learner may use imagery coding as a tool to retain various modeled gross motor skills involved in transferring to and from various surfaces. For example, when observing a peer model, the learner may attempt to retain a series of movements by the peer model in a sequence. In other words, the observer may remember the manner in which the peer model completed the task in a series of stages. Stage one may consist of a technique the peer model used to position their wheelchair alongside a mat. Stage two may consist of the positioning and the location of the peer model’s hands in proximity to the wheelchair prior to transferring.

Motor reproduction processes involve visual and symbolic concepts of modeled events that translate into behavior (Pintrich & Schunk, 2002). Upon observing a peer model and prior to attempting to perform a wheelchair transfer, the learner may rely upon visualization techniques to perform the transfer. For example, prior to attempting the transfer, the observer may visualize themselves or the peer model performing the task.

Motivational processes are activities that are valuable or insignificant, and contain positive or negative consequences. If the learner values the modeled activity and expects a positive consequence as a result, then the learner may imitate the modeled activity. If the learner determines that the modeled activity is unimportant, and the expected consequence is negative, then the learner may reject the modeled activity.

For example, the learner may receive motivation from their peers or from health care professionals and/or adapted physical educators that may serve as a motivating factor in attempting to perform a wheelchair transfer. Participants within the study may attain motivation by observing either the teacher or peer model performing one or more of the wheelchair transfer tasks.

Movement Confidence Model

Movement confidence is a person's sense of adequacy in a movement situation. Movement confidence serves as both a mediator of personal decisions and performance behavior as well as a consequence of evaluation relative to the demands of the task. Movement confidence as a mediator functions to influence participation choice, participation performance, and participation persistence (Crawford & Griffin, 1986). Movement confidence contains a two-factor personal assessment: perception and mediation (Crocker & Leclerc, 1992). The perception factor includes movement sense and movement competence. Movement sense is an individual's personal expectations (potential enjoyment and perceived potential for physical harm) of sensory experiences related to moving. Movement competence is an individual's perception of personal skill in relation to task demands. The mediation factor includes participation, participation behavior, and persistence. Participation is dependent upon whether the individual chooses to become involve or not. Participation behavior is dependent upon the type of the experience (negative or positive), while persistence is dependent upon the decision to participate and the educational support available during performance.

The various components of movement confidence function in what Griffin and Keogh (1981) have described as a four-stage involvement cycle. First, the individual in a movement situation determines what is expected (task demand). Second, the individual in the movement situation evaluates personal expectations (movement sense) and perception of personal skill (movement competence), and then moves or behaves accordingly. Third, upon completion of the movement task, the individual undergoes a personal evaluation (choice, behavior, persistence) of that experience. Finally, the experience becomes part of the individual's background when faced with the next movement situation. The involvement cycle for confident individuals acts as a positive spiral. As a consequence, confident individuals will choose to participate (move) to their satisfaction.

In contrast, the involvement cycle for non-confident individuals will be a negative spiral. Non-confident individuals are not likely to choose to participate (move), and are less likely to think that participation is gratifying. The four-stage cycle suggests that many individuals with spinal cord injuries may lack the confidence to perform situation-specific movement tasks. At the second stage, many individuals may believe the perceived potential risk of injury or harm outweighs the potential for enjoyment. For instance, when faced with performing a wheelchair transfer, individuals may have a fear of falling out of their wheelchair and injuring themselves. In addition, some individuals may believe they lack the competence required to complete the task. Individuals may think they need more time to practice. Alternatively, individuals may think the extent of their injury does not permit them to transfer successfully. At stage three, deciding whether to attempt a wheelchair transfer becomes problematic for the individual. Therefore, at stage four, many individuals choose not to perform the movement.

Research has provided evidence that movement confidence is valid construct. Studies have found that competence, potential enjoyment and perceived potential for physical harm are important influences on the confidence of individuals in a movement situation (Crawford & Griffin, 1986; Crocker & Leclerc 1992; Griffin, Keogh, & Maybee, 1984). In addition, observable behavioral manifestations of movement confidence among individuals, such as preparatory and performance movements, movement pace, auditory/visual focus, have been deemed important in aiding educators to identify and assist students lacking confidence in performing a task (Keogh, Griffin, & Spector, 1981).

Background and Need

Spinal cord injury, either through trauma or through disease, is one of the most traumatic events that an individual can experience in life (Lockette & Keyes, 1994). The NSCISC (University of Alabama-Birmingham, 2004) has maintained data on new spinal cord injury cases in the United States since 1973. Each year, the percentage of spinal cord injury cases increases by 13% in the United States alone. From 1973 to 1979, the average age at injury was 28.6 years, and most spinal cord injuries occur among individuals between 16 and 30 years old. Since the mid-1970s, the median age of the general population of the United States has increased by 8 years. At the same time, the average age at injury has increased to 38 years as of 2000. Since 2000, 78.2% of all spinal cord injuries have occurred among males. The majority of recent individuals with spinal cord injuries are Caucasian. Since 2000, 67.5% are Caucasian, followed 19% African American, 10.4% Hispanic, and 3.1% are from other racial/ethnic groups.

In 2002, the overall length of stay in the acute care unit among hospitals is 15 days. Among various hospital rehabilitation units, the average length of stay is 40 days. Individuals with complete neurological injuries remain longer in acute care and rehabilitation than individuals with incomplete neurological (University of Alabama-Birmingham, 2004).

Prior to the 1970s, the leading cause of death of individuals with spinal cord injuries was renal failure. However, since the 1970s there has been a significant advancement in urological management, which has caused a dramatic change in the leading causes of death. Diseases such as pneumonia, pulmonary emboli, and septicemia have the greatest impact upon life expectancy (University of Alabama-Birmingham, 2004).

The NSCISC (University of Alabama-Birmingham, 2004) suggests that more individuals are classified as tetraplegic as compared to paraplegic. The most frequent neurological category for individuals with spinal cord injuries is incomplete tetraplegic 34.3%, followed by complete paraplegic 25.1%, complete tetraplegic 22.1%, and incomplete paraplegic 17.5%.

A spinal cord injury is due to a lesion to the spinal cord that interrupts the control of muscles innervated at or below the level of the injury. Consequently, the severing of the cord, as well as severe bruising, creates swelling and rupturing of the myelin sheath on nerve fibers.

Depending upon the level of injury and the extent of spinal cord damage, individuals may experience varying degrees of neurological impairments (Blackwell, Krause, Winkler, & Stiens, 2001). Tetraplegia is an impairment that results in a loss of upper motor and/or sensory function to the cervical part of the spinal cord, or an injury to the upper thorax. An individual may have an incomplete or complete spinal cord damage that produces neurological impairment of the trunk and all extremities.

Paraplegia is an impairment that results in a loss of lower motor and/or sensory function to the lower thorax, lumbar, sacral, and coccyx segments along the spinal cord. An individual classified as a paraplegic may have incomplete and complete spinal cord damage that produces neurological impairment of the trunk and lower extremities (Lockette & Keyes, 1994).

Spinal cord injuries are classified as either a complete injury (paralysis) or an incomplete injury (paresis), depending upon the type of cord lesion. A complete spinal cord injury may consist of complete loss of movement. In addition, there may be a loss of sensation in muscles innervated below the level of the lesion. An incomplete spinal cord injury may consist of partial loss of movements and sensations in muscles innervated below the level of injury (Miller, 1995, pp. 183-192).

Subsequent to acquiring a spinal cord injury, individuals may experience long-term decreases in lean body mass. As a result of paralysis or motor loss, the affected muscles will atrophy over time. In other words, the affected muscles will deteriorate and reduce in size. The atrophied muscle is replaced with connective tissue consisting of fat and water. As a result, the individual may experience an increase in body fat and weight gain (Lockette & Keyes, 1994).

In addition, individuals with spinal cord injuries may experience a decline in aerobic capacity because of their injury. The decrease in large active muscle mass of the lower extremities, and loss of sympathetic neural regulation of the heart and vasomotor as well as short-duration tasks, may affect aerobic capacity (Lockette & Keyes, 1994). Some individuals with injuries at T6 or above may not achieve an aerobic training effect because they are unable to use the large muscle groups of the lower extremities. As a result, the upper extremities are incapable of pumping enough blood throughout the body during exercise to challenge the heart. In addition, injuries above T6 will affect the sympathetic nervous system's control of the heart. The sympathetic nervous system is unable to be maintained with injuries above T6. As a result, the individual will be incapable of elevating their heart rate and forcing enough blood to the muscles during exercise (Lockette & Keyes, 1994). Several individuals with spinal cord injuries practice short-duration tasks in rehabilitation and lifestyle for the purposes of developing muscles for activities of daily living (e.g. transfers, self-care). Among various adapted recreational facilities, the emphasis on using the upper extremities of muscles for long duration tasks is insufficient. As a result, the individual may not have the aerobic capacity to perform tasks of long duration (Lockette & Keyes, 1994).

The autonomic nervous system is responsible for the control of muscle tone in blood vessels (vasomotor tone). The loss of vasomotor tone for individuals with spinal cord injuries is the result of the pooling of blood in inactive lower extremities. Therefore, the blood is returning to the heart at a reduced rate. Individuals who engaged in aerobic exercise may experience low blood pressure because of the majority of blood pooled in the legs (Lockette & Keyes 1994).

Spasticity is a condition that results in abnormal muscle tone to one or more extremities. For example, when attempting to move a spastic extremity through a range of motion, the individual may experience added resistance. Depending upon the individual, spasticity may be mild, moderate, or severe. Spasticity may impede movement tasks involving wheelchair transfers and positioning in a wheelchair (Lockette & Keyes, 1994).

Following initial paralysis, individuals with spinal cord injuries are at risk of developing osteoporosis. An individual may experience complete skeletal mineral loss. Bone demineralization is the result of the individual no longer able to use their lower extremities for activities and weight bearing (Lockette & Keyes, 1994).

Contractures and decreased range of motion are conditions that are frequently the result of extended time spent in a wheelchair. Extended time spent sitting, in addition to spasticity, may lead to muscles becoming extremely taut. For example, hip, knee, and ankle flexors, may lose some of their range of motion. In addition, the anterior deltoid (shoulder) may be affected because of bad posture and excessive wheelchair pushing. As a result, the individual may have difficulty with performing transfers, dressing, and general hygiene (Lockette & Keyes, 1994).

The aforementioned data regarding spinal cord injuries and its related problems may negatively affect an individual's confidence when attempting to perform a wheelchair transfer task. According to Schunk (2000, pp. 78-118), an individual's level of performance may improve if they were to observe a peer model. Raudsepp and Raie (2001) suggest that observers, who identify with models with similar characteristics, are more successful in performing various tasks. Similar peer model characteristics such as age, status, and skill level are characteristics that may affect an observer's attention and focus (Schunk, 2000, pp. 78-118).

An individual's attention processes is preeminent when observing a peer model. The observer may attend to cues in which they believe are similar to the peer model. For example, in the present study, the observer may identify with a peer model that is of the same sex. Additionally, the observer may believe they share the same physical attributes as the peer model. The observer may consider their level of functioning is comparable to that of the peer model.

In addition, teachers serving as models are considered to have a positive effect upon a student's performance. Teacher models are able to describe and demonstrate skills that a student can learn. For example, a teacher model performing a wheelchair transfer can describe and demonstrate the skills necessary to perform a wheelchair transfer.

Teacher models may also provide persuasive information that may assist students in performing a task. Persuasive information may be in the form of conveying to the students why learning a particular task is important. For instance, a teacher model may convey to an individual with a spinal cord injury that learning to perform a wheelchair transfer is important for achieving independence.

Summary

The research regarding modeling suggests that individuals when observing a peer or a teacher model demonstrating a task, may improve their performance when performing the same task. Peer modeling has been found to be effective because the model and the observer often share the same physical characteristics. Teacher modeling has been found to improve an individual’s performance level of performance. Individuals who observe a teacher model demonstrating a task, may improve their performance when performing the same task, because the teacher may transmit fundamental techniques that are significant in the overall performance of the task. The present study investigated the effects of both forms of modeling on the movement confidence of individuals with spinal cord injuries. The following research questions were developed to determine which form of modeling had a larger effect on the movement confidence of individuals with spinal cord injuries.

Research Questions

1. Will participants in the peer model condition have a higher overall score on the modified version movement confidence posttest in comparison to participants in the teacher model condition?
2. Will participants in the peer model condition have a higher overall score on the modified version movement confidence pretest in comparison to participants in the teacher model condition?

Definition of Terms

The following definitions of terms are mentioned throughout this document that will assist in clarifying and comprehending the effects of modeling on the movement confidence of individuals with spinal cord injuries.

American Spinal Injury Association (ASIA): an organization that is design to promote and establish standards that is essential for individuals living with spinal cord injuries (American Spinal Injury Association, 2007).

Complete Spinal Cord Injury: loss of voluntary motor or sensory function below the level of injury (Spinal Cord Information Pages, 2007).

Coping Models: a model that is fearful or worried at the outset of attempting a task. Subsequently, by way of employing coping strategies for managing difficult situations, the coping model overcomes their reservations concerning the task (Bandura, 1997).

Functional Independence Measure (FIM): a test designed to analyze the level of independence that an individual with a disability as they proceed through medical rehabilitation. The Functional Independence Measure (FIM) consists of eighteen activities important for daily living skills measured on a seven level ordinal scale (Awang, Ekangaki, Poulos, Dickson, & Kohle, 2001).

Incomplete injury: a partial loss of sensory and/or motor function below the level of injury (Blackwell, Krause, Winkler, & Stiens, 2001).

Lesion: a pathological or traumatic injury to the spinal cord (Blackwell, Krause, Winkler, & Stiens, 2001).

Level of Injury: the lowest segment of the spinal cord where bilateral sensory and/or motor function is present (Blackwell, Krause, Winkler, & Stiens, 2001).

Mastery Models: models who perform calmly and flawlessly (Bandura, 1997).

Mediation: one of the two factor personal assessment component with the movement confidence model that describes an individual's motivation to participate in a given task (Crocker & Leclerc, 1992).

Modeling: a process in which human behavior in learned through observing other individuals. By way of observing individuals, the learner develops rules for behavior that serve as a guide for future actions (Bandura, 1986).

Movement Confidence: movement confidence is defined as a person's sense of adequacy in a movement situation. Movement confidence serves as both a mediator of personal decisions and performance behavior as well as a consequence of evaluation of self relative to the demands of the task (Crawford & Griffin, 1986).

Neurological Level: upon acquiring a spinal cord injury, an individual is classified according to the neurological level of injury. The neurological level is determined by the presence or absence of sensory and/or motor function. As a result, an individual may be classified as either a paraplegic or tetraplegic. (Blackwell, Krause, Winkler, & Stiens, 2001).

Observational Learning: an educational method that is accessible to the learner by way of observing the behavior of other individuals (Bandura, 1986).

Origin of Injury: for the purposes of this study, origin of injury is defined as the manner in which an individual acquired a spinal cord injury. In other words, it is the incident that led the individual to acquire a spinal cord injury.

Paraplegic: an injury sustained to the spinal cord that may lead to a loss of motor and/or sensory functioning in the lower extremities (Blackwell, Krause, Winkler, & Stiens, 2001).

Peer Model: for the purposes of this study, a peer model is defined as a model with similar physical characteristics to the observer; amid the model demonstrating behavior (Bandura, 1986).

Self Models: self models or self modeling is the videotaping of the learner who then observes their own behavior by way of videotape in the attempt that their performance will improve (Bandura, 1986).

Situation Specific Movement Tasks: a movement task is defined as an individual's intention to perform. Also, a movement task can be defined as the individual's attempt to accomplish the task (Burton, 1998). For the purposes of this study, a situation specific movement task can be defined as a movement that is germane to the performance of a task. For example, a wheelchair transfer technique performed by a model that would facilitate the observer to perform the identical transfer is considered a situation specific movement task.

Social Learning Theory: continuous reciprocal interactions between cognitive, behavioral, and environmental determinants which are thought to explain human behavior (Bandura, 1977).

Spasticity: a condition resulting in abnormal muscle tone to one or more extremities.

Spinal Cord Injury: an injury sustained to the spinal cord that may result in a loss of function in mobility and/or sensation (Blackwell, Krause, Winkler, & Krause, 2001).

Sympathetic Nervous System: a division of the autonomic nervous system that is responsible for the acceleration of the heart rate, constriction of blood vessels, and the elevation in blood pressure (Medicine Net, 20007).

Teacher Model: for the purposes of this study, a teacher model is defined as an adapted physical education instructor demonstrating how to perform a wheelchair transfer.

Tetraplegic: an injury sustained to the spinal cord that may lead to a loss of motor and/or sensory functioning in the upper extremities (Blackwell, Krause, Winkler, & Stiens, 2001).

Wheelchair Transfer: one or more methods that provides an individual with a disability who uses a wheelchair as a means for mobility to transfer to and from their wheelchair with or without assistance (Nixon, 1985).

CHAPTER TWO

REVIEW OF THE LITERATURE

This literature review consists of subsections regarding the following areas of research regarding modeling: school curriculum, academic achievement, modeled attributes and similarities and academic achievement, and individual persistence on task. Also, this literature review has a single subsection regarding wheelchair transfer task outcomes. To date, there is no empirical research concerning the effects of modeling on the movement confidence of individuals with a spinal cord injury when learning a wheelchair transfer task. Likewise, there is no empirical research concerning the effects of modeling on the movement confidence of able-bodied individuals when learning a task. There are studies concerning the effects of modeling among able-bodied individuals. The results of those studies have shown that modeling is a strategy that has a positive influence on an individual's performance. Previous research regarding performance on various wheelchair transfer tasks have found that practicing wheelchair transfer tasks while in rehabilitation and after may lead to a life of greater independence.

The following modeling studies may have implications for individuals with spinal cord injuries because adapted physical educators, physical therapists, and recreational therapists can use modeling as means to increase the level of confidence when learning a wheelchair transfer task. Educators and professionals can develop learning modules for performing wheelchair transfers in conjunction with modeling that would focus on daily observances of peer mastery models performing various transfer tasks, daily practice sessions, and strength and development exercise sessions.

Modeling and School Curriculum

Schunk and Hanson (1985) investigated the effects of modeling on school curriculum among children. Based upon those studies in which modeling was investigated among children prior to and following observation of an adult model, and experimentations involving didactic instruction as a comparative condition, results revealed that modeling does affect behavior. In the former case, children were instructed to view a “pessimistic” adult model who unsuccessfully attempted to solve a wiring puzzle. Children judged their levels of self-efficacy prior to a following observation (Schunk & Hanson, 1985). The results revealed that students’ levels of self-efficacy were lower when observing the “pessimistic” adult model subsequent to observation. In the case of the latter, children who lacked fundamental math (division) skills, were placed in the following two conditions: adult model verbalizing operations while solving problems, and didactic instruction (no model). Results found that both conditions rendered more problems solved on the posttest. However, the students within the modeled condition scored higher as compared to the students within the no model condition.

Modeling and Academic Achievement

As a result, Schunk and Hanson (1985) investigated the influences of peer modeling upon children’s academic achievement. The purpose of the study was to examine children’s academic achievement in performing mathematical subtraction problems upon observing a coping model, a mastery model, and a teacher model. A coping model is viewed as one who initially demonstrates fears and deficiencies, and subsequently improves in overall performance and confidence. A mastery and/or teacher model is one who from the inception demonstrates flawless behavior.

Based upon prior research, Schunk and Hanson (1985) proposed the following question: "Do the effects of peer modeling vary depending on the type of modeled behavior displayed"? Schunk and Hanson (1985) hypothesized children within the coping model condition would demonstrate a greater increase in their self-efficacy for learning, in comparison to children in the other model conditions. In addition, children within the peer (coping and mastery) conditions would judge their self-efficacy higher in comparison to children within the teacher model condition. Moreover, children within the teacher model condition would judge their self-efficacy higher as compared to children within the no model condition.

The research design of the Schunk and Hanson study (1985) involved a triangulation analysis of a sample comprising of 80 children from eight classes within two schools. The age range was from 8 years, 6 months to 10 years, 10 months. Teachers were shown a subtraction skills test that identified 80 children who could not solve more than 25% of the problems. The authors concentrated on children who demonstrated inadequate levels of self-efficacy and mathematical skills. The authors presupposed that self-efficacy and math skills would be augmented at lower levels. Initially, subjects were familiarized to the direction and the varying numerical values of the ensuing pretest.

The experiment began with the presentation of a pretest by one of seven female adult testers with no school affiliation. The purpose of the pretest was for subjects to judge whether they were capable in solving an array of subtraction problems. The individualized pretest consisted of measures of self-efficacy, subtraction, skill and persistence. The self-efficacy test consisted of 25 problems with a scale range from 10 to 100 in unit intervals of 10 from high uncertainty (*not sure*, 10) to complete certainty (*really sure*, 100). Each problem was to be completed within 2 seconds. All problems were similar in nature to the ensuing skills test. Twenty-five judgments were averaged and assessed. The skills and persistence test was administer after the self-efficacy test. The test consisted of 25 subtraction problems varying from two to six columns. Verbal instruction was given for each problem. No feedback was given. Scores were averaged across 25 problems.

Upon completion of the pretest, subjects were randomly assigned within sex and school to one of the six experimental conditions: male mastery model, male coping model, female mastery model, female coping model, teacher model, no model. Thus, boys were assigned to the first two conditions, and girls were assigned to the last two conditions. Equal number of boys and girls were assigned to teacher model and no model conditions. The authors indicate that the assignment procedure was necessary because children identify with models of the same sex as themselves.

Within the four model conditions, subjects received two 45 minute treatment sessions on consecutive school days. Videotapes were used to standardize the presentation across subjects. Problems were presented in 15 minute increments. The videotape consisted of a teacher presenting a subtraction problem to the student (model) via the chalkboard. For all six conditions, subjects participated in training sessions involving problem-solving math skills. The purpose of the training program was to assess problem-solving math skills. Problems consisted of two-paged column subtraction applications. Subjects solved problems independently. All sets of problems were problematic for subjects. Thus, no student was able to finish the entire session.

Within mastery model conditions, the teacher explained and demonstrated how to solve the problem. Next, the teacher presented another problem to the mastery model to solve. The mastery model performed all operations. While completing the mathematical problem, the mastery model verbalized aloud positive self-efficacy statements. For example, the mastery model verbalized such high self-efficacy statements, such as, “I can do that one,” “I’m good at this,” and “That looks easy” (positive attitudes). The mastery model rendered two different achievement beliefs while solving each problem.

Upon completion of the first videotape, subjects were instructed to determine how much of a similarity exist between themselves and the mastery model. Scores were recorded on a perceived similarity scale ranging from 10 (*not at all*) to 100 (*to a whole lot*). Following the viewing of the second videotape, self-efficacy for learning how to solve different types of subtraction problems was assessed. The assessment was identical to the pretest. However, the subjects were to judge their certainty of learning how to solve different types of problems as opposed to the certainty in problem solving.

Within the coping model conditions, the procedures and videotapes were identical to the mastery model conditions. During the viewing of the first videotape, the coping model hesitated and made errors. The teacher provided the following statements as a prompt for the coping model: “What do you do first”? and “No, better check that.” The coping model verbalized two negative self-efficacy statements, such as,” I’m not sure that I can do one,” “I’m not very good at this,” “That looks tough,” and “This isn’t much fun.” Upon progression of the videotape the coping model made fewer errors and thus rendered coping statements such as, “I’ll have to work hard on this one” and “I need to pay attention to what I’m doing.” Eventually, the coping model improved with performance and problem-solving behaviors and verbalizations identical to the mastery model. Within the teacher model condition, subjects were shown videotapes of a teacher providing instruction for mathematical problem solving. The teacher explained the same operations that were stated within the other conditions. Next, the teacher solved as many problems as did the mastery and coping models. There was no evidence of any hesitancy, errors, or verbalizations concerning achievement beliefs. Subjects were instructed to determine as to how much of a similarity there was between the teacher model and their teacher. Within the no model condition, self-efficacy for learning was assessed following the completion of the pretest. Moreover, subjects within the no model condition received only the training program.

Following the training session for all six conditions, a posttest was given for subtraction self-efficacy, skill, and persistence. Test instruments were identical to the pretest and experimental conditions. An analysis of covariance (ANCOVA) was used to determine the relationship between self-efficacy for learning and pretest self-efficacy. In addition, an analysis of variance (ANOVA) was used to compare perceived similarity judgments among subjects within the four modeled conditions. Moreover, an ANOVA was used to determine the rate of problem solving during the training sessions. A multivariate analysis of covariance (MANCOVA) was used to measure posttest scores in relation to the three pretest measures. Moreover, product-moment correlations were computed to between self-efficacy for learning, perceived similarity, posttest measures, and training performance.

Results for self-efficacy for learning revealed that among model conditions, there were no significant differences. However, subjects in the mastery and coping condition group judge self-efficacy higher in comparison to subjects in the teacher and no model conditions. Subjects in the teacher model condition rendered more self-efficacy judgments in comparison to the subjects in the no model condition.

Results for posttest measure revealed that among the four model conditions there were no significant differences. However, subjects in the teacher model condition scored higher in comparison to subjects in the no model condition.

Results for training sessions found no significant differences among model conditions. However, subjects within the model conditions completed more problems in comparison to subjects within the no model condition. The correlation analysis found self-efficacy for learning was positively related to posttest self-efficacy, posttest skill, and training performance, but negatively towards posttest persistence. Posttest self-efficacy was positively related to posttest self-efficacy and skill. Correlations involving perceived similarity and proportion of problems solved revealed no significant results.

In the discussion of the findings, Schunk and Hanson (1985) indicate that modeling has a positive influence on children's cognitive skill acquisition. Interestingly, there were no differences found perceived similarity due to type of modeled behavior. Schunk and Hanson (1985) hypothesized that differences would occur between the mastery model condition and the coping model condition. Schunk and Hanson (1985) postulate that subjects may have focused more on similarities than differences.

Based upon the results of the study, the attributes of a model are vitally important in creating a change in behavior among observes.

Modeled Attributes and Similarities and Academic Achievement

Schunk, Hanson, and Cox (1987) examined how a variety of attributes amongst peer models affects children's achievement behaviors. The study consisted of two experiments. In experiment one; children were to observe either a same or cross-sex peer model. In addition, children were to observe types of modeled behavior (mastery and coping). The authors hypothesized that children observing a coping model solving fraction problems would lead to higher levels of self-efficacy, skill performance, and perceived similarities, in contrast to observing a mastery model. Schunk et al. (1987) indicate that researchers suggest observing a model of the same sex enhances achievement among children. Based upon the sex of the model, the authors did not anticipate any differences in achievement. Subjects were comprised of 80 students (40 boys, 40 girls, *M = 10.6 yrs old*) representing grades four through six by way of four elementary schools. All subjects were predominately of a middle class socioeconomic background. The ethnic composition among children was the following: 64% White, 18% Black, 10% Hispanic, and 8% Asian. All students were classified as working below grade level in mathematics based upon the Comprehensive Test of Basic Skills. At the onset; students were given a fraction self-efficacy and skill pretest. The self-efficacy test measured students' perceived capabilities in solving different types of fractions problems correctly. The test consisted of 31 sample pairs of fractions problems. Each scale ranged in 10-unit intervals from *not sure* (10), to intermediate values (50-60), to *really sure* (100). The reliability of the self-efficacy test was $r = .79$.

Each student was shown the 31 sample pairs of fraction problems for two seconds. The purpose of the brief duration was to assess problem difficulty. All 31 scores were computed. Subsequently, the fraction skills test consisting of 31 addition and subtraction problems was administered. The reliability for the fraction skills test was $r = .90$.

Upon completion of the pretest, subjects were randomly assigned within sex to the following four treatment conditions: male mastery model, male coping model, female coping model, female mastery model, and female coping model. Two adult female teachers and four peer child models (two boys, two girls, $M = 10.3$ yrs old) were the videotape participants. Videotapes were based upon the sex of the peer model (male or female) and the type of model behavior (mastery and coping).

Each videotape consisted of a teacher and one of the four peer models: male coping model, male mastery model, female coping model, and female mastery model. Two versions were prepared for each of the four videotapes. In general, each videotape depicted a teacher instructing a model on how to solve a fraction problem. As the model solved each problem, the model would verbalize problem-solving operations and two distinct achievement beliefs. In the male (female) mastery condition, the model correctly solved all problems. The model uttered achievement beliefs such as, (e.g. “I can do that one”) high self-efficacy, (“I’m good at these”), high ability (“That was easy”), low task difficulty (“I like working these”). In the coping model condition, the model was initially hesitant and made errors. As the number of errors increased, the teacher provided a prompt (e.g., “What do you do when the denominators are the same”?). The model uttered achievement beliefs that indicated low self-efficacy (e.g. “I’m not sure that I can do that”).

Upon progression of the videotape, the model made fewer errors and began to utter coping statements (e.g., “I need to pay attention to what I’m doing, and I’ll try to do my best”). Subsequently, the performance and problem-solving skills were identical to those of the mastery model.

In small groups, subjects viewed the appropriate videotape according to their assigned experimental condition. On completion of the tape, subjects were administered three measures: self-efficacy for learning, perceived similarity in competence, and interest. The measure for interest was assessed to eliminate variations in self-efficacy by way of differential attention to the tapes. The measure for self-efficacy for learning assessed a child’s judgment about their certainty of learning how to solve a variety of problems.

On completion of the three measures, subjects participated in a fractions training program. The fractions training program consisted subjects solving two practice problems. Subsequently, the students solved additional problems for about 30 minutes. On completion of the training program, subjects received the self-efficacy and skill posttest. The posttest was identical to the pretest.

The results showed that subjects who observed a coping model demonstrated significant increases in self-efficacy ($M = 85.6$) and skillful performance ($M = 13.8$) when compared to observing a mastery model ($M = 70.9$, $M = 8.6$).

Results for similarity judgments revealed subjects who observed a coping model ($M = 57.8$) out performed those subjects who observed a mastery model ($M = 38.0$).

Results for self-efficacy for learning revealed subjects who observed a coping model (*M = 86.5*) significantly increased their self-efficacy for learning to solve fraction problems when compared to observing a mastery model (*M = 69.0*). Results for the training program revealed subjects who observed a coping model (*M =185.9*) completed significantly more problems than did subjects who observed a mastery model (*M = 158.7*).

In experiment two, Schunk et al. (1987) hypothesized that observing multiple models would augment children's behaviors when compared to observing a single model. Subjects were comprised of 80 children (forty boys, forty girls, *M = 10.9* yrs *old*). Subjects were selected based upon the criteria confirmed in experiment one. In addition, the order of procedure was the same except for the following adaptations. Subjects were randomly assigned within sex to four treatment conditions: single mastery model, single coping model, multiple mastery models, and multiple coping models. In contrast to the previous experiment, subjects only observed peer models who were of the same sex as themselves. There were three versions of each of the four single model conditions (male mastery, male coping, female mastery, female coping). Two versions were previously used in experiment one. The remaining version showed one of the two teachers in the other two versions, and a different boy and girl. In regards to the design of the multiple model videotapes, each videotape was created by way of joining segments of the appropriate single-model tapes. Three peer models of the same sex appeared in each videotape. Therefore, the same boys (girls) who appeared in the single-male (female) model videotaped were represented in each male (female) multiple-model videotape (mastery and coping).

The authors believed that three peer models would offer diversity in perceiving similarities and competence among subjects and models. In addition, including additional models allowed more problems to be solved. Moreover, both of the two teachers were represented in the four multiple-model conditions. Likewise, each of the three boys (girls) was represented in two of the six blocks on both the mastery and coping tapes. Both boys (girls) solved the same amount of problems on all four tapes. Upon completion of viewing the videotapes, subjects were measured according to the perceived similarity competence between themselves and the peer models.

Results revealed for self-efficacy and skill (pretest to posttest), all eight conditions demonstrated significant increases in fractions self-efficacy. Results for posttest skill revealed that subjects within the multiple-coping model ($M = 13.4$), and multiple-mastery model ($M = 12.3$) demonstrated significantly higher fraction skill that did subjects in the single-mastery model condition ($M = 7.3$). Results for perceived similarity revealed that subjects observing a coping model ($M = 55.3$) demonstrated significantly higher similarity judgment than subjects observing a mastery model ($M = 32.3$). Results for the training program revealed that subjects in the single model condition ($M = 177.3$), multiple-coping model condition ($M = 177.9$), and multiple mastery condition, completed significantly more problems than subjects in the single mastery model condition ($M = 155.3$).

Schunk et al. (1987) concluded by indicating that subjects who observed a single peer coping model demonstrated higher self-efficacy for learning, training performance, posttest self-efficacy, and skill, and perceived themselves as more similar than those subjects who observed a single mastery model.

Schunk et al. (1987) suggest that within a classroom setting, students who experience task anxiety and difficulty in learning new material may benefit more from observing a coping peer model. In addition, subjects who observed a multiple coping models, outperformed subjects observing a single mastery model. Schunk et al. indicate that subjects who observed multiple peer models, perhaps perceived themselves as similar to one of the models. However, there were no differences found for perceived similarity judgments between the single peer model conditions and the multiple peer model conditions. Schunk et al. suggest that students exposed to multiple peer models may not be advantageous. Remedial students who observe “normal” learners may not feel efficacious. In experiment one; there were no significant differences due to sex or sex of models. Schunk et al. proposed that observing the behavior of a model is more important than associating with the sex of the model. Schunk et al. conclude that researchers should analyze the effects of observing various types of tasks among multiple models by means of behavioral coping strategies. In addition, Schunk et al. recommend that future research should investigate whether teacher modeling of coping strategies promote children’s achievement behaviors in a classroom setting. Furthermore, in a classroom setting where there are many diverse cues concerning the performances of students, what are the effects on perceived similarity in competence? In other words, do students perceived themselves similar in competence when exposed to performance indicators via other students?

Schunk et al. (1987) indicate that attributes and similarities between model and observer are exact when one is one’s own model. Thus, self-modeling is a method in which behavioral changes occurs by way of observing oneself on videotape.

For example, subjects are videotaped individually while executing a behavior and will then at the completion of the videotaping, view their own behavior. Videotapes can identify current behaviors in which subjects are role-playing or performing previously learned skills. In addition, videotapes can portray desired (target) behaviors that can provide the learner the incentive to improve their behavior on a particular task.

Schunk and Hanson (1989) investigated the effects of self-modeling on children's achievement beliefs and behaviors during mathematical skill learning in the midst of three experiments. Schunk and Hanson (1989) anticipated that self-modeling would raise the level of self-efficacy among children with mathematical difficulties.

In experiment one, the researchers compared self-modeling with the effects of observing peer models. Schunk and Hanson (1989) expected that all treatments would be equally effective in elevating children's achievement behaviors. In addition, Schunk and Hanson (1989) proposed that perception of progress in learning and self-efficacy would be enhanced amongst children. The subjects were comprised of 48 children (27 girls, 21 boys) representing three elementary schools. The mean age for all subjects was *10.9* yrs *old*. Subjects were predominately from a middle class background. The ethnic composition of subjects was the following: 46% White, 42% Black, and 12% Mexican American. Based upon the results from the California Achievement Test (administered in the previous year) and approval from the previous year's teacher, subjects were classified as working below grade level in mathematics.

The research design consisted of a pretest measuring fractions self-efficacy. Subjects were assessed individually on their perceived capabilities for correctly solving various types of mathematical fraction problems. Subjects were shown 31 pairs of fraction problems. The scale range consisted of 10 unit intervals, ranging from *not sure* (10) to *really sure* (100). Subjects were given 2 seconds to complete each pair. The 2 second duration provided a means to assess problem difficulty but not actual solutions. Children were instructed to judge their certainty of solving different types of problems as opposed to judging their certainty of solving any specific problem. The reliability self-efficacy test was $r = .79$.

On completion of the pretest for measuring fractions self-efficacy, a fraction skills test was administered. The fraction skills test consisted of 31 addition and subtraction problems. In addition, the fraction skills test measured the number of problems solved correctly.

On completion of the fraction skills test, subjects were randomly assigned within sex and school to one of the following four treatment conditions: peer-model, self-model, peer + self-model (combined), and videotape control (subjects were taped but did not view themselves). Subjects within the peer model and peer + self-model conditions viewed a 45 minute videotape. There were two versions of the videotape. One version portrayed female peer models, and the other version portrayed male peer models. As a result, female subjects viewed the female peer models, and male subjects viewed the male peer models.

The videotape consisted of a female teacher demonstrating a fraction skills test (adding fractions with like denominators) to three peer models (M = 10.5 yrs old). The test encompassed six fraction skills in a 7 to 8 minute time frame. Each model performed two of the six blocks within both videotapes. In a 2 to 3 minute demonstration, the teacher wrote the problem on the chalkboard, and the peer model was instructed to solve the problem. While working on the problem, the peer model verbalized the problem solving operations. The peer model solved the problem within a 5 to 6 minute period. Upon completion of the problem, the peer model was told that the solution was correct. Subsequently, the teacher presented the next problem to the peer model to solve.

On completion of the videotape, all subjects were given the self-efficacy for learning test. The test was identical to the pretest except that children judge their certainty of learning to solve different types of problems. On completion of the self-efficacy for learning test, all subjects received a fractions instructional program. The fractions instructional program consisted of six sessions performed in six days.

The contents of each session consisted of six sets of fractions operations. Due to the nature of the problems within each set, subjects were unable to complete all problems. On completion of the third session, all subjects were videotaped. Subjects were videotaped in order to provide them experience with solving fractions. At the outset, a practice period encompassing three problems with corrective instruction was implemented. Based upon the trainer's opinion that subjects could solve problems, the trainer wrote 12 problems on the chalkboard involving addition problems. The addition problems were similar to those found within the first three sessions. In order to provide for self-modeling cues, subjects verbalized while problem solving. Subjects were encouraged when they failed to verbalize or committed an error in computation (e.g., "How much is seven times four"?). Upon completing a problem, subjects proceeded to solve the next problem. During the taping session, subjects were assigned no feedback.

The next day each subject within the self-model and peer + self-model conditions viewed the videotape in a private room. After viewing the tape, subjects were administered a measure of perceived progress. The test consisted of a 10-unit scale ranged in 10-unit intervals from *not better* (10) to *whole lot better* (100). The children were instructed to compare their problem solving skills and judging themselves regarding solving fractions upon commencement of the project. Lastly, all subjects received a self-efficacy and fractions posttest after the last instructional session.

An ANOVA was used to determine intracondition changes (pretest to posttest) for the self-efficacy test and fraction skills test. Posttest self-efficacy and fraction skills were analyzed by way of a *2 x 2* (Peer-Model: Yes/No x Self-Model: Yes/No) MANCOVA. The pretest measures were covariates. Posttest means were analyzed by way of Dunn's multiple comparison procedure. A *2 x 2* ANCOVA was used to determine self-efficacy for learning (instructional sessions). The self-efficacy pre-test was used as the covariate. A *2 x 2* ANCOVA was used to measure perceived progress. A *2 x 2* analysis of covariance ANCOVA was used to analyze the number of problems completed during the instructional sessions. Product-moment correlations were used to conduct a correlation analysis involving the following variables: self-efficacy for learning, perceived progress, instructional session performance (number of problems completed), posttest self-efficacy, and skill.

The results revealed the interaction between the peer-model condition and the self-model condition was significant. Results for posttest measures revealed all modeled conditions scored higher than did the videotaped control condition (peer-model; $M = 85.2$, $SD = 11.6$; self-model; $M = 87.3$, $SD = 10.2$; Peer model + Self-model; $M = 86.2$, $SD = 10.4$; videotape control; $M = 66.7$, $SD = 13.6$) ($ps < .01$).

Results for perceived progress revealed subjects within the self-model and the peer model + self-model conditions perceived progress significantly higher than did the videotape control subjects (self-model; $M = 80.0$, $SD = 26.6$; peer model + self-model; $M = 78.3$, $SD = 22.5$; videotape control; $M = 50.0$, $SD = 16.5$).

Results for the number of problems completed during the instructional sessions revealed that subjects within the modeled conditions solved significantly more problems than did subjects within the videotape control condition (peer-model; $M = 168.2$, $SD = 18.6$; self model; $M = 161.8$, $SD = 25.2$; peer-model + self-model; $M = 150.0$, $SD = 23.2$; videotape control: $M = 120.7$, $SD = 28.2$). Results for Product-moment correlations found all correlations were positive and significant ($ps < .05$).

In experiment two, Schunk and Hanson (1989) investigated the timing (early or late) of self-model videotaping within the instructional program. Schunk and Hanson (1989) hypothesized that the timing has virtually no impact upon behavioral change. Also, behavioral changes derive from actual exposure to a self-model condition. Subjects were comprised of forty children (24 boys, 16 girls, $M = 11$ yrs old) from two school elementary schools. Subjects were enrolled in below grade level mathematics classes. The selection procedure as well as the socioeconomic and ethnic backgrounds was the same to those of experiment one.

The research design consisted of materials and procedures that were the same as those found within experiment one with the following adaptations. Subjects were randomly assigned within sex and school to one of four conditions: early self-model, late self-model, and videotape control, instructional control. In order to unscramble any effects of being videotaped as opposed to receiving instruction, a instructional control condition was added (there was no explanation provided for the content within the instructional control condition). The procedure for videotaping was the same as for Experiment one with the following adaptations. For example, early self-model subjects were videotaped after the second instructional session. Schunk and Hanson (1989) supposed that early self-modeling would provide subjects with experience solving fraction problems, and permit for self-modeling effects in subsequent sessions. In addition, late self-model subjects were videotaped after the fourth instructional session. Late self-modeling would allow for preferred effects within the two remaining sessions. Schunk and Hanson (1989) indicate that videotape control subjects were videotaped either subsequent to the second or fourth instructional sessions. The instructional control subjects were videotaped after the self-efficacy posttest. During the videotaping sessions, early self-model subjects solved 15 fraction problems in 15 minutes. The problems were comparable to those within the instructional session’s one and two. The late model subjects solved 12 fraction problems in 12 minutes. The problems were comparable to those within the instructional sessions three and four. The videotape control subjects finished the progress and self-efficacy measure the day after taping.

Upon completion of the posttest for self-efficacy, the videotape control subjects viewed their performance. Schunk and Hanson (1989) indicate that the instructional control subjects completed the progress and self-efficacy measures either subsequent to session two or four.

The results for the comparison between early and late self-model conditions revealed no significant differences. However, both conditions outperformed the videotape and instructional control conditions. Results for the instructional session measures revealed that there were no differences between early self-model subjects and late self model subjects.

Results for the number of problems completed during the instructional sessions revealed no differences among experimental conditions. However, in determining whether self-modeling timing affected problem solving, researchers analyzed the number of problems completing during the first three and final three instructional sessions.

Results for first half performance found no significant finding. However, results for second half performance revealed that early and late self model subjects completed more problems than did the videotape and instructional control subjects (early model; *M = 83.2, SD = 18.1*; late model; *M = 82.6, SD = 11.3*; videotape control; *M = 57.1, SD =26.1*; instructional control; *M = 58.4*, *SD = 18.3*).

In experiment three, Schunk and Hanson (1989) investigated how content has an influenced upon children's achievement beliefs and behaviors. Specifically, researchers were interested when the content conveys either progress in skill development or complete mastery. Schunk and Hanson (1989) hypothesized that both the mastery and progress self-model treatments would influence to subjects to believe that they made progress in skill development and subsequently enhancing self-efficacy and achievement behaviors. Subjects were comprised of 60 children (30 boys, 30 girls, *M = 10.2 yrs old*) enrolled in a below grade level classes in two elementary schools. The socioeconomic and ethnic backgrounds were comparable to those in experiment one. The research design, the identical method of procedure was employed with adaptations in the following segments. Subjects were randomly assigned within sex and school one of three conditions: mastery self-model, progress self-model, or videotape control. On the day of the fourth instructional session, all subjects were videotaped.

Progress self-model subjects were videotaped during the first half of the session. Mastery model subjects were videotaped during the second half of the session. Videotape control subjects were videotaped during either the first half or second half of the instructional session. All Subjects were individually videotaped privately solving 12 additions problems of mixed numbers with carrying problems.

Next, an adult trainer verbalized subsequent steps while solving two problems. Subjects were verbalizing while solving problems via the chalkboard. The trainer provided encouragement if subjects either failed to verbalize or made errors in computation. The self-model subjects used the videotape session a means to learn how to solve fractions. Whereas, the mastery self-model subjects used the videotape session as a review.

On completion of videotaping, the self-model subjects and the videotape control subjects completed the perceived progress measure the following day. In addition, the self-modeling subjects viewed their videotapes. Collectively, the videotape control subjects view their videotape upon completion of the self-efficacy posttest.

The results revealed no differences between self-model conditions. However, both conditions scored higher on each measure than did the videotape control condition (Mastery model; $M = 85.7$, $SD = 9.4$; Progress model; $M = 82.1$, $SD = 10.4$; Videotape control; $M = 67.6$, $SD = 12.3$).

Results for perceived progress revealed no significant difference among self-modeling conditions. Nonetheless, self-modeling subjects judge their progress higher than did the videotape control subjects (Mastery model; *M = 73.0*, *SD = 19.2*; Progress model; *M = 68.0*, *SD = 16.4*; Videotape control; *M* = 53.0, *SD = 16.6*). An ANOVA for the number of problems completed during the instructional session was significant. There were no significant differences between self-modeling conditions. Nonetheless, self-modeling subjects completed more problems that did the videotape control condition (Mastery model; *M =181.4*, *SD = 21.1*; Progress model; *M = 180.4*, *SD = 13.1*; Videotape control; *M = 158.7, SD = 12.8*).

The authors concluded by proposing that self-modeling promotes children's achievement behavior during cognitive skill learning. Specifically, the benefits of observing a self-model tape is analogous to observing peer model tapes. In addition, observing a self-model tape is more important than the timing of the observation. Moreover, self-model tapes are as effective as mastery model tapes. The authors indicate that children, who may demonstrate difficulties in learning, will doubt their capabilities. In addition, children will be uncertain as to how well they are developing skills. Videotapes that portray successful skill performance will communicate to the observer that substantial progress in skill development is emerging. As a final point, the authors indicate that teachers have minimal time, technical, and editing skills to employ videotapes. Nevertheless, the results of the study suggests to teachers that focusing on a target population of students as well as developing tapes involving modest technical skills is not impossible.

Modeling and Individual Persistence on Task

Zimmerman and Ringle (1981) were interested in determining whether the role of the (adult) model in expressing confidence or pessimism during problem solving has an effect on children's persistence. Zimmerman and Ringle (1981) hypothesized that children observing an adult model portraying long durations of effort (high) would increase their level of persistence. In contrast, children observing an adult model portraying short durations of effort (low) would not increase their level of persistence. The subjects were comprised of 100 first and second graders from a public school.

Subjects were randomly assigned to the following four treatment conditions: high persistence, confidence (model), high persistence, pessimistic (model), low persistence, confident (model), low persistence, pessimistic (model), and control (no model). Each group was comprised of 10 boys and 10 girls equally divided among grades. The task consisted of solving two wire and word puzzles. Individual puzzles were given to all subjects. The procedure consisted of an introduction on how to solve the wire puzzles. Specifically, the model began by introducing the puzzles. Next, the model provided instruction in solving the puzzles. The model proceeded to verbalize that he was going to solve the puzzles. Next, the models verbalize that each student would have an opportunity to solve the puzzles. Subsequently, before taking the initiative in solving the problem, the model inquired as to the subjects' opinion concerning solving the puzzles. Afterward, the subjects viewed a series of faces depicting various expressions. The purpose of the series of faces was to assess self-efficacy estimates about solving the puzzles (pretest one).

On completion of the pretest phase, the modeling phase commenced. The experimenter-model was a male (adult) graduate student. In the high persistence conditions, the adult model played with the puzzles for 5 minutes. In the low persistence conditions, the adult model played with the puzzles for 30 seconds. Within each persistence condition, subjects were exposed to two types of comments (confident and pessimistic).

On completion of the modeling phase, the series of faces was reintroduced. The purpose of the reintroduction of the series of faces was to assess self-efficacy in connection with solving the puzzle. The subjects were then given one of the two wire puzzles to solve. Each subject was given 15 minutes to solve the puzzle.

On completing the puzzle, the series of faces was reintroduced (posttest one). The rationale for the reintroduction of the series of faces was to examine subjects' ability to solve the identical puzzle again, if presented in the future without any time constraints (posttest self-efficacy). Subjects within the control (no model) condition were pre-tested for self-efficacy identical to the modeled groups. Following the pretest for self-efficacy, the puzzle task was administered to the control group. Subsequently, the self-efficacy measured was administered to the control group. Finally, for all conditions, two word puzzles were introduced to the subjects. The procedure was identical to the pretest (one) for self-efficacy. Subsequently, the series of faces was reintroduced. Altogether, there were two pre and two posttests for self-efficacy.

An ANOVA was used to assess the relationship between subjects' persistence on the wire puzzle task and on the world puzzle. The analysis used a two (model duration:

long, short) x *2* (model comments: confident, pessimistic) x *2* (sex) x *2* (grade: first, second) x *2* (task wire puzzle, word puzzle) design.

The results revealed a significant main effect for model's durations of persistence ($F(1, 64) = 5.22$, $p < .03$. Subjects who viewed the long modeling duration persisted longer ($M = 210$ *seconds*) on both puzzles compared to subjects who viewed the short modeling duration ($M = 147$ *seconds*).

Zimmerman and Ringle (1981) conclude that prior research has found that observing an adult model of long duration, regardless of the outcome (success or failure), does improve one's level of persistence.

The aforementioned studies suggest that modeling may improve an individual's performance on various pedagogical tasks. The results have shown that regardless of the type of model (self, male, female, teacher, adult, mastery, peer coping) or the number of models, modeling is a method that may improve an individual's performance on a given task.

Wheelchair Transfer Task Outcomes

Previous research has suggested that individuals with spinal cord injuries in various hospital settings showed increases in independence on various wheelchair transfer task outcome measures during their rehabilitation. Mingaila and Krisciunas (2005) evaluated the functioning levels and related dysfunctions with patients with spinal cord injuries receiving occupational therapy during early rehabilitation. Also, Mingaila and Krisciunas (2005) assessed the effectiveness of occupational therapy in regards to level and completeness of spinal cord injury. According to Mingaila and Krisciunas (2005), occupational therapy is an important component in rehabilitation for patients with spinal cord injuries. The goal of occupational therapy is to assist individuals with disabilities in overcoming problems in relation to self-care, work, and leisure. Adaptations with regards to social, living and other environmental agents are developed during an occupational therapy session(s). Mingaila and Krisciunas (2005) suggest at the time of discharge, patients who received early occupational therapy after stabilization of their functional state achieved significant progress in areas such as self-care, mobility (wheelchair transfers), and bladder and bowel care during rehabilitation. However, there is no research on achievement and expected outcomes of patients during early rehabilitation.

Participants in the Mingaila and Krisciunas study (2005) were comprised of 136 (97 males, 39 females) patients with spinal cord injuries admitted to the Department of Rehabilitation, Kaunas University of Medicine Hospital from 1999 to 2005. All patients received early rehabilitation after the stabilization of their functional state was evaluated. The average duration of early rehabilitation was 68 days. The patients were comprised of two groups: patients with cervical lesions (CI-Th1 segments) and patients with thoracic lumbar lesions (Th2-S1 segments). Also, patients were divided into two according to the completeness of spinal cord injury: complete (ASIA-A) and incomplete injury (ASIA-B, ASIA-C). The level of independence of each patient was evaluated based upon the levels of injury: C4; C5; C6; C7-C8; Th-Th9; Th10-L1; L2-S5 segments. The FIM was utilized to assess the functional state and activity level of each patient.

The effectiveness of the occupational therapy was evaluated based upon each patient’s performance in relation to their predicted independence level at the end of rehabilitation. All patients were evaluated on variety of activities such as, eating, grooming, dressing, toileting, bathing, wheelchair transfer into bed, wheelchair transfer onto a toilet, and wheelchair transfer in shower/bathroom. For the purposes of this study, only the results pertaining to the wheelchair transfers tasks will be discussed.

A Man-Whitney-Wilcoxon sum of ranks analysis was to assess the data. The level of significance was $p < 0.05$. The results show that 21 patients (*15.4%)* had complete injury (ASIA-A) at the cervical level. Forty-one patients *(30.2%)* had complete injury at the thoracic-lumbar level. Also, 35 patients *(25.7%)* had incomplete injury at the cervical level and 31 patients *(28.7%)* at the thoracic-lumbar level.

The results found patients with incomplete (ASIA-B, C) spinal cord injury in cervical level independence improved in transferring from bed to wheelchair activity ($M = 3.74$, $SD = 1.58$), and transferring from bed to wheelchair ($M = 3.51$, $SD = 1.92$). Patients with complete (ASIA-A) spinal cord injuries at the thoracic-lumbar level improved in transferring from bed to wheelchair ($M = 3.41$, $SD = 1.56$). A comparison between patients with incomplete and complete spinal cord injuries in thoracic-lumbar level for transferring in bathroom found significant increase independence for the patients with incomplete spinal cord injuries (ASIA-A, $M = 0.98$, $SD = 1.67$; ASIA-B,C, $M = 2.56$, $SD = 2.21$). The results from this study show that when individuals with spinal cord injuries receive wheelchair transfer training in early rehabilitation, there is an improvement in their performance.

Pillastrini, Mugnai, Bonfiglioli, Curti, Mattioli, Maioli, Bazzocchi, Menarini, Vannini, & Violante, (2007) were interested in assessing the functional independence acquired by patients in early rehabilitation (at the time of admission into the study) and at discharge from a hospital. The study was conducted between 2004 and 2006. Subjects were comprised of 36 male subjects below the age of 60 from the Spinal Cord Unity of the Rehabilitation Institute of Montecatone (Imola, Italy). All subjects were diagnosed with complete paraplegia in the thoracic level at first hospitalization.

Upon admission, all subjects received early neuromotor rehabilitation from the rehabilitation staff. The neuromotor program consisted of reflexes inhibiting postures, mobilizations and proprioceptive neuromuscular facilitation, and trunk and lower limb exercises.

Five weeks prior to discharge, the sample was divided into two groups. The experimental group consisted of 24 patients, who underwent neuromotor rehabilitation and occupational therapy sessions. The control group consisted of the remaining subjects who voluntarily received neuromotor rehabilitation only. The occupational therapy sessions for the experimental group consisted of individuals practicing daily living activity skills in a wheelchair accessible occupational therapy room. Subjects were expected to practices various daily living skills which included various wheelchair transfer tasks.

The rehabilitation program consisted of eight sessions and two occupational therapy sessions for the experimental group. Whereas, the rehabilitation program for the control group consisted of 10 sessions. The duration of the neuromotor and occupational therapy sessions for both groups were 2 per day for 60 minutes 5 days a week.

Subjects in both groups were assessed on their ability to display functional independence several tasks including the wheelchair transfer by way of the Valutazione Funzionale Mielolesi (VFM) scale. Subjects were assessed at admission into the study and at discharge. The VFM scale is commonly used in rehabilitation settings for patients who undergo functional problems and changes in their functional status. The VFM consists of nine domains, one including 12 wheelchair transfer tasks. The VFM was administered by two non-residential physical therapists. Upon observing subjects' performance, each task was assigned a score ranging from zero to four. A score of zero denotes complete dependence and four denotes complete independence.

The data analysis consisted of computing the difference between discharge and admission scores for each domain from one to seven. A two-sample Wilcoxon rank-sum was used to assess and compare VFM domain scores between both groups. The level of significance was set at $p < 0.05$. For the purposes of this study, only the domain scores for wheelchair transfer tasks among both groups will be discussed.

The results showed a statistically significant increase for the various wheelchair transfer tasks assessed by the VFM at admission in the study and at discharge for the experimental group, ($M = 22.38$, $SD = 9.22$), in comparison to the control group, ($M = 7.92$, $SD = 8.38$) ($p < 0.0001$). The authors indicate that much of the occupational therapy training received by the experimental group included activities involving wheelchair use and transfers. The results of this study show that patients who received occupational therapy with an emphasis on wheelchair training, improved their level of independence at the early rehabilitation phases and at the time of discharge.

Scivoletto, Morganti, Ditunno, Ditunno, & Molinari (2003) compared outcome measures on various daily living activity skills at admission and discharge, between older patients and younger patients with spinal cord injuries. The subjects were comprised of 284 patients with recent onset of traumatic and nontraumatic spinal cord lesions. All patients had been admitted to a rehabilitation hospital in Italy between 1997 and 2001.

The sample was divided into the following two groups: (group one) under 50 years old, (group two) over 50 years old. At admission and discharge, The Barthel Index (BMI) and the Rivermead Mobility Index Index (RMI) were administered to all patients. Both Indexes consisted of tasks that pertain to daily living activity skills which include wheelchair transfers. The range of scores on the BMI was from 0 to 100. High scores on BMI denote greater independence. The range of scores on the RMI was from 0 to 15. High scores on the RMI denote greater autonomy in bed mobility (transfers). The difference between BMI and RMI scores achieved at admissions were compared with scores achieved at discharge. The statistical analysis used for the study consisted of mean + standard deviation (SD) for all continuous data. Also, a Student's *t*-test and x^2 test was used to analyze compare both groups.

The results for both the BMI and RMI showed that both groups improved their scores from admission to discharge (Group 1 admission BMI: $M = 25.4$, $SD = 22.6$, discharge BMI: $M = 69.3$, $SD = 29.8$, admission RMI: $M = 1.3$, $SD = 2.5$, discharge RMI: $M = 6.8$, $SD = 4.9$; Group 2 admission BMI: $M = 20.3$, $SD = 20.6$; discharge BMI: $M = 44.3$, $SD = 33.1$; admission RMI: $M = 0.8$, $SD = 2$, discharge RMI: $M = 3.5$, $SD = 4.5$).

Although the results show that neither group is completely independent according to both indexes, however; the results show that both groups improve in their ability to attempt numerous daily living activity skills from admission to discharge.

Middleton, Harvey, Batty, Cameron, Quirk, & Winstanley (2006) assessed the mobility and the locomotor function of individuals with spinal cord injuries over a six month period with FIM and five additional mobility items.

The subjects were comprised of 43 patients with spinal cord injuries (ASIA-A-C impairment) were admitted to two acute spinal cord injury units in Sydney, Australia between 1999 and 2002. Patients were assessed on locomotion and mobility at five time intervals: 72 hours within mobilizing in a wheelchair, 1 month, 2 months, 3 months, and 6 months. For the purposes of this study only items that pertain to the wheelchair transfer will be discussed.

Subjects were assessed on their ability to perform four wheelchair transfer tasks between the FIM and the additional mobility items. The four wheelchair transfer tasks consisted of: bed transfer, vertical transfer (floor to wheelchair), toilet transfer, and bath transfer. The criteria used for scoring on the transfer items consisted on the patient's ability complete independently four components of each task. Each patient was given three minutes to complete the task.

The statistical analysis for the study consisted of classifying patients into two groups according to impairment: tetraplegic (C5-C8), and paraplegic (T1 and below). A Mann-Whitney *U test* was used to assess the construct validity of one additional wheelchair item to discriminate between neurological impairments at each time interval.

The results for the vertical transfer item showed that patients' with tetraplegia improved their performance from 2 months to 6 months. Patients' with paraplegia improved their performance on the vertical transfer item from within 72 hours of mobilization to 3 months.

The results for the bed transfer item showed that patients' with tetraplegia improved from 1 to 6 months. Patients' with paraplegia improved on their performance from within 72 hours of mobilization to 3 months.

The results for the toilet transfer item revealed that only patients' with paraplegia improved in their performance. The improvement for patients' with paraplegia was from within 72 hours of mobilization to 3 months.

The results for the bath transfer item revealed an improvement in performance for patients' with tetraplegia from three to six months. For patients' with paraplegia there was improvement in bath transferring from within 72 hours of mobilization to 3 months.

The results of these studies show that individuals with spinal cord injuries improved in their ability perform a wheelchair transfer. Also, the results suggest that individuals with spinal cord injuries can attain a level of independence by way of attempting a wheelchair transfer task.

Summary

The modeling studies as well as the wheelchair transfer outcome studies suggest that individuals with spinal cord injuries may improve their level of movement confidence by way of observing a model. The model may have similar characteristics or convey important information to the individual that may improve their movement confidence to perform a wheelchair transfer.

CHAPTER THREE

METHODOLOGY

The purpose of this study was to analyze the effects of modeling on the movement confidence of individuals with spinal cord injuries. The following sections present information regarding the research design, sampling procedures, protection of human subjects, instrumentation, procedures, and data analysis procedures.

Research Design

The study was a quantitative experimental pretest and posttest design with random assignment of subjects to groups (Krathwohl, 1998). The dependent variables were the performances on the posttest for movement confidence, and responses to the questionnaire. Thirty-four adults with spinal cord injuries from five community sites in northern California participated in the study. There were respectively 10 participants at the first site, 6 participants at the second site, 5 participants at the third site, 2 participants at the fourth site, and 11 participants at the fifth site. Participants were randomly assigned to either a teacher model group or a peer model group. In the teacher model group, 17 participants observed a 2-minute video of an adapted physical education instructor demonstrating four wheelchair transfer tasks. In the peer model group, 17 participants observed a 5-minute video of an individual with a spinal cord injury performing the same four wheelchair transfer tasks. Prior to observing the videos, all participants completed a modified version of a pretest for movement confidence regarding the four wheelchair transfer tasks. Also, after the completion of the videos, all participants completed a modified version of a posttest for movement confidence regarding the four wheelchair transfer tasks. The purpose of the pretest and posttest movement confidence test was to assess and compare participants' level of movement confidence in performing the four wheelchair transfer tasks prior to and after viewing the videos. In conjunction with the posttest for movement confidence, all participants completed a questionnaire regarding demographic information, the videos, and related wheelchair transfer tasks. The responses given on the questionnaire were coded and quantified.

Sample

For the purposes of this study, a convenient sample was employed to assign 34 adult individuals with spinal cord injuries (29 paraplegics, 5 tetraplegics, 28 males, 6 females, *M* = 41.03 yrs old, *SD* = 13.84, level of injuries from C4 to L4-L5) from five northern California community sites, into two model groups (teacher and peer). An individual who is medically classified as a paraplegic may have experience complete or incomplete motor and/or sensory functioning in their lower extremities. An individual who is medically classified as a tetraplegic may have experience complete or incomplete motor and/or sensory functioning in their upper and lower extremities. The level of injury is the location down the spinal cord where the injury occurred. Also, a community site may include an adapted physical education program at a school, a city or a county adapted recreation program, or a spinal cord injury support group, and sponsored professional wheelchair sports teams.

Participants in the study were from the following communities in northern and southern California: two professional sponsored wheelchair basketball teams, a junior wheelchair sports team, a recreational wheelchair basketball league, a professional sponsored wheelchair tennis team, a spinal cord injury support group, and students enrolled in an adapted physical education program at a community college. The study was conducted at five community sites. There were 10 participants at the first site, 6 participants at the second site, 5 participants at the third site, 2 participants at the fourth site, and 11 participants at the fifth site.

Protection of Human Subjects

The study was approved by the IRB committee at the University of San Francisco and all protocols required were followed. The protection of the general welfare of human subjects consisted of presenting a verbal script to all subjects. The verbal script contained language pertaining to the nature of the study, data confidentiality, human subject privileges, and the benefits of participation. There was no risk of potential injury to any of subjects at any of the five locations.

Instrumentation

The dependent variables for the study were 1) the responses on the modified version posttest for movement confidence test and 2) the response items' 3, 4, and 5 on the questionnaire.

To date, a standard movement confidence instrument does not exist. However, previous research has showed that researchers have adopted their own movement confidence instruments which have included measures for movement competence, potential enjoyment, and potential risk of physical harm (Crocker & Leclerc, 1992; Crawford & Griffin, 1986; Griffin et al. 1984; Keogh et al. 1981).

A modified movement confidence measure was used for the study to measure overall movement confidence on the pretest and posttest for movement confidence as well as movement confidence for each task on the pretest and posttest for movement confidence (Griffin & Keogh, 1981). The movement confidence measure consisted of 28

Likert items that measured an individual's extend of agreement and disagreement to the statements about the movement confidence for each of the four tasks. A score of 6 indicated strongly agree, and a score of 1 indicated strongly disagree. Sixteen items were worded as positive, and the other 12 items were worded as negative. For each task, items' 1, 2, 4, and 6 were worded as positive, and items' 3, 5 and 7 was worded as negative (see Appendices A and B). Items' 3, 5, and 7 for each task were reflected so all items were in the same direction where higher scores indicated more movement confidence. Among all participants, an overall score for all tasks was summed for both the pretest and posttest for movement confidence. The overall score ranges that indicated the level of movement confidence for pretest and posttest for movement confidence were the following: *high* (121-168) *moderate* (73-120), and *low* (72-28). Also, among all participants, a score for each of the four tasks was summed for both pretest and posttest for movement confidence. The score ranges that indicated the level of movement confidence for each task on the pretest and posttest for movement confidence were the following: *high* (29-42) *moderate* (15-28) and *low* (7-14).

A questionnaire consisted of six items was included as a component of the posttest measure for movement confidence. Questionnaire item 1 was a *yes* or *no* question regarding whether or not participants learned more about how to perform a wheelchair transfer by observing the model portrayed in the video. Questionnaire item 2 was *yes* or *no* question regarding whether the participants would have learned more about performing wheelchair transfers by observing a model that was more similar in regards to gender, age, and physical ability. Questionnaire 3 was an open ended question regarding the method that participants used to perform a wheelchair transfer in the past.

Questionnaire item 4 was an open ended question in regards to the types of related wheelchair transfers participants performed on a regular basis. Questionnaire item 5 required a rating score of 4 indicating *a lot* and a score of 1 indicating *not at all* to determine the amount of confidence participants have in performing other related wheelchair on a regular basis. Questionnaire item 6 required a rating score of 4 indicating *a lot* and a score of 1 indicating *not at all* to determine the amount of improvement in confidence that participants would receive by observing a model performing one of the related wheelchair transfer tasks.

The purpose of the questionnaire was to provide additional information regarding each participant's opinion concerning aspects of the videos and other related wheelchair transfer tasks. Participants' responses to questionnaire items' 3 and 4 were collected and presented in Appendix C. Also, participants' responses to questionnaire item 5 was computed and presented in Appendix C. Questionnaire items' 1, 2, and 6 were not reported in the final analysis.

Cronbach's alpha (Vogt, 1999) was used to estimate the reliability of test scores attained on the pretest and posttest for movement confidence. The alpha reliability for scores on the pretest was alpha .95; the alpha reliability for the test scores on the posttest for movement confidence was .96.

Treatment Conditions

Teacher Model Condition

In the teacher model condition, participants viewed a 2-minute video of adapted physical education instructor demonstrating how to perform four wheelchair transfer tasks. In the first 90 seconds to 1-minute of the video, the teacher model positioned a wheelchair parallel to a mat of equal height, and then proceeded to transfer from a wheelchair to a mat of equal height and from the same mat of equal height returning into the wheelchair. In the last minute of the video, the teacher positioned the wheelchair adjacent to an exercise mat on the floor, and then proceeded to transfer from a wheelchair to the floor and from the floor returning into the wheelchair.

Peer Model Condition

In the peer model condition, participants viewed a 5-minute video of an individual with a spinal cord injury performing the same wheelchair transfer tasks as described in the teacher model condition. Within the first 90 seconds to 1-minute of the video, the peer model positioned his wheelchair parallel to a mat of equal height. The peer model proceeded to transfer from his wheelchair to the mat of equal height and transferring from the mat of equal height returning to his wheelchair. For the next 4 minutes of the video, the peer model positioned his wheelchair adjacent to a mat on the floor. The peer model proceeded to transfer from his wheelchair to the floor. Upon transferring from the floor returning to the wheelchair, the peer model while grasping his chair fell back on the floor. The peer model attempted the transfer a second time and successfully completed the transfer.

Initially, both model videos were to be of the same duration. However, as indicated previously, while attempting the fourth transfer, the peer model had difficulty in transferring from the floor to the wheelchair. The researcher thought it was important to continue videotaping as opposed to halting briefly and editing out the transfer from the segment. Previous research has shown that some observers may gain confidence in viewing someone who initially demonstrates difficulty in completing a task and subsequently completes the task (Schunk & Hanson, 1985).

Procedures

The researcher randomly assigned 34 participants to two model conditions: teacher model and peer model. In all, there were 17 participants in each group. The study was conducted at five community sites in northern California. There were 10 participants at the first site, 6 participants at the second site, 5 participants at the third site, 2 participants at the fourth site, and 11 participants at the fifth site.

At each site of the study, the researcher discussed with all participants the content of the experiment. All participants were told the study was design for any individual with a spinal cord injury and their movement confidence in performing wheelchair transfers. The researcher instructed all participants to indicate on the pretest and posttest for movement confidence to rate their level confidence if they were to perform the modeled wheelchair transfer tasks. Participants in their assigned condition received a 5-minute period to complete a modified version pretest for movement confidence along with items regarding demographic characteristics (see Appendix A). All participants viewed a video according to their assigned condition, of a model performing four wheelchair transfer tasks in an adapted physical education gymnasium. Upon observing the videos, all participants were given a 5-minute period to complete a modified version posttest for movement confidence and a questionnaire regarding the videos, and related wheelchair transfer tasks (see Appendices B and C).

The duration of the study was 12- 15 minutes for each group. All groups were run over a 9 day period. Data for the study was collected on separate days within the 9 day period.

Data Analysis

The data was analyzed by way of SPSS 16.0 statistical software package. An independent sample *t* test was employed to determine overall movement confidence on the pretest and posttest for movement confidence among both modeling groups. Additionally, an independent sample *t* test was employed to determine movement confidence on each task on the pretest and posttest for movement confidence among both modeling groups. An independent sample *t* test for questionnaire item 5 for confidence and related wheelchair transfer tasks among both modeling groups was analyzed. In combination with the independent sample *t* tests, Levene's equality of variance test was conducted. The purpose of the independent sample *t* tests was to analyze if the mean differences between group scores were significantly different from zero. The purpose of the Levene's test for equality of variance was to determine if the assumption of equal variance among both modeling group scores was justified. Also, individual responses to questionnaire items' 3 and 4 among both modeling groups were analyzed. The purpose for questionnaire items' 3 and 4 were to compare individual responses with overall movement confidence among both modeling groups.

CHAPTER FOUR

FINDINGS

In the following results section, independent sample t tests, Levene's test of equality of variances, questionnaire item responses, and participants' opinions regarding the study design are reported.

In analyzing the effects of modeling on the movement confidence of individuals with spinal cord injuries, the following statistical data were generated from the analysis: a Levene's test for equality of variances, means and standard deviations of modeling groups' overall scores on the pretest and posttest for movement confidence, means and standard deviations of modeling groups' score for each task on the pretest and posttest for movement confidence, types of related wheelchair transfer tasks as performed by number of participants, means and standard deviations of modeling groups' level of confidence performing related wheelchair transfer tasks, methods of learning previous wheelchair transfer tasks by number of participants, and participants' opinions regarding the study design. The statistical data collected for the pretest and posttest for movement confidence is reported by the two research questions. The statistical data for the pretest and posttest for movement confidence for each task and the data collected for questionnaire items' 3, 4 and 5 are reported by related findings.

Research Question 1

Will participants in the peer model condition have a higher overall score on the modified version movement confidence posttest in comparison to participants in the teacher model condition?

A Levene's test for equality of variances was conducted and found equal variance for overall movement confidence on the posttest. An independent sample *t* test for movement confidence on the posttest found that both modeling groups mean scores on the posttest were high, (Posttest: Teacher Model: *M* = 131.24 *SD* = 27.82; Peer Model: *M* = 124.00, *SD* = 33.97) *t* (32) = .673, *p* = .51, as shown in Table 1.

Table 1

Means and Standard Deviations of Model Groups' Overall Score on the Posttest for Movement Confidence (n = 34)

Model Group	M	SD
Teacher Model	131.24	27.82
Peer Model	124.00	33.97

There were no significant differences on the posttest for overall movement confidence between both model groups. The independent sample *t* test results suggest that both model groups were highly confident in their ability to perform the four wheelchair transfers after observing the videos.

Research Question 2

Will participants in the peer model condition have a higher overall score on the modified version movement confidence pretest in comparison to participants in the teacher model condition?

A Levene's test for equality of variances was conducted and found equal variance for overall movement confidence on the pretest. An independent sample *t* test for movement confidence on the pretest found that both modeling groups mean scores on the pretest were high, (Pretest: Teacher Model: *M* = 132.00, *SD* = 25.86; Peer Model: *M* = 125.06, *SD* = 33.79 *t* (32) = 1.10, *p* = .28, as shown in Table 2.

Table 2

Means and Standard Deviations of Model Groups' Overall Score on the Pretest for Movement Confidence (n = 34)

Model Group	M	SD
Teacher Model	132.00	25.86
Peer Model	125.06	33.79

There were no significant differences on the pretest for overall movement confidence between both model groups. The independent sample *t* test results suggest that both model groups were highly confident in their ability to perform the four wheelchair transfers prior to observing the videos.

Related Findings

Pretest Movement Confidence Scores for Each Task

A Levene's test for equality of variance was conducted for modeling groups' mean score on each task on the pretest and for movement confidence, and found equal variance among both groups. An independent sample *t* test was conducted for the modeling groups' mean score on each task on the pretest for movement confidence, and found that both groups' level of confidence on the pretest was high, Pretest task 1: *t* (32) =.-653, *p* = .52, Pretest task 2: *t* (32) =.-593, *p* =.56, Pretest task 3: *t* (32) = 1.10, *p* = .28, Pretest task 4: *t* (32) = 1.41, *p* = .17 as shown in Table 3.

Table 3

Means and Standard Deviations of Model Groups' Scores for Each Task on the Pretest for Movement Confidence (n = 34)

Group		Mean	SD
Task 1	T	36.59	5.28
	P	37.88	6.24
Task 2	T	36.00	5.78
	P	37.47	8.42
Task 3	T	30.18	9.95
	P	25.82	12.99
Task 4	T	29.24	9.88
	P	23.88	12.10
Overall	T	132.00	25.86
	P	125.06	33.79

There were no significant differences for each task score on the pretest for movement confidence among both model groups.

Posttest Movement Confidence Scores for Each Task

A Levene's test for equality of variance was conducted for modeling groups' mean score on each task on the posttest and for movement confidence, and found equal variance among both groups. An independent sample *t* test was conducted for the modeling groups' mean score on each task on the posttest for movement confidence, and found that both groups' level of confidence on the posttest was high. Posttest task 1: t (32) = 1.00, p =.33, Posttest task 2: t (32) = .05, p =.96. Posttest task 3: t (32) = .96, p = .35, Posttest task 4: t (32) = 1.50, p = *.16* as shown in Table 4. There were no significant differences found between both model groups.

Table 4

Means and Standard Deviations of Model Groups' Scores for Each Task on the Posttest for Movement Confidence (n = 34)

Group		Mean	SD
Task 1	T	36.69	6.54
	P	36.82	8.01
Task 2	T	37.18	6.03
	P	37.06	8.00
Task 3	T	30.35	10.25
	P	26.65	12.20
Task 4	T	29.28	10.33
	P	23.47	12.47
Overall	T	131.24	27.82
	P	124.00	33.79

Types of Related Wheelchair Transfers

The results for responses for questionnaire items' 4 concerning types of related wheelchair transfers performed among all participants showed that the wheelchair to and from a bed transfer was performed the most among all participants as shown in Table 5.

Table 5

Types of Related Wheelchair Transfer Tasks as Performed by Number of Participants (n = 34)

Wheelchair Transfer Tasks	Number of Participants
Wheelchair to and from a mat	(7)
Wheelchair to and from a bed	(23)
Wheelchair to and from a bathtub/shower chair	(17)
Wheelchair to and from the floor	(11)
Wheelchair to and from a car seat	(17)
Wheelchair to and from a sofa	(10)
Wheelchair to and from the bathroom toilet	(7)
Wheelchair to and from the pool	(2)
Wheelchair to and from the van seat (vehicle)	(3)
Wheelchair to and from gym equipment (gymnasium)	(1)
Wheelchair to and from sports equipment	(2)
Wheelchair to and from a boat (seat)	(1)
Wheelchair to and from a pickup truck (seat)	(11)
Wheelchair to and from work area (chair)	(1)

The rationale for identifying types of other related wheelchair transfers performed among all participants was for the purposes of future research regarding modeling, movement confidence, and wheelchair transfers.

Confidence and Related Wheelchair Transfer Tasks

A Levene's test for equality of variance for modeling groups' movement confidence performing related wheelchair transfer tasks found equal variance among both modeling groups. The results from the independent sample *t* test for responses regarding questionnaire item 5 concerning confidence and other related wheelchair transfer tasks performed, showed both modeled groups demonstrated a level of confidence ranging from somewhat to a lot, (Teacher Model: M = 3.8, SD = .39; Peer Model: M = 3.8, SD = .54) t (32) = .000, p = 1.00, as shown in Table 6.

Table 6

Means and Standard Deviations of Model Groups' Confidence Performing Related Wheelchair Transfer Tasks (n = 34)

Model Group	Mean	SD
Teacher Model	3.8	.39
Peer Model	3.8	.54

There were no significant differences in the level of confidence regarding other related wheelchair transfer tasks among modeling groups. Since both modeling groups demonstrated high movement confidence on the pretest and posttest for movement confidence, questionnaire items' 1, 2, and 6 were discarded in the final analysis.

Methods of Learning Wheelchair Transfers

The results for responses for questionnaire item 3 concerning methods of learning wheelchair transfers in the past revealed the practice and trial error method was the method chosen most among all participants as shown in Table 7.

Table 7

Methods of Learning Previous Wheelchair Transfer Tasks by Number of Participants (n = 34)

Methods	Number of Participants
Practice and Trial and Error	(23)
Observing others and Practice	(3)
Instruction from a Physical or Occupational Therapist	(7)
Observing a Teacher Model (Physical/Occupational Therapist) and Practice	(1)

The rationale for identifying other methods of learning concerning previous wheelchair transfer task was to compare the responses with modeling groups' overall scores on the pretest and posttest for movement confidence.

Participants' Opinions

At the completion of the experiment, some participants in the teacher modeling group expressed their opinions concerning the ineffectiveness of observing a teacher model as opposed to a peer model. Some of the participants indicated that a non confident individual may not relate to an individual (teacher model) imitating the movement patterns of an individual with a spinal cord injury. Also, some of the participants were able to identify certain movement patterns whereby the teacher model "cheated" by using his legs. The teacher model lacked the upper body strength to transfer from the floor to wheelchair. Therefore, the teacher model used his legs somewhat to assist himself in transferring into the wheelchair from the floor. The participants emphasized to the researcher the importance of observing a peer model as opposed to a teacher model demonstrating a wheelchair transfer. Also, the participants indicated that in several rehabilitation facilities, individuals with spinal cord injuries are all too often exposed to an able-bodied individual (physical or occupational therapist) demonstrating wheelchair transfers as opposed to an individual with a spinal cord injury.

Summary

In summary, the results suggest that the type of model observed in either video had no effect upon the movement confidence among both groups. Both groups were highly confident prior to the pretest and after the posttest for overall movement confidence. Also, the results suggest that both modeling groups were highly confident from pretest and posttest on each task. In addition, the results suggest that in regards to related wheelchair transfers tasks, the level of confidence among both modeling groups was somewhat to a lot. Moreover, the wheelchair to and from a bed transfer is performed the most among all participants. Also, the trial by error method of learning how to perform a wheelchair transfer was the method used the most when learning to perform a wheelchair transfer indicated by the majority of participants.

CHAPTER FIVE

SUMMARY, FINDINGS, LIMITATIONS, AND CONCLUSIONS

In the following chapter, sections regarding the purpose of the study, methodology, findings, limitations, discussion, implications, and conclusions are presented.

Purpose of Study

Movement confidence is important for individuals with spinal cord injuries when faced with attempting a situation specific movement task in lieu of movement limitations. Griffin and Keogh (1981) suggest that in a movement situation such as attempting a wheelchair transfer, the individual's capability to perform the task is important. Movement confidence has been found to serve both as a mediator of personal decisions and performance behavior and as a consequence of evaluation relative to the demands of the task. Also, movement confidence has been found to function as a mediator that influences participation choice, participation performance, and participation persistence (Crawford & Griffin, 1986). The movement confidence model provides a plausible explanation for the lack of confidence showed by individuals with spinal cord injuries.

The purpose of the study was to analyze the effects of modeling on the movement confidence among individuals with spinal cord injuries. The aim of the study was to show that individuals with spinal injuries observing a peer model performing a wheelchair transfer would demonstrate more movement confidence in comparison to individuals with spinal cord injuries observing a teacher model. The effectiveness of peer modeling may provide the impetus for adapted physical educators, physical and occupational therapists, etc. to incorporate peer modeling into their teaching curriculum to improve the confidence of individuals with spinal cord injuries in movement situations.

Observational learning has been found to cause a change in behavior for able-bodied individuals who demonstrate difficulties in performing various tasks. Consequently, individuals with spinal cord injuries may benefit from observing a peer model to increase their level of confidence when performing a wheelchair transfer task. A wheelchair transfer is considered to be an essential task for an individual with a spinal cord injury.

Methodology

Thirty-four individuals with spinal cord injuries (29 paraplegics, 5 tetraplegics, 28 males, and 6 females, level of injuries from C4 to L4-L5) from five northern California communities participated in the study. There were 10 participants at the first site, 6 participants at the second site, 5 participants at the third site, 2 participants at the fourth site, and 11 participants at the fifth site.

Thirty-four participants (17 in each group) by way of random assignment were instructed to observe via a video either a peer model (an individual with a spinal cord injury) or a teacher model (an adapted physical education instructor) performing four wheelchair transfer tasks. The first task consisted of a wheelchair transfer from a wheelchair to a mat of equal height. The second task consisted of a wheelchair transfer from a mat of equal height to a wheelchair. The third task consisted of a wheelchair transfer from a wheelchair to a mat on the floor. Finally, the fourth task consisted of a wheelchair transfer from a mat on the floor into a wheelchair.

Prior to and after the observing the videos, all participants received a 5-minute period were they completed a pretest and posttest of a modified version of a movement confidence inventory (Griffin & Keogh, 1981). Also, each participant was given a questionnaire consisting of items pertaining to the videos and related wheelchair transfers tasks to complete. Overall, the participants were evaluated on their movement confidence on the pretest and posttest, and questionnaire responses. Data analysis consisted of an independent sample *t* test to answer the first research question, “Will participants in the peer model condition have a higher overall score on the modified version movement confidence posttest in comparison to participants in the teacher model condition?”

In addition, data analysis consisted of an independent sample t test to answer the second research question, “Will participants in the peer model condition have a higher overall score on the modified version movement confidence pretest in comparison to participants in the teacher model condition?” Also, an independent sample *t* test was used to determine movement confidence for each task on the pretest and posttest for movement confidence among both model groups. Moreover, there was an independent *t* test used to determine the level of movement confidence when performing related wheelchair transfers tasks for all participants. Questionnaire responses to items’ 3, 4 and 5 were collected as part as the data analysis.

Findings

The results from the independent sample *t* test in answering the first research question, “Will participants in the peer model condition have a higher overall score on the modified version movement confidence posttest in comparison to participants in the teacher model condition?” showed that both groups level of movement confidence was high. Also, there were no significant differences in posttest movement confidence between both model groups.

The results from the independent sample *t* test in answering the second research question, "Will participants in the peer model condition have a higher overall score on the modified version movement confidence pretest in comparison to participants in the teacher model condition?" showed that both model groups' level of movement confidence was high. There were no significant differences in pretest movement confidence among both groups.

In regards to the study's related findings, the results from the independent sample *t* test for the pretest for movement confidence for each task found both groups' level of movement confidence on each task was high. There were no significant differences for pretest task scores among both model groups. The results from the independent sample *t* test for the posttest movement confidence for each task found that both groups' level of movement confidence was high. There were no significant differences for posttest task scores among both model groups. The results for responses regarding questionnaire item 3 concerning methods of learning wheelchair transfers in the past found learning by practice and trial error was the method most used among all participants. The results for responses to questionnaire item 4 concerning types of related wheelchair transfers performed on a regular basis found the wheelchair transfer to and from the bed was the transfer that was performed the most among all participants. The results from the independent sample *t* test for responses regarding questionnaire item 5 among both modeled groups showed that both modeling groups' level of confidence regarding other related transfer tasks ranged from somewhat to a lot. There were no significant differences in the amount of confidence regarding related wheelchair transfer tasks among both modeling groups.

Limitations

Due to time, locality, and financial restraints, there were certain limitations relating to the dissertation study that may have affected group and outcomes. The results should be viewed with caution and may not be generalizable to the population at-large.

The limitations of the study were the following: sample size, number of observations, previous experiences involving performing wheelchair transfers, the number of community sites, and the absence of a prescreening selection process. The size of the sample for the study consisted of 34 individuals with spinal cord injuries (29 paraplegics, 5 tetraplegics). A larger sample size consisting of 100 or more individuals with spinal cord individuals may have provided a truer indication of the level of movement confidence on the pretest and posttest. Therefore, the results from the study should be viewed with caution and may not be generalizible to the population at-large.

The experimental portion of the study consisted of a single observation of individuals observing a model performing the four wheelchair transfer tasks. Some participants' movement confidence might have changed with more observations over a longer period of time. Therefore, the single observation method may not present an accurate description of an individual's level of movement confidence.

While several if not all of the participants have performed wheelchair transfers on a daily basis, prior experiences involving wheelchair transfers might have affected the results from the study. Also, the participants within the study may have several positive experiences with performing wheelchair transfers which would explain the high movement confidence among both groups.

Since the study was conducted at five different community sites in northern California, the probability of non confident individuals participating in the study was poor. If the study were to have been conducted at one community site with a larger sample size of individuals with spinal cord injuries, non confident individuals may have been more willing to participate because the entire group would have been sought after.

The study did not include a prescreening selection process to recruit non confident individuals. If there had been a prescreening selection process, only non confident individuals would have been considered for participation in the study. Therefore, a study that attempted use a prescreening selection process to seek non confident individuals for participation may have revealed a more desirable effect.

In view of the fact that the study was conducted at five community sites, four of which involved individuals participating in physical activities, participants may have exhibited high risk taking when attempting to perform wheelchair transfers in the past. As a result, the risk taking demonstrated by individuals in both groups may explain the high movement confidence revealed on the pretest and posttest.

Discussion

The results of the study found that both modeling groups' level of movement confidence was high on the pretest and the posttest. Also, the results of the study found that all participants' level of movement confidence regarding other related wheelchair transfer tasks was somewhat to a lot. Moreover, the four video wheelchair transfer tasks in the study are consistent with other wheelchair transfer tasks found in other studies involving individual with spinal cord injuries. The main findings from the study do not support the original research hypothesis. It was hypothesized that individuals observing a peer model would have more movement confidence as result of observing a peer model than individuals observing a teacher model. Modeling was not found to have an effect on either group regarding movement confidence when performing a variety of wheelchair transfers tasks. Both modeling groups were very confident prior to and after observing their respective models.

The results of the present study are consisted with the findings in the Schunk and Hanson (1985) study involving the children's academic achievement in performing mathematical subtraction problems. Schunk and Hanson (1985) found no significant differences in subtraction self-efficacy, skill and persistence from pretest to posttest among 80 elementary students observing a male mastery model, male coping model, female mastery model, female coping model, or a teacher model.

Also, Schunk and Hanson (1989) in a series of three experiments found in experiment two involving 40 elementary students and the effects of timing (early or late) for self-modeling, no significant differences in self-efficacy and solving mathematical fractions problems, during three instructional sessions among participants in the early self-model, late self-model, videotape control, and instructional control groups. In experiment three, involving the influence of content on children's achievement beliefs and behaviors,

Schunk and Hanson (1989) found no significant differences among 60 elementary students for perceived progress, self-efficacy, and solving mathematical problems when observing a mastery self-model, progress self-model, or an instructional videotape.

An explanation for the no modeling effect among both groups in the current study may be the result of their pre-existing high level(s) of movement confidence. Previous studies were modeling has shown to have a significant effect on the performance of individuals included a pre-screening selection process whereby the researcher(s) selected only the individuals who demonstrate difficulties in performing a particular behavior.

Schunk et al. (1987) investigated the attributes of peer modeling affect on children's achievement behaviors and selected students for two experiments who according to a comprehensive test of basic skill test for mathematics, were working below grade level. In the first experiment, individuals were randomly assigned to male mastery and coping conditions, and female coping and mastery conditions. Individuals were assessed on the number of math problems solved, self-efficacy for learning math problems, perceived similarity in competence, and interest. Upon observing a model, there were significant increases in self-efficacy and skill performance for the coping model conditions in comparison to the mastery model conditions.

In the second experiment, Schunk et al. (1987) selected 80 children to assess whether observing multiple models would augment children's behavior more than observing a single model. Results found significant increases in math self-efficacy, skill, and perceived similarity among all eight modeling conditions. Schunk and Hanson (1989) in the first of three experiments, compared the effects of observing self-models with observing peer models, among 48 elementary students. According to the results from a California achievement test, all participants were classified as working below grade in mathematics. The peer and self modeling conditions were found to score significantly higher than the videotaped control group conditions.

Due to time and financial constraints, participants in the current study were not pre-screened prior to being randomly assigned into the model groups. If a larger sample of individuals with spinal cord injuries was obtainable for the study, whereby highly confident individuals were divided from the low confident individuals on a measure, and the low confidence individuals were randomly assigned to either condition, there may have been the potential for a significant effect.

Another likely explanation for the high levels of movement confidence found among both model groups may be due to the fact that 23 of the 34 participants indicated on questionnaire item 3 that they learned to perform a wheelchair transfer by practice and trial by error. Individuals who learn how to perform a wheelchair transfer by practicing and by trial by error are considered to be engaging in enactive learning (Bandura, 1986). Bandura (1986) suggests that learning occurs in two ways: vicariously or enactively. Vicarious learning occurs by means of individuals observing others (modeling) performing a task. Enactive learning occurs when individuals actually perform the task. In other words, enactively learning involves learning from one's own consequences. Consequences are considered to be sources of information and motivation (Schunk, 2000). An individual, who performs a task successfully, may consider the consequences of their actions as positive. The positive consequence may motivate the individual to continue to learn other tasks in the same manner. Conversely, if an individual is unsuccessful at performing a task, the individual may consider the consequences of their actions as negative. The negative consequence may inhibit the individual's motivation to perform the task successful, or the individual may correct the problem and perform the task successfully.

For example, an individual who is successful at performing a wheelchair transfer by practicing and trial by error may consider the consequences of their actions as positive. If a different individual attempts to perform a wheelchair transfer by practicing and trial and error and is unsuccessful, the individual may not be motivated to learn how to perform the transfer successfully. Nevertheless, if the individual is motivated to successfully perform the transfer, the individual may correct the problem and eventually perform the transfer successfully.

The positive consequences of one's action in performing a task are similar to the four stage movement cycle for movement confidence (Griffin & Keogh, 1981). At stage one; the participants may evaluate the task demand (performing a wheelchair transfer) by remembering prior attempts at performing the task, or visualizing themselves attempting the task. At stage two; the participants may evaluate their expectations and perception of personal skill and proceed to move. At stage three; after completing the movement task (performing the wheelchair transfer) the participants may evaluate the experience (choice, behavior, persistence). Stage three is significant because as indicated by the high levels of movement confidence, the participants may have had a positive experience in performing the wheelchair transfer. The participants may have believed there was no risk of injury because of their physical ability to perform the task. Thus, at stage four, the participants' positive experience may have become a basis from which they relied upon when attempting the same task or a different task. The positive experiences with physically or visualizing themselves attempting wheelchair transfers are possible in proportion to their level of injury.

The level of injuries among all participants may have provided an additional cause for the high levels of confidence. The range of level of injury among all participants was C4 to L4-5. Individuals who experience a spinal cord injury from C4 to C7 level(s) are often able to use their shoulder, bicep, and wrist muscles. The ability to use shoulder, bicep, and wrist muscles would allow for upper arm mobility, especially when performing any wheelchair transfer task.

Individuals who experience a spinal cord injury from T1 to T6 have potential problems with trunk stability and balance, however; in most cases individuals have complete usage of their upper extremities that would permit them to perform a wheelchair transfer.

An individual who experiences a spinal cord injury from T7 to T12 may have adequate to good trunk stability and balance. Some individuals may rely upon long leg braces and crutches for ambulatory purposes more than a wheelchair. For individuals who individuals who have a spinal cord injury from L1 to L5, short leg braces with crutches may be used for locomotive purposes (Trieschmann, 1988).

Individuals with a spinal cord injury at the L1 to L5 level(s) may only use a wheelchair when participating in adapted recreational activities such as tennis, basketball, and track and field events.

The four video wheelchair transfer tasks as well as the related wheelchair transfer tasks as indicated by both modeling groups are similar to the other wheelchair transfer tasks found in various studies. Mingaila and Krisciunas (2005) when evaluating the functioning levels as well as the effective of occupational therapy during early rehabilitation, evaluated patients on numerous tasks which included a wheelchair transfer into bed, a wheelchair transfer onto a toilet, and a wheelchair transfer in a shower/bathroom. In the present study, several participants indicated they transfer from to and from a bed, toilet, and bathroom/shower. Scivoletto et al. (2003) assessed older patients and younger patients with spinal cord injuries on various daily living activity skills at admission and discharge from the hospital. One of the daily living activity skills that were measured was the mobility in performing a wheelchair to and from a bed transfer. Middleton et al. (2006) assessed the mobility and locomotive function of individuals with spinal cord injuries over a 6 month period. Among the mobility tasks that were chosen for assessment were a bed transfer, a floor to wheelchair transfer, and a bathroom/toilet transfer.

Summary

The findings from the current study show that modeling did not have effect on either modeling group's movement confidence. Both modeling groups were highly confident from pretest to posttest for movement confidence. An explanation for the non effect may have been the absence of a pre-screening process where highly confident individuals would have been weeded out from the study. Also, the majority of the participants in the study indicated they learned to do other related wheelchair transfer task by way of enactive learning. The experiences involved in enactive learning coincide with Griffin and Keogh's (1981) third stage of the four stage movement cycle for movement confidence. Enactive learning is not presented in this paper as an alternative to modeling, but merely to provide another possible explanation for the high movement confidence found among both modeling groups. Another plausible explanation for the high movement confidence found among participants in the study may be the result of the level of injury. In lieu of the fact that there was no modeling effect, the wheelchair tasks chosen for the study as well as types of related wheelchair transfer tasks as indicated by participants, are similar to the wheelchair transfer tasks found in studies involving wheelchair transfers.

Implications

Implications for Future Research

The results from the study suggest that modeling had no effect upon the movement confidence among individuals with spinal cord injuries. Specifically, peer modeling was shown not to have any effect on the movement confidence of individuals with spinal cord injuries. Both modeling groups were highly confident on the pretest and the posttest for movement confidence. However, there is anecdotal evidence that suggest some individuals with spinal cord injuries may lack the confidence to perform certain tasks such as a wheelchair transfer. Future research should continue to analyze the effects of modeling and movement confidence among individuals with spinal cord injuries. Researchers should employ a larger sample size of individuals with an equal number of paraplegics and tetraplegics. Also, researchers should analyze individuals' movement confidence by showing the videos and administering the pretest and posttest for movement confidence on more than one occasion. Although individuals in the present study were highly confident from pretest to posttest, there may be instances in which the level of confidence of an individual may decrease over time. Also, researchers should include several wheelchair transfers tasks within their studies. The four wheelchair transfer tasks chosen for the study were thought to be germane to other wheelchair transfer tasks performed on a daily basis. Moreover, researchers should pre-screen individuals by administering a questionnaire or test, and selecting only individuals with low movement confidence.

Researchers should consider when choosing individuals for study, the effect of engaging in physical activities such as sports, has upon the confidence levels of individuals. The present study was conducted at five community sites four of which involved physical activities. Some of the participants may have engaged in high risk taking when attempting to perform various wheelchair transfer tasks in the past. As a result, high risk taking may explain the high movement confidence found on the pretest and posttest among participants.

Implications for Practice

Adapted physical educators, physical and occupational therapists, and recreational leaders should employ modeling into their methods of instruction when faced with an individual with a spinal cord injury. The adapted physical educator, physical or occupational therapist, or recreational leader should seek those individuals who possess similar characteristics to the observer(s) when recruiting for potential peer models for demonstration. In the present study, some of the participants in the teacher model group did not like observing a video of a teacher playing the role of an individual with a disability performing the four wheelchair transfer tasks. In general, some of the physical characteristics that a adapted physical education instructor, physical and occupational therapist, or recreational leader should consider when seeking peer models to demonstrate a wheelchair transfer are gender, sex, level of injury, and medical classification.

Conclusions

In conclusion, the aim of the study was to show that individuals with spinal injuries observing a peer model performing a wheelchair transfer would demonstrate more movement confidence in comparison to individuals with spinal cord injuries observing a teacher model. The results of the study did not reflect any differences in movement confidence among both modeling groups. Both modeling groups' level of movement confidence was high on the pretest and the posttest. In spite of the results from the study, research regarding modeling and its effect on movement confidence among individuals with spinal cord injuries should continue. The overwhelming amount of anecdotal evidence presented in the study suggest there are several individuals with spinal cord injuries who are not confident in performing situation specific movement tasks such as wheelchair transfer. As of 2004, there are approximately 247,000 persons living with a spinal cord injury in the United States. Many individuals with spinal cord injuries have various physical limitations that may affect their ability to move in certain situations (University of Alabama-Birmingham, 2004). Griffin and Keogh (1981) suggests because individuals with spinal cord injuries have various physical limitations, they may the lack the movement confidence to perform certain tasks such as a wheelchair transfer. Observational learning specifically modeling has been found to be very effective in improving performance among able-bodied individuals. The research regarding modeling suggests that an individual's level of performance would improve more if they were to observe an individual with similar characteristics (Bandura, 1977). Some of the participants within teacher model condition expressed their dissatisfaction with observing a teacher model as opposed to a peer model. Although participants within the study were highly confident on the pretest and the posttest for movement confidence, participants in the teacher model condition indicated how much more effective it would be for a non-confident individual with a spinal cord injury to observe a peer model.

As a result, the vast amount of anecdotal evidence regarding individuals with spinal cord injuries, movement confidence, and modeling should provide researchers and practitioners the motivation to investigate and utilize modeling as means to improve the movement confidence among individuals with spinal cord injuries when performing a wheelchair transfer.

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Appendix A

Pretest Measure of Movement Confidence

Directions:
1. Please respond to each item on this page.
2. Please rate each of the following movement wheelchair movement tasks listed at the top of the next four pages by circling the appropriate item.

Name: ______________________________________

Age: _____

Gender: _______

Level of injury: __________________

Medical classification of injury: _________________________

TASK #1 A wheelchair transfer from a wheelchair to a mat of equal height

1. I think I am confident in my ability to complete this task.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

2. I think this wheelchair transfer is easy.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

3. I am unskilled at performing this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

4. I am willing to perform this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

5. I think performing this wheelchair transfer is irritating.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

6. I think performing this wheelchair transfer is safe.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

7. I am uncomfortable about performing this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

TASK #2 A wheelchair transfer from a mat of equal height to a wheelchair

1. I think I am confident in my ability to complete this task.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

2. I think this wheelchair transfer is easy.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

3. I am unskilled at performing this wheelchair transfer.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

4. I am willing to perform this wheelchair transfer.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

5. I think performing this wheelchair transfer is irritating.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

6. I think performing this wheelchair transfer is safe.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

7. I am uncomfortable about performing this wheelchair transfer.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

TASK #3 A wheelchair transfer from a wheelchair onto the floor

1. I think I am confident in my ability to complete this task.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

2. I think this wheelchair transfer is easy.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

3. I am unskilled at performing this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

4. I am willing to perform this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

5. I think performing this wheelchair transfer is irritating.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

6. I think performing this wheelchair transfer is safe.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

7. I am uncomfortable about performing this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

TASK #4 A wheelchair transfer from the floor into a wheelchair

1. I think I am confident in my ability to complete this task.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

2. I think this wheelchair transfer is easy.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

3. I am unskilled at performing this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

4. I am willing to perform this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

5. I think performing this wheelchair transfer is irritating.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

6. I think performing this wheelchair transfer is safe.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

7. I am uncomfortable about performing this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

Appendix B

Posttest Measure of Movement Confidence

Directions:

1. Please rate each of the following movement wheelchair movement tasks listed at the top of the following four pages by circling the appropriate item.
2. Please respond on the fifth page with a check mark for *Yes and No* items, a *circle* for rating items and a *brief statement* for all other items.

TASK #1 A wheelchair transfer from a wheelchair to a mat of equal height

1. I still think I am confident in my ability to complete this task.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

2. I still think this wheelchair transfer is easy.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

3. I still feel that I am unskilled at performing this wheelchair transfer.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

4. I am still willing to perform this wheelchair transfer.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

5. I still think performing this wheelchair transfer is irritating.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

6. I still think performing this wheelchair transfer is safe.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

7. I am still uncomfortable about performing this wheelchair transfer.

1	2	3	4	5	6
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

TASK #2 A wheelchair transfer from a mat of equal height to a wheelchair

1. I still think I am confident in my ability to complete this task.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

2. I still think this wheelchair transfer is easy.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

3. I still feel that I am unskilled at performing this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

4. I am still willing to perform this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

5. I still think performing this wheelchair transfer is irritating.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

6. I still think performing this wheelchair transfer is safe.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

7. I am still uncomfortable about performing this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

TASK #3 A wheelchair transfer from a wheelchair onto the floor

1. I still think I am confident in my ability to complete this task.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

2. I still think this wheelchair transfer is easy.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

3. I still feel that I am unskilled at performing this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

4. I am still willing to perform this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

5. I still think performing this wheelchair transfer is irritating.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

6. I still think performing this wheelchair transfer is safe.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

7. I am still uncomfortable about performing this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

TASK #4 A wheelchair transfer from the floor into a wheelchair

1. I still think I am confident in my ability to complete this task.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

2. I still think this wheelchair transfer is easy.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

3. I still feel that I am unskilled at performing this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

4. I am still willing to perform this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

5. I still think performing this wheelchair transfer is irritating.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

6. I still think performing this wheelchair transfer is safe.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

7. I am still uncomfortable about performing this wheelchair transfer.

1	*2*	*3*	*4*	*5*	*6*
Strongly Disagree	*Moderately Disagree*	*Mildly Disagree*	*Mildly Agree*	*Moderately Agree*	*Strongly Agree*

Appendix C

Questionnaire

Please respond to each item

1. Did you learn more about how to perform a wheelchair transfer by observing the model portrayed in the videotape? Yes____ No _____

2. Do you think that you would have learned more about performing wheelchair transfers if you were to observe a model that was more similar to you in regards to gender, age, and physical ability? Yes____ No_____

3. How have you learned to do a wheelchair transfer in the past?

____

____

____

4. What types of related wheelchair transfers do you do on a regular basis?

____

____

____

5. Are you confident in performing the other related wheelchair transfers that you do on a regular basis?

1	*2*	*3*	*4*
Not at all	*Slightly*	*Somewhat*	*A lot*

6. How much do you think your confidence would improve if you were to observe a model performing one of the related wheelchair transfer tasks?

1	*2*	*3*	*4*
Not at all	*Slightly*	*Somewhat*	*A lot*