The relationships between cognitive appraisal, coping and physical functioning in a work hardening population

Linda Susan Townsend

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The relationships between cognitive appraisal, coping and physical functioning in a work hardening population

Townsend, Linda Susan, Ed.D.
The College of William and Mary, 1994

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THE RELATIONSHIPS BETWEEN COGNITIVE APPRAISAL,
COPING AND PHYSICAL FUNCTIONING IN A
WORK HARDENING POPULATION

A Dissertation
Presented to
The Faculty of the School of Education
The College of William and Mary in Virginia

In Partial Fulfillment
Of the Requirements for the Degree
Doctor of Education

by
Linda Susan Townsend
November 1994
THE RELATIONSHIPS BETWEEN COGNITIVE APPRAISAL,
COPING AND PHYSICAL FUNCTIONING IN A
WORK HARDENING POPULATION

by

Linda Susan Townsend

Approved November 1994 by

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Kevin E. Geoffroy, Ed.D.
Dedication

This work is dedicated to

Larry,

whose appraisal of
me has always been positive and
who has helped me cope with
life.
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Abstract

This study explored the interactions of cognitive appraisal of pain, cognitive appraisal of function, pain coping strategies and physical functioning in a work hardening population. Using a retrospective design, the medical records of 85 subjects were reviewed for their responses on the following instruments: a 10 cm. Visual Analogue Scale (to measure appraisal of pain), the Spinal Function Sort (to measure appraisal of function); the Coping Strategies Questionnaire (to measure pain coping strategies); a series of objective measures of physical function; and several demographic questions. Pearson product moment correlation and simple regression were used to analyze data. Correlational analyses suggested that a moderate to strong, statistically significant relationship existed between the Spinal Function Sort and most of the objective measures of physical function. The statistically significant, negative relationship between the Coping Strategies Questionnaire's subscale catastrophization was anticipated and supported prior research with this tool. The statistically significant relationships between subjects' appraisals of pain and their functional status were weaker than anticipated and may be attributed to validity problems with the Visual Analogue Scale. Duration since injury as a factor in the maintenance of physical dysfunction was not supported by statistical analyses. The expected positive relationship between the Coping Strategies Questionnaire's coping subscales was not supported by analysis and was consistent with some of the prior research conducted with this instrument. Results from the current study give support to Lazarus' theory of cognitive appraisal as a factor in illness and function.

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THE COLLEGE OF WILLIAM AND MARY IN VIRGINIA
THE RELATIONSHIPS BETWEEN COGNITIVE APPRAISAL,
COPING AND PHYSICAL FUNCTIONING IN A
WORK HARDENING POPULATION
Chapter 1

The Purpose of the Study

Physical disabilities resulting from on-the-job injuries are estimated to cost the American economy many billions of dollars every year. In 1986, it was estimated that 140 billion dollars were spent on disability claims. The average permanently disabled worker costs over 154,000 dollars before they turn 65, and in the case of younger workers the costs can rise to over one million dollars. With the rise in the median age of American workers there is also an anticipated rise in the number of injured workers and resulting costs (Farrell, Knowlton, & Taylor, 1989). Injuries can result in structural changes, chronic pain and physical deconditioning—making it difficult for injured workers to return to work.

One of the most difficult conditions to assess and treat is chronic pain. Chronic pain impacts all aspects of individuals' lives and can cause a decrease in activity, multiple changes in lifestyle, financial problems and depression. Individuals with chronic pain may fear activity and may embrace a disabled or sick role (Bettencourt, Carlstrom, Hargreaves-Brown, Lindau, & Long, 1986). The most pervasive chronic pain condition is chronic back pain which Sullivan, Turner and Romano (1991) stated accounted for 1.3 billion person days of lost work each year. Low back pain is the leading cause of compensation payments in the U.S. and is higher than all other injuries combined (Bettencourt et al., 1986). Although the overwhelming majority of back injuries quickly
resolve themselves, the number of individuals who are permanently disabled is on the rise (Fordyce, 1988). Capra, Mayer and Gatchel (1985) noted that chronic low back pain was the primary cause of disability in clients under 45 and, next to the common cold, accounted for the greatest amount of lost work time.

In recent years the health care industry has turned its attention to the assessment and treatment of injured workers. By 1990, over 400 work hardening centers existed with the goal of improving the function of injured workers with the workers' ultimate return to work. Rehabilitation of injured workers benefits society, employers and injured workers by improving the workers' attendance, improving retention, improving productivity, decreasing recruitment costs, decreasing training costs, improving worker safety, decreasing health care costs, decreasing workers' compensation costs, improving physical function, and decreasing pain and suffering (Matheson, 1990a).

There has been an increasing recognition in the literature of the roles cognitive appraisal and coping play in recovery from illness and injury (Folkman, Lazarus, Gruen, DeLongis, 1986; Gass & Change, 1989; Main & Waddell, 1991; Parker et al., 1989). Recently researchers at Duke University have examined the roles played by coping strategies in various chronic pain populations (Beckham, Keefe, Caldwell, & Roodman, 1991; Keefe et al., 1987; Keefe, Crissom, Urban, & Williams, 1990a, Rosenstiel & Keefe, 1983; Keefe & Williams, 1990). They postulated that cognitive coping strategies are important mediating factors in individuals' responses to chronic pain conditions.

Past research efforts have focused on various aspects of the three variables being studied, however no studies have focused on cognitive appraisal, coping and physical
function in a work hardening population. The current study was needed to provide information about the interaction of these variables with this population. How injured workers appraised their pain and functioning was postulated to be related to the type of pain coping strategies they used and to their actual physical function. This information was important because objective physical findings did not always account for workers' actual functional status, which may make it difficult for health care workers to appropriately assess workers and effectively intervene (Gatchel, Mayer, Capra, Diamond & Barnett, 1986). Knowledge of workers' appraisals of their pain and function, the coping strategies they utilized and their actual functional status improves the delivery of individualized care and facilitates their return to work.

The purpose of this study was to investigate the relationships between cognitive appraisal, pain coping strategies and physical functioning of injured workers who presented for evaluation to a CARF (Commission on Accreditation of Rehabilitation Facilities) accredited, work hardening clinic. Using a retrospective design, medical records of eighty-five injured workers were evaluated for their responses on the Spinal Function Sort (SFS), a visual analogue scale (VAS), the Coping Strategies Questionnaire (CSQ), several measures of physical function, and demographics questions. Descriptive statistics, Pearson product moment correlation and simple regression were used to evaluate the data.

**Theoretical Rational**

Selye pioneered research in the 1930's which postulated that continuous stress was a causative factor in illness. Since that time numerous theorists such as Lazarus, and
Holmes and Rahe have examined the role stress and coping play in health (Matheny, Aycock, Pugh, Curlette and Cannella, 1986; Thorpe & Olson, 1990). Richard Lazarus' cognitive model of stress and coping provided the theoretical framework for this research study. Matheny et al. indicates that Lazarus is the "principal spokesman" for the cognitive theories of stress and coping (p. 502). Thorpe and Olson emphasized that Lazarus' model of coping has been the "most influential" behavioral model developed (p. 265).

An important component of Lazarus' theory is found in his definition of stress which he defines as "...a relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being. The judgment that a particular person-environment relationship is stressful hinges on cognitive appraisals" (Lazarus & Folkman, 1984, p. 23) This quote emphasized two important constructs in his theory. The first construct is that it is the relationship (transaction) between the person and a specific environment that is stressful not necessarily a specific event (Lazarus, Delongis, Folkman & Gruen, 1985, Lazarus, 1991). The other important construct is the role cognitive appraisal plays in shaping the persons' perception of the event and their ability to cope. Lazarus and Folkman postulated that individuals utilize cognitive appraisal to assess the significance of events and to assess how events impact their well-being. This appraisal was hypothesized to be the mediator of emotional reactions (Lazarus & Folkman, 1987). They suggested that there are three kinds of cognitive appraisals which they called primary appraisal, secondary appraisal and reappraisal. In primary appraisal, people evaluate their situation and determine if it is irrelevant, benign-positive or stressful. Stressful appraisals can be one of the following:
harm/loss, threat or challenge. In harm/loss individuals evaluate the stressful situation and
determine that damage has already been sustained. Threat is used to describe
circumstances when individuals assess events and anticipate there will be harm/loss in the
future. Challenge is used to describe the response when individuals evaluate situations and
determine there is a possibility of gain or mastery (Holroyd & Lazarus, 1982; Lazarus &
Folkman, 1984). During secondary appraisal, Lazarus and Folkman suggested that
individuals examine their circumstances and decide what can be done and how effective
various strategies may be. Coping strategies are evaluated in conjunction with other
internal and external demands. The final kind of cognitive appraisal is reappraisal which is
when individuals change their appraisal based on new information (Coyne & Lazarus,

Lazarus theorized that the most important factors influencing cognitive appraisal
are individuals' commitments and beliefs. Commitment refers to "...the higher-order
cognitive and social processes emphasized in cognitive theory, and it implies an enduring
motivational quality" (Lazarus & Folkman, 1984, p. 56). Through commitments
individuals express what is important to them—commitments underlie the choices people
make and direct them toward or away from situations that harm, threaten or benefit them.
The greater the commitment, the greater the likelihood of threat or challenge occurring.
Commitment can help people remain hopeful in the face of severe stress. Lazarus and
Folkman defined beliefs as "...preexisting notions about reality which serves as a
perceptual lens...beliefs determine what is fact, that is 'how things are' in the
environment, and they shape the understanding of its meaning" (1984, p. 63). They also
postulated that beliefs are in two categories--personal control beliefs and existential beliefs. Personal control beliefs can be general (which is the extent individuals believe they can control important outcomes) or situational beliefs (expectations people have for controlling their reaction to the event). Existential beliefs (such as belief in God), provide individuals with meaning and help maintain hope (Lazarus and Folkman, 1984).

Cognitive appraisals were also theorized to be impacted by the following situational factors: novelty, event uncertainty, ambiguity, timing of the stressful event in the life cycle, imminence, duration, and temporal uncertainty (Lazarus and Folkman, 1984). Novel situations refer to situations where people have not had prior experiences. Completely novel situations (although rare) may be appraised as harmful only if some aspect of the situation is related to a previous harmful experience, otherwise the situation will be connected with mastery or gain. A second situation to be considered is event uncertainty which is the probability that an event will occur. Event uncertainty can be stressful and immobilize anticipatory coping strategies. Not knowing whether an event will occur can result in a cycle of cognitive appraisal and reappraisals which can result in confusing thoughts and hopeless feelings. Ambiguity refers to a lack of clarity in the situation and unless individuals are able to develop another interpretation, the lack of clarity may result in an appraisal of threat.

Another aspect to consider in the appraisal of situations is the relationship stressful events have to individuals' life cycles. Lazarus and Folkman (1984) theorized that events which occur out of sequence may be appraised as more stressful than events which occur during the expected time in the life cycle. Lazarus groups the final three situations
together under the category of temporal factors. The first factor in this category is the imminence of the event and refers to the amount of time before an event occurs. It was postulated that the more imminent the event, the more intense the appraisal. Imminent events with an element of threat will be appraised as more intense than those with an element of challenge. The quality of decision making is impacted by imminence, with stress increasing if there is little time to make decisions. A second aspect to consider is the duration of the situation (which refers to how long the stressful event lasts). It is theorized that duration is a factor in the development of illness. The last factor in this section is temporal uncertainty—which is not knowing when an event will occur. Temporal uncertainty may result in an increase in the number of coping responses required (Lazarus & Folkman, 1984).

Coping was defined by Lazarus and Folkman (1984) as "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (p. 178). Coyne and Lazarus (1980) postulated that coping serves two functions. First, coping can alter the person-environment relationship by dealing with the source of stress, which results in a change in the problem maintaining behavior and a change in the environmental conditions. Secondly, coping can control stressful emotions through emotional regulation.

Lazarus and Folkman (1984), postulated that the ways people cope were influenced by the following: their resources (which includes their health and energy); their existential beliefs; their commitments; their problem-solving skills; their social skills; their social supports; and their material resources.
It was theorized that stress and coping affect health in the following ways. First, stress and coping influence the frequency, intensity and pattern of the neuroendocrine response. For example, if problem-focused coping strategies eliminate environmental demands, the stress response will be reduced, but if the strategies are ineffective, the physiological response to stress will increase. Emotion-focused coping strategies such as denial can decrease, increase or prolong the stress response depending on individual circumstances. Second, coping influences health when illness behaviors (such as how quickly individuals report symptoms or how compliant individuals are to prescribed treatments) serve as coping strategies. Next, coping influences health when people engage in coping behaviors that are unhealthy (smoking, abuse of alcohol and drugs fall in this category). The final way coping can affect health is in the way individuals respond to illness. For example, if individuals with heart disease respond to their illness with panic levels of anxiety their doctors may prescribe more medication than if they were not exhibiting anxiety (Holroyd & Lazarus, 1982; Lazarus & Folkman, 1984; Thorpe & Olson, 1990).

Holroyd and Lazarus (1982) stated that research is needed to describe the social, psychological and physiological mechanisms that operate as health outcomes improve, remain constant or worsen in the face of stress. Coyne and Lazarus (1980) indicated that research is needed in the field of stress/coping and the experience, course and outcome of illness as well as the utilization of medical care and compliance and response to treatment. Lazarus (1993) stated that "what is need most in coping measurement is to
describe what a person is thinking and doing in the effort to cope with stressful encounters" (p.236).

In light of the stress/coping theory postulated by Lazarus and others, this investigation explored the relationships between cognitive appraisal, coping and physical function in men and women experiencing chronic pain from work related injuries.

**Definition of Terms**

1. Chronic—condition that has lasted for six or more months.
2. Chronic pain—pain not associated with ongoing tissue injury and which serves no biological usefulness. Chronic pain is not accompanied by an autonomic nervous system response.
3. Cognitive Appraisal—"...evaluative cognitive processes that intervene between the encounter and the reaction" (Lazarus & Folkman, 1984, 52-53)
4. Coping—"...any efforts—healthy or unhealthy, conscious or unconscious.—to prevent, eliminate, or weaken stressors, or to tolerate their effects in the least hurtful manner..." (Matheny et al., 1986, p. 515).
5. Function—actual physical performance.
6. Work hardening—a work oriented, multidisciplinary treatment program designed to assess and/or improve the functioning and productivity of injured workers.

**Statement of the Problem**

The problem of this study concerns the relationships that exist between cognitive appraisal, pain coping strategies and physical functioning in injured workers. Specifically,
this study tried to answer this question—What relationships exist between injured workers' cognitive appraisals, their pain coping strategies and their physical functioning?

**Research Hypotheses**

1. Subjects who appraise their current pain as high on the Visual Analogue Scale (VAS) will appraise their physical functioning as low on the Spinal Function Sort (SFS).

2. Cognitive appraisal of pain (as measured by VAS) will be negatively related to physical functioning (as measured by functional evaluation).

3. Cognitive appraisals of physical functioning (as measured by the SFS) will be positively related to actual physical functioning (as measured by functional evaluation).

4. Cognitive coping strategies (as measured by the CSQ's subscales diverting attention, reinterpreting pain sensation, coping self statements, ignoring pain sensations, and praying and hoping) will be positively related to physical functioning (as measured by functional evaluation).

5. Catastrophizing coping strategies (measured by the CSQ) will be inversely related to physical function (as measured by functional evaluation).

6. There will be a positive relationship between the length of time since the onset of pain and subjects' functional status.

7. The relationship between appraisal of function and observed function will be stronger than the relationship between cognitive pain coping strategies and observed function.
Sample Description and General Data Gathering Procedures

The target population for this study was injured workers evaluated by work hardening clinics in the United States. The accessible population was clients assessed by a CARF accredited, outpatient, work hardening clinic in Newport News, Virginia.

Following a retrospective design, medical records of 85 subjects were evaluated for the following data: the SFS (evaluated workers' cognitive appraisal of their ability to complete specific work related tasks); a VAS (evaluated workers' appraisal of their current pain level); the CSQ (evaluated workers' pain coping strategies); a functional evaluation conducted by a physical therapist, an occupational therapist and/or an exercise physiologist (evaluated workers' actual physical functioning); and demographics.

Limitations

The sample for this study was a convenience sample including all patients evaluated at one work hardening clinic between July 1993 and October 1994, and as such generalizability to the target population—-injured workers in the United States—may be limited.

Another limitation to this study is its correlational design. When correlational statistics are used to explore the relationships between variables, it is impossible to determine cause and effect.

This study did not address psychological or social functioning. It also did not evaluate subjects' prior physical functioning or prior coping behavior.

The results of the current study were also limited by the lack of evaluation of sick role behavior, malingering and symptom magnification. Sick role behavior was first
defined by Parson in 1951 and included behavior such as relaxed role obligations which can result in secondary gains such as extra attention from family members. Malingers pretend to be "more distressed, more impaired or more disabled [than they actually are]" (Lees-Haley, English & Glenn, 1991, p. 203). Matheson (1991) developed a theory on symptom magnification and postulated that the symptom magnifier presents with symptoms that are greater than expected given their disorder. The undetected presence of these behaviors limits the current study by possibly increasing subjects' scores on the VAS and decreasing their scores on the SFS and the measures of physical functioning.

Another limitation was the potential interaction of history with the data. In the 15 months encompassed by the data gathering, changes in the health care industry (specifically an increase in managed care companies) limited the number of subjects available to this clinic. Also the current economic slowdown decreased the number of jobs available, which may have encouraged some injured workers to maintain their disability (and tax-free) status by presenting themselves as more impaired than they actually were.

A final limitation was that the SFS, the VAS and the CSQ utilized self report which has value in evaluating individuals' cognitions but may not reflect the actual thoughts and perceptions of subjects. This might reduce the validity of results. For example, the results may not measure what the test was constructed to measure because subjects lacked self insight or choose not to reveal their thoughts and perceptions. Individuals also may have falsified answers in order to appear more impaired than they actually were. Individuals who hoped to retain their disability status may have chosen responses that indicated they were less functional or were in more pain than they actually
chosen answers they thought were socially desirable (Anastasi, 1988). Therefore self-report may have limited this study by reducing the validity (what the test is supposed to measure) and reliability (the stability of the test over time) of these measures.
Chapter 2
Review of the Literature

Theoretical Concept

Current status of the theory

Lazarus' theory on stress, cognitive appraisal and coping was systematically
developed through experimental and descriptive research in psychology and counseling
conducted by Lazarus and his colleagues (Folkman & Lazarus, 1980; Folkman et al.,
1986; Koriat, Melkman, Averill & Lazarus, 1972; Speisman, Lazarus, Davidson &
Mordkoff, 1964). Recently his theory has found acceptance by other researchers,
especially those in the health sciences (Brown et al., 1988; Gass & Change, 1990; McNett,
(1986) identified Lazarus as the "principal spokesman" for the cognitive theory of stress
and coping (p. 502).

Research using Lazarus' theory

An example of Lazarus' early experimental research is reflected in a 1964 study in
which he explored the relationship between personality variables and reactivity to a
stressful motion picture. Using a counterbalanced design, a validated personality measure
(the Minnesota Multiphasic Personality Inventory--MMPI) and objective physiological
data, Lazarus concluded that the magnitude and quality of an individual's reaction was
affected by the film content (Speisman et al., 1964). His theory was further influenced by
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a 1972 study which examined the extent that individuals can control their emotional responses through cognitive processes. In this experimental study, 115 paid male volunteers watched an industrial safety film while their skin resistance and heart rate were monitored. Subjects were instructed to be emotionally involved or detached during the time they viewed the film. Results were compared to a control group and to data from sessions in which the subjects viewed the film without instruction. The researchers concluded that individuals can control their emotional response through coping strategies (Koriat et al., 1972).

Lazarus' later research focused on the influence of coping, stress and adaptation. An example of this interest is reflected in a 1980 study by Folkman and Lazarus in which they evaluated the ways 100 middle-aged men and women coped with the stresses of ordinary living. They also explored the factors that influenced the coping process. Data were collected through monthly structured interviews, a self report questionnaire and the Ways of Coping Checklist (WCC) (Cronbach's alphas for the problem focused scale were .80 and for the emotion focused scale .81). Results indicated that the subjects used both problem-focused and emotion-focused coping in almost every stressful event. Statistical analysis also suggested that coping is best understood as a relationship between individuals and their environment. Finally, the investigators noted that cognitive appraisal of a stressful event was an important determinant in coping.

Lazarus and his colleagues expanded their research on coping in their 1986 descriptive study "Appraisal, coping, health status, and psychological symptoms" (Folkman et al., 1986). In this study they evaluated the contributions of personality
factors, coping processes, and cognitive appraisal of circumstances to long term adaptational status. Results indicated that coping processes were more stable than primary and secondary appraisal and that there was a significant negative relationship between coping and somatic health. Results in this study were difficult to understand because of the multiple variable sets (4), 6 complex measuring instruments and unclear tables. It also appears that the researchers used the same sample to collect data for more than one study (see also Folkman, Lazarus, Dunkel-Schetter, DeLongis and Gruen, 1986) which may indicate they used the multiple measures in hopes of finding support for several aspects of their theory (a shotgun approach).

Justification for several aspects of Lazarus's theory was provided by McNett (1987) in her examination of the relationships among perceived availability of social supports, perceived effectiveness of social support, perceived personal constraints to the use of social supports and threat appraisal, coping responses and coping effectiveness. She postulated that coping responses directly affected "...coping effectiveness and mediated the effects of the other variables" (p. 99). McNett selected her subjects from a pool of individuals recently discharged from two rehabilitation facilities. Potential subjects were mailed the Interpersonal Support Evaluation List (internal reliabilities=.88-.90), the WCC (alpha reliability coefficients above .70, except for two emotion focused scales which had alphas of .59 & .65), and the McNett Coping Effectiveness Questionnaire (alpha reliability coefficients above .80). Data analyses indicated that relationships existed between the following: perceived availability of social support and coping effectiveness; perceived availability of social support and the use of social support; and perceived
availability of social support and reduced threat appraisal. Data analyses did not find a significant relationship between the use of social support and coping effectiveness. The researcher did not anticipate this finding and (among other possible causes) attributes this result to the unequal relationships that sometimes exist between disabled subjects and their significant others.

Gass and Change (1989) used Lazarus' theory to study appraisal of bereavement, coping resources and psychosocial health function. Subjects were interviewed using the WCC, the Sickness Impact Profile, a researcher designed instrument to assess resource strength and a question on how they appraised their bereavement. Correlational statistics indicated that situations which are appraised as stressful required more coping strategies and resulted in poorer health, thus supporting Lazarus' premise of the relationship between stress, cognitive appraisal, coping and health.

In three, well designed, experimental studies that used electronic measurements of subjects' physiological responses, Tomaka, Blascovich, Kelsy, and Leitten (1993) studied Lazarus' theory. Results from the first two studies suggested that "... threat and challenge appraisal also predicted subjects' perceived performance, effort, and actual performance across tasks" (p. 203). Results from all three studies indicated that subjects' cognitive appraisals predicted subjective and physiological reactions to an active stressor (a mental arithmetic task). The researchers stated that because subjects were allowed to "self-select into appraisal groups" (p. 258), causal conclusions needed to be made with caution.
Summary

Lazarus' earlier research was experimental in design and constructed to develop/evaluate various aspects of his theory on stress, cognitive appraisal and coping. More recently he utilized descriptive studies to explore various aspects of this paradigm. For example, his 1980 study "An analysis of coping in a middle-aged community" supported his assumption that cognitive appraisal was an important determinant in the coping process. Consistent with this conclusion, the current study hypothesized that subjects who appraised their pain as high, appraised their functioning as low. Lazarus also postulated a relationship between duration of a stressor and health and coping. Therefore the current study hypothesized that there would be a positive relationship between the duration of pain and functional level (Lazarus & Folkman, 1984). Tomaka et al.'s (1993) studies suggested a relationship between subjects' cognitive appraisal and subjective and physiological reaction to stress. Congruent with their finding, this current study hypothesized that subjects' cognitive appraisal of their physical functioning will be positively related to their actual physical functioning. In 1980, Coyne and Lazarus emphasized that research was needed in the area of stress/coping and the experience of illness. The current study was designed to evaluate the relationship between cognitive appraisal, coping and function in a work hardening population.

Critique

Because the literature review in Speisman, et al.'s (1964) study utilized the researchers' previous work to justify their study--there is a possibility of experimenter bias. Another flaw in this study was the small (24) sample size which is lower then
recommended for experimental studies (Borg & Gall, 1989). This limits the strength of the study's conclusions and restricts generalizability. A final criticism of this study is the use of a movie that depicted graphic sexual mutilation scenes to generate stress in subjects. Replication of this study by present day researchers would be blocked by most human subject committees because of the potential for adverse stress responses to the stressors (such as Post-traumatic Stress Syndrome). In the current study experimenter bias was prevented by the retrospective nature of this design, which did not allow experimenter-subject interaction. The current study's sample size of 85 was adequate given the three variables and the correlational design being utilized. Finally, in order to protect subjects, the study was approved by the School of Education Human Subjects Committee, The College of William and Mary Committee on Human Subjects and Riverside Rehabilitation Institute's Institutional Review Board.

The Folkman and Lazarus (1986) study was severely confounded by the use of four variable sets, six complex instruments and data that was extremely difficult to understand (even with the accompanying tables and text). These researchers addressed their "microanalysis" (p. 578) of data as a design flaw and noted that a broader analysis might have produced more useful information. McNett's (1987) and Gass and Change's (1990) results were easier to interpret because of their clear visual models, data tables and accompanying text. This study limited the number of variables to three and used clear data tables and accompanying text to present conclusions.
Variable # 1: Cognitive Appraisal

Lazarus and Folkman defined cognitive appraisal as the "...evaluative cognitive processes that intervene between the encounter and the reaction. Through cognitive appraisal processes the person evaluated the significance of what is happening for his or her well-being" (1984, pp. 52-53). Lazarus theorized there are three types of cognitive appraisal—primary appraisal, secondary appraisal and reappraisal. In primary appraisal a judgment is made on whether an encounter is irrelevant, benign or stressful. Stressful encounters may be further appraised as harm/loss (damage has already occurred), threat (damage is anticipated) or challenge (encounter has the potential for mastery or gain). During secondary appraisal the person makes a judgment about what can be done. In reappraisal individuals change their appraisals based on new information.

The relationships among cognitive appraisal, coping and encounter outcomes were researched by Folkman et al., (1986). Using a cross sectional, retrospective design, they studied 85 married couples over a six month period of time. Five separate monthly interviews were conducted with each husband and wife. Following a structured protocol, subjects were asked to recall the most stressful event in the past month and then were asked to respond to a five point likert scale that measured primary appraisal and secondary appraisal. The Ways of Coping Checklist (Revised) was used to evaluate coping. Multivariate analysis was used to evaluate data and indicated that when subjects appraised their encounters as changeable, they used more problem-focused coping strategies than when they appraised the encounter as having few options.
A study conducted by Browne et al. (1988) evaluated the Meaning of Illness Questionnaire (MIQ) which was constructed to assess individuals' cognitive appraisals of an illness event. This instrument was based on the work of Lazarus and Folkman. The investigators postulated that cognitive appraisal of the illness was more important than coping behavior in explaining adjustment to illness. Volunteers were recruited from three medical clinics. Data gathering instruments included a baseline questionnaire, the MIQ and the Psychosocial Adjustment to Illness-Self Report Scale (PAIS-SR). Statistical analysis indicated that the following five factors were present in the MIQ: impact of illness; type of stress (includes harm/loss, threat, and prognosis); degree of stress (secondary appraisal); positive attitude (challenge, hope, motivation and control); and expectancy. The researchers noted that their analysis indicated that 33 percent of the adjustment variance was explained by the impact of the illness and that 46 percent of the variance in poor adjustment to illness was explained by the impact of the illness, negative attitudes (harm/loss and or threat) and lack of positive attitude. This study provided test-retest reliabilities for 76 of the 320 subjects (kappas ranged from .45 to 1.00, with the majority falling between .60 and .77).

Lazarus' theory provided the theoretical framework for Pagna's 1990 study of nursing students' appraisal of stress in their first medical surgical experience. She evaluated the relationship of hardiness and social support to appraisal and hypothesized that hardiness and social support would be positively related to challenge and negatively related to threat. She used the Clinical Stress Questionnaire (which she modified), a hardiness test (alphas in the .90's), and the Norbeck Social Support Questionnaire to
evaluate 261 female nursing students from seven colleges and universities. Data analysis indicated a statistically significant, low, positive relationship existed between hardiness and challenge. This suggested that individuals who appraised their circumstances as challenging were more optimistic. Analysis also indicated a statistically significant, low, negative relationship between hardiness and threat which implied that individuals who have higher appraisals of threat are less hardy. The analysis did not support the relationship between social support and threat—Pagna attributed this result to the correlational design and to when the social support measure was administered. She was concerned that these two factors "may not have allowed social support to be optimally effective [in helping subjects] perceive a stressor as less threatening" (p. 260).

Coping and health outcomes were evaluated by Neurndorfer in her 1991 study of spouse caregivers of persons with dementia. Basing her research on Lazarus' theory, she hypothesized that the caregivers' cognitive appraisal of their stress was a better predictor of their physical and emotional health than the severity of the dementia patient's behavior and memory problems. She also hypothesized that any additional variances in health would be explained by coping. Sixty caregivers were interviewed in their homes using the Memory and Behavior Problem Checklist (Guttman split half reliability .65), the WCC (alpha coefficients ranged between .36 and .81), six items from the OARS, the Brief Symptom Inventory (BSI)(alpha coefficients of .78 for the depression scale and .76 for the anxiety scale) and two single items to measure appraisal of options. The researcher noted that the caregivers' appraisal of stress did not correlate with their physical health but did correlate with their psychological health. This finding implied that stress appraisal may
have more impact on psychological health than physical health. On the other hand, results may have been related to this specific sample of caregivers. Although these results were not surprising in light of the weak measure of appraisal used, the researcher attributed her findings to caregivers using adaptive coping strategies to decrease the stress of caregiving.

Recently, Pellino and Oberst (1992) published the results of their research titled "Perception of control and appraisal in chronic low back pain." They hypothesized that "...those persons who appraised their pain situation as harmful or threatening would have more pain and more mood disturbances than those who did not appraise the situation as harmful or threatening" (p. 22). They noted in their literature review that prior research with low back pain clients did not give a clear idea how these clients appraised their pain situation. Consistent with their literature review these researchers explored the relationships between appraisal of illness, pain level, mood and sense of personal control in low back pain clients. Results indicated that subjects' cognitive appraisals of their entire situation (and not their pain level) was an important determinant in coping. These researchers stressed that coping with low back pain was multifaceted and resulted in alterations in numerous areas of life such as work, relationships and finances.

Summary

Of all the research reviewed, Pellino and Oberst's 1992 study has the greatest implications for the proposed study. Consistent with their findings that the subjects' cognitive appraisals of their entire situation and not their pain level determines coping, this current study hypothesized that the relationship between cognitive appraisal of physical functioning and physical function would be stronger than the relationship between
appraisals of pain and physical function. Interestingly, Brown et al.'s research (1988) indicated that the subjects' appraisals of an event may be more powerful than coping behavior in explaining adjustment. Congruent with Brown's research, this current study hypothesized that the relationship between subjects' appraisals of function would be more highly correlated with observed function than the relationship between cognitive pain coping strategies and observed function.

**Critique**

A major flaw in Pellino and Oberst's research was their small sample size (40 subjects). It is recommended that correlational studies have at least 30 subjects per variable. Therefore, to improve generalizability these researchers needed approximately 90 subjects (Borg and Gall, 1989). Also, they offer little information on the characteristics of their sample or on their measurement tools. Finally, although tables accompanied the text, results were poorly written and difficult to understand.

Folkman et al.'s, (1986) simple design was well written and easy to follow, however it would be expensive to replicate given the amount of time needed to interview 85 subjects, five times each.

Pagna attributed her statistically significant correlations to her large sample size (261), however p values were not consistent and ranged from .01 to .23.

Although Browne et al.'s study of the MIQ appeared to support Lazarus' constructs of stress, cognitive appraisal and coping, one is left wondering about the construct validity of the MIQ—did the researcher manipulate the results to fit the theory or did the MIQ really fit the theory?
Finally, little specific research has been conducted on cognitive appraisal in work hardening populations. This current study was warranted to provide information on the relationship between cognitive appraisal, pain coping strategies and function. With the prominence of cognitive therapy, one expects there would be more studies seeking to validate the relationships between the variables in this population. This was not the case and this study was needed to provide validation for Lazarus' constructs by a researcher other than the originator of the theory. Despite these criticisms, Lazarus' theory is a useful behavioral model of stress and coping and provides a firm foundation for this research study of cognitive appraisal, coping and function.

**Variable # 2 Coping**

The second variable in the current study is coping. Matheny et al. (1986) noted that there was no consensus in the behavioral sciences on what constitutes coping. In an effort to clarify the construct of coping, Matheny et al. offered the following definition of coping "...any effort—healthy or unhealthy, conscious or unconscious—to prevent, eliminate, or weaken stressors, or to tolerate their effects in the least hurtful manner ..." (p. 515). These researchers went on to note that effective coping was a major factor in the maintenance of health.

One of the most comprehensive studies reviewed was Matheny et al. (1986) meta-analysis of recent experimental and quasi-experimental studies on stress and coping. The purpose of their research was to evaluate what constitutes coping. The researchers surveyed PsychoINFO, Medline, Education Index and Dissertations Abstract. They compiled a total of 41 recent journal articles and 15 dissertations on stress and coping. A
strong point in this meta-analysis was the researchers' comparisons of their results to recent opinion articles on stress and coping. They noted that a high percentage of recent articles and experimental studies focused on cognitive restructuring and relaxation, and concluded that these two treatments appeared to connote coping to other researchers. On the other hand, problem solving and social support appeared frequently in the theoretical articles but were infrequently evaluated in the experimental studies. The investigators expanded their results section by formulating a model of stress coping that included four classes of preventive coping (such as interventions that increased self-worth, confidence and control) and five classes of "combative" coping strategies (interventions such as problem solving that directly attacked stressors) (p. 538).

A number of descriptive studies have examined coping responses to pain with the majority of the work published by researchers at Duke University. These researchers evaluated coping responses in subjects with rheumatoid arthritis (Beckham et al., 1991), osteoarthritis (Keefe et al., 1987), low back pain (Keefe et al., 1990a, Rosenstiel & Keefe 1983), and different age groups (Keefe & Williams, 1990). An example of their research was the 1983 study by Rosenstiel and Keefe in which they examined how frequently various coping strategies were used by 61 outpatients with chronic low back pain. Other areas examined in this study included the relationships between different pain coping strategies and the relationship of pain coping strategies to adjustment. The CSQ was evaluated in this study. The CSQ measured six cognitive coping strategies (diverting attention, ignoring pain sensation, reinterpreting pain sensation, coping self statements, catastrophizing and praying and hoping), a question measuring the subjects perception of
their ability to control their pain and a measure of their ability to decrease their pain. Results indicated that the patients used a wide variety of coping strategies to deal with their pain. Three coping factors (which the researchers called cognitive coping and suppression; helplessness; and diverting attention and praying) accounted for a large percentage of the coping strategies used. They found that the type of coping strategy used did not correspond to the adjustment of the patient.

The Rosenstiel and Keefe study was the benchmark for several other studies including one by Turner and Clancy (1986) who sought to replicate Rosenstiel and Keefe's results with the CSQ using a different sample. They studied 74 patients with chronic back pain using the CSQ; a pain diary; three self report scales to measure pain; downtime (average length of time spent lying down or sitting); the Sickness Impact Profile (SIP); and the Beck Depression Inventory (BDI). Subjects were assigned to a waiting list control group; a cognitive behavioral group or an operant behavior group. The treatment groups met in eight, weekly, 2-hour sessions. In discussing their results, the investigators noted that even when accounting for the demographic differences, their results supported Keefe and Rosenstials's earlier findings. Turner and Clancy noted that both studies found the CSQ had the same factors—with only minor differences between the two studies. They also found a significant relationship between coping style and "...average pain, downtime, functional impairment, and depression" (p.362). These results supported Rosenstiel and Keefe's results with the exception of downtime (Rosenstiel and Keefe did not find a significant relationship between downtime and coping style).
Keefe et al.'s 1990a study expanded their 1983 study. In it they explored the relationships between pain coping strategies and specific demographic variables, medical status and pain measures in 62 patients with chronic low back pain at a Duke University chronic pain clinic. Measures included a thorough medical evaluation; the CSQ; two measures of the subjects' perceived ability to control and decrease their pain; the McGill Pain Questionnaire; the Symptom Check List-90 (SCL-90); the BDI; a ten minute videotape session to document pain behavior; an activity diary to measure uptime (average time spent up); and a demographic questionnaire (which included age, gender, disability status, support status, years since the onset of pain, and number of prior operations).

Results suggested that individuals who scored moderate or high on cognitive coping and suppression experienced higher levels of psychological distress. Also, individuals who scored high on helplessness were more psychologically distressed and those with fewer physical findings demonstrated the lowest level of total pain behavior. The experimenter noted that subjects who scored high on diverting attention and praying had high rates of pain on the McGill Pain questionnaire. The investigators concluded by stating "...pain coping strategies appear to be much more important than demographics and medical status variables in explaining psychological distress and just as important in explaining pain report" (p. 300-301).

A similar study was conducted by Keefe and Williams (1990b) in which they examined pain coping strategies of different age groups. They noted in their literature review that although coping with life problems had been well researched, there had been little research on how people cope with chronic pain, and many features of the pain coping
paradigm (such as how age affects coping) had not been explored. These investigators used the medical records of 88 subjects to study pain coping strategies in four different age groups. Measurement instruments were similar to those used by Keefe et al.'s 1990a study and data analysis supported earlier findings. For example, Keefe discussed that subjects who scored high on diverting attention and increased behavioral activities reported higher levels of pain on the McGill Pain Questionnaire. On the other hand it appears from this research that subjects who scored high on catastrophizing had higher levels of depression, psychological distress and pain. The researchers also indicated that subjects who rated their ability to use coping strategies to decrease pain as high reported lower levels of depression and pain. They concluded that different age groups coped with chronic pain in a similar fashion and that there were no developmental differences.

Pain control and rational thinking were evaluated by Parker et al. in a 1989 descriptive study. These researchers analyzed the CSQ's effectiveness by evaluating 79 male clients with rheumatoid arthritis. The researchers used a total of nine scales to measure their variables including a VAS to measure the subject's perception of pain; the McGill Pain Questionnaire; the SCL-90; the Arthritis Helpless Index; the BDI; the Hassles Scale; and two scales to measure the impact of the disease. Results indicated that pain intensity was predicted by a factor on the CSQ the researchers called pain control and rational thinking (PCRT—which includes the following subscales: catastrophizing, ability to control pain and ability to decrease pain) thus supporting Lazarus' theory of the relationship between cognitive appraisal and coping. The researchers noted that the PCRT "appears to measure an individual's confidence in his or her ability to effectively
manage pain problems. Individuals who score high on the PCRT factor have confidence in their ability to control their pain, believe that they can successfully decrease their pain, and tend to avoid a 'catastrophic' assessment of their situation" (p.989). Weaknesses of this study included the lack of validity and reliability data for the data collection instruments and the heavy use of self report.

A 1990 study by Beckham et al. evaluated how 65 patients with rheumatoid arthritis coped with pain and disability. The researchers hypothesized that coping was a moderator of affective and functional outcome. They were able to recruit all patients in an outpatient rheumatoid arthritis clinic. Measures included the CSQ (alphas ranged from .49 to .83), the Arthritis Impact Measurement Scale, the BDI, the Hassles Scale, and a medical status measure that was coded by a rheumatologist. Statistical analysis indicated that PCRT "explained a significant proportion of the variance in physical disability, pain, psychological disability, depression and severity of daily hassels" (p 119) The researchers also noted that patients' perceptions of their abilities to cope were more important than their medical status in explaining their adjustments to their pain. Future research was encouraged in the area of coping and function, especially in determining if there is a causal relationship between the two variables.

Summary:

Recent research on pain coping strategies indicated a number of relationships exist that have direct implications for the current research study. Matheny et al.'s meta-analysis (1986) suggested that a high percentage of recent articles and studies on cognitive restructuring and relaxation indicated that these two treatments appeared to connote
coping to researchers. In like manner, the current study will explore the relationships between cognitive pain coping strategies and physical function.

Beckham et al's. (1991) study indicated that "pain coping strategies are strongly related to pain and disability in arthritis patients" (p. 120). Accordingly, the current study hypothesized that cognitive coping strategies (as measured by the CSQ subscales of diverting attention, reinterpreting pain sensations, coping self statements, ignoring sensations, and praying and hoping) will be positively related to physical function (as measured by functional evaluation). Interestingly, Rosenstiel and Keefe's 1983 study found that subjects who scored high on the "cognitive coping and suppression factor were more impaired functionally" (p. 42). Although these researchers admit their findings did not support prior research, they attributed their results to the differences between experimental and chronic pain, when in fact their results may have been more related to their subjective measures of function.

Turner and Clancy (1986) suggested that subjects who scored high on helplessness (CSQ subscale catastrophization) were more impaired physically—it is expected that the current study will obtain similar results.

**Critique:**

One of the major weaknesses in the previous studies on pain coping strategies was that they were not based on an identified theory. This current study was based on Lazarus' cognitive appraisal and coping paradigm. A second criticism was that the majority of the published work on pain and coping has been conducted by one research group. This current study was needed to broaden the research data base.
Finally, although many different chronic pain populations have been researched, no one has researched the pain coping strategies used by patients in a work hardening program. This study added new information to the field of stress, coping and chronic pain.

**Variable # 3: Function**

The final variable in this proposal was the way subjects' function physically. Physical functioning is influenced by factors such as physical strength, the presence of pain, changes due to injury, illness or surgery, and psychological factors. Gatchel et al. (1986) noted that because of the interaction of psychological and physical factors, physical function and complaints of pain do not always correlate with structural changes. Physical deconditioning further complicates the rehabilitation of injuries and return of function and often necessitates the need for objective measures of function (Mayer et al. 1987)

The relationship between chronic pain, cognitive factors and functional impairment was evaluated by Riley, Ahern, and Follick (1988). They justified their study by noting that many chronic pain patients cognitively link their pain with their impairments. They hypothesized that subjects' belief that pain impedes their functioning would be associated with their actual functional status. Fifty-six chronic pain patients were evaluated using the SIP, the Cognitive Errors Questionnaire; pain diaries; the Pain and Impairment Relationship Scale (PAIRS) (alpha=.82); a videotaped structured sequence of movements; and an interview. Statistical analysis indicated that "... the belief that pain necessarily implies disability is associated with actual impairment..." (p. 581). Analysis also suggested that functional status covaries with the subjects' perception of pain only to the
extent the subjects linked them together cognitively. Findings also suggested that functional status may be improved in patients who are able to view their function as linked to something other than their pain. These results lend support for the use of behavioral interventions that stress increasing activity levels and discourages attention on sensations.

In an attempt to quantify function and predict treatment outcome, Gatchel et al. (1986) evaluated a number of psychological measures in a study of 134 consecutive patients in a functional restoration program. Measurements included the MMPI, the Millon Behavioral Health Inventory, the BDI, Quantified Pain Drawings, the Million Visual Analog Scale, a ten centimeter Visual Analog Scale to measure pain, the Trail Making Test, the Wechsler Adult Intelligence Scale, the Wide Range Achievement Test, the Rorschach and specific measures of physical function. Structured patient interviews included patient and family history, mental health history, work history, financial history, litigation status and an evaluation of stress. Several of the measures were repeated at three and six months. Results suggested that the functional restoration program was effective in improving subjects' strength, range of motion, pain and depression, however the lack of a control group decreased the generalizability of these conclusions. The researchers noted that no one tool reliably predicted outcome in all patients.

Mayer et al. (1989) evaluated the physical functioning of 46 patients three months following spine surgery. Specific tests of physical function and Quantified Pain Drawings were used to evaluate the patients. Demographic information included length of time since injury, gender, surgical procedure, and work status. Statistical analysis indicated that significant functional impairment (subjects were unable to carry out normal physical
tasks of everyday living such as dressing, cooking, etc.) existed for all subjects. The investigators stressed that since the spine cannot be evaluated visually, quantification of function through specific functional tests was an important tool in the assessment and rehabilitation of low back injuries.

Rubenstein et al. (1989) conducted an experimental study of patient function with 510 patients and 76 physicians. They hypothesized that teaching physicians to recognize functional status problems would result in the physician modifying the treatment plan and treating the functional problem. The patients and their physicians were randomly assigned to either a control group or an experimental group. All the patients completed a functional status questionnaire every four months for one year (the questionnaire measured the patient's physical, psychological, social and sexual functioning). The physicians in the experimental group viewed a two hour multimedia educational program on function, plus they received functional status reports on each of their patients every three months for a year. Despite the fact that six months into the study, 43 percent of the physicians in the experimental group indicated they had used the questionnaire to modify their treatment, data analysis at the end of the year indicated there was no difference in the functional status of the two groups of patients. The researchers attributed their results to the weak multimedia educational program and noted that physicians might not be the appropriate subjects for the intervention.

Rubenstein et al. (1989) followed up their 1989 study with a 1991 descriptive study (Calkins et al.) in which they compared how 118 physicians and 408 of their patients rated the patient's functional status. To improve generalizability, subjects were recruited
from Boston, Massachusetts and Los Angeles, California. Questionnaires that measured three activities of daily living (eating, dressing and bathing), six instrumental activities of daily living (included housework and grocery shopping) and three social activities (such as religious or community activities) were simultaneously administered to each physician and patient independent of an office visit. Patients in Boston were interviewed by telephone and patients in Los Angeles completed a self-administered questionnaire. Results suggested that physicians underestimated 66 percent of their patients' disabilities and overstated functional impairment 21 percent of the time. The researchers concluded by emphasizing the importance of accurately evaluating the patient's functional status and noted that if, for example, the patient's pain was underestimated they might not receive adequate analgesics.

**Summary:**

Recent research on physical function stressed the importance of quantifying functional status through objective measures (Calkins et al., 1991; Mayer et al., 1987, and Mayer et al., 1989). Mayer et al. (1989) stressed that function and complaints of pain do not always correlate with the physical changes associated with the injury. This current research study used several objective measures of function to quantify the subject's functional status.

Riley et al. (1988) suggested that functional status covaried with perception of pain only to the extent the subject linked them together cognitively. Consistent with Riley et al.'s findings, this current research study hypothesized that cognitive appraisal of physical functioning would be positively related to actual physical functioning. It was also
hypothesized that subjects who appraised their current pain as high would appraise their physical functioning as low.

**Critique:**

Several design flaws may have adversely impacted the results of these earlier studies. For example, Rubenstein et al.'s (1989) study had a weak experimental intervention and Calkin et al.'s (1991) inconsistently utilized phone interviews and self-administered questionnaires to gather data—making it difficult to draw conclusions from their results which limited generalizability. Another flaw with the cited studies was that Mayer et al.'s 1987 study did not report the specific psychological measures used, making it difficult to replicate findings. Finally, the majority of the research being published on function was atheoretical or based on the medical model. This current study corrected these discrepancies by utilizing a correlational research design that was based on Lazarus' theory of stress and coping.

**Population**

The target population for this research consisted of disabled workers who are assessed by work hardening clinics in the United States. These individuals have experienced an illness or injury that left them unable to adequately perform their jobs. Work hardening is a work oriented, multidisciplinary treatment program designed to improve the functioning and productivity of injured workers. The goal of work hardening is to improve individuals' level of productivity to make them competitive in the job market. Important components of work hardening clinics are Work Tolerance Screenings (WTS) and the Work Capacity Evaluations (WCE). These evaluative components provide
important baseline data on individuals' work performances. The WTS is the "primary evaluation component" (Matheson, 1986, p. 1-7) and measures workers' ability to respond to the demands of simulated work. The WCE is a comprehensive evaluation and includes serial measurements of simulated work, predictions of work capacity, information about safety, interpersonal behavior, attendance, timeliness and productivity (Matheson, 1986; May, 1988). Once the assessment component is completed, individuals admitted to a work hardening program are assigned specific, work-related functional tasks with the goal of decreasing their impairment by increasing their strength, flexibility and endurance (Matheson, Ogden, Violette, & Schultz, 1985). The program also decreases individuals' disabilities—which is defined as "...the impact of functional impairment on client's societal roles, among which work are predominant" (Matheson et al., 1985, p 314)

Matheson identified three types of clients who benefit from work hardening:
(1) those who are severely deconditioned after an injury or illness. (2) those who have a major discrepancy between their physical impairment and function, and (3) those whose impairment is limited to an upper extremity. Many of these disabled workers experience chronic, benign pain which can be a major limiting factor in the workers' functional status and rehabilitation (Deyo, Bass, Welsh, Schoenfeld & Ramaneuthy, 1988). One of the most prominent physical conditions these injured workers present with is low back pain. Spengler and Szpalski (1990) noted that there are 2.4 million individuals disabled from low back pain with an additional 9.1 million individuals significantly impaired. The cost to society from low back pain was estimated at over $20 billion a year. Low back pain interferes with all aspects of an individual's activities of daily living and may result in
decreased activity, dramatic changes in life style, financial problems, and depression
(Bettencourt et al., 1986).

Kuhn and Kneidal (1990) conducted a retrospective study of a work hardening program and hypothesized that individuals who were treated early after their injury were more likely to return to work then those treated later. The sample included 91 individuals with lumbar related injuries. Of the 91 subjects who were referred to the program, 58 entered the work hardening program and 52 were studied (statistical analysis did not include 6 subjects who had non work related injuries, were not in the program long enough or who had died). Independent variables included the number of sessions in the work hardening program the subject completed, the number of prior back surgeries, the medical diagnosis, progress in the program, type of work the subject performed, and the time interval from the injury to the date of entering the program. The dependent variable was the vocational outcome. Results supported the hypothesis and indicated that the more successful subjects were those who had shorter times since their injury, had a positive attitude and had no previous surgeries.

The relationship between compensation status and symptoms in chronic pain patients was studied by Tait, Margolis, Krause, and Liebrowitz (1988). These researchers went to some length in their literature review to dispute the common belief that clients on workman's compensation were symptom magnifiers or embraced or enjoyed a sick role. These researchers stated their purpose was "...a preliminary investigation of other factors that might distinguish compensation patients from non compensation patients when they present for treatment" (p. 1027). They hypothesized that "...dysfunction in the work,
play, marital and medical arenas would be greater among compensation patients" (p. 1027). The researchers recruited 136 consecutive patients in a chronic pain clinic and developed several likert type measuring tools to evaluate subjects' pain (included duration, distribution, severity, frequency of severe pain episodes, and number of pain related surgeries), level of disability (included vocation, recreation, social and sexual effects), and psychological response (included helplessness, happiness, appetite and perceived severity of disability). Subjects were required to fill out the measurements prior to their first visit to the clinic. Statistical analysis indicated that clients receiving disability payments reported more dysfunction related to pain and perceived their medical condition as worse than subjects who did not receive disability compensation. Their results also suggested that subjects on disability assumed a sick role as a result of their work injuries and that this role extended to many aspects of their lives. They also speculated that subjects involved in compensation may lack confidence in health care professionals which may interfere with successful rehabilitation. The researchers noted that the self report measure used may not be an accurate reflection of the subject's condition and disability. They encouraged further research in the field of disability and attitude.

Depression, pain and pain behavior were examined by Keefe, Wilkins, Cook, Crissom and Muhlbaier (1986). The researchers explored the question of whether or not the level of depression predicted the patients' perception of pain and pain behavior. Measures included observation during the physical exam to evaluate pain behavior (guarding, bracing, rubbing, grimacing and sighing); three pain measures; information on analgesic use; a measure of activity; and medical status. Demographic information
included disability status, time since onset of pain, duration of continuous daily pain and the number of lumbar operations. The researchers' analysis indicated that the magnitude of patients' pain, their pain behavior, activity level and medication intake were all related to the severity of depression.

In an effort to evaluate the effects of psychological differences and demographic characteristics on treatment outcome, Deyo et al. (1988) compared a sample of chronic pain patients (which they had recruited for a separate study on a pain intervention), with patients attending a chronic pain clinic. Demographic information included gender, age, ethnicity, education, employment status, compensation status, prior pain therapy, current narcotic analgesic use and current muscle relaxant use. Measurements included the MMPI and the Pain Assessment Index (which was a calculation of five MMPI scales—hypochondriasis, depression, hysteria, hypomania, and psychasthenia). Results indicated that the recruited patients were better educated, had higher employment rates, were not on workmen's compensation, and had lower scores on several MMPI scales than the regular clinic patients. These researchers concluded by cautioning future researchers to respect the wide heterogeneity among low back pain subjects and to keep this variability in mind when interpreting and reporting results.

Mayer et al. (1987) conducted a two year follow-up study of 116 clients who had been treated for industrial related low back injuries, 11 clients who dropped out of the program, and 72 clients who were denied entry to the program by their insurance carrier. Unfortunately, the researchers did not specify which psychological measures were utilized. Through aggressive follow-up, a large percentage of the sample were recontacted at three
months, one and two years. Results indicated that 87 percent of the treatment group were working at two years, compared to 25 percent of the group who had dropped out, and 41 percent of the group had been denied entry. They noted that the reasons individuals returned to work were complex and included physical and motivational factors. They stated that they were not able to isolate a specific component of the treatment program that was responsible for the high return to work rate, but attributed their success to their multidisciplinary approach.

**Summary:**

Kuhn and Kneidal (1990) indicated that the more successful work hardening subjects were those with less time since their injury, who had a positive attitude and who had not previous surgery. This was consistent with Lazarus's theory on stress and coping in which he postulated a positive relationship between duration of stress and health and coping (Lazarus & Folkman, 1984). The current study hypothesized that a positive relationship would exist between the length of time since onset of pain and the subject's functional level.

Deyo, et al.'s (1988) research emphasized the heterogeneity of low back pain patients and cautioned future researchers to interpret their results in light of the specific demographics gathered. The following demographics were collected and analyzed in this current study: gender, age, work status, type of injury, disability status, number and type of relevant surgeries, time since original injury and current use of pain medication.
Critique:

The majority of current research with the chronic pain/work hardening population was atheoretical or based on the medical model. This current research study was based on Lazarus' cognitive model of stress and coping which added a needed dimension to the study of this population.

Tait et al. (1988) required their subjects to complete their research measurements prior to the subjects being accepted for treatment. This raised an ethical question—were subjects refused treatment if they failed to complete the forms? The retrospective nature of this study precluded subjects being denied treatment if they did not participate.

Finally, there was no evidence that research had been conducted on the relationship between cognitive appraisal, coping and function in this population. Lazarus and Folkman (1984) stressed the need to study cognitive appraisal, coping and health--this current study added a needed dimension to the study of this population.

Chapter Summary

Reviews of recent literature on cognitive appraisal, coping, function and work hardening yielded a limited number of relevant research articles and indicated that much of the recent research has been conducted by relatively few research groups. Lazarus' theory of cognitive appraisal and coping was well suited for use with this population because of its emphasis on the relationships among cognitive appraisal, coping and health. In order to avoid past research design flaws conducted with this theory, this study limited the variables being studied to three and used clear tables to present results.
Pain coping strategies were explored by Keefe and his colleagues at Duke University, however, research had yet to be conducted with the work hardening population. Keefe's development of CSQ benefited this study by supplying reliability and normative data on this instrument. Recent research on physical function had been marred by research design flaws or unclear presentation of results. The parsimonious design in this study, combined with clear presentation of results, was an important addition to previous research on physical function. Finally, there was little published research on the work hardening population. Jensen, Turner, Romano and Karoly (1991) noted that the diverse nature of chronic pain patients can effect the relationship between appraisal and coping and that research was needed to determine which coping strategies were most effective in specific populations. This current study added needed data to work being conducted with this group of subjects.
Chapter 3

Collection of Data

Population

The target population for this study was work hardening clients in the United States. The accessible population was clients assessed by a CARF accredited, work hardening clinic in Newport News, Virginia between July, 1993 and October, 1994. Using a retrospective design, medical records of 85 individuals with work related injuries or illnesses resulting in benign pain and decreased physical function were evaluated. Clients with a major chronic illness were excluded.

Description of Intervention

Subjects who attended the clinic routinely completed the Spinal Function Sort (SFS), the Coping Strategies Questionnaire (CSQ), a Visual Analogue Scale (VAS) and a series of physical measures to evaluate function. Evaluation of function was conducted by a certified Occupational Therapist, an exercise physiologist and/or a licensed Physical Therapist. This functional evaluation included resting pulse rate, resting blood pressure, and time and distance subjects completed on a treadmill. Subjects were also evaluated using a series of fifteen functional tasks that were modeled after items on the SFS. These items were selected by a certified Occupational Therapist and a licensed Physical Therapist as representing common functional tasks. Additionally, the clinic evaluated injured workers on how many pounds the injured workers could static lift, their ability to lift
under a workload (lift and carry), and their ability to push and pull a sled. All scales were accompanied by clear written instructions, with verbal instruction given upon request.

**Instrumentation**

**Spinal Function Sort (SFS)**

The SFS is a relatively new, 50 item, self report measure developed by Matheson and based on his theory of symptom magnification. It was constructed to evaluate subjects' perceptions of their abilities to perform specific physical tasks. Using a test booklet, subjects viewed drawings of men and women performing specific physical tasks and marked on a likert type scale whether they believed they were able to perform the task, were restricted in their ability to perform the task, were unable to perform the task or were uncertain. Each drawing was accompanied by a simple description.

The SFS was developed from over 500 photographs of various work related tasks, resulting in 208 non-repetitive photographs being selected and drawings being made. These drawings were then reviewed by five experienced evaluators who selected 43 drawings that represented common work related tasks that required the workers to use their spines. Simple descriptions were added to each drawing. Five additional drawings were made, and to measure internal reliability, two drawings were repeated (descriptions of these two drawings were modified slightly), resulting in a total of 50 tasks and descriptions.

Scoring consisted of initially reviewing the two pairs of similar items to evaluate the tool's internal reliability. The test was considered reliable if the subject's responses on at least one of the pairs was similar. If the subject's responses on both validity pairs were
dissimilar then the test was considered unreliable. The test yields a single score between 0 and 200 called the Rating of Perceived Capacity (RPC). The lower the score, the less subjects felt they were able to do.

Reliability studies were conducted over a three year period and indicated a consistently high test-retest reliability. One study of 30 healthy adult females had a test-retest reliability of .85. Another study of 30 disabled males had a two to seven day test-retest reliability of .82. A third study was conducted with 39 men and 22 women in a work capacity evaluation center and resulted in a test-retest reliability of .81 for the men and .76 for the women. A fourth study of 29 healthy men had a seven day test-retest reliability of .84. When compared to other studies, this fourth group of healthy men had higher mean scores on the SFS which indicates that the SFS might be biased in favor of individuals who are physically fit. Finally, reliability studies were conducted at four rehabilitation sites scattered throughout the U.S.A., resulting in a total of 136 subjects and a one to seven day test-retest reliability of .87.

Validity data was limited to the initial face validity conducted during the construction of the SFS.

Normative data was available for employed females (n=116), employed, healthy males (n=62), unemployed, disabled females (n=60), and unemployed, disabled males (n=161) (Matheson and Matheson, 1991).

Coping Strategies Questionnaire (CSQ)

The CSQ is a 50 item, self report tool that was developed by Keefe to research pain coping strategies. Items were selected for inclusion in the CSQ based on relevant
pain research (Rosenstiel & Keefe, 1983). The CSQ has six subscales (diverting attention, reinterpreting pain sensation, coping self-statement, ignoring pain sensations, praying or hoping, and increasing behavioral activities) and two ratings of coping effectiveness (ability to control pain and ability to decrease pain). All subscales and ratings use a seven item likert scale. Subjects respond to each item by writing their responses next to each item. Directions are included with each questionnaire. Subscale items are randomly distributed throughout the CSQ. A tally is made for each subscale and rating resulting in eight scores for each client.

The CSQ has been utilized in a variety of research studies on pain (Keefe et al., 1987; Keefe et al., 1990; Keefe, Wilkins, Cook, Crissom, & Muhlbaier, 1986; Keefe & Williams, 1990; Lawson, Reesor, Keefe, & Turner, 1990; Parker et al., 1989; Rosenstiel & Keefe, 1983). A number of researchers have reported data on the internal consistency of the CSQ--Cronbach's coefficient alphas are fairly consistent among studies, are generally moderately high (range--.63 to .85) and indicate that the CSQ is internally consistent (Keefe et al., 1987; Parker et al., 1989; Rosenstiel & Keefe, 1983). Other studies have evaluated the CSQ test-retest reliability. Main and Waddel (1991) reported 24 hour test-retest reliabilities ranging from .68 on coping self-statements to .93 on increasing behavioral activities.

Rosenstiel and Keefe's (1983) initial evaluation of the CSQ indicated the following three factors were present: Cognitive Coping and Suppression (included reinterpreting pain sensations, coping self-statements and ignoring pain sensation); Helplessness (included catastrophizing, increasing activity level, perceived ability to control pain and
perceived ability to decrease pain); and diverting attention, and praying and hoping. A study by Parker et al. (1989) indicated that pain intensity was predicted by a factor on the CSQ which the researchers named Pain Control and Rational Thinking (PCRT). The PCRT was derived from the following scales: perceived ability to control pain; perceived ability to decrease pain; and catastrophizing. Lawson et al. (1990) evaluated the factor structure of the CSQ using 620 subjects from five different geographic areas. Statistical analysis indicated consistency in the following three factors: (1) conscious cognitive coping (an average of scores from ignoring pain sensation, coping self-statements and reinterpreting pain sensation); (2) appraisal of ability to decrease or control pain; and (3) diverting attention and praying and hoping.

Jensen, Turner, Romano and Karoly (1991) presented an extensive critique of recent research on coping and chronic pain. In their article, the researchers note "that cognitive coping strategies, assessed by the Coping Strategies Questionnaire, appear to be associated with a number of pain-related adjustment dimensions. In particular, a belief that one has control over pain (the 'self-efficacy belief' factor sometimes emerging in factor analysis of the CSQ) is predictive of better functioning" (p. 277). They go on to question whether this factor was a coping strategy or an appraisal of coping. The catastrophizing subscale was criticized as an assessment of appraisal and not an evaluation of coping.

Criterion and construct validity studies have not been reported on this measure.

Normative data has been reported in several studies. Lawson et al., (1990) reported normative data on five samples of chronic pain patients in a variety of settings resulting in a total of 620 patients. Available data included descriptive statistics on the
subscales and demographic items (age, education, duration of pain, presence of depression, gender and primary pain location). Subscales showing consistency over the five samples included reinterpreting pain sensation, coping self statements, ability to decrease pain and ability to control pain. Research by Deyo (1988) emphasized the heterogeneity of chronic pain clients and the need for researchers to interpret findings in light of their demographic data. Differences in demographics were expected, however they may limit the generalizability from this study to other populations.

**Visual Analogue Scale (VAS)**

A subject's perception of pain can be measured using a self report VAS, which was a commonly used method to evaluate individuals' perceptions of pain (Capra et al., 1985; Carlsson, 1983; Deyo et al., 1988; Gatchel et al., 1986; Hoon, Feuerstein, & Papciak, 1985; Linton, 1991; Parker et al., 1989; Turner & Clancy, 1986; Van Lankveld et al., 1993). Burckhardt (1990) noted the difficulty in assessing pain because it is a personal, subjective experience. Objective clues such as increased pulse and increased blood pressure which are present in acute pain are often absent in chronic pain (Deyo et al., 1988; Brunner & Suddarth, 1984). The VAS scale consists of a 10-cm. line with the descriptors *No Pain* at the left end of the line and *Pain as Bad as You Have Experienced* at the right end of the line. Subjects are asked to place an X on the line indicating their current level of pain. Scoring consists of measuring from the left side of the line with a ruler and recording the results.

Several researchers have evaluated the reliability of the VAS (Carlsson, 1983; Ferraz et al., 1990; and Love, Lebeuf and Crisp, 1989). Ferraz et al. (1990) evaluated the
reliability of three pain scales including the VAS with 91 subjects in Brazil. Each scale was administered before a consultation with a physician and after the consultation. They reported a test-retest reliability for the VAS of 0.93 for 66 literate patients and 0.71 for 25 illiterate patients. The researchers also compared the mean and standard deviations for the three scales which indicated the VAS yielded similar results to the numerical rating scale. They concluded from their results that the VAS was reliable, but, might be difficult for some illiterate patients to interpret. On the other hand, Gatchel et al. (1986) noted that the VAS is useful in helping individuals nonverbally describe their pain.

Love et al. (1989) evaluated the reliability of the VAS, the Pain Drawing and the McGill Pain Questionnaire. Sixty-five volunteers who had chronic back pain for over 6 months were recruited via newspaper ads. Three VASs were used to measure the subjects' perception of their current pain (test-retest .77), pain at its worst (test-retest .49), and pain at its best (least pain)(test-retest .57). They also included mean scores for the VASs. The researchers stressed that their results supported the use of VASs to measure current pain but that the scales may be less reliable when measuring past pain.

In two studies involving a total of eight subjects, Carlsson (1983) correlated the results between a visual analogue absolute scale (100 mm line) with a comparative scale (a 200 mm line). Repeat measures were made at 30 and 120 minutes. Other measures included an assessment by a physician on the amount of expected pain and an evaluation of the patient's ability to judge the length of lines (line length may be an important consideration with longer lines resulting in more scores in the middle of the line (due to visual field limitations) and shorter lines limiting the space available for the marking of
responses). Results indicated good correlation between scales when the level of pain was unchanged or increased but unsatisfactory correlations when pain was rated as decreased. She attributed her results to the difficulty subjects have in accurately recalling prior pain experiences. Carlsson expressed concern about the ability of some clients to transcribe their pain perception to a mathematical dimension and noted that subjects must use perceptual judgment to use the VAS. The limited number of subjects evaluated by Carlsson made it difficult to generalize her results to the population evaluated in this current study.

Grossman et al. (1992) compared a new instrument—the Hopkins Pain Rating Instrument (HPRI) with the VAS and the Verbal Descriptor Scale in 71 patients with cancer. Correlations between the HPRI and the VAS were high ($r=0.90$) Pain was reassessed after five minutes using the same instruments—test-retest reliabilities for the VAS were 0.97. The researchers discussed two possible disadvantages of the VAS such as subjects' tendencies to mark towards the anchors and the difficulty some subjects may have transcribing a subjective experience to a straight line continuum.

Miller and Ferris (1993) examined recent literature on the VAS and reported several potential sources of error that might affect validity. Since VAS's commonly evaluate subjective phenomena—anchor points in some subjects may be unstable as subjects may overestimate or underestimate the strength of sensations. This current study evaluated subjects' appraisal of pain—an overestimation or an underestimation is as important as an accurate perception. Clustering of data was also cited as a potential source of error—this study statistically monitored for this by using a frequency histogram.
Finally, the authors discussed that researchers need to be cautious in their statistical analysis of the VAS—some scale values are evaluated incorrectly as interval scales when they are in fact ratio scales. On the other hand, Miller and Ferris cite numerous advantages to the VAS such as it is "quick and simple to construct, easily understood, interesting, easy to score, they require little motivation and their use frees the rater from direct quantitative terms, i.e., the rater does not need to worry about the quantitative nature of his/her judgments" (p. 21).

**Functional Evaluation:**

A baseline measure of each subjects' physical functioning was obtained by evaluating their cardiovascular fitness/endurance and by a series of fifteen tasks modeled after items on the SFS. Additional measures of physical function included subjects' ability to static lift, their ability to lift under a workload (lift and carry), and their ability to push and pull a sled. Clients were allowed to stop any activity if they believe they were not capable of continuing. Matheson (1985), Mayer et al. (1987) and Turk and Rudy, (1991) stressed the importance of a comprehensive evaluation of a client's function. Mayer et al. conducted a two year study of functional restoration of low back injuries and noted that chronic pain often resulted in physical deconditioning and decreased physical function. They suggested that a comprehensive evaluation should include an objective evaluation of cardiovascular fitness/endurance, ability to lift under a workload and spinal range of motion (plus ability to static lift and muscle endurance). Matheson (1990) discussed Mayer et al.'s successful rehabilitation program and stated that Mayer had an 87 percent
success rate with chronically disabled workers--many who were medical and surgical failures.

The following tests were used to evaluate cardiovascular fitness/endurance:
resting heart rate; resting blood pressure; and length of time and distance subjects walked on a treadmill, without exceeding their target heart rate. Resting heart rate was measured by manually palpating the radial artery and counting the number of beats per minute. This test was performed prior to the initiation of physical activity. A normal adult heart beats between 60 and 80 times a minute.

Resting blood pressure was measured with a sphygmomanometer and stethoscope prior to the initiation of physical activity. Two numbers were generated when measuring blood pressure--the higher number is the systolic pressure and the lower is the diastolic. Normal adult systolic blood pressure ranges between 90 and 140 mm Hg. and normal adult diastolic pressure ranges between 60 and 90 mm Hg. (Ignatavicius & Bayne, 1991). Stress, acute pain and poor physical function have been implicated in abnormal heart rates and blood pressures, however, individuals with chronic pain generally physiologically adapt and have near normal heart rates and blood pressure (Brunner & Suddarth, 1984; Deyo et al., 1988; Ignatavicius & Bayne, 1991; Kozier, Erb & Oliveri, 1991). The third measure of cardiovascular function was the length of time and distance subjects walked on a treadmill without exceeding their target heart rate which is 85 percent of their maximum heart rate as established by the American Heart Association (Kozier, Erb & Oliveri, 1991). Subjects were closely monitored during this test and were asked every three minutes to
rate their exertion on a 0-10 scale with 10 being the most exertion and 0 being none. This measure resulted in a score in minutes and distance for each subject.

A series of fifteen functional tasks were selected from the SFS by a certified Occupational Therapist and a licensed Physical Therapist. Sixty seven subjects were evaluated by a certified Occupational Therapist or an exercise physiologist on whether they were able to perform the task, were restricted in their ability to perform the task or were unable to perform the task. A five point likert type scale was used to evaluate each subject. All therapists administering the series of tasks were initially trained by a certified Occupational Therapist. While administering this test, therapists noted on the form a rationale for subjects scores, e.g. "subject complained of inability to perform task."

Static lifting was measured by evaluating how many pounds each subject lifted floor to waist, waist to shoulder and shoulder to overhead. Ability to lift under a workload was evaluated by determining how many pounds each subject could lift and carry with both arms. Each subject was also evaluated on how many pounds they could push and pull in an sled.

**Threats to reliability**

There are several behaviors that may result when a subject is injured or ill which may have affected subjects' responses on the various measuring tools. These included the assumption of a sick role, malingering and symptom magnification. Bloom (1988) differentiated between having a disease and being sick and stated that having a disease is a physical phenomenon whereas being sick is a psychosocial phenomenon "...meaning that you act like and are treated like a sick person" (p. 181). In 1951, Parson postulated that
individuals who assume a sick role are held blameless for being sick (it is not their fault that they are sick) and they have relaxed role obligations (and are free from their normal responsibilities such as working, cooking, cleaning house, yardwork, etc.). Parson (1978) also theorized that the sick role brings with it the obligation to seek medical treatment to get well and to comply with what is prescribed. Holroyd and Lazarus (1982) addressed illness behavior as a coping function that can result in secondary gains such as extra attention from family members. Secondary gains can be powerful incentives to remain sick. Salloway (1993) noted that it sometimes takes the powerful disincentives of loss of income, loss of roles, and/or disagreeable medical treatments to prevent some individuals from assuming a sick role for minor illnesses (or continuing a sick role when well).

Feist and Brannon (1988) reviewed several studies on Parson's construct of blamelessness and noted that the studies failed to substantiate this construct. They concluded that people tended to seek a cause for their health problems—even if they blame themselves. Feist and Brannon go on to critique other aspects of Parson's theory and noted that some people go out of their way not to assume a sick role where others assume a sick role when they are not sick. Despite these criticisms, Parson's sick role theory is widely accepted by health care professionals (Bloom, 1988; Kozier, Erb, and Bufalino, 1991).

Malingering is another illness behavior encountered by health care professionals. Waikar, Aghazadeh and Schlegel (1991) proposed the following definition of malingering: "In rehabilitation, malingering is said to occur when the client or patient is pretending to
be ill or incapacitated in order to escape duty or work. Thus, malingering combines a
description of behavior with an imputed motivation" (p.247). Lees-Haley, English and
Glenn (1991) conducted a research study using the MMPI-2 to detect malingers in
personal injury suits. They discussed that malingers in personal injury suits pretend to
be "more distressed, more impaired or more disabled" (p. 203) then they actually were.
They noted that the potential financial gain from winning any injury suit is a major problem
and that attorneys may indirectly or directly encourage malingering in an attempt to
maximize monetary gains.

The problem of malingering was also addressed by Jayson (1992) in his article
"Trauma, back pain, malingering, and compensation." He stated "A major difficulty
therefore lies in determining how much of the symptoms is directly due to tissue damage
in the spine; how much is subconscious amplification of a minor problem, which is
nevertheless perceived as severe pain and results in chronic disability; and how much is
fabrication" (p. 8). He noted a recent interest among medical professionals to use
dynamometric techniques in which the client is asked to perform repeated exercises using
electronic measuring devices to distinguish malingers from clients with genuine causes
for their symptoms. Jayson challenges the use of these techniques by citing the lack of
normative data and the difficulty evaluating subconscious factors in the maintenance of
pain and decreased function.

A final factor that is challenging to detect in chronic pain patients is symptom
magnification which has its roots in the sick role (Matheson, 1991). Matheson (1990b)
defined symptom magnification as ". . . a self-destructive, socially reinforced behavioral
response pattern consisting of reports or displays of symptoms which function to control the life circumstances of the sufferer" (p. 1). In other words symptom magnifiers present with symptoms that are greater than expected given their disorder. He stated that in one recent study of 377 consecutive, chronically disabled subjects, over 24 per cent of them appeared to be symptom magnifiers (1990b). Matheson (1991) developed a theory on the manifestation and detection of symptom magnification and noted that detection of symptom magnification is a complex process that involved evaluating information from interviews, behavioral observations, psychological tests, and functional evaluations. He postulated that the symptom magnifier "...acts as if control over the current or future circumstances has been given over to symptoms" (1991, p. 6). He also suggested that symptom magnifiers exaggerated their functional limitations and perform at a level less than is expected during functional evaluation. Waikar et al. (1991) differentiated between symptom magnification and malingering by noting the malingerers play "games for secondary gains" (p. 247).

In summary, there were several threats to the reliability of test data—which included the assumption of a sick role, malingering and symptom magnification. Matheson (1991) suggested that injured workers also needed to be monitored for the following: other illnesses that may account for their symptoms; low endurance; pain; fear of re-injury; and performance anxiety. This research utilized several measures that were subject to these threats. Results were interpreted in light of these factors.
Demographics

Demographics were collected on all subjects and included gender, age, work status, occupation, type of injury, disability status, number and types of relevant surgeries, time since original injury, and current use of pain medications.

Research Design

A retrospective, correlational design was used to study the relationships between the following variables—cognitive appraisal, coping and physical functioning in a work hardening population.

Data Analysis

Pearson's product moment correlation and simple regression were the statistical techniques that were used in this study. A one-tailed test of significance was used to evaluate hypotheses (alpha=0.05).

Descriptive statistics were used to define the sample in term of responses on the various measures and to evaluate the demographic data.

Ethical Considerations

On-the-job injuries are estimated to cost the American economy many billions of dollars each year. Past research efforts focused on pain coping strategies, however no studies have focused on cognitive appraisal, coping and physical function in a work hardening population. This current study was warranted to provide needed information about the interaction of these variables in this population. The retrospective design of this study presented minimal risks to the participants. To protect the confidentiality of participants, measures were coded with a number and letter that had no link to the subjects
and access to the data was limited to the principal investigator, her committee members and clinic personnel. Measures were administered by an independent third party not connected to the investigator.

Approval was obtained from The School of Education Human Subjects Committee, The College of William and Mary Committee on Human Subjects, and Riverside Rehabilitation Institute's Institutional Review Board prior to data being collected.
Chapter 4

Presentation of Data

Demographic Information

The medical records of 85 consecutive injured workers who were evaluated by Riverside Rehabilitation Institute's Work Hardening Clinic between July, 1993 and October, 1994 were reviewed. Two additional injured workers were excluded from the study secondary to their medical diagnoses—post polio syndrome and traumatic brain injury. The major medical diagnostic category was back injury/back pain, with 78.31% (n=65) of the subjects reporting this category. The mean age of the sample was 40.50 years old with a range of 19 years old to 70 years old. More men than women were found in the sample—64.70% (n=55) of the subjects were male and 35.29% (n=30) were female. The sample included 60 subjects who were on temporary disability, 13 subjects who were on permanent disability and 12 subjects who were not on disability. Subjects averaged 13.48 months since their injuries, with a range of one month to 77 months, however, 34.12% (n=29) were less than 6 months post injury and only 8.2% (n=7) were more than 40 months post injury. Sixty subjects (70.5%), were taking at least one medication for pain. These medications included over-the-counter pain medications such as Tylenol, non-steroid anti-inflammatory products, narcotics, muscle relaxants, benzodiazepines, and antidepressants. Thirty-two of the subjects (37.9%) had experienced at least one injury-related surgery.
Additionally, 21 subjects were single, 48 were married, 11 were divorced and five were widowed. The average subject was a high school graduate with some college: 18.07% (n=15) reported having less than a high school education; 51.81% (n=43) reported having a high school diploma; 8.43% (n=7) reported earning a GED; 14.46% (n=12) reported having some college; 4.82% (n=4) reported having a college degree; and 2.41% (n=2) reported having some postcollege education. Data were missing on 2 subjects. The reported mean family income was between $20,000 and $29,000 per year.

Subjects reported a variety of occupations including 4 who worked in professional positions (5.1%); 4 who worked in managerial positions (5.1%); 1 who worked in sales (1.28%); 20 who worked in skilled positions (25.64%); 27 who held semiskilled positions (34.62%); and 22 who worked in unskilled jobs (28.21%).

**Instrumentation—Descriptive Results**

**Spinal Function Sort**

Eighty of the eighty-five subjects completed the Spinal Function Sort (SFS). Minimum possible score on the Spinal Function Sort was 0 and maximum possible score was 200. Statistical results are presented in Table 1.

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Descriptive Statistics—Spinal Function Sort</strong> (n=80)</td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>92.625</td>
</tr>
</tbody>
</table>
Coping Strategies Questionnaire

Eighty-two subjects completed this instrument. Minimum scores on the CSQ subscales' diverting attention, reinterpreting pain sensations, coping self statements, ignoring sensations, praying and hoping, catastrophizing, and increased behavioral activity were 0 and maximum scores were 36. Minimum scores on the CSQ subscales' decrease pain and control pain were 0 and the maximum scores on these two subscales were 6.

Data analysis is presented in Table 2.

Table 2

<table>
<thead>
<tr>
<th>CSQ Subscales</th>
<th>mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diverting attention</td>
<td>16.439</td>
<td>7.877</td>
<td>0 - 36</td>
</tr>
<tr>
<td>Reinterpreting Pain</td>
<td>8.866</td>
<td>7.516</td>
<td>0 - 36</td>
</tr>
<tr>
<td>Coping self statement</td>
<td>21.634</td>
<td>6.899</td>
<td>5 - 36</td>
</tr>
<tr>
<td>Ignoring Sensation</td>
<td>14.354</td>
<td>6.986</td>
<td>0 - 36</td>
</tr>
<tr>
<td>Pray/hope</td>
<td>21.134</td>
<td>9.877</td>
<td>0 - 36</td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>14.195</td>
<td>8.200</td>
<td>0 - 33</td>
</tr>
<tr>
<td>Increase Behavior</td>
<td>17.232</td>
<td>6.684</td>
<td>3 - 33</td>
</tr>
<tr>
<td>Decrease pain</td>
<td>2.549</td>
<td>1.209</td>
<td>0 - 6</td>
</tr>
<tr>
<td>Control pain</td>
<td>2.890</td>
<td>1.176</td>
<td>0 - 6</td>
</tr>
</tbody>
</table>
Visual Analogue Scale

Eighty-two subjects completed the VAS. Minimum possible score on the VAS was 0 and maximum possible score was 10. Results are presented in Table 3 and a frequency histogram is presented in Figure 1.

| Descriptive Statistics—Visual Analogue Scale (n=82) |
|---------------------------------|--------|--------|
| Mean                           | 5.102  | 2.470  |
| Standard Deviation             |        |        |
| Range                          | 0.50 – 9.75 |
The frequency histogram lacked clear definition and demonstrated two highpoints similar to a bimodal distribution. There was a slight clustering of data at the higher anchor point with 8.5% of the subjects (n=7), marking a score above 9.0.
**Functional Measures**

Statistical results for the functional measures are presented in Table 4.

<table>
<thead>
<tr>
<th>Measure</th>
<th>n</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical task</td>
<td>67</td>
<td>41.030</td>
<td>16.382</td>
<td>0 - 62</td>
</tr>
<tr>
<td>Resting pulse</td>
<td>61</td>
<td>84.770</td>
<td>14.939</td>
<td>58 - 127</td>
</tr>
<tr>
<td>Systolic BP</td>
<td>62</td>
<td>123.258</td>
<td>16.860</td>
<td>80 - 174</td>
</tr>
<tr>
<td>Diastolic BP</td>
<td>62</td>
<td>74.355</td>
<td>12.786</td>
<td>50 - 110</td>
</tr>
<tr>
<td>Distance treadmill</td>
<td>66</td>
<td>0.397 miles</td>
<td>0.305</td>
<td>0 - 1.16</td>
</tr>
<tr>
<td>Time treadmill</td>
<td>70</td>
<td>10.732 minutes</td>
<td>7.225</td>
<td>0 - 27</td>
</tr>
</tbody>
</table>

**Additional Functional Measures**

<table>
<thead>
<tr>
<th>Measure</th>
<th>n</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lift floor/waist</td>
<td>81</td>
<td>31.395</td>
<td>21.616</td>
<td>0 - 100</td>
</tr>
<tr>
<td>Lift waist/shoulder</td>
<td>81</td>
<td>30.630</td>
<td>18.725</td>
<td>0 - 85</td>
</tr>
<tr>
<td>Lift shoulder/overhead</td>
<td>81</td>
<td>23.889</td>
<td>13.758</td>
<td>0 - 60</td>
</tr>
<tr>
<td>Carry</td>
<td>80</td>
<td>30.125</td>
<td>18.155</td>
<td>0 - 85</td>
</tr>
<tr>
<td>Push</td>
<td>79</td>
<td>28.329</td>
<td>16.415</td>
<td>0 - 80</td>
</tr>
<tr>
<td>Pull</td>
<td>76</td>
<td>27.434</td>
<td>15.522</td>
<td>0 - 68</td>
</tr>
</tbody>
</table>
Relationship of the Data to the Research Hypotheses

The first research hypothesis (hypothesis 1) was evaluated using simple regression. The remaining six research hypotheses were evaluated using Pearson's product-moment correlation (1-tailed significance).

Hypothesis 1: Subjects who appraise their current pain as high on the VAS will appraise their physical functioning as low on the SFS. Table 5 lists the simple regression performed on this hypothesis.

Table 5

| Simple Regression with the Visual Analogue Scale and the Spinal Function Sort |
|-------------------------------|------------------|-----------------|-----------------|-----------------|-----------------|
| Multiple R                   | .320             |
| R Square                     | .102             |

<p>| Variables in the Equation    |
|-------------------------------|------------------|-----------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>95% Confidence</th>
<th>Interval B</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS</td>
<td>-5.881</td>
<td>1.996</td>
<td>-9.857</td>
<td>-1.905</td>
<td>-.320</td>
</tr>
<tr>
<td>(Constant)</td>
<td>121.818</td>
<td>11.173</td>
<td>99.565</td>
<td>144.072</td>
<td></td>
</tr>
</tbody>
</table>

F = 8.679  Significance F = .004

The negative correlation coefficient indicated a moderate, inverse relationship between VAS and SFS. Results also indicated that F = 8.679 and that F is significant at .01. R Square suggested that there was a 10 percent overlap between VAS and SFS, which was not strong enough to accurately predict SFS from VAS. The standard error is high at 43. The scatter plot demonstrated little clustering of data, and included multiple
outliers which may have adversely affected the correlation. Statistical analysis provided very weak, statistically significant support of this hypothesis—VAS is weakly predictive of SFS.

Hypothesis 2: Cognitive appraisals of pain as measured by VAS will be negatively related to physical function as measured by functional evaluation. Table 6 details the specific correlations for this hypothesis.

<table>
<thead>
<tr>
<th>Table 6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correlations Between the Visual Analogue Scale and Functional Evaluation</strong></td>
</tr>
<tr>
<td>Variable 1</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>VAS</td>
</tr>
<tr>
<td>VAS</td>
</tr>
<tr>
<td>VAS</td>
</tr>
<tr>
<td>VAS</td>
</tr>
<tr>
<td>VAS</td>
</tr>
<tr>
<td>VAS</td>
</tr>
<tr>
<td>VAS</td>
</tr>
<tr>
<td>VAS</td>
</tr>
<tr>
<td>VAS</td>
</tr>
<tr>
<td>VAS</td>
</tr>
<tr>
<td>VAS</td>
</tr>
<tr>
<td>VAS</td>
</tr>
</tbody>
</table>

*Curvilinear plot
Hypothesis 2 is weakly supported by the correlations between VAS and the following functional measures: physical task (statistically significant), systolic blood pressure, and diastolic blood pressure. The relationships between VAS and distance and time on the treadmill provided moderate, statistically significant support (p < .01) of this hypothesis. The correlation between VAS and resting pulse did not support the hypothesis. All the correlations between VAS and the additional functional measures demonstrated weak to moderate, statistically significant correlations. Two of the scatter plots were curvilinear, which indicated r may be underestimated for the following correlations: VAS and distance on the treadmill; and VAS and carry.

Hypothesis 3. Cognitive appraisals of physical functioning (as measured by the SFS) will be positively related to actual physical functioning (as measured by functional evaluation). Table 7 defines the specific correlations obtained.
### Table 7

<table>
<thead>
<tr>
<th>Variable 1</th>
<th>Variable 2</th>
<th>r</th>
<th>p</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFS</td>
<td>Physical task</td>
<td>.513</td>
<td>.000*</td>
<td>64</td>
</tr>
<tr>
<td>SFS</td>
<td>Resting pulse</td>
<td>-.072</td>
<td>.294</td>
<td>58</td>
</tr>
<tr>
<td>SFS</td>
<td>Systolic BP</td>
<td>.003</td>
<td>.489</td>
<td>59</td>
</tr>
<tr>
<td>SFS</td>
<td>Diastolic BP</td>
<td>.059</td>
<td>.327</td>
<td>59</td>
</tr>
<tr>
<td>SFS</td>
<td>Distance treadmill</td>
<td>.360</td>
<td>.002</td>
<td>62</td>
</tr>
<tr>
<td>SFS</td>
<td>Time Treadmill</td>
<td>.462</td>
<td>.000</td>
<td>66</td>
</tr>
</tbody>
</table>

**Additional Measures**

| SFS              | Lift Floor/waist | .541 | .000* | 77 |
| SFS              | Lift Waist/shoulder | .668 | .000* | 77 |
| SFS              | Lift Shoulder/overhead | .654 | .000  | 77 |
| SFS              | Carry             | .648 | .000  | 76 |
| SFS              | Push              | .538 | .000  | 75 |
| SFS              | Pull              | .535 | .000  | 73 |

* Curvilinear plot

Results from correlations between SFS and physical task, distance on the treadmill, and time on the treadmill provided moderate, statistically significant support for this hypothesis. The correlations between SFS and resting pulse, systolic blood pressure and diastolic blood pressure did not support hypothesis three. Correlations between SFS and all the additional functional measures provided moderate, statistically significant support (lift floor/waist, push and pull) or strong, statistically significant support.
(lift waist/shoulder, lift shoulder/overhead and carry) for this hypothesis. Three of the scatter plots indicated a slight curvilinear relationship existed, which suggested r may be underestimated for the following correlations: SFS and physical task; SFS and lift floor/waist; and SFS and lift waist/shoulder.

**Hypothesis 4:** Cognitive coping strategies (as measured by the CSQ's subscales diverting attention, reinterpreting pain sensations, coping self statements, ignoring pain sensations, and praying and hoping) will be positively related to physical functioning (as measured by functional evaluation). Table 8 presents the specific correlations obtained.
<table>
<thead>
<tr>
<th>Variable 1</th>
<th>Variable 2</th>
<th>r</th>
<th>p</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diverting attention</td>
<td>Physical task</td>
<td>-0.154</td>
<td>0.112</td>
<td>64</td>
</tr>
<tr>
<td>Diverting attention</td>
<td>Resting pulse</td>
<td>0.133</td>
<td>0.158</td>
<td>58</td>
</tr>
<tr>
<td>Diverting attention</td>
<td>Systolic BP</td>
<td>0.119</td>
<td>0.183</td>
<td>59</td>
</tr>
<tr>
<td>Diverting attention</td>
<td>Diastolic BP</td>
<td>0.012</td>
<td>0.464</td>
<td>59</td>
</tr>
<tr>
<td>Diverting attention</td>
<td>Distance</td>
<td>-0.236</td>
<td>0.031</td>
<td>63</td>
</tr>
<tr>
<td>Diverting attention</td>
<td>Time</td>
<td>-0.166</td>
<td>0.089</td>
<td>67</td>
</tr>
<tr>
<td>Reinterpreting pain</td>
<td>Task</td>
<td>-0.018</td>
<td>0.443</td>
<td>64</td>
</tr>
<tr>
<td>Reinterpreting pain</td>
<td>Resting pulse</td>
<td>-0.069</td>
<td>0.302</td>
<td>58</td>
</tr>
<tr>
<td>Reinterpreting pain</td>
<td>Systolic BP</td>
<td>-0.035</td>
<td>0.394</td>
<td>59</td>
</tr>
<tr>
<td>Reinterpreting pain</td>
<td>Diastolic BP</td>
<td>-0.099</td>
<td>0.226</td>
<td>59</td>
</tr>
<tr>
<td>Reinterpreting pain</td>
<td>Distance</td>
<td>-0.076</td>
<td>0.276</td>
<td>63</td>
</tr>
<tr>
<td>Reinterpreting pain</td>
<td>Time</td>
<td>-0.017</td>
<td>0.443</td>
<td>67</td>
</tr>
<tr>
<td>Coping statements</td>
<td>Task</td>
<td>0.143</td>
<td>0.129</td>
<td>64</td>
</tr>
<tr>
<td>Coping statements</td>
<td>Resting pulse</td>
<td>-0.035</td>
<td>0.395</td>
<td>58</td>
</tr>
<tr>
<td>Coping statements</td>
<td>Systolic BP</td>
<td>0.152</td>
<td>0.125</td>
<td>59</td>
</tr>
<tr>
<td>Coping statements</td>
<td>Diastolic BP</td>
<td>-0.063</td>
<td>0.317</td>
<td>59</td>
</tr>
<tr>
<td>Coping statements</td>
<td>Distance</td>
<td>0.073</td>
<td>0.284</td>
<td>63</td>
</tr>
<tr>
<td>Coping statements</td>
<td>Time</td>
<td>0.057</td>
<td>0.321</td>
<td>67</td>
</tr>
<tr>
<td>Ignore sensation</td>
<td>Task</td>
<td>0.105</td>
<td>0.203</td>
<td>64</td>
</tr>
<tr>
<td>Ignore sensation</td>
<td>Resting pulse</td>
<td>0.104</td>
<td>0.217</td>
<td>58</td>
</tr>
<tr>
<td>Ignore sensation</td>
<td>Systolic BP</td>
<td>-0.006</td>
<td>0.482</td>
<td>59</td>
</tr>
<tr>
<td>Ignore sensation</td>
<td>Diastolic BP</td>
<td>-0.092</td>
<td>0.242</td>
<td>59</td>
</tr>
</tbody>
</table>
Table 8 continued

<table>
<thead>
<tr>
<th>Variable 1</th>
<th>Variable 2</th>
<th>r</th>
<th>p</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignore sensation</td>
<td>Distance</td>
<td>.010</td>
<td>.466</td>
<td>63</td>
</tr>
<tr>
<td>Ignore sensation</td>
<td>Time</td>
<td>.020</td>
<td>.433</td>
<td>67</td>
</tr>
<tr>
<td>Pray/hope</td>
<td>Physical task</td>
<td>-.241</td>
<td>.027</td>
<td>64</td>
</tr>
<tr>
<td>Pray/hope</td>
<td>Pulse</td>
<td>.095</td>
<td>.238</td>
<td>58</td>
</tr>
<tr>
<td>Pray/hope</td>
<td>Systolic BP</td>
<td>.230</td>
<td>.040</td>
<td>59</td>
</tr>
<tr>
<td>Pray/hope</td>
<td>Diastolic BP</td>
<td>.195</td>
<td>.069</td>
<td>59</td>
</tr>
<tr>
<td>Pray/hope</td>
<td>Distance</td>
<td>-.218</td>
<td>.043</td>
<td>63</td>
</tr>
<tr>
<td>Pray/hope</td>
<td>Time</td>
<td>-.259</td>
<td>.017</td>
<td>67</td>
</tr>
</tbody>
</table>

Additional Functional Measures

| Diverting attention | Lift floor/waist    | -.268| .009| 78|
| Diverting attention | Lift waist/shoulder | -.173| .064| 78|
| Diverting attention | Lift shoulder/overhead | -.113| .162| 78|
| Diverting attention | Carry               | -.128| .134| 77|
| Diverting attention | Push                | -.062| .297| 76|
| Diverting attention | Pull                | -.095| .210| 74|
| Reinterpreting pain | Lift floor/waist    | -.062| .294| 78|
| Reinterpreting pain | Lift waist/shoulder | -.038| .369| 78|
| Reinterpreting pain | Lift shoulder/overhead | .029| .399| 78|
| Reinterpreting pain | Carry               | -.009| .466| 77|
| Reinterpreting pain | Push                | -.005| .483| 76|
| Reinterpreting pain | Pull                | .032| .392| 74|
As noted by the statistical results in Table 8, there was weak, statistically
significant support for the hypothesis between coping self statement and the additional
functional measures. Two of the correlations between ignoring sensations and the
additional functional measures (lift shoulder/overhead and carry) demonstrated weak, statistically significant support for this hypothesis. In addition, the correlations between diverting attention and distance on the treadmill, and between diverting attention and lift floor/waist demonstrated weak, negative, statistically significant relationships. Unexpectedly, most of the correlations between the extra functional measures and praying/hoping demonstrated a weak, negative, statistically significant relationship.

**Hypothesis 5: Catastrophizing coping strategies (measured by the CSQ) will be inversely related to physical function (as measured by functional evaluation).** Table 9 presents the statistical analysis for this hypothesis.
Table 9

<table>
<thead>
<tr>
<th>Variable 1</th>
<th>Variable 2</th>
<th>r</th>
<th>p</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophizing</td>
<td>Physical task</td>
<td>-.168</td>
<td>.092</td>
<td>64</td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>Resting pulse</td>
<td>-.027</td>
<td>.418</td>
<td>58</td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>Systolic BP</td>
<td>-.007</td>
<td>.478</td>
<td>59</td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>Diastolic BP</td>
<td>-.215</td>
<td>.051</td>
<td>59</td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>Distance treadmill</td>
<td>-.221</td>
<td>.041</td>
<td>63</td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>Time treadmill</td>
<td>-.158</td>
<td>.101</td>
<td>67</td>
</tr>
</tbody>
</table>

**Additional Functional Measures**

<table>
<thead>
<tr>
<th>Catastrophizing</th>
<th>Lift floor/waist</th>
<th>-.302</th>
<th>.004</th>
<th>78</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophizing</td>
<td>Lift waist/shoulder</td>
<td>-.322</td>
<td>.002</td>
<td>78</td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>Lift shoulder/overhead</td>
<td>-.309</td>
<td>.003</td>
<td>78</td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>Carry</td>
<td>-.318</td>
<td>.002</td>
<td>77</td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>Push</td>
<td>-.151</td>
<td>.096</td>
<td>76</td>
</tr>
<tr>
<td>Catastrophizing</td>
<td>Pull</td>
<td>-.160</td>
<td>.086</td>
<td>74</td>
</tr>
</tbody>
</table>

Data analyses indicated weak, statistically significant support for this hypothesis with the following correlations: catastrophizing and diastolic blood pressure; and catastrophizing and distance on the treadmill. Most of the correlations between catastrophizing and the additional functional measures provided weak to moderate, statistically significant support for this hypothesis.
Hypothesis 6: There will be a positive relationship between the length of time since the onset of pain and subjects' functional status. Table 10 presents the statistical analysis for this hypothesis.

Table 10

<table>
<thead>
<tr>
<th>Variable 1</th>
<th>Variable 2</th>
<th>r</th>
<th>p</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Months</td>
<td>Physical task</td>
<td>-.029</td>
<td>.405</td>
<td>67</td>
</tr>
<tr>
<td>Months</td>
<td>Pulse</td>
<td>.065</td>
<td>.308</td>
<td>61</td>
</tr>
<tr>
<td>Months</td>
<td>Systolic BP</td>
<td>-.105</td>
<td>.207</td>
<td>62</td>
</tr>
<tr>
<td>Months</td>
<td>Diastolic BP</td>
<td>-.165</td>
<td>.099</td>
<td>62</td>
</tr>
<tr>
<td>Months</td>
<td>Distance treadmill</td>
<td>-.211</td>
<td>.044*</td>
<td>66</td>
</tr>
<tr>
<td>Months</td>
<td>Time treadmill</td>
<td>-.189</td>
<td>.058</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Additional Measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Months</td>
<td>Lift floor/waist</td>
<td>-.069</td>
<td>.270</td>
<td>81</td>
</tr>
<tr>
<td>Months</td>
<td>Lift waist/shoulder</td>
<td>-.102</td>
<td>.181</td>
<td>81</td>
</tr>
<tr>
<td>Months</td>
<td>Lift shoulder/overhead</td>
<td>-.045</td>
<td>.343</td>
<td>81</td>
</tr>
<tr>
<td>Months</td>
<td>Carry</td>
<td>-.050</td>
<td>.328</td>
<td>80</td>
</tr>
<tr>
<td>Months</td>
<td>Push</td>
<td>-.022</td>
<td>.423</td>
<td>79</td>
</tr>
<tr>
<td>Months</td>
<td>Pull</td>
<td>-.044</td>
<td>.352</td>
<td>76</td>
</tr>
</tbody>
</table>

*Curvilinear Plot

Data analysis did not support this hypothesis and indicated a weak, negative relationship existed between length of time since onset of pain and some of the measures.
In other words, as length of time since injury increased, physical functioning decreased.

The curvilinear scatter plot between months and distance on the treadmill indicated $r$ may be underestimated for this correlation. The additional functional measures did not support hypothesis 6.

**Hypothesis 7:** The relationship between appraisal of function and observed function will be stronger than the relationship between cognitive pain coping strategies and observed function. This hypothesis was supported by the statistical results presented in Tables 7 and 8. Analyses indicated moderate, statistically significant support for the relationship between appraisal of function and observed function. A few of the correlations between coping strategies and observed function demonstrated a weak, positive relationship.
Chapter 5
Discussion of the Research

Summary of the Results

This study analyzed data from 85 injured workers who were evaluated by Riverside Rehabilitation Institutes' Work Hardening Clinic between July, 1993 and October, 1994. The majority of subjects were male, were on disability, took at least one pain medication and averaged 13.48 months since their injuries. Over 75% of the subjects were diagnosed with a back injury/back pain. Subjects in the current study obtained a mean score on the Visual Analogue Scale of 5.1 (possible range on the Visual Analogue Scale was 0 to 10).

Statistical analysis using simple regression weakly supported the predictive value of current pain rating for appraisal of physical functioning. Correlational statistics indicated a weak to moderate, negative, statistically significant relationship existed between subjects' cognitive appraisals of pain and most of the measures of physical function. Significant statistical support was also present for a moderate to strong, positive relationship between cognitive appraisal of function and most measures of physical function. A few of the correlations between cognitive coping strategies and function demonstrated a weak, positive, statistically significant relationship. Most of the correlations between praying/hoping and the extra functional measures demonstrated a weak, negative, statistically significant relationship. Additionally, the analysis
demonstrated weak to moderate, significant statistical support for the relationship between catastrophizing and most of the measures of physical function. The positive relationship predicted between length of time since onset of pain and the subjects' functional status was not supported by the analysis—in fact some of the correlations indicated that this might be an inverse relationship. Finally, the relationship between appraisal of function and observed function was stronger than the relationship between cognitive pain coping strategies and observed function.

**Discussion of the Hypotheses, Theory and Past Research.**

**Hypothesis 1:** Subjects who appraise their current pain as high on the VAS will appraise their physical function as low on the SFS. Simple regression statistics indicated a moderate, inverse, statistically significant relationship existed between VAS and SFS, however, the analysis indicated that VAS was only weakly predictive of SFS Thus, statistical analysis provided very weak, statistically significant support for this hypothesis.

Lazarus and Folkman's 1980 research study of 100 middle age men and women indicated that cognitive appraisal was an important determinant in coping. The weak results obtained in the current study may have resulted because the measures used lacked statistical power and were not strong enough to measure such a complex paradigm (Lazarus and Folkman, 1984).

Research by Riley et al. (1988) suggested that functional status covaries with subjects' perceptions of pain only to the extent subjects link them together cognitively. These researchers also discussed that it is the subjects' appraisals that their pain causes
disability that is associated with physical impairment. Their data collection instruments included several measures of cognitive appraisal and disability. The current study's results may have been hampered by the limited number of instruments used to measure appraisal.

Miller and Ferris (1993) discussed several potential sources of error for VAS such as possible unstable anchor points and clustering of data. Grossman et al. (1992) also expressed concern about the VAS and noted that some subjects have a tendency to mark towards anchors and that other subjects may have difficulty transcribing a subjective experience to a straight line continuum. The frequency histogram conducted on the VAS demonstrated a distribution with two highpoints and that seven subjects marked scores above 9.0—this indicated clustering of data and a slight tendency among the current study's subjects to mark towards the higher anchor. Carlsson (1983) expressed concern that some subjects may have difficulty transcribing perception of pain to a mathematical dimension. Finally, since pain is a personal, subjective experience its accurate evaluation depends on subjects' willingness to convey their appraisal to others and their ability to accurately use a tool such as a VAS (Burckhardt, 1990). All of these factors may have affected the results obtained with the current study.

Matheson (1991) presented normative scores for the SFS in the tool's test manual. The current study's SFS mean of 92.625 was lower than the mean for all four of the studies cited by Matheson (who cited a range of means between 98.65 and 117.86). This infers that this study's subjects perceived themselves as more disabled than Matheson's normative sample.
Self report tools such as the SFS and VAS are prone to validity problems—they might not accurately reflect the actual thoughts and perceptions of subjects. Indeed it may not be possible to use two simple instruments to measure two complex concepts—pain and cognitive appraisal of function. Also, issues such as symptom magnification, malingering and sick role behavior were not evaluated and may have adversely impacted the results by exaggerating the VAS and SFS scores.

**Hypothesis 2:** Cognitive appraisals of pain as measured by VAS will be negatively related to physical function as measured by functional evaluation. Correlational statistical analysis indicted weak to moderate, statistically significant support for this hypothesis.

Both Lazarus and Folkman's (1984) theory and Riley et al's. (1988) research on the relationship between chronic pain, cognitive factors and functional impairment support the results obtained in this study. As noted in the discussion in hypothesis one, cognitive appraisal is a complex process that is affected by multiple issues. Riley et al. (1988) utilized numerous tools to evaluate cognitive factors. Also, as noted in the preceding discussion for hypothesis one, the VAS is subject to several potential threats to validity. All of these factors may have impacted the results obtained in hypothesis two.

Recent research on physical functioning stressed the importance of quantifying functional status through objective measures (Calkins et al., 1991; Mayer et al., 1987; Mayer et al., 1989). In the current study stronger correlations were obtained between VAS and the series of fifteen functional tasks, between VAS and subjects' scores on the treadmill, than between VAS and resting pulse and resting BP. This is congruent with the
literature which states that individuals with chronic pain generally physiologically adapt and have near normal heart rates and blood pressures (Brunner & Suddarth, 1984; Deyo et al., 1988; Ignatiavicius & Bayne, 1991; Koziar, Erb & Olivieri, 1991). In the current study, 66 percent of the subjects were more than six months post injury—which is the criteria used to differentiate between acute and chronic conditions. Near normal heart rates and blood pressures were expected with the subjects in the current study.

The literature supports that the functional tests used in the current study were adequate measures of the subjects' functional status. Mayer et al. (1987), suggested that a comprehensive functional evaluation should include an objective evaluation of cardiovascular fitness/endurance, ability to lift under a workload, ability to static lift, muscle endurance and spinal range of motion. Measures of function for this study included all the recommended tasks with the exception of muscle endurance (excluded in this study because it is a subjective measure) and spinal range of motion (excluded because of the low number of subjects evaluated with this measure).

Hypothesis 3: Cognitive appraisals of physical functioning (as measured by the SFS) will be positively related to actual physical functions (as measured by functional evaluation). With the exception of pulse and blood pressure, statistical analysis provided moderate to strong, positive, statistically significant support for this hypothesis.

The results obtained are congruent with Lazarus's construct of cognitive appraisal and function. Also, the moderate correlations obtained between SFS and the 15 functional tasks are not surprising given that the tasks were modeled after items on the SFS. The
possibility that selected subjects remembered their responses on the SFS when completing the 15 functional tasks may have affected scores. For example, some subjects may have deliberately self-limited their functional scores based on their memories of what they previously selected on the SFS. To control for this possible carry-over effect, the SFS and functional tasks were not administered on the same day. Also, the therapists monitored subjects closely during the evaluation of subjects' ability to complete the 15 functional tasks and noted on the scoring sheet rationale for scores. The therapists also noted when subjects appeared to give less than maximum effort when completing this evaluation. This information was used to support the scores subjects' obtained on the 15 functional tasks. Despite these measures to control for carryover effect, subjects may have remembered their scores on the SFS when completing the functional measures thereby adversely impacting the correlations.

The statistical results obtained in this hypothesis are congruent with Riley et al's. (1988) research on chronic pain, cognitive factors and functional impairment. These researchers concluded that functional status covaries with perception of pain to the extent subjects link them together cognitively. The current study's results were also congruent with Tomaka et al.'s 1993 study which suggested that a relationship existed between subjects' cognitive appraisal and subjective and physiological reaction to stress.

What was unexpected was the moderate to strong correlations obtained between SFS and the additional functional measures. It was possible that these correlations may have resulted from the larger number of subjects who completed the additional functional
measures—which indicates that these measures of function may be a more representative sample of the accessible population.

In conclusion, the moderate to strong, positive, statistically significant results obtained by the current study are supported by previous research conducted by Riley et al. (1988) and Tomaka et al. (1993). The moderate to strong correlations between the Spinal Function Sort and the functional measures support the use of the Spinal Function Sort to measure subjects' cognitive appraisal of function.

Hypothesis 4: Cognitive coping strategies (as measured by the CSQ's subscales diverting attention, reinterpreting pain sensations, coping self statements, ignoring pain sensation, and praying and hoping) will be positively related to physical functioning (as measured by functional evaluation). Statistical analysis indicated that weak, statistically significant, positive correlations existed between coping self statements and the additional functional measures. What was unanticipated was the lack of a significant statistical relationship between most of the subscales and the functional measures. Also, the weak, negative, statistically significant correlations between most of the extra functional measures and praying/hoping was unexpected.

Based on the large number of articles on cognitive behavioral techniques cited by Matheny et al. (1986), it appears that many researchers connect effective coping with positive cognitive processes. These researchers also noted in their meta-analysis that there is no consensus in the behavioral sciences on what constitutes coping. They stressed that effective coping was an important determinant in the maintenance of health.
Rosenstiel and Keefe's (1983) initial evaluation of the CSQ indicated that subjects who scored high on the cognitive coping and suppression subscales were more impaired functionally. These researchers noted that this result was unexpected and did not support prior research. They attributed their results to the differences between experimental and chronic pain, however their results may have been due to their use of self report measures of function rather than the objective measures of function used by the current study.

Lawson, et al. (1990) discussed the variable results obtained in previous research studies with the CSQ. These researchers noted the following rationale for the conflicting results: (1) the challenge of measuring cognitive factors; (2) the variety of clinical settings represented; (3) the heterogeneity of pain clients; (4) demographic differences; and (5) psychological factors.

Main and Waddel (1991) studied 120 subjects with low back pain and found a lack of relationship between cognitive measures on the CSQ and physical severity. These researchers used an unspecified measure to evaluate physical impairment, which may not be comparable to the objective measures of physical function used in this study.

Results in the current study may have been hindered by the use of self report measures. Subjects may have responded based on what they thought was an appropriate response rather than on what they actually thought. On the other hand, subjects who wanted to retain their disability status may have deliberately chosen responses that indicated they were having difficulty coping.

It appears from the results obtained by previous researchers and the results obtained by the current study that the CSQ may have construct validity problems. On the
other hand, the inconsistent results may be indicative of the lack of clear definition on what constitutes effective coping with pain and the diverse nature of clients with pain.

**Hypothesis 5:** Catastrophizing coping strategies (measured by the CSQ) will be inversely related to physical function (as measured by functional evaluation). Correlational statistics demonstrated weak to moderate, statistically significant relationships between catastrophizing and most of the functional measures.

Lawson et al., (1990) reported normative data for the CSQ from five studies. These researchers cited a range of means of 8.4 to 15.6 and a range of standard deviations of 6.7 to 10.6 on the catastrophizing subscale for these studies. The current study obtained a mean of 14.195 and a standard deviation of 8.2 on this subscale. Given the possible range of 0-36 on this subscale and the overlap of the standard deviations, this study had results similar to those reported by Lawson et al. (1990)

The research results were also congruent with results reported by Turner and Clancy's 1986 experimental study of the coping strategies of 74 subjects with chronic low back pain. Their results indicted that high scores on the CSQ's catastrophizing subscale (which the researchers called helplessness) were related to depression and physical impairment. One of the treatment groups utilized cognitive behavioral treatment measures. Analysis suggested that low catastrophizing scores were associated with the use of cognitive behavioral techniques.

The weak to moderate, statistically significant results obtained by the current study are congruent with prior research and suggest that catastrophizing thoughts are associated with lower rates of physical function in injured workers.
Hypothesis 6: There will be a positive relationship between length of time since onset of pain and subjects' functional status. Data analysis did not support this hypothesis and indicted a weak, negative relationship existed between onset of pain and some of the functional measures (systolic BP, diastolic BP, distance on the treadmill and time on the treadmill). Generally, as the length of time since onset of pain increased, the subjects' functional status decreased.

Lazarus and Folkman (1984) hypothesized that duration was a factor in the development of illness. The original hypothesis in the current study specified this relationship would be positive when, in fact, to support Lazarus and Folkman's theory, the relationship should be negative. Results very weakly supported this inverse relationship.

One of the explanations for the weak correlations obtained in the current study is the limited number of subjects (only 7 of 85) who were more than 40 months post injury. This low number of subjects limited the evaluation of the impact of duration as a factor in illness and physical function. If Lazarus and Folkman's hypothesis is valid, then those clients with the greatest time since injury should be the less functional. This was not supported by the current study. Another explanation for the results obtained in the current study is that functional status and health are influenced by numerous factors besides duration. Some of these factors include heredity, premorbid physical functioning, psychological functioning, and social factors. Additionally, malingering, sick role behavior, and symptom magnification can influence subjects' functional status. The simple design in this study did not explore or control these other factors impacting function.
Hypothesis 7: The relationship between appraisal of function and observed function will be stronger than the relationship between cognitive pain coping strategies and observed function. There was statistically significant support for this hypothesis.

The results obtained in the current study are congruent with Pellino and Oberst's 1992 study of 40 subjects with chronic low back pain in which they found that subjects' cognitive appraisals of their entire situation and not just their pain level determined coping. Brown et al.'s (1988) research also provided support for this hypothesis. Their research indicated that subjects' appraisals of an event may be more powerful than coping behavior in explaining adjustment.

The weak and inconsistent results obtained in the correlations between the CSQ's cognitive subscales and the functional measures indicates that these subscales may not be an appropriate instrument to measure pain coping strategies. Although analysis supported this hypothesis, further interpretations about the relationship between these variables should be made with caution.

Implications for Future Research—General

Because this was not a randomly drawn sample, this particular study's generalizability to the target population—injured workers in the United States must be made cautiously. Comparison of the demographics obtained in the current study to Kuhn and Kneidel's 1990 study of 91 work hardening subjects in Wichita, Kansas reveals some differences and one similarity. For example, Kuhn and Kneidel had an age range of 22-59 years old, with a mean age of 37.8 years old. The current study had an age range of 19 to
70 years old, with a mean age of 40.459 years old. More of Kuhn and Kneidel's subjects were male (78%), compared to the subjects in the current study (64.7% male). Interestingly, both studies had similar rates for subjects with injury related surgeries—38% for the Kuhn and Kneidel's study and 37.9% for this current study. Future researchers should take the heterogeneity of this population into account when analyzing data.

The correlational design used in the current study limits the statistical conclusions to discussions of the strength and direction of the relationships between the variables—causal effects cannot be construed. The lack of statistical controls for functioning other than physical functioning (such as social and psychological) may have adversely impacted the strength of the correlations. Furthermore, sick role behavior, malingering and symptom magnification were not evaluated by the current study. Their undetected presence in this sample may have adversely impacted the results obtained by increasing subjects' scores on the VAS and the SFS and by decreasing subjects' scores on the functional measures.

Another aspect that needs to be considered when evaluating the generalizability of results is the length of time needed to collect data. During the 15 months needed to gather data, there was an increase in the number of managed health care companies in the area which limited the number of clients referred to this clinic. Also, during the 15 months needed to gather data, an economic slowdown occurred which forced the jobless rate up. This may have encouraged some subjects to appear more dysfunctional in order to retain their disability status (and protect their incomes). Future researchers need to carefully
examine the economic and social events impacting their population prior to comparing their research to the results obtained by the current study.

Finally, self report was used to measure several variables. Although previous researchers such as Turk and Rudy (1991) stressed that self report was an important way to determine disability, it is not without its drawbacks. Self report only reflects what subjects want others to know about them and may not reflect their actual thoughts and feelings.

The twelve objective measures of physical function used in the current study provided numerous ways to evaluate subjects' actual functional status. These multiple measures of function increased the confidence in the findings obtained with this variable and indicate the results are an accurate reflection of subjects' functional status (Borg & Gall, 1989).

**Implications for Future Research—Specific**

Future researchers using the CSQ should consider evaluating the construct validity of this measure. Although Rosensthiel and Keefe (1983) developed this measure from pertinent pain research and other researchers (Beckham et al, 1991; Lawson et al., 1990; Rosensthiel & Keefe, 1983) have examined its factor structure and test-retest reliability, no one has specifically addressed the question—Does this test really measure pain coping strategies? Also future researchers should consider using a simple "...composite score such as the average of the factorially consistent scales [CSQ subscales--ignoring sensations, coping self statements, and reinterpreting pain sensations, which] could most accurately reflect cognitive coping activity" (Lawson, et al., 1990, p. 203).
A longitudinal design using blue collar workers as they enter the labor force could provide valuable information on injured workers. Objective measures of physical functioning could be collected at regularly scheduled intervals during the workers' careers as a valuable component in evaluating the impact of injuries on workers.

Other researchers might want to consider using an experimental design with randomly assigned groups to evaluate the effects that cognitive behavioral interventions have on pain coping strategies and function. Groups should include a control group and several alternative treatment groups to evaluate the variables. Pregroup and postgroup measures of pain, appraisal of function, pain coping strategies and functioning could yield valuable information on cause and effect among these variables. Clinicians could use the information from the CSQ subscales and the VAS to individualize their treatment plans. Educational sessions could be held to teach clients who score high on these scales to identify what they are thinking and to use thought stopping techniques to replace negative thoughts. Role playing could be conducted to reinforce these concepts.

Several other correlational studies could be conducted with this population. For example, the relationship between the VAS and the CSQ's subscales of diverting attention and praying and hoping could be explored. Keefe et al.'s 1990a study suggested that subjects who score high on diverting attention and praying/hoping on the CSQ will also assess their pain as high. These researchers suggested that this finding did not relate to the "...quantity of coping attempts, but the degree to which these attempts enable the patient to control and decrease pain and to minimize negative self-statement and ideation" (p. 300). Consistent with their study, Keefe and Williams' 1990b research suggested
that individuals who scored high on diverting attention, catastrophizing and increased behavioral activities also reported high levels of pain. This implied for future studies, that work hardening clients who scored high on diverting attention, praying/hoping, catastrophizing and increased behavioral activity would also report high levels of pain on the VAS. Clinicians could also use the information for the CSQ subscales and the VAS to individualize their treatment plans. Educational sessions could be conducted to teach clients who score high on these subscales to identify what they are thinking and to use thought stopping techniques to change negative thinking.

Keefe and Williams (1990b) also found that subjects who rated their ability to use coping strategies to decrease their pain as high also reported lower levels of pain (and depression). It is anticipated that future studies would have similar results.

Implications for Clinical Practice

The current study indicates that clinicians need to be aware of their clients' appraisals of pain and their clients' functional status. Once these areas have been evaluated, counselors can utilize a variety of behavioral techniques to facilitate clients' coping with pain. Techniques such as relaxation training and EMG biofeedback have proven effective in decreasing muscle tension associated with pain, which in turn, reduces pain levels and improves coping.

The current study also underscores the importance of evaluating clients' appraisals of their functional status. Clients may unconsciously, or consciously, self-limit their functional abilities based on their appraisals of function, and thus adversely impact their functional status. Counselors also need to utilize specific, functional information from
other health care providers to comprehensively evaluate these clients. For example, knowledge of clients' functional assessments completed by physicians, occupational therapists, and/or physical therapists could prove useful when counseling clients on specific occupational choices. Clients' actual functional abilities may limit their competing successfully in jobs that require physical abilities they do not possess.

Finally, the current study indicated the need for counselors to identify clients who use catastrophization to cope with pain and be aware that clients who score high on the CSQ subscale catastrophization may have a lower functional capacity. Counselors should consider using cognitive behavioral interventions to help these clients identify catastrophic thoughts, teach them to use thought stopping techniques, and encourage clients to replace negative thoughts with positive ones.

Conclusions

Physical disabilities resulting from on-the-job injuries costs the American economy billions of dollars annually. Injuries often result in structural changes, chronic pain and physical deconditioning, making it difficult for many of these workers to return to work. Results from the current study are useful to those who work with injured workers and will facilitate an increased understanding of the characteristics of this population and improve the delivery of individualized care.

Although prior research indicated cognitive appraisal was an important determinant in coping, the current study's results indicated that subjects' appraisals of pain were only weakly predictive of subjects' appraisals of physical functioning. The weak results obtained in the current study may be attributed to the use of simple self report tools
to measure two complex concepts. Results may also be attributed to the limited number of instruments used to measure cognitive appraisal and validity problems associated with the Visual Analogue Scale.

It can be construed from the data analysis that there is a weak to moderate, negative, statistically significant relationship between subjects' cognitive appraisals of pain and their physical functioning. One of the strengths of the current study was the multiple objective measures of physical function. Future researchers should consider using objective measures of function when measuring functional status.

One of the interesting results from this study was the positive, statistically significant relationship between subjects' appraisals of function and their actual function. This result is congruent with past research and supports the importance of assessing the person's appraisal of function and assessing actual physical function. On the other hand, the current study did not control for the possible interaction of prior physical function, psychological functioning, social functioning, sick role behavior, symptom magnification, or malingering.

The conflicting results obtained between the CSQ cognitive subscales and functioning are also supported by the prior research conducted with this instrument. Rosenstiel and Keefe's (1983), initial study of the CSQ noted the unexpected negative relationship between cognitive coping strategies and function. It is possible that results in their study and the current study may be attributed to the lack of clear definition of what constitutes effective coping with pain or construct validity problems with the CSQ. Future
researchers should consider these issues and conduct construct validity studies with the CSQ prior to using it.

The weak to moderate, statistically significant correlations obtained when the CSQ subscale catastrophizing was correlated with the functional measures provides some credence for the current popularity of cognitive behavioral interventions with this population. It is suggested that researchers conduct experimental studies to further explore this concept.

Statistical results in the current study did not support Lazarus' construct of duration as a factor in the maintenance of illness. It is suspected that the limited number of subjects who were more than forty months post injury may have influenced the results.

Finally, analysis of data in the current study was congruent with prior research by Pellino and Oberst (1992) and Brown et al. (1988). Their results indicate that subjects' appraisals of function and observed function would be stronger than the relationship between cognitive pain coping strategies and function. This implies for counselors the importance of evaluating their clients' appraisals of function, actual functional status, and clients' cognitive pain coping strategies. Future researchers should consider alternative methods of measuring pain coping strategies.
APPENDIX A

SPINAL FUNCTION SORT

The SFS is a 50 item, self report measure developed by Matheson to evaluate subjects' perceptions of their abilities to perform specific physical tasks. Using a test booklet, subjects view 50 drawings of men and women performing specific physical tasks and mark on a likert type scale whether that they believe they are able to perform the task, are restricted in their ability to perform the task, are unable to perform the task or are uncertain. The test yields a single score between 0 and 200 called the Rating of Perceived Capacity (RPC). The lower the score, the less subjects felt they were able to do.

The Spinal Function Sort, its test booklet and the accompanying manual were used with the permission of Leonard Matheson and can be purchased from:

Leonard N. Matheson
Performance Assessment and Capacity Testing
31801 Via Perdiz
Trabuco Canyon, California 92679
APPENDIX B

COPING STRATEGIES QUESTIONNAIRE

The CSQ is a 50 item, self report tool that was developed by Keefe to research pain coping strategies. The CSQ has six subscales (diverting attention, reinterpreting pain sensations, coping self-statements, ignoring pain sensations, praying or hoping, and increasing behavioral activities) and two ratings of coping effectiveness (ability to control pain and ability to decrease pain). All subscales and ratings use a seven item likert scale. Subjects respond to each item by writing their responses next to each item. A tally is made for each subscale and rating resulting in eight scores for each client.

The Coping Strategies Questionnaire was requested for use in this study and received from:

Dr. F.J. Keefe
Department of Psychiatry,
Pain Management Program
Box 3159
Duke University Medical Center
Durham, North Carolina 27710
APPENDIX C

VISUAL ANALOGUE SCALE

Please make an "X" along the line to show how bad your current pain is.

No Pain ⟷ Pain as bad as you have experienced
APPENDIX D

FUNCTIONAL TASK EVALUATION

Name: ____________________
Date: ____________________
Chart #: ____________________
Admission/Discharge

<table>
<thead>
<tr>
<th></th>
<th>Able</th>
<th>Restricted</th>
<th>Unable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lift 10# Floor to Eye-Level</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Lift 20# Floor to Eye-Level</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Lift 100# Crate Floor to Bench</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Lift 20# Box Floor to Bench</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Lift 50# Tool Box Floor to Bench</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Carry 30# Bucket</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Push Heavy Door</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Retrieve/Tool/Floor</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Install Face-Plate</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Carry 10# Stool</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>Light Bulb Overhead</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Carry 20# Groceries</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>Pour Soap</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>14</td>
<td>Push/Pull/Vacuum</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>15</td>
<td>Sweep Kitchen Broom</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total**

|   | 4x | 3x | 2x | 1x |
APPENDIX D

FUNCTIONAL TASK EVALUATION

CONTINUED

Functional Tasks Instructions

This is an evaluation of the injured worker's current level of functioning. On the answer sheet indicate the worker's ability to perform each task.

If client can perform the task with no difficulty, circle #1, "Able"

If client cannot perform the task at all, circle #5, "Unable"

If client can perform the task, but has some difficulty (slow movements and/or body mechanics indicate some difficulty but client is able to complete task in one trial), circle #2, "Restricted"

If client can perform the task but has more difficulty (slower movements, body mechanics indicate increasing difficulty, and/or vocalizations indicates difficulty with the task but client is able to complete task in one trial), circle #3, "Restricted"

If client is almost unable to perform the task (extreme slowness, uses unnatural body mechanics or body parts, vocalizations indicates extreme difficulty and/or takes more than one trial to complete the task) circle #4, "Restricted"

APPENDIX E
DEMOGRAPHIC QUESTIONNAIRE

Please answer the following questions by checking the correct response or writing in the correct answer.

1. Date of Birth: ___ / ___ / ___

2. Sex: ___M ___F

3. How many hours per week do you work? ___ less than 20 ______ 20 to 29

   ___ 30 to 39 ______ 40

   ___ more than 40

4. What is your occupation?

5. Please list what type of injury you have.
   a.  
   b.  
   c.  
   d.  

6. Are you on disability ___Yes ___No

7. Please list all surgeries (and their dates) that are related to your injury.
   a.  
   b.  
   c.  
   d.  

8. When did your original injury occur? _____ Month _____ Year

9. List medications you are currently taking (include non prescription medications)
   a.  
   b.  
   c.  
   d.  

10. How many years of school did you attend (last grade completed)?

11. Marital Status: ___Single ___Married ___Divorced ___Widowed

12. Not including you, how many other people currently live in your household?
   Please mark the number next to each category.
   ___Spouse ___Children ___Brother(s) ___Sister(s)
   ___Parent(s) ___In-laws ___Grandchildren ___Other

13. Race: ___White ___Black ___Hispanic ___Other

14. Your total annual income for your household:
   ___less than $20,000 _____$20,000 to 29,000 _____$30,000 to 39,000

   ___$40,000 to 49,000 _____Over 50,000
References


Vita

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Professional Experience  


Riverside Hospital School of Professional Nursing, Medical Surgical Nursing Instructor. September 1981-July 1983.

Volunteer Experience  