PHYSICAL WORK CAPACITY EVALUATION IN VOCATIONAL
REHABILITATION AND ITS EFFECT ON THE VOCATIONAL
PLACEMENT OF DISABLED MALE WORKERS

by

CHRISTOPHER COOKE

B.A./B.P.H.E., Queens' University, 1973
B.Ed., Queens' University, 1974
M.P.E., University of British Columbia, 1977

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF EDUCATION

in

THE FACULTY OF GRADUATE STUDIES
Educational Psychology and Special Education

We accept this thesis as conforming
to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA
April 1990

© Christopher Cooke, 1990
Abstract

The purpose of this study was to examine the effect of program type and selected predictor variables on the vocational placement and feelings of self-esteem of disabled male workers. It was predicted that: (1) a physical capacity assessment program (PCA), designed by the investigator, would result in a higher rate of successful vocational placement than conventional placement techniques, in a shorter period of time and with a better vocational match; (2) increased measures of self-esteem would be experienced by the PCA group and at a more significant level than conventional vocational programs; (3) there would not be a significant interaction between the vocational placement variables and the independent variables of age, degree of disability and injury type; and (4) there would not be a significant effect of selected moderator variables between groups on the vocational placement variables.

Fifty disabled workers were randomly selected from the active caseloads of the Vocational Rehabilitation Department of the Workers' Compensation Board of British Columbia for participation in the study. Their average age was 33.32 years, and their average length of time on wage loss was 245 days. All subjects were injured as the result of an industrial accident, were no longer undergoing medical
treatment, had been cleared for a return to work but were suffering from a residual disability that prevented them from returning to the work force. Subjects were randomly assigned to one of two treatment conditions involving vocational counselling with job search training (JS) and vocational counselling with physical capacity assessment (PCA). Following completion of the program, subjects began job search activities and were monitored for a period of 6 months or until successful vocational placement was achieved.

Data analyses showed that: there was a significant main effect between groups for success in vocational placement with PCA placing more subjects than job search; there were no significant differences between groups on measures of self-esteem following completion of the programs; there was a significant interaction effect of age, degree of disability and type of injury with success in vocational placement and; there was a significant interaction effect of several moderator variables including marital status and length of time on wage loss with success in vocational placement and time to vocational placement.

The results tend to support the use of physical capacity assessment for the quantification of individual capacity to perform work. Further, the results suggest that the use of PCA information in the identification and
selection of appropriate vocational alternatives can significantly enhance the success of vocational placement of disabled workers. Recommendations were made for future research.
# Table of Contents

Abstract .............................................. ii
List of Tables .......................................... viii
List of Figures .......................................... ix
Acknowledgements ....................................... x

CHAPTER I: INTRODUCTION ............................... 1

1.1 BACKGROUND OF THE PROBLEM ..................... 3
  1.1.1 The Need for an Integrated Evaluation Format ............................ 3

1.2 RESEARCH PROBLEM .................................. 9

1.3 QUESTIONS .......................................... 10

1.4 DEFINITION OF TERMS .............................. 13

CHAPTER II: LITERATURE REVIEW ...................... 15

2.1 THE EMERGENCE OF PHYSICAL CAPACITY EVALUATION .......... 15
  2.1.1 Occupational Therapy and Work Hardening:
        A Historical Perspective .................................. 15
  2.1.2 Work Sampling, Work Simulation and Vocational Evaluation Programs ....... 20
  2.1.3 Paper Testing ........................................ 27
  2.1.4 Physical Capacity Assessment Programs .............................. 35
    2.1.4.1 Pruitt's Vocational Evaluation System .......................... 39
    2.1.4.2 The Matheson Work Capacity Evaluation Format ................. 40
    2.1.4.3 The Blankenship Industrial Rehabilitation System .............. 44

2.2 THE DYNAMICS OF UNEMPLOYMENT ................... 46
  2.2.1 Unemployment and the Physically Disabled ......................... 47
  2.2.2 Unemployment and Measures of Self-Esteem .......................... 49

2.3 VARIABLES AFFECTING VOCATIONAL PLACEMENT .......... 53

CHAPTER III: METHODOLOGY ............................ 59

3.1 OVERVIEW .......................................... 59

3.2 PURPOSE OF THE STUDY ............................. 60

3.3 METHODOLOGY ...................................... 60
    3.3.1 Rationale and Experimental Design ............................. 60
    3.3.2 Dependent Variables .................................. 62
List of Tables

I. Crosstabulation Table and Chi-square Analysis of Success in Vocational Placement (VPSUCCES) by Group Type (GRPTYPE) ....... 83

II. LERTAP Means, Standard Deviations, Variance, Cronbach alpha and Correlation of Self-Esteem Scores .................. 84

III. Crosstabulation Table and Chi-square Analysis of Success in Vocational Placement (VPSUCCES) by Group Type (GRPTYPE) controlling for Injury Type (INJTYPE) for injuries to the Upper Body .......... 85

IV. Crosstabulation Table and Chi-square Analysis of Success in Vocational Placement (VPSUCCES) by Group Type (GRPTYPE) controlling for Degree of Disability (DISABGP) less than or equal to 5% ............ 87

V. Crosstabulation Table and Chi-square Analysis of Success in Vocational Placement (VPSUCCES) by Group Type (GRPTYPE) controlling for Age Group (AGEGP) for subjects greater than or equal to 30 years of age. 88

VI. Summary of 2-way Analysis of Variance of Time to Vocational Placement (LTIME2VP) by Group Type (GRPTYPE) by Marital Status (MARITAL) .......... 90

VII. Summary of 2-way Analysis of Variance of Time to Vocational Placement (LTIME2VP) by Group Type (GRPTYPE) by Timeloss (TMLOSSGP) ........ 91
List of Figures

Figure 1. Group A Lifeline Pattern .................................. 89
Figure 2. Group B Lifeline Pattern .................................. 90
Figure 3. Group C Lifeline Pattern .................................. 91
Figure 4. Group D Lifeline Pattern .................................. 92
Figure 5. Self-Esteem Score Improvement by Group ........... 94
Acknowledgement

In the completion of this dissertation, I would like to express my appreciation to several individuals who made the process rewarding and worthwhile. Foremost, I would like to thank my thesis committee - Dr. David Kendall, Dr. Norm Amundson and Dr. Robert Conry - for extending their help and interest.

I would like to thank the staff of the Vocational Rehabilitation Department of the Workers' Compensation Board of British Columbia, especially Mr. Thomas Wharton and Mr. Mike Cannings for their approval of, and support for, the project. I would also like to thank Mr. Keith Mason of the Statistics Department for his encouragement and guidance through the data analysis phase.

Many thanks to all the subjects of this study whose journey along the road from unemployment to re-employment provided me with the incentive and the motivation to complete this project.

Finally, I wish to thank my wife, Carolyn for her patience, support and understanding through yet another thesis and my son Christian Anders who finally has his daddy back, again, to play with.
CHAPTER I INTRODUCTION

To the actively employed individual, work is a complicated environment of daily human activity. In addition to its importance for the provision of physical sustenance, work also provides us with the intangible rewards of self-worth, structure and belonging to the community that many of us seek in an increasingly complex world (Clutterbuck, 1984). Without work, studies have shown that people feel the consequences in both economic and human terms (Finley and Lee, 1981; Kelvin, 1981; Rump, 1983).

In 1988 in British Columbia, 192,515 claims were reported for injuries suffered in the work place; one injury every 12 seconds. Those injuries were of sufficient severity to require medical treatment and time loss from work. Of those claims accepted, 2,656 resulted in a medical disability of sufficient proportion that it restricted the worker's ability to return to their pre-accident vocation.

The way in which the disabled person responds to unemployment has been the subject of numerous research articles over the years. Some studies have outlined the difficulty experienced by the disabled person in securing suitable employment (Williams, 1972; Sears, 1975; Florian, 1978; Acton 1981) while others have found specific barriers on the road to re-employment suggesting alteration of the work experience (Stone and Sawatzki, 1980). Some researchers have described factors affecting the
unemployment experience for the disabled as specific and unique to this particular sub-group in our society (Borgen, Amundson and Biela, 1987). Understanding the cumulative nature of these factors and the subsequent development of appropriate coping strategies for application within the overall vocational framework has greatly assisted the rehabilitation specialist in returning disabled workers to the work place (Flamer, 1985).

The determination of physical work capacity has been an essential element in the overall process of preparing for work (Matheson, Ogden, Violette and Schultz, 1985). Within a vocational context, Matheson (1987) offers a broad definition of physical work capacity as;

"The measurement of an individual's capacity to dependably sustain performance in response to broadly defined work demands." (p. 11.)

In particular instances where the existence of a physical disability has imposed some limitation of function, the nature of that limitation must be defined prior to the consideration of suitable vocational alternatives. This approach is well documented in the literature and specific assessment tools have evolved over the years with formats designed to meet particular needs (Hanman 1958; Gannaway and Sink, 1978; Smith, Cunningham and Weinberg, 1986; Matheson, 1987; Blankenship 1988).

Traditionally, functional capacity evaluation programs have been clinically oriented and have been used as a preliminary screening tool for specific target populations
and as a general diagnostic guide to motor and cognitive function (Makisara and Makisara, 1982; Murphy and Ursprung, 1983; Thibeault and Blackmer, 1987). Often time consuming and expensive, they have concentrated on combinations of motor, cognitive and aptitude components or sub-tests designed to evaluate overall vocational potential. In the few programs designed to assess physical function, the motor component has been one of limited scope and simulated application with some tests relying exclusively on a written component for the assessment of functional capacity (Smith, Cunningham and Weinberg, 1986). Very few activity-oriented programs exist that actually relate physical capacity to specific work-related functions that have practical application to the work place. None have the capacity to simulate, on-site, actual work experiences in an industrial setting. Vocational counselling techniques, and in some cases career paths, have been chosen based on demonstrated capacity for work from assessment-oriented programs where minimal functional information is actually known about an individual's capacity for work.

1.1 BACKGROUND OF THE PROBLEM

1.1.1 THE NEED FOR AN INTEGRATED EVALUATION FORMAT

At the Workers' Compensation Board of British Columbia, workers who have been left with a residual disability as the result of their injury or who are having difficulty
returning to the work force following completion of medical treatment are referred to a rehabilitation consultant for vocational counselling. The consultant assists the injured worker in the identification and selection of vocational options suited to his/her individual needs and within the limitations imposed by his/her injury. Often, this process involves the use of existing, transferable skills or the provision of additional skills through training, in an effort to improve the worker's marketability in the workplace.

Success or failure in finding suitable employment may depend on the random selection of alternatives and, to some extent, trial and error when individual limitations are not known. Approaches to solving vocational problems vary with each individual situation, and a consistent approach to the identification and selection of suitable vocational alternatives does not exist from consultant to consultant.

The assumption basic to the premise of physical capacity evaluation is that the measurement of relevant function in a simulated environment has direct application to the practical world of work (Matheson, 1987). Further, it is clear that multiple situational formats have been designed over the years in an attempt to gather information over a large cross-section of work environments or as a general indicator of work-readiness.

In physical capacity evaluation, four distinct approaches have emerged and come to prominence in the last
20 years. These four approaches have been characterized by Neff (1966) as the mental or paper testing approach, the job analysis approach, the work-sample approach and the situational assessment approach. The majority of physical capacity evaluation research has concentrated in these four basic areas with the emergence of a plethora of programs and designs.

Testing in vocational evaluation usually follows a hierarchy of logical implementation. The paper testing approach is used to identify abilities, aptitudes and interests and is used as a general screening tool for vocational placement. This approach is usually quick and inexpensive and generates data as complex and useful as the tool being used. Several studies have evaluated the efficacy of paper testing on predicting physical work capacity as well as success at returning to work (Smith, Cunningham and Weinberg, 1986; Moriarty, Walls and McLaughlin, 1987; Thibeault and Blackmer, 1987). Most of the studies have shown generalized results with small sample sizes and limited practical application to activities of daily living and to the world of work.

Job analysis emerged as a product of industry and governmental agencies in an attempt to quantify the various aspects of work to standard units for measurement and evaluation. This approach focuses on the nature of the task to be performed rather than on the human being who is performing it (Neff, 1966). Although this type of approach
was designed to analyze a given kind of work into a series of machine-like units or elements, the work of Roethlisberger and Dickson (1939) demonstrated that job analysis had to be complemented with attention to human relations in industry to have any practical value. The most widely used physical capacity evaluation programs have concentrated on a combination of work-sampling and situational assessment to evaluate readiness for work (Blankenship, 1988; Matheson, 1987). Following the work of Snook (1978) and Chaffin, Herrin and Keyserling (1978) on pre-employment strength testing and lifting tasks, multiple task testing has evolved to a sophisticated level in its attempt to define physical capacity for work.

A review of the literature revealed that increasing numbers of predictive, simulated tests were emerging in an attempt to define dysfunction for litigation purposes rather than for the purpose of defining ability for vocational placement (Blankenship, 1988). The term physical work capacity was steadily being replaced by the term residual disability profile in a litigation oriented system which was charged with the responsibility of evaluating dysfunction. The emergence of clinical electro-diagnostic testing with sophisticated quantification programs fuelled this process but provided information of minimal practical relevance to the world of work (Ayeroff and Kerr, 1982; Chaffin, 1975; Jiang, Smith and Ayoub, 1986). It is at this point that caution should be taken
against generalizing these findings to a true working environment.

Another area of interest has been the impact of the vocational intervention process on the disabled individual per se and on individual satisfaction with various vocational intervention techniques. Most researchers agree, however, that a critical look should be taken at the way in which vocational counselling is introduced and that approaches should vary depending on the worker and on the desired result (Gellman, 1968; Flamer, 1985; Livneh, 1989).

Further, the impact in a practical way of current vocational evaluation techniques on vocational placement has not been clearly addressed in the literature. The work of Gannaway and Sink (1978), establishes a causative relationship between performance on work sample evaluation and type of vocational placement. No empirical data exists, however, in relation to statistical success rates nor has any attempt been made to classify successful vocational placement following vocational intervention techniques in terms of relevant demographic factors such as age, type of injury or degree of disability.

If our ultimate goal in the evaluation of physical capacity for work is to return the injured worker to gainful employment, then an accurate and objective tool needs to be developed. This has prompted a growing number of research institutions to design simulated work environments and sophisticated machinery to simulate physical work demands
(Kroemer, 1983; Chaffin, 1978). In the vast field of situational evaluation and work samples, however, only a few studies have emerged which have attempted to relate evaluation outcomes to the working environment (Matheson, 1987; Blankenship, 1988).

Although the emergence of these new evaluation techniques has greatly augmented the diagnostic capabilities of industrial rehabilitation, there has been very little research on the outcomes of these programs in terms of vocational placement and the impact of the process on the individual. Despite agreement by work proponents that the quantification of physical work capacity is the first step in the diagnosis of individual ability for work, the effectiveness of these programs on the placement of disabled workers still awaits empirical investigation. Until such time as follow-up information becomes available, we can only guess the outcome effects of present intervention techniques.

A work-oriented, task-module physical capacity assessment program was developed by the investigator for the assessment of injured workers at the Workers' Compensation Board of British Columbia Clinic in an attempt to provide critical information on physical work capacity. It emerged as a direct result of the clear need for objective, activity-based information in order to accurately propose vocational alternatives within the functional limitations imposed by an industrial injury. It shifted
attention away from the traditional focus of assessment of disability to a critical analysis of specific function through demonstrated ability. From this analysis emerged an objective picture of functional capacity with clear links to the demands of the workplace.

1.2 RESEARCH PROBLEM

The research problem undertaken here was two-fold. First, the objective was the development of a physical capacity evaluation format with strong ties to the objective measurement of function through task simulation. Following completion and implementation of the program, the secondary purpose was to evaluate the efficacy of the evaluation format on vocational placement.

The format was designed under a task-module work sample approach and monitored in a pilot program for a period of one year. Following completion of the pilot program, the present study was implemented. Two experimental groups were designated to undergo conventional vocational rehabilitation intervention with one group having the additional protocol of physical capacity assessment. Subjects were randomly assigned to one of two experimental groups and monitored for a period of six months or until vocational placement was achieved.
1.3 QUESTIONS

The impact of such an assessment program on vocational placement clearly needs to be defined. If one concedes that the ultimate goal of physical capacity assessment is to assist in the selection of accurate vocational alternatives and if one sees worker involvement as an important component of that process, then the following questions must be examined;

(a) Can an activity-oriented, physical capacity assessment program that would accurately reflect an injured worker's physical readiness for work be designed and implemented for use in a clinical setting?

(b) Is there a difference between the two treatment groups as represented by specific vocational placement techniques in terms of vocational placement success, time to successful vocational placement and type of placement?

(c) Are there trait/treatment interactions between the dependent variables and select worker characteristics of injury type, degree of disability and age?

(d) What is the impact of selected moderator variables including time in medical treatment, pre-injury wages, post-injury wages, language, marital status education and rehabilitation consultant on the dependent variables?

(e) How will the workers respond to the two different
placement techniques employed in this study in terms of their own feelings of self esteem for each treatment condition?

There are several features of this study which distinguish it from previous work in the area. First, the industrial physical work capacity program is task-module oriented with a firm basis in industrial rehabilitation. The dual component format of physical and industrial evaluation provides more concrete, objective information on industrially-related physical abilities than was previously available.

Second, the study takes a critical look at outcome variables not previously reviewed in the rehabilitation literature with respect to vocational placement following physical work capacity evaluation versus conventional placement techniques as well as examining specific worker traits including age, injury type and degree of disability. Third, the process of vocational intervention is evaluated from the perspective of the disabled worker, and its impact on the human values of self-esteem is explored.

A review of the literature explains the development of the physical work capacity evaluation concept and the emergence of the sophisticated systems in use today. An overview is given of the available formats with particular interest given to the trait-cluster and work sample formats. This is followed by a look at some self-esteem literature and an overview of the human variables.
involved with unemployment and disability. The impact of these factors are explored within the social, psychological and financial context of the overall process. Finally, the literature on vocational placement following injury is reviewed with respect to placement success within the general context of select biodemographic variables.

The lack of an objective, industrially-based evaluation format with work-relevant data is confirmed. Within the existing evaluation formats, very little outcome data is available on rates and success of placement specifically for disabled workers. When outcome or placement data is available, it is generically presented with no specific interpretation for subject characteristics nor is any relevant data available on assessment strategies for injury, disability or age.

The principles of the construct theory from Amundson and Borgen (1982) on the dynamics of unemployment are extrapolated to include not only the process of vocational intervention but also the human factors and outcome variables arising from the search for employment. The self-esteem and critical incidence research is also explored with respect to its impact on the decision making process in order to provide relevant information for the possible outcomes of this study.
1.4 DEFINITION OF TERMS

a. vocational rehabilitation: the process of active counselling, by qualified professionals, for the purpose of defining vocational suitability.

b. situational assessment: a clinical assessment method using systematic observational techniques in established or created work environments.

c. evaluation: a process of assessment according to a defined set of criteria.

d. job analysis: the systematic study of an occupation in terms of what the worker does in relation to data, people, and things; the methodology and techniques employed and the machines, tools, equipment, and work aids used; the materials, products, subject matter or services which result and the traits required of the worker.

e. physical work capacity: the measurement of an individual's work tolerance or capacity to sustain performance in response to broadly defined work demands.

f. successful vocational placement: the location and acquisition of full-time employment for renumeration within a 6 month time frame from completion of the program.

g. time to vocational placement: length of time in days measured as cumulative, chronological time, to a maximum of 132 days (6 months), exclusive of weekends and statutory holidays, while actively looking for work.

h. impairment: medical rating of physical, functional or anatomical loss based on pre-determined rating schedules; expressed as a percentage of a healthy (100%) equivalent e.g. discectomy, 1-level, impairment = 5% of a totally functional person.

i. disability: a socially-oriented term used to describe the impact of impairment on all activities including vocational, social, recreational etc.

j. PCA: short form designation for physical capacity assessment; one of the treatment conditions of the study involving a 2-week program of work tolerance evaluation in an industrial setting within the Workers' Compensation Board Rehabilitation Clinic.
k. J.S.: short form designation for job search program; one of the treatment conditions of the study involving a 3-day program of job search and interview techniques based on the Azrin model.

l. self-esteem: overall level of well-being; the totality of an individual's thoughts with respect to self-concept and self-worth. For the purpose of this study, self-esteem was measured as the total number of negative and positive responses as recorded by the Coopersmith Self-Esteem Inventory (1967: short version).

m. task: a specifically designed industrial project with pre-determined physical demands and requirements.

n. module: a group of tasks with like components according to strength, dexterity etc.

o. lifeline: a linear, emotional time line between two separate points in time; for the purpose of this study the time frame was from date of injury to date of intake into the study; emotional fluctuations from a steady state including positive and negative variations as influenced by day to day life experiences.

p. lifeline category: one of four categories or groupings of emotional lifeline variation (A-D), as described in the study, based on common characteristics and responses to the lifeline chart.
CHAPTER II LITERATURE REVIEW

2.1 THE EMERGENCE OF PHYSICAL CAPACITY EVALUATION

2.1.1 OCCUPATIONAL THERAPY AND WORK HARDENING: A HISTORICAL PERSPECTIVE

One of the first documented references to the medically prescribed use of work for remediation was by Philippe Pinel in 1801 in his "Treatise on Insanity" (Pinel, 1962). Within the environment of the Bicetre Asylum for the Insane, Pinel introduced work treatment on the basis that:

"the only method of securing health, good order, and good manners, is to carry into decided and habitual execution the natural law of bodily labour, so contributive and essential to human happiness." (p.9)

Through the introduction of work treatment programs, Pinel observed;

"that the return of convalescent patients to their previous interests, to the practice of their professions, to industriousness and perseverance has always been ...... the best omen of final recovery." (p. 12)

During his lifetime, Pinel's work gradually became well known and accepted throughout the medical community in 19th century France. The unique nature of his work with such an obscure population, isolated by society in general, revealed some startling insights into the therapeutic use of work for the treatment of disorders of the brain.

These productive, activity programs, conceived and implemented by Pinel, continued in several psychiatric settings through the 1800's into the early 1900's with the
theme of work the main therapeutic tool (Ballard et al, 1986). As the success of work therapy grew, these programs were soon followed by the establishment of the first professional school for occupational therapists in Chicago in 1915 by Elenor Clarke Slagel (Slagel and Robeson, 1941). Military and civilian casualties from the two World Wars and the increasing number of injured workers from the mechanization of North American industry, gradually shifted attention towards the growing numbers of disabled veterans and workers wishing to return to the work place (Matheson et al, 1985). The general response within the medical community came from occupational therapy with the development of specialized treatment programs such as the Toronto and the Delaware Curative Workshops and with the later formalization of work evaluation programs (Noble, 1937). Within these workshops, the objective became the physical restoration and psychological adjustment of injured patients (Gleave, 1947) with the ultimate goal of bridging the gap between the restoration of physical function and the return to work (Matheson et al, 1985).

The concept of work hardening in occupational therapy evolved during the late 1940's and early 1950's as the result of the demand for objective information on work-related tolerances, critical physical capacities and worker traits (Holmes, 1985). Through the introduction and performance of graded activity and exercise programs that reflected the actual physical demands of specific jobs,
information could be gathered on the patient's ability to perform repetitive tasks such as lifting, carrying, pushing, and pulling of weighted objects under simulated conditions (Ballard, Baxter, Bruening and Fried, 1986). At this stage in its evolution, work hardening was broadly defined as a "prescriptive, productivity development program" to prepare the worker for a return to the demands of the workplace (Matheson, 1987).

Treatment programs broadened to include not only patients with psychiatric disorders but also those with physical disabilities (Ballard et al, 1986). It was during the development of these treatment programs that the evolution of the technology and terminology which was to form the basis of the emerging sub-discipline to be known as vocational evaluation began (Matheson, Ogden, Violette and Schultz, 1985).

The demand for work-relevant information continued yet the formalized protocols which were later to become the frames of reference for work evaluation were only now beginning to emerge (Stevens, 1950; Licht and Greenwood, 1950; West and McNary, 1956; Reuss, Rawe and Sundquist, 1958; Wegg, 1960). The introduction of standardized work samples and psychometric testing to determine individual interests, aptitudes, skills and limitations provided yet another information gathering tool both as an estimate of ability and as an exercise medium (Rosenberg and Usdane, 1963; Wegg, 1960; Goldman, 1961). With diversification and
formalization of the process, the program protocols, sophisticated terminology, equipment and medical orientation were slowly beginning to evolve. Throughout this developmental phase, however, evaluation instruments largely remained general screening assessments involving a treatment component. No data had yet been collected on establishing instrument validation nor examiner reliability (Smith, 1964).

It was during the mid-sixties and seventies that work hardening programs with formalized approaches to the task of treatment and evaluation began to find their way into treatment centers and educational institutions (Overs, 1968; Pacinelli, 1970; Pruitt, 1977). The role of occupational therapy within vocational evaluation continued to be defined (Highbaur-Vandomm, 1981) and to evolve through to a multi-faceted, reality based assessment centering on an individual's ability to perform various physical and psychological components of jobs. Emphasis was also being put on the predictive nature of prevocational training (Solberg and Chueh, 1976). Results from these studies showed significant correlations between successful performance in occupational therapy and successful performance in pre-vocational evaluation programs.

The further development of work hardening programs into the eighties involved an increasingly sophisticated approach to the basic task of restoration of health through function (Holmes, 1985). The role of the "worker" was reestablished
in the rehabilitation process and work behavior (Johnson, 1971; Matsutsuyu, 1971; Shannon, 1972) and work-play theories (Tuck, 1983) were incorporated into program philosophies. Awareness of the psycho-social factors impacting on the injured worker (Spencer, 1983) and the sensitization of occupational therapists and evaluators to these factors, promoted individualized approaches to vocational exploration.

Throughout southern California in the 1980's, a high concentration of work hardening programs had been established by occupational therapists (Matheson, Ogden, Violette and Schultz, 1985). Frequently, work simulation devices were used to collect information which allowed the worker to attempt graded tasks that simulated job tasks (Matheson and Ogden, 1983) and which allowed extensive exploration of physical tolerances under controlled, standardized conditions (Blankenship, 1988). Although structured and systematic in their simulation of physical requirements, these work stations could only sample general responses to generic types of work and lacked specific, industrially-oriented information. At best, evaluators could gain a measure of overall ability on a limited basis within a limited time-frame. The predictive nature of this type of testing and its correlation to job-related tasks has yet to be explored.
2.1.2 WORK SAMPLING, WORK SIMULATION AND VOCATIONAL EVALUATION PROGRAMS

Since the development of the first rehabilitation centers in the 1920's, vocational evaluation systems have been in existence in one form or another (Ballard et al, 1986). Since that time, according to Neff (1966), program development has progressed along five distinct approaches or categories including: (1) psychological tests; (2) job analysis; (3) work samples; (4) situational assessment; and (5) job tryout. The advantages and disadvantages of each approach has been discussed at length in the literature (Moed, 1960; Neff, 1966). Of the five approaches, work samples appear to encompass some of the most critical advantages of the other approaches while avoiding their major disadvantages (Gannaway and Sink, 1978). There are four main types of work samples according to their physical requirements and orientation to the actual world of work. These include actual job samples, simulated job samples, single trait samples and cluster trait samples. The majority of the work samples most widely used are of the simulated job sample and cluster trait sample variety.

In his excellent text on the comparison of commercial evaluation systems, Botterbusch (1982) describes four main considerations or factors an evaluator should analyze prior to selecting a commercial evaluation system. These considerations include the range and type of jobs available in the local labour market, training opportunities, the client
population and the overall purpose of the evaluation. Having answered these questions, the most appropriate evaluation system can be chosen to adequately assess a client's abilities.

It is not the author's intention to discuss the relative merits of the wide range of commercial vocational evaluation systems currently available. For the purposes of this study, the discussion will be confined to those work samples which display the following common characteristics: (1) have been designed for use with physically disabled populations; (2) contain material or tasks which gather industrially-relevant information; (3) contain tasks with a physical tolerance component and; (4) are most commonly used within the evaluation community.

The Institute for the Crippled and Disabled is credited with developing the first work sample battery in 1937 called the TOWER System (Pruitt, 1986). An acronym for Testing, Orientation and Work Evaluation in Rehabilitation, the TOWER System included 93 work samples or tasks within 14 broad job training areas (Rosenberg, 1969). Originally designed for use by physically disabled persons, this system is now used for all persons with all forms of disability. While each of the 14 areas is independent, the work samples within each area are arranged in order of complexity. Simpler tasks must be completed before beginning more complex ones.

Despite the fact that the only work performance factor specifically listed is dexterity, the TOWER System exposes
the client to many different training areas which are representative of a variety of jobs. The lack of precise definitions for work performance factors and client behaviors and the lack of adequate norms are the major weaknesses of the system (Botterbusch, 1982). In addition, the requirement to follow written instructions and the complexity of some of the evaluation areas restricts its application to clients with lower levels of education.

The physical aspects of the TOWER System consist of sedentary to light work especially involved with the Welding (#13) and Workshop Assembly (#14) work samples. Manual dexterity is the major physical factor evaluated under standardized time norms. Time results are rated on a 5-point scale based upon the number of minutes to completion and the final report contains work and personal characteristic ratings for each of the 14 job areas and a narrative report.

Despite the widespread use of the TOWER System, there are no industrial norms available for the system and a lack of reliability and validity data. In addition, the population on which the system was normed has not been described in terms of sample size nor characteristics. Minimal physical tolerance information is available in terms of task completion and no relationship is established between completion of the individual tasks and the physical requirements of industry (Neff, 1966).

The Occupational Assessment/Evaluation System (OA/ES)
was produced by a private sector rehabilitation service called Individualized Rehabilitation Programs in Long Beach, New York. The OA/ES was designed for use in assessing vocational potential of literate, working adults who became disabled as the result of an accident or illness, and is basically a worker trait assessment which also uses work samples. The work samples are closely linked to the Dictionary of Occupational Titles (DOT) although both the apparatus tests and the work samples are optional.

The motor coordination portion of the work samples consists of an apparatus test moving different sized washers from one bolt to another. The finger dexterity and manual dexterity apparatus involve moving small items, nuts and bolts from one bin to another and from one column to another. The eye-hand-foot coordination involves the operation of a small flex shaft and foot control in a precision drilling task. There are nine work samples including systems planning, file management, order request processing, product identification, grinding operations, drill press operations, electro/mechanical, welding and itinerary planning. Of these work samples, 5 are clerical and 4 are industrially-oriented.

The OA/ES system can be fully administered in 4 hours and has an established link with the industrially defined physical requirements of jobs as set out in the DOT. The apparatus tests and work samples evaluate physical capacity and aptitude on a much broader scale than some other work
samples, however care should be taken to avoid applying the specific results obtained from the individual samples to broader trades categories. The working norms supplied with the sample do not contain time and quality norms and despite a close relationship to the DOT, the actual relationship of the work samples and tasks to the physical requirements of actual jobs is questionable.

The Singer System was developed by the Singer Educational Division, Career Systems of Rochester, New York. It was originally designed for use with special needs populations including physically handicapped but now has a broad range of rehabilitation and educational applications. (Botterbusch, 1982). The Vocational Evaluation System (VES) contains 24 work stations involving various industrial categories. Administration of the work samples involves the client listening to an instructional video and then performing a particular task. The task is then checked by the evaluator for completion criteria. All work samples are timed and performance scores are compared to established norms. Each unit contains 3 types of norms including participant norms, industrial norms and methods-time-measurement norms (Moors and Reed, 1979) with the industrial norms being used as the perfect score or 100%.

Researchers have reported moderately reliable test-retest reliability coefficients (Cohen and Drugo, 1976) across all samples of work tasks. In addition, Gannaway and Sink (1978) reported that 82% of the VES job samples
obtained correlation coefficients of +0.50 or greater in predicting employment success in jobs specifically found in the occupational group associated with the job sample. These results may be based on a stronger physical requirements link between the VES, and the requirements of industry, than any previous work sample system.

The Valpar System, in the Component Work Sample Series (CWS) format, was developed by Valpar International of Tuscon, Arizona. It contains 19 work samples and although originally designed for use with the general population, it has been widely used with industrially injured workers. Adaptation kits to use VCWS 1, 2, 4, 8, 9 and 10 with the visually impaired are available as well as video administration tapes for the hearing impaired for the complete VCWS Series with the exception of VCWS 14 (Integrated Peer Performance). Computer based products are also available including COMPORT and MESA for the production of integrated final reports; a G.O.E. Interest Survey and a VAL-SEARCH Employee Talent Bank for use in job training and placement (Botterbusch, 1982).

The VCWS Series is based on a trait/factor approach and samples general worker trait groups as well as specific occupational groups. They are designed to be administered individually and independently and can usually be completed within a one hour time frame. Norms for each of the work samples are available with information gathered from various sources including employed workers, skill center trainees.
and community colleges with varying sample sizes from 50 to 550. Performance on all work samples is timed and the total time is converted into percentiles with 5% increments.

The Upper Extremity Range of Motion (4), Simulated Assembly (8), Whole Body Range of Motion (9) and Eye-Hand-Foot Coordination (11) work samples provide objective, functional information which can be used as a general indicator of physical tolerance. Many of the other samples, although providing excellent general information, have limited relationship to specific jobs, occupations or worker trait groups (Botterbusch, 1982).

In general, work samples are designed to assess a client's potential for a range of occupational areas (Pruitt, 1986) and across a broad matrix of physical requirements. Of the commercial work samples reviewed of specific relevance to this study, none covers the worker traits or general physical requirements associated with the full range of occupations. In addition, all work samples are restricted to the sedentary to light work range leaving the other strength classifications unsampled. With the exception of the Valpar Component Work Sample Series, none of the commercially available work samples were specifically designed to evaluate workers injured as the result of industrial accidents (Botterbusch, 1982; Pruitt, 1986) or involved workers as part of the normative data collection sample.

In his review of 14 commercially available work
samples, (Walk 1985) found none to be comprehensive enough to be used as a general screening tool for assessing a variety of disabling conditions. In each instance, either information of relevance to specific worker traits or physical requirements was lacking, or the method of tabulating scores or the reporting of results was inconsistent. To date, a comprehensive, industrially-oriented evaluation program has not been developed that can assess a broad range of occupational and physical requirements within a general work sample format.

2.1.3 PAPER TESTING

The development of psychometric testing in a formal way began in the late 1800's and early 1900's. It was during this period that experimental psychologists and others began to concern themselves with the individual differences of people (Boring, 1951) and to develop tests to measure these individual interests and abilities. It was during those early years that the concepts of the testing laboratory, norming, the standardized administration of tests and the use of statistical analysis were conceived and implemented (Goldman, 1961). Later, they were to form the nucleus of the emerging field of psychometric testing as well as very valuable terms of reference for the development of the modern work evaluation process (Pruitt, 1986).

It is not the author's intention to chronicle the development of psychometric testing and its present
application to the field of vocational evaluation. The reader is referred to Vernon Zunker's reference to the use of assessment results in career counselling (Zunker, 1988) for an extensive breakdown of test development and current trends. The field of psychometric testing in general, however, did lay the foundation for the emergence of paper and pencil tests predictive of physical capacity which merits some discussion at this point.

Research on the predictive validity of physical capacity through inventories and questionnaires is a relatively new field. It is only recently that researchers have attempted to use information gathered either through a paper testing format, with a minor work simulation and activity-oriented component, or through computer sampling, to predict individual capacity for work.

One test used to more accurately define individual levels of function is the Functional Capacities Evaluation (FCE). This evaluation, when combined with a performance component, has been used extensively not only to identify individuals for vocational intervention (Baxter, 1978; Kester, 1979; Smith, Cunningham and Weinberg, 1983) but to also predict their success in returning to work.

Smith, Cunningham and Weinberg (1983) studied the validity of the FCE with the Smith Physical Capacities Evaluation (SMITH-PCE) when administered to subjects by a qualified therapist. They defined validity as the ability of a trained occupational therapist to use the results of
the evaluation to predict accurately whether or not a claimant would return to work. The Smith-PCE contained 20 sub-tests to measure the 20 physical demands that the U.S. Department of Labour specifies for jobs in the national competitive job market. Each subtest consisted of 3 to 39 elements with a total of 154 performance items for the entire test.

Of the 125 subjects selected for the study, only 52 responded with a completed questionnaire regarding their current employment status. Comparisons of evaluation predictions to current employment status revealed that 86.5% were accurate. Chi square analysis demonstrated statistical significance at an alpha level better than $p = .001$ however the limited sample size and high number of nonrespondents limited any generalization of the validity of the instrument.

In a follow-up report (Smith, Cunningham and Weinberg, 1986) the authors elaborated on their original data including classification by age, race and gender. Unfortunately, the unequal distribution within the ethnic and gender classification and the limited geographic distribution of the sample limited any generalization of the findings.

Formalization of a predictive scale for returning disabled workers to active employment emerged as a result of the work of the Menninger Foundation in the development of the Menninger Return to Work Scale. Hester, Decelles and
Gaddis (1986) collected detailed information on 600 Long Term Disability claimants who had injury claims with a major insurance carrier. Of the total sample, half had returned to work and half had not. From this sample, ten characteristics were found to differ significantly. These items were type of disability, age, gender, education, marital status, type of occupation, area of residence, employer type, type of disability support received and amount of wage replacement. These ten items were then combined to form the Menninger Return to Work Scale which was used to predict the likelihood of a disabled person returning to work without rehabilitation assistance.

For the ten variables identified, univariate comparisons involving Chi square and t-test were performed for the return to work and non-return to work subsamples. The variables showing significant differences were used as items on the scale. Each variable was then transformed to a set of scale scores from 0 to 10 where each unit corresponded to a 10% probability of return to work. The sum of the variables then comprised an individual's score on the Menninger RTW Scale.

The research results showed significant separation between those who return to work and those who do not. Of the 600 subjects reviewed, 89% of those who scored 50 or more points returned to work while only 18% of those who scored less than 50 ever returned. The scale, however, did not contain an activity component as a part of the overall
assessment nor any relevant functional or medical information on which to assess individual tolerances. It relied, instead, on the classification of the injury or disability grouping according to the Merck Manual (Berkow, 1982) as a basis for success or failure in returning to the work force.

As a general screening tool, the Menninger RTW Scale is appropriate in identifying those injured workers who may benefit from vocational intervention, or, more importantly, those who may not. Following identification, the appropriate type of vocational intervention can then be implemented, including physical capacity assessment.

Hester, Decelles and Stanton (1988) have also provided some research on using the Menninger RTW Scale in disability cost containment. Through the identification of appropriate vocational intervention candidates and predicting the need for rehabilitation, their research generates a theoretical cost model of where to best use rehabilitation funds. Utilizing the Intervention Impact Quotient (IIQ) (Hester and Descelles, 1985), they have found that early and accurate identification of rehabilitation candidates can reduce the number of people in a theoretical disability support system by 26% with significant overall cost savings.

The Preliminary Diagnostic Questionnaire (PDQ) was designed by Joseph Moriarity (1981) to assess the functional capacity of handicapped individuals in relation to employability. It contains eight subscales providing
relevant information on the four major components of functional assessment; cognitive, physical/motor, emotional/social and disposition (Diller, 1971). It was designed to be administered quickly in a counsellor's office to collect information on a client's capability for competitive work.

Moriarty, Walls and McLaughlin (1987) reported satisfactory test-retest reliability on a sample of 28 clients who were administered the PDQ in the areas of estimate of learning (r=.97) and emotional functioning (r=.91). Internal consistency as measured by Cronbach's coefficient alpha (Cronbach, 1951) demonstrated acceptable levels overall while content validity and criterion-related validity results supported its use in predicting future employment. The psychomotor scale, however, appeared to reflect the cognitive more than the physical functioning and lacked a conclusive measure of physical tolerance. To date, this component has not been enhanced nor has any further research been conducted on the use of the PDQ in predicting reemployment. It does, however, remain an acceptable screening tool in the functional assessment of employability.

Introduced in 1979 by Bloomer and Williams, the Bay Area Functional Performance Evaluation (BaFPE) was designed as an objective measure of daily living activities for patients with psychiatric disorders. It has since been revised and validated on a larger population with the
inclusion of a larger variety of subject variables (Williams and Bloomer, 1987). The BaFPE consists of an interview and the administration of a task-oriented assessment (TOA) and a social interaction scale (SIS). The task-oriented component encompasses five tasks including a sorting task, a money management exercise, a home drawing task, block design and the task of drawing a kinetic person.

Thibeault and Blackmer (1987) administered the BaFPE to 60 psychiatric patients who were tested over a period of 8 months. In addition to performance scores, demographic and medical information was also collected including age, gender, medication type and amount, education, time in hospital and type of treatment. The results showed that the BaFPE correlated highly with some of the WAIS subscores and that there was a significant relationship between age and performance on the BaFPE (p < .001) and education and BaFPE performance (p < .01). Younger people performed better than older people and more highly educated people performed better than less educated people. The other factors did not show statistical significance.

There was, however, distorted information on the 3 separate subscales of the TOA casting some doubt on the validity of those measures. There was a high correlation between the cognitive, performance and affective components of the scale suggesting an overlapping effect. The individual scores may therefore be misleading and not pure measures of functional performance. The robustness of the
functional tolerance components of the TOA was also minimal and did not contain a wide cross-section of general physical abilities. In addition, no data is yet available on the correlation of the functional performance component of the TOA to any other measure of functional ability.

One of the first attempts to computerize the collection of physical capacity information appeared with the Inventory of Physical Capacities Perception (IPCP). Developed by Luc Duval at the Centre Humaniste D'Orientation et de Consultation in Quebec (Duval, 1988), this inventory allows the rehabilitation specialist to obtain an initial profile of a client's mode of physical functioning and activity potential. Available in paper test or computerized format, the questionnaire is made up of 95 items along six thematic scales including cognition and communication, vision, lower limbs, upper limbs, general capacities and environmental conditions.

The test is designed for adults with functional limitations and provides general information on physical functioning and individual tolerances. The levels of function are cross-referenced to the Canadian Classification and Dictionary of Occupations; however there is no actual demonstration of physical capacity nor industrially-related work tolerances. To date, no empirical data is available on the validity of this inventory nor on its correlation with other measures of functional assessment in current use.
2.1.4 PHYSICAL CAPACITY ASSESSMENT PROGRAMS

Physical work capacity has been studied in great depth by exercise physiologists and cardiologists for many years (Christensen, 1955; Bink, 1962; Bonjer, 1962; Astrand, 1967; Davis, Faulkner and Miller, 1969; Astrand and Rodahl, 1970; Snook, 1971;). Within this medical framework, physical work capacity was described as the practical result of the transformation of chemically bound energy into mechanical energy and was measured in terms of physical performance. According to Astrand and Rodahl (1970) the objectives of physical work capacity research are;

"to study the effect of various activities and environmental factors on different organ function; to investigate the capacity of the individual to meet the demands imposed upon him; and to determine how this capacity can be influenced." (p. 182)

One of the first recorded position papers on physical capacity evaluation was written by B. Hanman in 1958 in the New England Journal of Medicine. Building on his previous research in the areas of physical demands and capacities analysis (Hanman and Kuh, 1944), occupational incapacity in workers compensation (Hanman, 1948) and job-specific physical requirements (Hanman, 1945), the author described a rating method for the evaluation of physical ability which led the primary care physician;

"toward the extension of medical practice further into the domain of man's physical abilities - to improve upon and be able to make a more objective and qualitative evaluation of the patient's capacity to engage in such activities as lifting, climbing and operating hazardous equipment". (p. 987)
Hanman developed a check-off list of 80 pertinent activities and hazards based on the Manual of Job Analysis for Physical Fitness Requirements developed by the United States Civil Service Commission (1955). This check-off list was divided into two subsections; one dealing with physical factors and the other with environmental factors relative to a particular occupation. The information gathered through this format provided the primary care physician with a profile of physical abilities and individual limitations for the particular patient under review. The form was designed to be completed in the physician's office in 2-3 minutes as a rough indicator, based on medical examination (Hanman, 1958).

Although the Physical Abilities Profile was designed to be job-specific, no actual job simulation or evaluation of physical work tolerances ever took place. Instead, the profile was based on the extrapolation of medical information from an office examination to the perceived physical requirements of a particular job and rarely took into consideration demonstrated functional ability or fatigue.

What Hanman's profile did emphasize, however, was the identification of physical ability with a positive prognosis for returning the injured worker back to gainful employment. Unfortunately, no data was ever published on the accuracy or placement success of this ability classification system.

A further refinement of the rating and classification
concept was provided by Leon Koyle in his development of the GULHEMP Scale of measurement during his work with the DeHavilland Aircraft Corporation (Koyle, 1965). Originally designed for use with older workers, this scale provided a match between individual functional abilities and the demands of specific jobs and was one of the first multifactorial indicators of industrial work capacity. The GULHEMP Scale consists of 7 divisions of function which are factor-specific including (1) general physique; (2) upper extremities; (3) lower extremities; (4) hearing; (5) eyesight; (6) mentality and (7) personality. Within each division exists seven levels of fitness ranging from completely competent (level 1) to incompetent (level 7). Competency within each division is based on individual function in defined areas including lifting, climbing, pushing and pulling as well as general strength categories from sedentary to very heavy.

Information gathered during the course of job evaluation on individual worker tolerances could be matched against the actual physical demands of a specific job. Worker/job matches could then be made ensuring that the worker was working within his/her demonstrated tolerance levels (Matheson, 1987). The general categories and strength levels first identified by Hanman (1958) and later expanded by Koyle in the GULHEMP Scale were to serve as a firm basis for the later development of the United States Department of Labor's Handbook for Analyzing Jobs (1972) which was to be

The Ranchos Los Amigos Hospital in California began the introduction of objective physical capacity assessment in the development of their cardiac rehabilitation programs in the early 1970's. Through the introduction of simulated work tasks, medical rehabilitation teams were able to assess and develop treatment strategies for injured workers who had cardiovascular disabilities with the aim of returning them to active employment (Harrington et al, 1981). This technique proved to be quite successful with this specific population and allowed appropriate vocational decisions to be made with accuracy and safety (Matheson, 1987). With the increasing popularity of the work sample and multiple format testing, structured, multi-disciplinary physical capacity evaluation programs began to emerge with specific (Baxter, 1978) and general applications (Kester, 1979) to the evaluation of work potential. Physical capacity evaluation became a generic descriptor for the more specific areas of work evaluation and vocational evaluation with work evaluation assessing vocational strengths and weaknesses through the use of real or simulated work and vocational evaluation involving an in-depth, interdisciplinary assessment of pertinent medical, psychological, educational, social, environmental and vocational factors (Kester, 1979).

Ogden's research into graded rehabilitation programs for cardiac patients provided additional insight into the
effects of work sampling, work simulation and graded exercise programs in cardiac rehabilitation with the positive results of active return to employment following cardiac insult (Ogden, 1979; 1980; 1981). At the same time, Matheson was conducting research on the physical characteristics of work (Matheson, 1981) which was to lead to the later development of his model of work capacity evaluation (Matheson, 1987) at the Employment and Rehabilitation Institute of California.

2.1.4.1 PRUITT'S VOCATIONAL EVALUATION SYSTEM

Prior to discussion of the Matheson model, a brief discussion on the earlier work of Walter A. Pruitt at the University of Wisconsin-Stout in the development of their vocational evaluation program is in order. Pruitt's early work on work sample theory (Pruitt, 1970) and his later text on vocational evaluation (Pruitt, 1977) provided a basis for the later evolution of a more specific physical capacity evaluation theory (Pruitt, 1986). He defined the formal stages of vocational evaluation, introduced general guidelines regarding the development of observational skills and promoted the use of work samples and situational assessment which are a major components in the sophisticated evaluation programs in use today. In addition, Pruitt pointed out errors inherent in the evaluation process which could alter the accuracy of the evaluation or render the
findings inappropriate. These included sampling error, rater bias, error due to ambiguous items, interpretation error, validity criteria error and administration error.

Pruitt emphasized the importance of vocational development theory and the concepts of vocational life stages (Super, 1957) in his attempt to apply the most appropriate evaluation techniques to each individual situation. In order to satisfactorily progress through the vocational life stages, Pruitt was acutely aware that people needed to have experiences in the developmental tasks appropriate to the various vocational life stages (Ginzberg, 1952; Samler, 1964; Havighurst, 1964; Borow, 1964) and that within this general framework vocational evaluation techniques could be applied with accuracy and efficacy. He also promoted the collection of functional information through situational assessment which he felt provided the most relevant, industrially-oriented data with which to assess individual capacity for work (Pruitt, 1986).

2.1.4.2 THE MATHESON WORK CAPACITY EVALUATION FORMAT

The most widely used contemporary physical capacity evaluation programs evolved from the work of two researchers; Leonard Matheson from the Employment and Rehabilitation Institute of California (Matheson, 1987) and Keith Blankenship from American Therapeutics of Macon, Georgia (Blankenship, 1988). These two programs represent the current trend in commercial evaluation programs in their
highly structured, multi-faceted formats and their multidisciplinary approach to the definition of physical capacity.

In his excellent text on the systematic approach to industrial rehabilitation (Matheson, 1986), Leonard Matheson defined work capacity evaluation as:

"A systematic process of measuring and developing an individual's capacity to dependably sustain performance in response to broadly defined work demands." (p. I-2)

Based on the area assessed, Matheson described an 8-stage model of industrial rehabilitation including (1) pathology; (2) impairment; (3) functional limitation; (4) occupational disability; (5) vocational feasibility; (6) employability; (7) vocational handicap and (8) earning capacity. Depending on the stage within the model, various evaluation techniques could be applied to evaluate overall physical work capacity.

Matheson's work capacity evaluation program made a further distinction between the three concept areas of medical evaluation, vocational evaluation and physical work capacity evaluation earlier defined by Kester (1979) on the basis of the stages within the model that impact upon the final, and perhaps the most relevant stage, earning capacity. Through the administration of specially designed programs including Work Tolerance Screening, Work Hardening, Specific Vocational Exploration, Functional Disability Assessment and Job Match, information is gathered on individual tolerances for work which ultimately lead to the
identification of suitable vocational alternatives. Although Matheson's program adhered to an "industrial model" and emphasized work capacity evaluation as a "process; as a means to restore the patient's emotional and physical health and to return the patient to the role of worker" (Matheson, 1987, p. I-3), no satisfaction or self-esteem measures were taken. In addition, most of the industrially-relevant conclusions were made following the administration of work-simulation tasks.

One of the central factors in Matheson's program was the ERIC Cluster Work Simulation System. This series of 10 work clusters samples individual performance under simulated work conditions for the various strength levels as originally defined by Hanman (1951) and later developed by Fine and Wiley (1971) and Miller, Treiman, Caine and Roos (1980) for the Dictionary of Occupational Titles. Following completion of one or more clusters, a critical physical demands work sheet was developed for the worker which could then be matched with the individual demands of specific vocational options and an appropriate match made.

The Cluster System incorporated various accepted evaluation tools and self-generated formats under four main categories including dexterity, work capacity evaluation devices, work samples and work simulation devices, depending on the individual requirements of the worker. Examples of the dexterity sampling devices include the Crawford Small Parts Dexterity Test, the Minnesota Rate of Manipulation,
the Purdue Pegboard and the EAS #9. Work Capacity Evaluation Devices used include the Vertical Pegboard, the WEST #4 and the BTE Simulator. Work Sample evaluation could include Valpar #4,8,9,10 and 16, WEST Bus Bench, and WEST 2 Brief Tool Use with Work Simulation concentrating in various areas including clerical, light industrial, crafts and small motor assembly up to furniture moving and heavy materials handling. The repeated sampling procedures and use of simulated work environments makes the ERIC Cluster System one of the more distinct, practically-based systems available today.

Matheson also identified a behavioral component of physical capacity evaluation called symptom magnification and defined three distinct classifications by general description. He suggested specific strategies for dealing with workers displaying symptom magnification syndrome in order to enhance participation in the information gathering process and improve the reliability of performance measures.

Despite the highly structured, multiple factor characteristics of the Matheson work capacity evaluation program, the system does not inherently contain an industrial-specific evaluation component. Most of the functional and work tolerance information is obtained from work samples, structured tests and work simulation devices in an atmosphere that is more clinical than industrial in orientation. Following completion of the evaluation process, observations regarding physical function are then
made which are translated into inferences on work performance. This is done with minimal or no actual exposure to the rigors of the working environment. Despite the impressive nature of the program, there is no research data available, either from Matheson himself or from others using these techniques, on the vocational success of workers completing this physical capacity evaluation process.

2.1.4.3 THE BLANKENSHIP INDUSTRIAL REHABILITATION SYSTEM

A similar multi-faceted approach to physical capacity evaluation has been developed by Blankenship (1988) in his Industrial Rehabilitation Functional Capacity Evaluation (FCE) program. Through a series of special processes, evaluation procedures, tests and techniques, Blankenship attempted to quantify individual observations regarding work tolerances. His Modular System satisfied specific and unique requirements for every patient through the development of job specific and non-job specific formats.

Within the Modular System, Blankenship introduced various components which rely on established investigative and testing techniques for the collection of functional information. The Static Strength Testing component relies on documented protocols originally established by Chaffin (1975) and further defined by Petrofsky and Lind (1978) for the evaluation of static lifting strength. Lift/strength ratios are established using a strain gauge and coefficients of variation are used to establish maximum efforts.

44
Maximum Effort Dynamic Testing involves the lifting of boxes of variable weight in various positions in order to determine lifting and carrying tolerances as well as pain tolerance and postural information. Based on the design of manual handling tasks proposed by Snook (1978), strength percentiles are established for each worker and compared to established norms for various material handling activities and movements. General information is also collected consistent with the critical demands of individual jobs for components involving lifting (Snook and Ciriello, 1974; Snook, 1978; Ayoub et al, 1983; Mital, 1984; Karwowski and Yates, 1986), cardiovascular endurance (Astrand and Rodahl, 1970), grip strength and endurance (Niebuhr and Marion, 1987) and time/fatigue ratios for non-materials handling (Mital, 1984).

Computerized back and extremity testing as well as musculoskeletal evaluations are also included as general program components including a pain evaluation component using formats developed by Melzak (1975), Ransford and Cairns (1976) and Waddell (1984).

Following completion of the evaluation process, Blankenship then combined the information to establish an individual tolerance profile from which recommendations can be made regarding a workers ability to satisfy critical work demands or to give an indication of overall function. Due to the specific nature of the information collected, results are limited in their application to the work setting.
due to their lack of relevancy to the actual physical demands of the job. Statements regarding individual tolerances for work are restricted to general use as predictors of performance in the absence of demonstrated capacity in a work setting. To date, no empirical data has been collected on the accuracy of predicting success on the job by the application of critical demands testing. It is very difficult to generalize this type of functional information to a specific job category or job cluster in the absence of an industrial framework.

2.2 THE DYNAMICS OF UNEMPLOYMENT

Active involvement in a work situation has been described by some researchers as essential to the maintenance of a healthy identity (Kelvin, 1981; Feather and Davenport, 1981) and for the provision of basic needs such as safety, belonging, self-actualization (Maslow, 1968) and self-esteem (Cohn, 1978). Important to the maintenance of human dynamics, work is needed not only for financial reasons, but also for social and psychological reasons as well (Vargo, 1978; Tuck, 1983) and is essential to the very meaning and structure of our lives (Acton, 1981).

The impact of job loss has been well documented in the literature (Amundson and Borgen, 1982; Jahoda, 1982; Rump, 1983; Tiggemann and Winefield, 1984) with the consequences being measured both in human and financial
terms. Some of the more specific challenges for those facing re-employment following a disabling injury have also been explored (Stone and Sawatzki, 1980; Borgen, Amundson and Biela, 1986) which has suggested some unique barriers being faced by this group on the road to re-employment.

2.2.1 UNEMPLOYMENT AND THE PHYSICALLY DISABLED

Research into the dynamics of unemployment for those suffering from a disabling condition, either congenital or traumatic in nature, has revealed some insight into the transitional process for this unique population. Stone and Sawatzki (1980) identified several factors specific to the disabled group which may impact negatively on the re-employment process including initial employment handicaps, management misconceptions and the job interview process itself.

Garrity (1973) and Brown and Rawlinson (1976) noted that the self-perception of disability and health had a significant impact on physical recovery and successful return to work for those unemployed as the result of sickness or injury. This led Schechter (1981) to suggest that differential work responses existed at given levels of disability and allowed him to develop predictor factors including sex, age, need to provide financial support to others, length of pre-injury work experience and level of functional capacity from which to predict return to work success.
Borgen, Amundson and Biela (1987) interviewed a group of disabled, unemployed individuals in an attempt to investigate and describe their experience of unemployment and to compare that experience with what had been described for other unemployed groups. Using a previously reported structured interview format (Borgen and Amundson, 1984), information was gathered on people's experiences of unemployment and the emotional effects of incidents during the period of job loss.

They were able to identify four distinct patterns of the unemployment experience and from this information generated graphs which described emotional reactions to unemployment over time. They described emotional responses to job loss characteristically ranging from discouragement, worry, apprehension and anger gradually changing to realistic and hopeful emotional reactions following the initiation of job search activities. Most people in all the groups had some significant event or critical incident during the job search activity ranging from support groups, volunteer activities, personal events and relearning which encouraged them to continue.

The interview structure included the collection of information in several key areas designed to group the responses along general thematic lines. This included questions in the areas of support (family, friends), structure (routine, organization), meaning of life (purpose and contribution) and financial security which emerged as
important, contributing factors in individual reactions to unemployment.

The results of this study allowed some conclusions to be made regarding the development of an individualized reaction to unemployment regardless of disability type. They also identified several internal factors influencing individual reactions to unemployment and which could have profound effects on such factors as self-esteem and job search success. This information allowed them to suggest the use of specific intervention strategies based on emotional reactions and response characteristics of group membership in order to maximize the potential for successful return to work.

2.2.2 UNEMPLOYMENT AND MEASURES OF SELF-ESTEEM

The concept of self-esteem is used in this study to refer to feelings of satisfaction a person has about him/herself which reflect the relationship between the self-image and the ideal self-image (Silber and Tippett, 1965). It has been associated with a person's over-all level of well-being and is an important aspect of a person's self-concept (Sigal, 1987). Coopersmith (1967) found that people with high levels of self-esteem demonstrated greater confidence, were more independent, were more popular and were able to express themselves more openly. Rosenberg (1979) defines self-esteem as "the totality of the
individual's thoughts and feelings having reference to himself as an object." When viewed as a dynamic process throughout the life span, self-esteem seems to increase with age (Schlossberg, Troll and Liebowitz, 1978) as the direct result of coping strategies accumulated from life experiences.

The impact of unemployment on self-esteem has been discussed in the literature from numerous perspectives. Descriptive accounts of the experience of unemployment presents a scenario of the unemployed as bored, depressed and lonely. The most consistently noted effect is a loss of morale or self-esteem, with the individual losing his or her self-respect and sense of personal worth (Tiggemann and Winefield, 1984).

Several authors have described successive stages in the gradual erosion of self-esteem due to unemployment ranging from initial shock, through optimism, pessimism and finally to fatalism (Harrison, 1976). This condition described by Seligman (1975) as "learned helplessness" may be a built-in mechanism to preserve remaining self-esteem and protect against further depression by relieving self-blame.

Shapiro (1978) found significant improvement in measures of self-esteem for unemployed workers following implementation of a "short, intensive job search program coupling formal instruction with hands-on planning and supervision of their job search . . . (thereby) helping them get a job through their own efforts" (Shapiro, 1976 p. 50.
3). This perspective tended to support the process of proactive intervention for individuals who require specific direction or who may have reduced levels of self-esteem due to prolonged absence from work.

Zander, Stotland and Wolfe's work in group unity (1960) provides a context from which to evaluate reduced levels of self-esteem following a significant loss. Their findings revealed compensatory mechanisms for increasing self-esteem on the part of group members through psychological withdrawal or group departure. These concepts, when interpreted within the context of job loss, suggest ways in which self-esteem may be influenced through such factors as group unity, group identification and self-evaluation during the period of unemployment.

The work of Tiggemann and Winefield (1984) on the effects of unemployment on the mood, self-esteem, and locus of control of school leavers generated some interesting information on the young, unemployed person. Of specific interest was that portion of their data that showed that the unemployed scored lower on self-esteem and higher on depressive affect than the employed and that these psychological effects were directly attributable to the unemployment experience.

The research of O'Brien and Kabanoff (1979) on the effect of unemployment on work values, locus of control and health factors provided some interesting relationships for the understanding of self-esteem and job loss. Comparing
employed and unemployed workers, O'Brien and Kabanoff noted an increased number of reported physical health problems among unemployed subjects and a significant correlation between health problems and elevated stress levels. Their conclusions, however, were that these physical problems were not the cause of unemployment, but the result of it, suggesting some deeper rooted psychological disturbance. They also found lower work values, perceived loss of locus of control, lower feelings of satisfaction with life and a greater use of helping agents (therapists, counsellors) for personal problems for the unemployed group. All of these were regarded as showing reduced levels of self-esteem.

The emotional aspects of physical disability following industrial injury, and its effect on self-esteem and self-image, is a directly related area which deserves a brief mention at this point. According to Simon (1971) alteration of the body image following an injury can lead to the development of psychological defenses to maintain self-esteem and satisfaction of needs. These defenses may manifest themselves in feelings of anger, denial, frustration and fear which, when combined with the reality of job loss, can create serious psychological and emotional obstacles to successful rehabilitation and vocational placement.

Research on the appropriate timing and application of intervention techniques has shown that the time between injury and intervention is important in that as more time
elapses, the probability of successful vocational rehabilitation decreases (Conley and Noble, 1978; Lynch, 1979). More specifically, studies by Fierro and Leal (1988) have shown that depression, self-esteem and dependency are significantly impacted by the length of time between onset of injury and referral to the vocational rehabilitation process for those workers suffering an industrial injury. The implications for this type of research on the potential for enhancing self-esteem values through the application of appropriate vocational rehabilitation techniques including physical capacity evaluation is apparent.

3. VARIABLES AFFECTING VOCATIONAL PLACEMENT

Several studies have defined a relationship between certain demographic characteristics of disabled workers and success in rehabilitation programs. Following validation of the Singer Vocational Evaluation System (VES) by Cohen and Drugo (1976), Gannaway and Sink (1978) investigated the correlation between subject performance and employment in specifically related jobs for 117 subjects in the Monroe County Vocational Rehabilitation Project. In addition to the performance/placement relationship, demographic information on age, race and educational level was collected for the study participants.

Despite the fact that only 11 of the 17 VES job samples were investigated, the results showed that 82% of the work
samples obtained correlation coefficients of +0.50 or
greater in predicting employment success in jobs found in
the occupational group associated with the job sample. The
most significant of these correlations was in the Carpentry
and Woodworking (VES #6) and in the Heating, Air
Conditioning and Refrigeration (VES #7) work samples where a
correlation of +1.00 was obtained. Unfortunately, none of
the correlation coefficients in any of the groups were
significant at the .05 level because of the small sample
size. This severely limited any statements regarding
predictive validity. In addition, no data analysis was
provided for the age, education level or race variables.
The lack of significance due to the small sample size
presumably affected any inference regarding trends in these
variables.

The work of Growick and McMahon (1983) concentrated on
characteristics of older successful vocational
rehabilitation clients with particular attention to the age
group 45 and over. They found that within this group, the
successful VR client tended to be female, married, with less
than a high school education and with a physical disability.
The middle age group (30-44) tended to be male, married, a
high school graduate and with a classification of behavioral
disability. The younger, successful VR client (<30 years of
age) was male, single, with a high school diploma and having
a disability with an emotional/behavioral component.

This study followed earlier research by Krauft and
Bolton (1976) who found that age was viewed as a deterrent to successful rehabilitation with the trend toward a greater likelihood of successful rehabilitation outcome for the younger age group. This could be attributed, in part, to the diminishing work capacity of older persons (Christensen, 1955; Bonjer, 1962; Bink, 1962; Snook, 1971; Petrofsky and Lind, 1975) and to the general relationship between age and frequency of work disability as reported by Blake (1981) and Bowe (1983).

Hester, Decelles and Hood (1986) described a relationship between age and return to work following injury in a study of claimants with disability insurance claims. They found that the likelihood of return to work is greatest for workers disabled before age 35 and that the return to work rate progressively diminishes with age. They also established a clear relationship between age at the onset of disability and the time a person spends in the disability support system. Workers in the 45-54 age group spent the longest time in the system (4.9 years) compared to 2.9 years for the 16-34 age group.

Additional insight into the effect of the age variable on vocational placement can be found in the work conducted by Rasch (1979). In contrast to previous studies, he found that it was not only economically feasible but also socially desirable to rehabilitate older, disabled clients in comparison to any other age group. This research was supported by Morrison, Magel and Brody (1985) who showed
that the majority of older (55–64 years), disabled workers tended to return to work and, in fact, returned to their previous employers and jobs following recovery from a disabling injury. In addition, Kiser (1972) reported that the provision of services to older, disabled workers was a profitable investment for VR programs. Meier and Kerr (1976) gave further support for the provision of vocational rehabilitation programs for older workers. They showed that if older workers are placed properly, they sustain fewer accidents on the job, show greater stability on the job and lose less time from work than their younger counterparts.

Kennedy (1974) examined certain demographic variables for 222 rehabilitated and 58 non-rehabilitated clients in an attempt to define those factors which discriminated between success and non-success in vocational rehabilitation programs. Of the eleven variables studied in the project, only three were found to be significant. Successful clients were found to have a higher education level, typically to be working at the time of referral and to not be dependent on some form of public assistance. This trend regarding financial assistance was also identified by Walls (1977) in his study of 200 vocational rehabilitation clients. Among the factors investigated including age, gender, disabling condition and full-time work history, Walls found that none were consistently related to outcome. He did find, however, that the greater the amount of benefits received, the less likely was the incidence of successful rehabilitation.
Krauft and Bolton (1976) also identified this trend and noted that clients receiving support from family members and friends and those on some form of public assistance at referral were less likely to be rehabilitated.

Other researchers have also collected information on various demographic variables which in their own way have been used as general screening variables for predicting outcomes in vocational rehabilitation programs. Eber (1966) used a weighted combination of variables for the prediction of rehabilitation success. The results of his investigations showed that males, married or having been previously married, with an education level of at least 10th grade and employed at the time of acceptance into the program demonstrated greater chances of success. Schechter (1981) also identified several variables associated with successful return to work status including being male, having greater financial need, a milder disability and a higher education level. These findings were generally supported by the research of Wright, Reagles and Thomas (1973) who identified the problem cases for vocational rehabilitation to be less well educated, single, having a severe disability and receiving some form of public assistance.

The majority of research to date has shown some interesting trends for a wide cross section of variables which may be used as general indicators of success or failure in vocational rehabilitation programs. The lack of
homogeneity in many of the samples, small sample sizes and diverse economic and sociological backgrounds of the subjects makes the comparison of much of the data difficult (Hester et al, 1986). While it is agreed that the trends found for some of the demographic variables warrants their use as a general screening tool, it is the complex interaction of these variables, not the singular influence of any one in particular, that seems, ultimately to influence success. Of all the studies reviewed, no intervention technique was found, either evaluation or treatment oriented, whose outcomes were measured in terms of successful vocational placement.
CHAPTER III    METHODOLOGY

3.1 OVERVIEW

Within the field of industrial medicine, the assessment of individual capacity for work is rapidly becoming an essential component of the vocational rehabilitation process. In particular instances where the presence of a physical disability has imposed some limitation of endurance or function, the nature of that limitation must be defined prior to the consideration of suitable vocational alternatives.

From a review of the literature, it is apparent that many specific assessment tools have evolved over the years with formats designed to meet particular needs (Pruitt, 1977; Gannaway and Sink, 1978; Smith, Cunningham and Weinberg, 1986; Matheson, 1987; Blankenship, 1988). These contemporary physical capacity assessment programs have developed a highly structured, multi-factorial approach with a distinct clinical orientation. Whether designed for use as a preliminary screening tool for specific target populations or as a general diagnostic guide to motor and cognitive function, the absence of empirical data from an industrial environment imposes distinct limitations on the interpretation of much of the data.

In order to satisfy the demands for objective measures of function within the actual world of work, most programs have attempted to quantify specific activity components of
jobs and have concentrated on the assessment of multiple aspects of overall function in simulated environments rather than the collection of work-related information. In most instances, no empirical data exists on the efficacy of the programs nor on their impact on returning injured workers to the work force. Very few physical capacity assessment programs exist that evaluate physical/functional capacity within an industrial context while assessing the impact of the process of information gathering on the ultimate goal of finding work.

3.2 PURPOSE OF THE STUDY

The purpose of this study was two fold. The primary objective was the development of an industrially-oriented, assessment format for the evaluation of individual physical capacity to perform work. Following completion and implementation of the evaluation program, the secondary purpose was to evaluate the efficacy of the physical capacity assessment program (PCA) on vocational placement.

3.3 METHODOLOGY

3.3.1 RATIONALE AND EXPERIMENTAL DESIGN

Following medical treatment, workers within the British Columbia Compensation System who have been left with a residual disability as the result of an industrial injury or
who are having difficulty returning to the work force are referred to a rehabilitation consultant affiliated with the Vocational Rehabilitation Department of the Workers' Compensation Board. The consultant assists the injured worker in the identification and selection of vocational options suited to their individual needs and within the limitations imposed by their injury. Often, this process involves the use of existing, transferable skills or the provision of additional skills through training, in an effort to improve the worker's marketability in the work place.

When the study was initiated, an intensive job search program was available to injured workers prior to searching for alternate employment. This assisted in the identification of job goals and provided job search strategies. Unfortunately, success or failure in finding suitable employment often depended on the random selection of vocational alternatives and, to some extent, trial and error when individual physical tolerances and limitations were not known. Approaches to solving vocational problems varied from consultant to consultant and no standardized approach to the identification and selection of suitable options existed.

The experimental design proposed two treatment groups in a post-test only configuration. The two treatment groups consisted of injury plus disability with vocational counselling only for job search (JS); and injury plus
disability with vocational counselling plus physical capacity assessment (PCA). Random assignment of the subjects to their specific treatment groups assumed significance in the absence of any pre-test information. In order to simulate actual working conditions in the rehabilitation setting, rehabilitation consultants were randomly selected for inclusion in the study and asked to select subjects for participation from their caseloads according to the pre-selected criteria. Subjects were then randomly assigned, on an alternating basis, to one of the two treatment groups.

Group homogeneity was maintained by selection criteria which included comparable types and degrees of disability, completion of active medical treatment, active rehabilitation cases and limited age range. Exclusively male subjects were selected for the study due to overall reduced availability of female participants in the compensation system.

3.3.2 DEPENDENT VARIABLES

For the purpose of this study, the effect of the two vocational placement techniques was evaluated in relation to the following dependent variables:

a. vocational placement (success/failure)
b. time to return to work (chronological)
c. type of vocational placement (appropriateness)
d. self-esteem (Coopersmith Self-esteem Questionnaire)
3.3.3 INDEPENDENT VARIABLES

In addition to the experimental variables, several independent variables were selected for investigation in relation to their possible effect on the outcome variables. Consistent with previous research in the field of predictive variables for returning disabled workers to active employment (Gannaway and Sink, 1978; Bolton, 1979; Growick and McMahon, 1983; Hester, Decelles and Gaddis, 1986) the following variables were selected for inclusion in the study:

a. injury type (upper body, lower body, spine)

b. degree of disability (medical percentage)

c. age (18-45)

All information relevant to these variables was obtained from the worker's files.

3.3.4 MODERATOR VARIABLES

The following biodemographic and moderator variables were selected for investigation to determine the extent to which they may impact on the outcome variables. They were selected on the basis of their relevancy to the compensation process.

a. time in medical treatment (injury to medical plateau)

b. pre-injury wages (monthly salary)

c. post-injury wages (monthly salary)
d. rehabilitation consultant  
e. marital status  
f. language (ESL)  
g. education (years)  

3.3.5 QUESTIONS

The critical questions to be asked in this study were as follows:

a. Can an activity-oriented, physical capacity assessment program that would accurately reflect an injured worker's readiness for work be designed and implemented for use in an industrial setting?

b. Is there a difference in the variables of success rate in vocational placement, time to vocational placement and type of vocational placement between the two treatment groups as represented by specific vocational placement techniques?

c. Are there trait/treatment interactions between the dependent variables and select worker characteristics of injury type, degree of disability and age?

d. What is the impact of select moderator variables such as time in medical treatment, pre-injury wages, post-injury wages, language, marital status, education, language and the effect of the rehabilitation consultant on the dependent
variables?

e. How is self esteem affected by involvement in either of the two different vocational placement techniques?

f. What is the overall reaction of the subjects in the study to their individual experiences of injury, disability and unemployment?

3.3.6 HYPOTHESES

Based on the above questions the following hypotheses were formulated:

Hypothesis 1: Subjects who receive physical capacity assessment (PCA) in addition to vocational counselling will be more successful in vocational placement, will return to work in a shorter period of time and will achieve a better vocational match than those who do not.

The information collected through physical capacity assessment will provide the rehabilitation consultant with detailed and accurate information on a worker's individual capacity for work. This information will refine the process of defining viable options for the worker by providing a more sophisticated information base than the technique presently in use which relies on a rehabilitation consultant's knowledge of the work place and previous experience with similar jobs and types of injuries. Improving the worker's chances of locating a suitable job
within his realm of abilities and physical limitations by providing more accurate and individualized information should enhance successful vocational placement and reduce not only the time taken in actually looking for work, but also provide a better job match for the worker.

Hypothesis 2: Subjects who undergo physical capacity assessment (PCA) in addition to vocational counselling will show a greater overall increase in measures of self-esteem.

The PCA program has been structured to be as informative as possible. From the intake to the discharge interviews, information will be continuously exchanged. Subjects were told the reason for referral and were invited to participate in the process. In addition, subjects were kept informed of their progress throughout the assessment and received a verbal summary of their results at discharge. The assessment format was structured to promote as positive and productive an environment as possible throughout the process of defining individual work tolerances. It is hypothesized that within such an environment where the worker, and the evaluator, cooperate to develop options for the future, that satisfaction levels will be higher and, accordingly, self-esteem enhanced as employment options are identified and developed.

Hypothesis 3: Ho: There will not be a significant trait/treatment interaction between the type of injury a subject has and the dependent variables of success in vocational placement, time to vocational placement, type of vocational placement and self-esteem for those subjects who undergo physical capacity assessment (PCA).
It is assumed that the type of injury a subject has will not affect nor contribute in any way to the differences that may be found to exist between the two treatment groups for the selected dependent variables. Regardless of injury type, subjects should experience similar feelings of satisfaction and self-esteem from the treatment processes and achieve similar success finding the appropriate type of work in the shortest period of time possible.

Hypothesis 4: Ho: There will not be a significant trait/treatment interaction between the degree of disability a subject has and the dependent variables of success in vocational placement, time to vocational placement, type of vocational placement and self-esteem for those subjects who undergo physical capacity assessment (PCA).

Assuming a consistent data collection format, PCA information collection should be unaffected by how much a subject is disabled as each task and module are completed at his own speed and within his levels of work tolerance. In reality, the assessment process should clearly define work-related limitations in the more severely disabled subjects. This information would then be used by the rehabilitation consultant in the selection of suitable vocational options taking into consideration the limitations and abilities revealed during the assessment process. Consistent, objective and reliable functional information is collected and provided to each worker consisting of an individualized physical tolerance profile. Once identified,
this information is used by the rehabilitation consultant to match workers with suitable employment options.

Hypothesis 5: Ho: There will not be a significant trait/treatment interaction between a subject's age and the dependent variables of success in vocational placement, time to vocational placement, type of vocational placement and self-esteem for those subjects who undergo physical capacity assessment (PCA).

Age should not affect the collection of assessment information nor in the marketing of a subject once he begins to actively look for work. Subjects will be selected in the age range 18-45 to ensure a sufficient period of time left in their working lives prior to retirement. In addition, the selected age range should be low enough so as not to be a negative factor for those employers looking for potential employees.

3.3.7 SUBJECTS AND SAMPLING

To facilitate the post-test only experimental design and to provide the highest power possible to the process of causative inference, the sample (N=50) was selected exclusively from the active cases of the Workers' Compensation Board of British Columbia Vocational Rehabilitation Department. Within this population, the following selection criteria were imposed;

a. completion of all medical treatment following recovery from an industrial accident.

b. in receipt of, or being evaluated for, a permanent
partial disability pension as the result of injuries sustained.

c. cleared for a return to work and preparing to become actively involved in that process.

d. male.

e. 18-45 years of age.

All subjects were selected by the rehabilitation consultants handling their cases for inclusion in the study and were known to the rehabilitation consultants prior to selection. The experimental design assumed equal cell size per treatment group with each subject randomly assigned to one of two treatment groups on the basis of the selection criteria. In addition, equal distribution took place with reference to the pre-selected worker characteristics of interest including age, degree of disability and type of disability.

3.4 DEVELOPMENT OF THE TESTING MATERIALS

3.4.1 TASK/MODULE PHYSICAL CAPACITY ASSESSMENT PROGRAM

Subjects assigned to the experimental group involving injury plus disability with vocational counselling plus physical capacity assessment (N=25) underwent an individually designed two week physical work capacity program within the Industrial Department of the Workers' Compensation Board clinic. For this experimental group twenty-five separate industrial tasks were designed ranging
from sedentary to very heavy in their strength requirements, consistent with the classification outlined in the CCDO (1987). The tasks were designed to be carried out in a shop setting and covered a variety of industrial work environments in a project format (Appendix A).

Tasks were listed in an inventory format primarily by the strength requirements of lifting, carrying, pushing and pulling various weights and were classified from sedentary to very heavy as defined in the CCDO (1987). Other information included a brief description of the project, the project setting, the necessary tools, materials required, instruction time and completion time, as well as some comments regarding specific work tolerances (Appendix B). The selection of tasks for the development of individual evaluation programs was completed by the vocational evaluator from the task inventory. The task/inventory served as the basis of the task/module system. All tasks were carried out within the same shop environment which constituted the Industrial Therapy Department.

A task was defined as an individual project with specific strength requirements containing one or more of the seven factors defined by the CCDO. Several tasks containing the specific factors of interest were then grouped together in a module to provide a specific measure of function for the factor under consideration. Following completion of the evaluation, subject performance for each separate task was grouped together in modules to give a factor-specific,
objective measure of function.

All tasks were designed to simulate actual working conditions and physical demands of industrial jobs as closely as possible. Tasks were consistently administered and monitored for all subjects by qualified shop instructors. Progress reports were completed by the shop instructors for each subject during task construction and submitted to the vocational evaluator for review (see Appendix C). Subjects were assigned to individual programs by the vocational evaluator based on demonstrated capabilities following completion of a physical evaluation to determine critical tolerance levels. Over the course of the two week evaluation, subjects were gradually progressed, as tolerated, through more physically demanding tasks until maximal demonstrated tolerance levels were achieved.

3.4.2 REMEDIAL THERAPY PHYSICAL EVALUATION

Following the intake interview with the vocational evaluator and prior to commencing any tasks within the industrial shops, all subjects underwent a two hour physical evaluation carried out by a qualified remedial therapist. This exercise-oriented evaluation was designed to assess individual critical tolerances consistent with the guidelines established by the CCDO in the main strength categories of pushing, pulling, lifting and carrying as well as seven other critical factors. Individual performance
tolerances in these factors were recorded in a standard report format (Appendix D) and provided to the vocational evaluator for review prior to the development of the evaluation program. Utilizing the minimum critical tolerance levels previously defined by the physical evaluation for the eight factors, individual programs for each subject were then designed using the task/module format.

3.5 DATA COLLECTION

3.5.1 PROGRAM ADMINISTRATION

Subjects were referred for Physical Capacity Evaluation by the rehabilitation consultant handling their case and randomly assigned to the experimental group. A standardized referral format was used and the subject informed of the assessment in advance (Appendix E). For this treatment group collection of all pre-program critical tolerance information in the Remedial Therapy Physical Evaluation was carried out by two male remedial therapists within the treatment gymnasiums at the Workers' Compensation Board of British Columbia Clinic. Both therapists were professionally qualified and had many years experience in performing evaluations of this type. Subjects were referred for physical evaluation to the therapists on an alternating basis and the evaluation was carried out following a brief intake interview. All evaluations were administered
utilizing the same exercise protocol and each subject took approximately 60-70 minutes to complete the evaluation. Reports were available one day following completion of the physical evaluation.

Four qualified vocational evaluators were involved in the collection of the physical capacity information from the industrial shops and were assigned subjects on an alternating basis. The vocational evaluators conducted the initial intake interviews which lasted from 15-30 minutes each following the format described by Pruitt (1986) where the purpose of the program was discussed and the appropriate shops and activities selected. Following receipt of the physical evaluation information, the evaluators designed the individual task/module programs for the subjects and provided an orientation to the industrial shop areas. This process involved approximately 60 minutes per subject. Following confirmation of the program and shop orientation, each subject began their individualized structured work day from 8.30 a.m. until 4.00 p.m. Subjects undertook a series of progressive, task-oriented projects designed to evaluate physical work capacity based on a task/module format consistent with the strength and activity factors described by the CCDO (1987). Each subject was encouraged to work within their own personal tolerance levels and progress was recorded on a daily basis by the shop instructor assigned to each shop on a task analysis sheet. Subjects alternated between several different tasks within a working day within
several different shops with individual tasks varying from a one day project to two weeks. On a daily basis during the course of the two week evaluation, the evaluators discussed individual subject performance, reviewed task performance in the shop setting, discussed subject performance with the shop instructors and accommodated changes in program requirements as needed. They were also available to answer any questions which arose during the course of the evaluation.

Following completion of the program, the evaluators provided each subject with a verbal progress report during their discharge interview and completed an individualized written final report based on the observations of the shop instructors for each task performed (Appendix F). This final report was returned to the rehabilitation consultant within 3-4 working days for their review. With this information on individual work tolerances, the subject then began the task of looking for suitable work within the general tolerance guidelines outlined in the report with the assistance of the rehabilitation consultant for a predetermined period of six months. Progress in the task of looking for work was monitored by the rehabilitation consultant every two weeks.

The shop instructors involved in the collection of individual task performance data within the industrial shops were qualified tradesmen and trained in task detailing and data collection. Standard report formats were used for the
collection of all task information (Appendix C) and were provided to the vocational evaluator for inclusion in the final report immediately following completion of the task.

3.5.2 JOB SEARCH PROGRAM

Subjects assigned to the treatment condition involving injury plus disability with vocational counselling only were referred on a random basis to a three day job search program conducted by a vocational rehabilitation consultant on a full day basis. Referral to the program was made by the rehabilitation consultant handling the case using an established referral format. During the job search program, subjects were counselled on the process of actively looking for work using established and recognized techniques (Azrin, Flores and Kaplan, 1975) consisting of job goal identification, interview techniques, job search strategies and resume writing. Following completion of the three day program, subjects were referred back to their rehabilitation consultants to begin the task of looking for work with a completed and updated resume. Progress was monitored by the rehabilitation consultant in charge of the case during the process of job search every two weeks for a period of six months or until the subject found employment.
3.6 SCORING

3.6.1 SUCCESS IN VOCATIONAL PLACEMENT AND TIME TO VOCATIONAL PLACEMENT

Following completion of the treatment programs, each consultant monitored the progress of their subjects every two weeks during the process of actively looking for work. For those subjects involved in the job search treatment condition, the process of actively looking for work began within 3 days of completing the job search program following receipt of their resume. For those subjects undergoing physical capacity evaluation, active job search began within 2 days of program completion following receipt of the functional information by the rehabilitation consultant.

Once the subject began to actively look for work, success in vocational placement was defined in terms of actively returning to the work force in full-time employment for renumeration. Time to vocational placement was defined as chronological time elapsed until successful vocational placement was achieved. The potential working days per month were tabulated, exclusive of holidays, and recorded on a cumulative basis. Those subjects not securing employment within the 6 month time period received the maximum recorded value. The total number of days to employment were tabulated for the two treatment conditions and were expressed as an mean figure.
3.6.2 TYPE OF VOCATIONAL PLACEMENT

The type of vocational placement ultimately achieved was defined as either appropriate, inappropriate or not applicable. For those subjects who ultimately achieved successful vocational placement, an appropriate vocational placement was defined as a job having general physical requirements within the demonstrated guidelines identified during physical capacity assessment. In addition, subjects achieving successful vocational placement within the six-month placement restriction were monitored for 2-4 weeks following placement as a follow-up. If they were still working without problem within this follow-up time-frame, it was considered that appropriate vocational placement had been achieved.

Inappropriate vocational placement was defined as successfully securing a job that was within a subject's demonstrated capacity following PCA but without successful long-term vocational placement after the 2-4 week follow-up. These failures or inappropriate vocational placements were usually due to the patient's inability to tolerate some specific aspect of the physical demands of the job resulting in a lay-off due to increased symptomatic discomfort or physical incompatibility.

Vocational placement that was not-applicable was recorded for those patients who were unsuccessful in achieving vocational placement within the six-month
3.6.3 SELF-ESTEEM

Information relevant to feelings of self esteem was measured for all subjects \((N=50)\) in both treatment conditions by the Coopersmith Self-Esteem Inventory (Coopersmith, 1965) prior to the beginning of the program and following completion of the treatment condition. It was considered critical to the implementation of vocational counselling techniques to assess how subjects viewed themselves within the greater context of the two treatment processes and how these feelings carried over into the task of looking for work. For the purpose of this study, high self-esteem was taken to mean that the individual had self-respect and considered him/herself worthy. Low self-esteem implied rejection, self-dissatisfaction and self-contempt. The inventory consisted of 25 items answered on a modified five-point Guttman scale from "always like me" to "never like me" (Appendix G). Responses were treated as scores.

3.7. QUALITATIVE DESCRIPTION OF UNEMPLOYMENT EXPERIENCE

In addition to the Coopersmith Self-Esteem Inventory data, each subject was interviewed for an average of 60 minutes by the rehabilitation consultant handling their case using a structured interview format similar to that used by Borgen and Amundson (1984). This approach was designed to collect information in the major area of life experience in
relation to factors that change with unemployment. This information was collected in pre-program and post-program interviews by the rehabilitation consultant handling the particular case. The interview style was open-ended and non-directive and was designed to collect information on individual experiences in the areas of community (support from family, friends), meaning of life (purpose and contribution), life structure (routine and organization) and finance (security). Following collection and sorting, the interview information was discussed with the consultants for general accuracy and authenticity.

Following a review of the pre-program interview information, the 50 experiences were compared with each other and similar incidents or trends were sorted by the principal investigator into general categories based on the support, meaning, structure and security headings. The post-program interview was carried out for all subjects to determine if any changes had taken place in relation to the life experience factors and to determine what had contributed to the change. Positive high points and negative low points were noted as well as critical incidents that may have influenced, or perpetuated change, were recorded for each subject. Sorting of the incidents into the 4 suggested categories was confirmed with a sample of six rehabilitation consultants with 85% reliability.

A life line was constructed for each subject noting the time sequencing of events throughout the program and how
these events impacted and affected overall feelings of self-esteem. Lifelines were sorted into 4 major categories with a verbal description and visual outline based on common factors including curve characteristics, similar interview response groupings and post-program esteem scores. An 88% reliability rating was achieved following review by a panel of six rehabilitation consultants on the 4 lifeline categories.

3.8 DATA ANALYSIS

3.8.1 STATISTICAL PROCEDURES

Statistical analysis of the data was done in two phases using the Lertap 3 P/C Version 2.31 (1987 Update) for tabulation of the self-esteem data and the Statistical Package for the Social Sciences Version X 3.0 (SPSS, 1988). The computer used was an IBM 3090 maintained by the Workers' Compensation Board Computing Centre.

Chi-square and a multi-variate analysis of variance (ANOVA) for the main effect of the difference between treatment groups (N=50) using a mixed model ANOVA were analyzed to yield the results provided in Tables I-VII. The statistical significance (probability of type 1 error) was determined for each independent variable and for each interaction. The Fischer t statistic was then employed as a post-hoc analysis to determine the loci of significant differences found in main and interaction effects.

80
Chapter IV RESULTS

The purpose of this study was two-fold. The initial objective was the development of an industrially-oriented assessment format for the evaluation of individual capacity to perform work. Following development and implementation of the evaluation program, the second purpose was to evaluate the efficacy of the physical capacity assessment program on vocational placement. Based on a review of the literature, five hypotheses were formulated stating main effects and interactions of age, injury type and degree of disability.

Summaries of the demographic characteristics of subjects can be found in Appendix H. As the distribution of the variable time to vocational placement (TIME2VP) was skewed positively to the right, the natural log of the values was used to normalize the data in order to make ANOVA an appropriate statistical procedure. The results of inferential statistical tests of the hypotheses are as follows;
4.1 STATISTICAL ANALYSES

Hypothesis 1: Subjects who receive physical capacity assessment (PCA) in addition to vocational counselling will experience more frequent success in vocational placement (VPSUCCES), in a shorter period of time (TIME2VP) and with a better vocational match (TYPVP) than those who do not.

Contingency table (2 X 2) and Chi-square analysis revealed a significant main effect for group type (GRPTYPE) at the .005 level for success in vocational placement (VPSUCCES) with the physical capacity assessment (PCA) group mean exceeding that of the job search (JS) group (Table I). Of the 25 subjects in the PCA group, 18/25 or 72% were successfully placed within 6 months versus 7/25 or 28% for the JS group. Chi-square analysis of the effect of vocational match between groups (TYPVP) failed to achieve statistical significance.

Analysis of variance results for time to vocational placement (TIME2VP) using the natural log transformation of cumulative total time (days) revealed that the effect of group type failed to achieve statistical significance. The first hypothesis was, therefore, only partially supported.

Given this significant main effect for the dependent variable for success in vocational placement of p=.005, the effect of group type on VPSUCCES warrants further discussion.
Table I - Crosstabulation Table and Chi-square Analysis of Success in Vocational Placement (VPSUCCESS) by Group Type (GRPTYPE)

<table>
<thead>
<tr>
<th>GROUPTYPE</th>
<th>VPSUCCESS</th>
<th>COUNT</th>
<th>ROW TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>7</td>
<td>25</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>18</td>
<td>50.0</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>7</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>18</td>
<td>50.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHI-SQUARE</th>
<th>D.F.</th>
<th>SIGNIFICANCE</th>
<th>MIN E.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.000000</td>
<td>1</td>
<td>0.0047</td>
<td>12.500</td>
</tr>
</tbody>
</table>

VPSUCCESS: 1=SUCCESSFUL  2=UNSUCCESSFUL
GROUPTYPE: 1=JOB SEARCH  2=PHYSICAL CAPACITY ASSESSMENT

Hypothesis 2: Subjects who receive physical capacity assessment (PCA) in addition to vocational counselling will show a greater overall increase in measures of self-esteem.

Table II shows the LERTAP analysis of the raw pre/post- program self-esteem scores for both groups including means, standard deviations, variance and Cronbach alpha internal consistency scores. Both groups increased their self-esteem scores during the course of the program.
with some slight variations between groups. Subjects in the job search (JS) group were found to have lower pre-program self-esteem mean scores compared to the physical capacity assessment (PCA) group (87.72 vs 92.68) and higher post-program self-esteem values (96.08 vs 95.96). ANOVA results revealed no significant differences between groups for pre-program, post-program or for changes in self-esteem scores. The second hypothesis was not supported.

Table II - LERTAP Means, Standard Deviations, Variance, Cronbach alpha and correlation of self-esteem scores N = 50

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>Variance</th>
<th>Cronbach alpha</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>90.20</td>
<td>11.92</td>
<td>142.122</td>
<td>.777</td>
<td>.210</td>
</tr>
<tr>
<td>Post-test</td>
<td>96.02</td>
<td>11.64</td>
<td>135.367</td>
<td>.819</td>
<td>.005</td>
</tr>
</tbody>
</table>

Hypothesis 3: There will not be a significant trait/treatment interaction between the type of injury a subject has and the dependent variables of success in vocational placement, time to vocational placement, type of vocational placement and self-esteem for those subjects who undergo physical capacity assessment (PCA).

Contingency table (2 X 3) and Chi-square analysis failed to achieve a significant between groups effect for injury type on the dependent variables of success in vocational placement and type of vocational placement.
achieved. ANOVA for the effect of injury type on time to vocational placement did not reveal any significant differences between groups. ANOVA for the effect of injury type on self-esteem scores did not reveal any significant differences between groups.

Cross-tabulation of success in vocational placement controlling for injury type did, however reveal a significant interaction with group type (p < .05) for those subjects with injuries to the upper body (Table III). The third hypothesis was partially supported. This effect warrants further discussion.

Table III - Crosstabulation Table and Chi-square Analysis of Success in Vocational Placement (VPSUCCES) by Group Type (GRPTYPE) controlling for Injury Type (INJTYPE) for injuries to the upper body

<table>
<thead>
<tr>
<th>GROUPTYPE</th>
<th>COUNT</th>
<th>VPSUCCES</th>
<th>ROW TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>13</td>
<td>59.1</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>9</td>
<td>40.9</td>
</tr>
<tr>
<td>COLUMNS</td>
<td>10</td>
<td>12</td>
<td>45.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>45.5</td>
<td>54.5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHI-SQUARE</th>
<th>D.F.</th>
<th>SIGNIFICANCE</th>
<th>MIN E.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.40157</td>
<td>1</td>
<td>0.0359</td>
<td>4.091</td>
</tr>
</tbody>
</table>

85
Hypothesis 4: There will not be a significant trait/treatment interaction between the degree of disability a subject has and the dependent variables of success in vocational placement, time to vocational placement, type of vocational placement and self-esteem for those subjects who undergo physical capacity assessment (PCA).

Contingency table (2 X 2) and Chi-square analysis did not reveal a significant difference between groups effect of degree of disability on the dependent variable of success in vocational placement or type of vocational placement. Analysis of variance results revealed that degree of disability was not significant in its effect between groups on time to vocational placement or self-esteem scores.

Crosstabulation of success in vocational placement by group type controlling for degree of disability did reveal a significant Chi-square value (p = .01) indicating a relationship with group type for those subjects with disabilities less than 5% (Table IV). The fourth hypothesis was partially supported and warrants further discussion.
Table IV - Crosstabulation Table and Chi-square Analysis of Success in Vocational Placement (VPSUCCES) by Group Type (GRPTYPE) controlling for Degree of Disability (DISABGP) less than or equal to 5%.

<table>
<thead>
<tr>
<th>GROUPTYPE</th>
<th>COUNT</th>
<th>VPSUCCES</th>
<th>1</th>
<th>2</th>
<th>ROW TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>4</td>
<td>9</td>
<td>13</td>
<td>50.0</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>11</td>
<td>2</td>
<td>13</td>
<td>50.0</td>
</tr>
<tr>
<td>COLUMN TOTAL</td>
<td>15</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROW TOTAL</td>
<td>57.7</td>
<td>42.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CHI-SQUARE</th>
<th>D.F.</th>
<th>SIGNIFICANCE</th>
<th>MIN E.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.67273</td>
<td>1</td>
<td>0.0172</td>
<td>5.500</td>
</tr>
</tbody>
</table>

Hypothesis 5: There will not be a significant trait/treatment interaction between a subject's age and the dependent variables of success in vocational placement, time to vocational placement, type of vocational placement and self-esteem for those subjects who undergo physical capacity assessment (PCA).

Contingency table (2 X 2) and Chi-square analysis did not reveal a significant between groups effect of age on the dependent variable of type of vocational placement. Crosstabulation of success in vocational placement by group type controlling for age group did show a significant Chi-square value (p < .05) (Table V). Analysis of variance results confirmed a 2-way interaction between group type and
age on time to vocational placement. The difference, however, was not statistically significant (p = .06). Analysis of variance results did not reveal that age was significant between groups in its effect on self-esteem scores. The fifth hypothesis was partially supported and does warrant further discussion.

Table V - Crosstabulation Table and Chi-square Analysis of Success in Vocational Placement (VPSUCCES) by Group Type (GRPTYPE) controlling for Age Group (AGEGP) for subjects greater than or equal to 30 years of age

<table>
<thead>
<tr>
<th></th>
<th>GROUPTYPE</th>
<th></th>
<th></th>
<th>ROW TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPSUCCES</td>
<td></td>
<td>1</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>11</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>4</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>COLUMN TOTAL</td>
<td>11</td>
<td>15</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>ROW TOTAL</td>
<td>42.3</td>
<td>57.7</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

CHI-SQUARE | D.F. | SIGNIFICANCE | MIN E.F. |
-----------|------|--------------|---------|
3.72273   | 1    | 0.0537       | 5.077   |
4.2 INDIVIDUAL DIFFERENCES

In the second part of this chapter, inferential statistical techniques (ANOVA) are used to relate select biodemographical data and moderator variables to the outcome variables and to the difference between groups. The purpose of this analysis was to determine which of these factors affected the dependent variables and to determine the extent and influence of any interactions. Of the variables investigated, marital status and time-loss were found to be significantly related to time to vocational placement (TIME2VP) and to group (GRPTYPE).

Appendix H lists the biodemographic data and moderator variables that were examined. The average time in medical treatment was 245 days. The average level of education was Grade 11. Of the entire sample, N=42 or 84% spoke English as a first language; N=8 or 16% spoke English as a second language; N=18 or 36% were single and N=32 or 64% were married. Other factors investigated were the difference in pre-injury salary and post-injury salary for those who achieved successful vocational placement and the effect of rehabilitation consultant.

Marital status as a discreet variable was divided into two groups; single and married. A two way Analysis of Variance with log n of time to vocational placement (LTIME2VP) as the dependent variable revealed a significant relationship between marital status and log n of time to vocational placement (p = .01) and group type (p = .05).
There was also a significant 2-way interaction between group type and marital status (p = .05) (Table VI). This relationship indicated overall that single subjects tended to be placed faster than married subjects and that this trend was consistent for those subjects in the PCA group compared to those subjects in the job search group.

Time loss as a continuous variable showed a significant relationship to time to vocational placement (p = .05) following analysis of variance (Table VII). As a general indicator, subjects with less time loss from the time they were injured to the time they began the program were placed faster than those subjects with more time loss. No effect for group was found. These were the only two variables examined that had a significant relationship with the dependent variables.

Table VI - Summary of 2-way Analysis of Variance of LTIME2VP by GRPTYPE by MARITAL STATUS

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Probability (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRPTYPE</td>
<td>1</td>
<td>5.976</td>
<td>6.183</td>
<td>.021</td>
</tr>
<tr>
<td>MARITAL</td>
<td>1</td>
<td>8.625</td>
<td>8.923</td>
<td>.007</td>
</tr>
<tr>
<td>INTERACTION</td>
<td>1</td>
<td>5.788</td>
<td>5.988</td>
<td>.023</td>
</tr>
</tbody>
</table>

90
Table VII - Summary of 2-way Analysis of Variance of LTIME2VP by GRPTYPE by TMLOSSGP

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Probability (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRPTYPE</td>
<td>1</td>
<td>3.851</td>
<td>3.214</td>
<td>.087</td>
</tr>
<tr>
<td>TMLOSSGP</td>
<td>1</td>
<td>7.618</td>
<td>6.357</td>
<td>.020</td>
</tr>
<tr>
<td>INTERACTION</td>
<td>1</td>
<td>1.928</td>
<td>1.609</td>
<td>.218</td>
</tr>
<tr>
<td>GRPTYPE X TMLOSSGP</td>
<td>1</td>
<td>1.928</td>
<td>1.609</td>
<td>.218</td>
</tr>
</tbody>
</table>

4.3 INTERVIEW INFORMATION AND LIFELINE PATTERNS

Pre-program interview information collected by the rehabilitation consultants was transcribed and summarized. These summarized transcripts were then transferred to rating sheets which emphasized general characteristics of the subjects unemployment experience from the date of injury to the date of intake into the program. Responses were grouped following the general categories of community (support from family, friends), meaning of life (purpose and contribution), life structure (routine, organization) and finance (security). Similar stories for the 50 subjects were grouped together based on interview responses and were cross-referenced with lifeline groupings. Four patterns (A - D) of the injury/unemployment experience emerged which mapped individual emotional responses over time.
Group A

Group A (Figure 1) was composed of 9 people: 4 back injuries; one crushed hand; one electrocution with burns to the feet and hands; one multiple class injury with hip and knee injuries from an MVA; one rotator cuff tear to the shoulder and one knee injury. Only one subject had attempted to return to work since the injury without success. All subjects had experienced an initial negative reaction to the injury and had consistently reported negative feelings of emotional behavior from date of injury to date of intake into the program with some minor fluctuations. All subjects had experienced significant physical pain at the time of injury and one subject had gone through a death experience. Throughout the recovery period, all subjects remained reasonably optimistic regarding their vocational outlook despite varying degrees of vocational counselling. All subjects admitted to being slightly below their usual levels of self-esteem or optimism but were looking forward to the upcoming programs with a positive outlook. Composition by treatment group was three PCA, six JS.
<table>
<thead>
<tr>
<th>(+)</th>
<th>E M O T I O N</th>
<th>(−)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E</td>
</tr>
</tbody>
</table>

Time

Figure 1 - Group A: Lifeline Profile

A. Initial reaction to accident/injury (worry, anger)
B. Medical recovery phase (anxious, frustrated, hope)
C. Acceptance of accident/loss (stable, encouraged)
D. Anticipation of job search or physical capacity assessment (doubtful, hopeful, encouraged)
E. Lifeline completion prior to program start

Group B

Group B (Figure 2) was composed of 7 people: 3 hand injuries including an amputation, laceration (saw cut) and bi-lateral wrist tendonitis; one fractured tibia/fibula; one rotator cuff tear to the shoulder; one back and one elbow injury. None of the subjects had returned to work since their injury. All had experienced an initial negative reaction to the injury followed by a steady, negative emotional decline. None of the subjects in this group had come to terms with their disability from an emotional perspective and, in addition, had experienced some difficulty with the acceptance of their claim. Several of
the subjects in this group had experienced marital problems since their injury which had impacted significantly on their emotional support structure. One of the subjects had lost his wife to cancer since his injury and was raising his two children alone. Two of the subjects had experienced deaths of fathers or mothers and one subject had lost his child at birth. All subjects were experiencing worry and anxiety regarding their vocational futures despite varying degrees of vocational counselling and were not optimistic regarding future prospects. Group composition was six PCA, one JS.
Figure 2 - Group B: Lifeline Profile

A. Initial reaction to accident/injury (worry, anger)
B. Medical recovery phase (anxious, frustrated, fear)
C. Significant life event (emotional uplift)
D. Reflection upon loss (discouraged, uncertain)
E. Insulation from job search (apathetic)
F. Internalization of rejection (despair, uselessness)
G. Lifeline completion prior to program start

Group C

Group C (Figure 3) was composed of 19 people: 4 back injuries; 5 knee injuries; 3 shoulder injuries; one elbow injury; one wrist injury; one bilateral fractured os calcis; one crush amputation to fingers on the right hand; one saw cut to the leg; one animal bite to the thigh and one burn to the arm. None of the subjects had returned to work since the injury. All subjects but one had experienced an initial negative reaction to the injury and had encountered minor day to day emotional fluctuations. Despite some very serious and life-threatening injuries (amputation injury and fractures to the feet), none of the subjects in this
category were overly concerned regarding their vocational future and most were confident about returning to work. All had returned to an emotional and self-esteem level close to their pre-accident level and felt that it was simply a matter of time before they got back to work. Group composition was 12 PCA, 7 JS.

Figure 3 - Group C: Lifeline Profile

A. Initial reaction to accident/injury (worry, anger)
B. Medical recovery phase (anxious, frustrated, hope)
C. Ongoing medical emergencies/surgery/recovery (hope, anger, frustration, emotional rollercoaster)
D. Anticipation of job search (hopeful, encouraged)
E. Lifeline completion prior to program start
Group D

Group D (Figure 4) was composed of 10 people: 3 back injuries; 2 shoulder injuries; 2 knee injuries; 2 hand injuries including an amputation and one fractured foot. None of the subjects had returned to work since the injury. Despite experiencing an initial negative reaction to the injury, all had recovered to an emotional level exceeding the pre-injury level and had maintained an optimistic and positive outlook for the upcoming program. Most of the subjects in this group expressed satisfaction with their rehabilitation consultant, with their medical treatment and with their exposure to the WCB process. Nearly all of these subjects described a good family support structure and a strong marriage as contributing factors to their positive outlook. Group composition was seven PCA, three JS.
Figure 4 - Group D: Lifeline Profile

A. Initial reaction to accident/injury (worry, anger)
B. Medical recovery phase (anxious, frustrated, hope)
C. Acceptance of loss and anticipation of job search (hopeful, determined)
D. Support/maintenance/levelling/stabilization
E. Anticipation of job search or physical capacity assessment (hopeful, encouraged)
F. Lifeline completion prior to program start
4.4 SUMMARY OF FINDINGS

In the present chapter, the results of subjects' success in achieving vocational placement as well as feelings of self-esteem under two treatment conditions were analyzed. Chi-square analysis showed success in vocational placement (VPSUCCES) to be the only significant main effect for the difference between groups with the subjects involved in physical capacity assessment (PCA) being successfully placed more frequently than those in the job search program (JS).

Effects of group type (GRPTYP) on type of vocational placement (TYPVP) and time to vocational placement (TIME2VP) were not found. There was a significant effect of age on success in vocational placement between groups indicating that older subjects ( > 30 years) were successfully placed more frequently than younger subjects ( < 30 years). This trend was consistent between groups with the PCA group placing more older subjects than younger subjects.

A significant interaction effect between success in vocational placement (VPSUCCES) and injury type (INJTYPE) was found between groups showing that subjects with injuries to the upper body tended to be placed more successfully and that this trend was consistent for the PCA group over the job search (JS) group. A significant interaction effect was also found between success in vocational placement (VPSUCCES) and degree of disability (DISABGP) between groups with those subjects with a disability less than 5% being
placed more frequently than those with a greater disability. This trend was also consistent for the PCA group over the job search (JS) group.

The prediction that the PCA program would result in a greater overall increase in measures of self-esteem was not confirmed. No significant differences were found between groups for pre-program self-esteem scores or for post-program self-esteem scores. The difference in self-esteem scores was also not significant between groups. Both groups, however, recorded increases in self-esteem values during the course of the program indicating a positive overall effect (Figure 5) with the job search group showing the most improvement overall.

Figure 5: Self-Esteem Score Improvement by Group
Education, language, consultant, pre-injury wages, post-injury wages, length of time on wage loss and marital status were investigated as possible biodemographic factors or moderator variables which could influence the dependent variables. It was found that length of time on wage loss (TIMELOSS) and marital status (MARITAL) significantly affected time to vocational placement. For the TIMELOSS variable, those subjects with less time loss were placed faster. No effect for group was found. The marital factor demonstrated a significant 2-way interaction with time-loss and group type indicating single subjects were placed faster than married subjects overall and that single subjects in the PCA group were placed faster than single subjects in the job search group. These findings will be further discussed in the following chapter.
CHAPTER V  DISCUSSION OF RESULTS

At the Workers' Compensation Board of British Columbia, workers who have been left with a residual disability as the result of an industrial accident, and who are experiencing difficulty in returning to the work force, are referred to a vocational rehabilitation consultant for assistance. The consultant assists the injured worker in the identification and selection of suitable vocational alternatives within the physical limitations imposed by their injury.

At the time when the research study was initiated, a formalized job search program was available to injured workers prior to embarking on their quest for alternate employment. The job search program assisted in the identification of job goals and provided some job search strategies and techniques. Success or failure in finding suitable employment following completion of this program often depended on the random selection of vocational alternatives and, to some extent, trial and error when individual physical tolerances were not known. No screening device or standard approach to the quantification of individual tolerance for work was then available to assist the rehabilitation consultant in the identification and selection of suitable vocational options. It was suggested that the development of a physical capacity assessment program (PCA) for the quantification of individual work tolerances based on actual performance within an industrial setting would greatly assist the
rehabilitation consultant in the successful placement of injured workers.

Following the review of the literature, questions were raised regarding the relevance of some of the commercially available physical capacity assessment programs to the actual physical demands of the working world in the absence of a discrete industrial component. In addition, very few programs presently in use had investigated the effect of physical capacity assessment on vocational placement (Walk, 1985; Smith, Cunningham and Weinberg, 1983) and no specific program information was available on the impact of the process of physical capacity assessment on the human values of self-esteem. For these reasons, it seemed appropriate to design an industrially-oriented physical capacity assessment program and explore the effects of various factors on specific vocational placement and human variables.

5.1 GROUP DIFFERENCES IN VOCATIONAL PLACEMENT VARIABLES

Success in vocational placement showed a significant difference for the treatment group undergoing physical capacity assessment. Eighteen of the twenty-five subjects in the PCA group or 72% successfully returned to work in six months following completion of the program compared to seven out of twenty-five or 28% for the job search group. This compares favorably with the placement information reported
for the Singer System (Gannaway and Sink, 1978) where a +0.50 correlation coefficient was found in predicting employment success in jobs specifically found in the occupational group associated with the job sample.

There is very little other related research with which to compare this finding. Using paper tests with a limited functional component, Smith, Cunningham and Weinberg (1983) studied the predictive validity of the Functional Capacities Evaluation (FCE) when administered with the Smith Physical Capacities Evaluation (SMITH-PCE). Comparisons of evaluation predictions to current employment status revealed an 86.5% prediction rate despite minimal use of any activity-based program. Hester, Decelles and Gaddis (1986) reported an 89% prediction rate for identifying potential return to work subjects for the Menninger Return to Work Scale.

Despite the superiority of PCA over job search on success in vocational placement, no difference was found for the variables of time to vocational placement and type of vocational placement. Of those subjects who achieved successful vocational placement in both groups, there was no difference between the length of time it took them to find work. Most of the work found by subjects in both groups was appropriate and within their individual work tolerances. This meant that most of the workers who found employment were still working 2-4 weeks following placement.

There are several possible explanations for the
significant main effect of success in vocational placement and the lack of significance for the other two variables. One explanation rests with the type of objective data generated by the PCA which outlines individual tolerances for specific types of work and job compatibility. With this information, the rehabilitation consultant can work with the worker to actively pursue concrete vocational options on the road to employment knowing their individual tolerances. Options that may have been possibilities and which now have been confirmed can be quickly investigated.

The job search process does not provide this type of information. Consultant follow-ups tend to decline following completion of the job search program in the absence of firm vocational options and the enthusiasm generated by the program quickly subsides. Unlike the job search program, worker confidence and involvement in the process of looking for work following PCA is enhanced by the knowledge of individual work tolerances and there is confidence in ability to perform the job.

5.2 LIFELINE CATEGORIES, UNEMPLOYMENT AND SELF-ESTEEM

Despite the lack of significant differences between groups on measures of self-esteem, the impact of the overall process on individual feelings of self-worth deserves some mention. Both the job search and PCA programs positively influenced self-esteem. This information would tend to support the literature describing reduced levels of
self-esteem and self-worth that accompany unemployment (Amundson and Borgen, 1982; Jahoda, 1982; Rump, 1983; Tiggemann and Winefield, 1984; Harrison, 1976; Simon, 1971) and unemployment with disability (Stone and Sawatzki, 1980; Borgen, Amundson and Biela, 1987). The increased levels of self-esteem following the job search program tend to support the previous research findings reported by Shapiro (1978) of significant improvement in measures of self-esteem for unemployed workers following a short, intensive program of job search with supervision. Our findings would tend to support previous evidence that an intervention technique, especially with disabled groups who are unemployed, would result in increases in self-esteem. Whether this represents an actual increase, is the result of denial or is merely an artefact of the testing process is unclear.

The interview information and lifeline categories reveal detailed information on individual reactions to injury, disability and unemployment and places a significant amount of importance on the financial support structures of the wage loss system. It also reveals the significance of family support structures on self-esteem values and how critical incidents, both positive and negative, can influence emotional levels.

5.3 WORKER CHARACTERISTICS IN VOCATIONAL SUCCESS

There was a general tendency in both groups for injury
type, age and degree of disability to affect success in vocational placement. Significant values were recorded for all measures (p < .05) indicating some interesting general trends. The lack of research findings in the literature on the effect of injury type on vocational placement makes comparison of this information difficult. The significant interaction of upper limb injuries with success in vocational placement for the PCA group showed that those subjects with injuries to the upper portion of the body (chest, shoulders, elbows, wrists, hands) tended to be placed more frequently than those with injuries to other parts of the body. Several explanations are offered for this effect.

Firstly, when compared with injuries to the spine and to the lower limbs, the overall impact of upper limb injuries on general mobility is less significant. Mobility can still be maintained while recovering from an upper body injury and variations in posture and ambulation are less obvious. Despite a medical plateau and recovery from injuries to the lower limbs and back, the restrictions to mobility and hence job search activity from these type of injuries can be more restrictive than injuries to the upper limbs on a long-term basis with ramifications far beyond the recovery stage.

Secondly, spinal and lower leg injuries, especially to the knees and feet, tend to deteriorate with time due to weight-bearing requirements and are prone to degenerative
arthritis. With the physical requirements of most primary industry jobs necessitating long hours on the feet, these type of injuries may not tolerate repeated exposures on an ongoing basis.

The effect of degree of disability on success in vocational placement indicated that those workers with a disability less than 5% (mild) were placed more frequently than workers with more severe disabilities. These findings are supported by the work of Schechter (1981) who correlated milder disability with successful return to work and Wright, Reagles and Thomas (1973) who identified problem cases for vocational rehabilitation to be less educated, single, having a severe disability and receiving some form of public assistance. These results are not consistent, however, with the research of Walls (1982) who found no significant interaction between disabling condition and success in vocational placement. Of significance may be the observation that a higher proportion of subjects in both groups had milder disabilities which may have had an impact on the overall success rate.

It was predicted that age would not have any effect on the placement variables. The significant success in vocational placement by group type by age interaction indicated that older subjects were placed more frequently than younger subjects and that this trend was consistent for the PCA group over the Job Search group. These findings are in contrast to the work of Bolton (1979) who found that age
was viewed as a deterrent to successful vocational placement and who identified a trend toward a greater likelihood of successful vocational outcome for the younger age group. This general trend was also identified by Hester, Decelles and Hood (1986) and was generally attributed, in part, to the diminishing work capacity of older persons (Christensen, 1955; Bonjer, 1962; Snook, 1971; Petrofsky and Lind, 1975) and to the general relationship between age and frequency of work disability as reported by Blake (1981) and Bowe (1983).

The research of Rasch (1979), Morrison, Magel and Brody (1985) and Meier and Kerr (1976) however, support the view that older, disabled workers tended to achieve successful vocational placement and in fact returned to their previous employers following recovery from a disabling injury. The results from this study tend to support this tendency towards older, successful vocational placement. The reality that employers valued work force experience gathered as the result of age could be another explanation for the older age group success rate in vocational placement. In addition, the 45 years of age upper limit for the older age group meant that the subjects still had 15-20 years left in their working careers which would again be viewed as positive by a prospective employer.

Finally, the significant interaction between time to vocational placement with marital status and time-loss deserves some discussion. For the marital status variable, single subjects were placed more quickly than married
subjects and this trend was consistent for the PCA group. Growick and McMahon (1983) reported a tendency for single men to be more successful in vocational placement than married men for the <30 age group which would tend to support the results found in the study. The length of time on wage loss variable also showed significance with less time on wage loss subjects being placed faster. Walls (1982) and Krauft and Bolton (1976) identified the trend that workers who were receiving some sort of public assistance were less likely to achieve successful vocational placement as did Wright, Reagles and Thomas (1973). Their suggestion as to the source of this trend was that there was less incentive to seriously look for work if alternate forms of income were readily available. Length of time on wage loss could also be related to degree of disability with the more seriously injured subjects requiring longer to recover and resulting in a more significant level of disability. This relationship was not evaluated and may warrant further investigation in the future.
6.1 SUMMARY

This study examined the effect of two different vocationally-oriented programs on vocational placement and self-esteem of disabled workers. One of the programs was the traditional method of vocational placement involving job search training. The other program involved a recently developed, industrially-based, physical work capacity evaluation program for the assessment of individual tolerance for work (PCA).

Impetus for the development of the PCA program came from the need for objective physical work capacity information to assist in the placement of disabled workers. Of the commercially available assessment formats currently in use, none contained a sufficient industrial component through the actual simulation of work demands, conditions and environments to be able to establish firm relationships to with the actual work of work. Investigation of the literature revealed limited empirical data on the placement success of these programs in terms of returning injured workers back to the work force. By the introduction of a physical work capacity component to the overall process of vocational intervention, it was possible to examine the efficacy of this method of collecting data on the ultimate goal of finding work and to evaluate the effect of the
process of intervention on overall program success. It was also possible to evaluate the impact of select demographic variables on success in vocational placement. 

Several basic assumptions were made prior to this study. The first was that the collection of physical work capacity information, based on demonstrated work capacity in an industrial setting, would have a discrete, positive effect on the selection of appropriate vocational options. When matched with an aggressive job search, it was predicted that this individual work tolerance information would enhance overall chances of vocational success. The second assumption came from a review of the research on self-esteem and unemployment. From a review of this information it was felt that vocational intervention through PCA would positively influence self-esteem measures which would carry over into process of looking for work.

The experimental design provided two treatment conditions involving a 3 day job search program and a 2 week physical capacity assessment program. Subjects were grouped, following referral by the rehabilitation consultant, according to the independent variables of age, degree of disability and injury type. To test the hypotheses, Chi-square analysis and analysis of variance were used to determine main effects and any interactions with the independent and biodemographic variables.

The sample consisted of 50 male subjects selected by the rehabilitation consultants handling their case and
randomly assigned to one of 2 treatment groups. The mean age was 33.32 years, average length of time in treatment was 245 days and all subjects had medically plateaued from treatment prior to referral to the study. All had been left with some form of residual disability as the result of their injury which prevented them from returning to their pre-accident employment (1-25%). All were actively preparing to begin the task of looking for suitable employment prior to referral to the study.

Analysis of the data revealed a significant main effect of group type on success in vocational placement (VPSUCCES) \((p = .005)\) with 72% of the PCA group and 28% of the job search group finding full time employment. No significant effect was found for time to vocational placement or type of vocational placement between the groups. Significant interaction effects were found between group type and several independent and biodemographic variables including age, injury type, degree of disability, marital status and timeloss. Age produced a general effect on success in vocational placement \((p = .05)\) for PCA subjects older than 30 years of age. A significant interaction effect for injury type and degree of disability between groups was also found with upper limb injuries and those with a disability less than 5% being placed more successfully. Marital status and length of time on wage loss also had significant interactions with time to vocational placement indicating that single subjects were placed faster than married
subjects and those with less time on wage loss were placed faster than those with more time.

Finally, there was no significant main effect between groups for measures of self-esteem. It was generally observed, however, that both groups recorded small increases in their self-esteem scores over the duration of the program.

6.2 CONCLUSIONS

In the present study, it was found that subjects who underwent physical capacity assessment (PCA) as an adjunct to working with a rehabilitation consultant in looking for suitable employment, were significantly more successful at finding work than subjects who were involved in job search (JS) alone. Despite minimal comparison data on vocational success from other physical work capacity assessment programs (Gannaway and Sink, 1978), the higher vocational placement rate for those subjects in PCA is readily apparent. It is also apparent that certain biodemographic and moderator variables including age (AGEGRP), degree of disability (DISABGRP), injury type (INJTYPE), marital status (MARITAL) and time on wage loss (TIMELOSS) also affect vocational placement to some extent.

Several basic conclusions can be drawn from these results that impact on the overall implementation of vocational intervention and counselling techniques for the industrially-injured worker. First, physical capacity
assessment introduces a component which augments existing vocational counselling techniques in a positive way by more precisely defining individual work tolerances. With this information, the rehabilitation consultant is able to select appropriate vocational alternatives consistent with individual limitations and abilities to ensure a better vocational match. PCA should be considered in cases where a disability prevents a worker from returning to the work force and when an accurate measure of work capacity is sought to assist in vocational planning.

The second conclusion is that some variables or characteristics of injured workers may used as indicators of vocational success or lack of success, when construed within the overall vocational framework. These variables include age, degree of disability, type of injury, marital status and length of time on wage loss. When taken independently, these variables may not carry sufficient strength to suggest the implementation of specific vocational counselling techniques. When considered in concert, however, they may be general indicators of trends towards vocational success or failure and may assist the rehabilitation consultant in selecting workers for involvement in programs designed to maximize their chances of success.

The identification of some of these general indicators, specifically the age variable, contradicts research in the area of predictors of vocational success which has generally found that the older a worker becomes, the less likely are
his/her chances of returning to the work force following a disabling injury (Bolton, 1979; Hester, Decelles and Hood, 1986). One explanation for these findings may rest with the observation that experience is a valued commodity in an employee and as long as the age variable is not excessive (< 45 years), it is not a deterrent to an employer in hiring a disabled employee.

The observation that single workers were placed faster than married workers and that increased length of time on wage loss negatively affected vocational placement success may be of general interest when considering the success of retraining or vocational placement programs for workers with these particular characteristics. Certainly the literature tends to support these general trends (Growick and McMahon, 1983; Walls, 1982; Krauft and Bolton, 1976) for workers with these common characteristics.

The results of this study do need further review with respect to the detailed analysis of specific biodemographic variables as accurate predictors of vocational success. In addition, follow-ups studies should be conducted to determine the accuracy of these variables as long-range predictors and whether or not single factors or combinations of factors can prescribe success or failure for disabled individuals.
6.3 IMPLICATIONS

In the present study, disabled workers were successfully placed more often following exposure to a physical work capacity assessment program in concert with vocational rehabilitation counselling. In the PCA program, certain trends were also apparent with respect to selected worker traits including age, degree and type of disability, marital status and length of time on wage loss. On the basis of these research findings, the following implications for vocational intervention programs are suggested:

(1) The inclusion of physical capacity assessment should be considered in vocational counselling programs in cases where a worker is limited in returning to their pre-accident job due to a physical disability. More generally, PCA should be considered when specific work tolerance information is sought to assist in the identification of vocational alternatives in the presence of some form of physical limitation. In the province of British Columbia, vocational rehabilitation specialists have expressed a need for a standardized approach to the identification and quantification of individual work capacity. Particularly in cases when employability is limited by a functional disability, individual work tolerance information is critical to the selection of suitable intervention techniques.

(2) The results of the interaction effect of specific independent variables with success in vocational placement
suggest that some variables may be used, on a limited basis, as general predictors of overall vocational success or failure. More specifically, these predictor variables may be considered by the vocational counsellor in the decision making process regarding overall time investment or, in particular cases, for the identification of those workers who would benefit most from the application of specific intervention techniques. It has been suggested that some worker traits may be used as general screening indicators to predict overall success in vocational programs (Hester, Decelles and Gaddis, 1986) in an effort to more efficiently manage vocational counselling resources. The results from this study have some implications in the consideration of these variables during the implementation of vocational counselling techniques and programs. The results from the interviews and lifeline data supports the conclusion that different injury/unemployment experiences require different approaches which has some implications for the delivery of services.

(3) Although the results of the self-esteem measures did not show significance between groups, the overall positive increase in scores following the implementation of both programs is encouraging. Unfortunately, the reason for these increases cannot fully be explained by the assumption of the positive nature of the intervention technique alone. Consideration must also be given to alternate explanations for the increase including test
instrument artefact, effect of the test procedure and the possibility of "denial" affecting the measure. While the job search program appears to have had a more positive, overall influence on self-esteem scores following completion of the program, this self-esteem "high" does not appear to have carried over into the success in looking for work which the PCA group experienced.

Further research may be appropriate to investigate the nature and causes of apparent increases in self-esteem following job search to assist the vocational counsellor in taking advantage of this phenomenon. In addition, where applicable, consideration could be given to combining the PCA and job search programs in an integrated format to further enhance overall placement success.

6.4 LIMITATIONS

(1) The results of this study are limited in their application to disabled, male workers, 21 to 45 years of age, who have a physical disability as the result of an industrial accident.

(2) Success in vocational placement as a significant main effect between groups was based on sampling following placement with a 2-4 week follow-up. Long-term vocational placement figures are not available and the effect of programs on vocational placement over time was not investigated.
(3) The unequal cell size for consultant made investigation of the effect of this variable on vocational placement outcome difficult. The decision was made, however, to attempt to reproduce typical rather than simulated referral patterns of vocational counsellors within the Workers' Compensation Board in order to make practical inferences about the outcomes with respect to usual referral practices.

(4) The relatively small sample size of some of the sub-groups combined with the relatively large number of independent and moderator variables makes extrapolation of some of the study outcomes to the general population difficult.

(5) The difference in actual "time in treatment", 3 days for the Job Search (JS) group and 10 days for the Physical Capacity Assessment (PCA) group, may have had an undetermined effect on some the outcome variables. This possible effect warrants further investigation.

6.5 RECOMMENDATIONS FOR FUTURE RESEARCH

(1) This study should be repeated with a larger sample size in order to confirm the general trends found. Where possible, similar disabilities and injury types should be grouped to assess the overall impact of these variables on vocational success with a finer variable classification. In addition, the age group variable should be expanded to include the 45+ range to give a more representative sample
of the working population as well as a broader cross-section of biodemographic variables.

(2) A follow-up study on this same sample at 3 month intervals for up to a year should be done in order to evaluate long-term placement success following program completion.

(3) In order to gather additional information on the effect of the job search process on self-esteem, repeated measures of the Coopersmith self-esteem Inventory could have taken place at 2 week intervals for the 6-month duration of looking for work or until successful vocational placement was reached. In addition, other variables related to self-esteem such as locus of control could be evaluated to more fully understand these changing human variables during the process of disability, unemployment and job search.

(4) Additional research is needed on the impact of established assessment programs and formats on vocational placement to evaluate the overall efficacy of these programs for comparison purposes and for program development.

(5) More detailed, standardized measurement techniques should be established for the evaluation of function in an industrial setting and normative data published for replication.

(6) It would be of interest to examine the impact of program combinations on vocational placement. The combination of the objective, functional information from the PCA program with the motivating effect of the job search
program may produce more positive program results in terms of the success in vocational placement and time to vocational placement variables.

(7) Replication of the study with provision for more rigid control of the rehabilitation consultant variable to further examine its impact on the outcome variables is needed.

(8) Replication of the study with the addition of a female component to assess the impact of gender on selected vocational placement variables.

(9) A more sophisticated and accurate development of the lifeline categorization process and data analysis would also be of interest for future studies. In this way, a more objective assessment of the process of injury, disability and unemployment can be obtained.
REFERENCES


APPENDICES
Appendix A: I.D. Task File Inventory
<table>
<thead>
<tr>
<th>ID</th>
<th>TASK FILE INVENTORY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STRENGTH</strong></td>
<td><strong>OTHER</strong></td>
</tr>
<tr>
<td>1. S</td>
<td>4,5,6,7</td>
</tr>
<tr>
<td>2. L</td>
<td>3,4,5,6,7</td>
</tr>
<tr>
<td></td>
<td>3,4,6,7</td>
</tr>
<tr>
<td></td>
<td>3,4,5,6,7</td>
</tr>
<tr>
<td></td>
<td>3,4,6,7,8</td>
</tr>
<tr>
<td></td>
<td>3,4,6,7,8</td>
</tr>
<tr>
<td></td>
<td>3,4,6,7,8</td>
</tr>
<tr>
<td></td>
<td>3,4,6,7,8</td>
</tr>
<tr>
<td></td>
<td>3,4,6,7,8</td>
</tr>
<tr>
<td></td>
<td>3,4,7,8</td>
</tr>
<tr>
<td></td>
<td>4,6,7,8</td>
</tr>
<tr>
<td></td>
<td>4,6,7,8</td>
</tr>
<tr>
<td>3. M</td>
<td>2,3,4,5,6,7</td>
</tr>
<tr>
<td></td>
<td>3,4,5,6,7</td>
</tr>
<tr>
<td></td>
<td>3,4,5,6,7</td>
</tr>
<tr>
<td></td>
<td>2,4,5,6,7</td>
</tr>
<tr>
<td></td>
<td>3,4,6,7</td>
</tr>
<tr>
<td></td>
<td>3,4,6,7</td>
</tr>
<tr>
<td></td>
<td>3,4,6,7,8</td>
</tr>
<tr>
<td></td>
<td>3,4,7</td>
</tr>
<tr>
<td></td>
<td>4,6,7,8</td>
</tr>
<tr>
<td>4. H</td>
<td>3,4,6,7</td>
</tr>
<tr>
<td></td>
<td>3,4,6,7</td>
</tr>
<tr>
<td>5. VH</td>
<td>3,4,6,7</td>
</tr>
<tr>
<td>VARIABLE</td>
<td>3,4,6,7,8</td>
</tr>
</tbody>
</table>

142
Appendix B: Sample Task Sheet
TASK #: 24
STRENGTH FACTOR: 2. L
OTHER FACTORS: 3,4,6,7,8
SHOP: GENERAL INSIDE
TIME:
PROJECT: CEDAR LAWN CHAIR

TOOLS: Table/radial arm/band saw, drill press, disc/belt sander, planer, jigs.
SETTING: Inside - primarily bench level with infrequent floor level work.

MATERIALS: Dimensional lumber (2 x 6, 2 x 10), screws, glue, sandpaper.

ACTIVITIES: Select materials from storage; lay out and cut to shape/size; smooth surfaces; assemble; final fit and finish sand.

INSTRUCTION TIME: .5 hours
COMPLETION TIME: 3 hours

Attachment: Task requires considerable repetitive hand/arm/shoulder pushing and pulling during hand tool and machine operation. Some shoulder pull down strength required during drill press operation. Varying degrees of forearm supination/pronation and hand grip strength required during drill press operation and while driving screws by hand. Some stooping/squatting required during material handling as well as lumbar spine mobility during assembly phases. Task is performed in a standing position.
Appendix C: Instructor's Report Form
<table>
<thead>
<tr>
<th>INSTRUCTOR'S EVALUATION FORM</th>
<th>WORK PERFORMANCE</th>
<th>BEHAVIOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Attendance</td>
<td>Pain: Verbal</td>
</tr>
<tr>
<td></td>
<td>Attendance Possible</td>
<td>Number of Complaints</td>
</tr>
<tr>
<td></td>
<td>Attendance Actual</td>
<td></td>
</tr>
<tr>
<td>TOLERANCE OBSERVATIONS</td>
<td>Punctuality</td>
<td>Pain: Non-verbal</td>
</tr>
<tr>
<td></td>
<td>NEVER LATE</td>
<td>POSTURE</td>
</tr>
<tr>
<td></td>
<td>SOMETIMES LATE</td>
<td>GAIT</td>
</tr>
<tr>
<td></td>
<td>USUALLY LATE</td>
<td>OTHER BODY MOVEMENTS</td>
</tr>
<tr>
<td></td>
<td>LEAVES EARLY</td>
<td>FACIAL EXPRESSIONS</td>
</tr>
<tr>
<td>TASK MANAGEMENT</td>
<td>Approach</td>
<td>Disability Behav.</td>
</tr>
<tr>
<td></td>
<td>CONSCIENTIOUS</td>
<td>CONSISTENT</td>
</tr>
<tr>
<td></td>
<td>ATTEMPTS TO MANAGE AS INSTRUCTED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RELATES WELL TO OTHERS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UNCOOPERATIVE</td>
<td>INCONSISTENT</td>
</tr>
<tr>
<td></td>
<td>TIME REQUIREMENTS</td>
<td></td>
</tr>
<tr>
<td>FORM OF COMPROMISE</td>
<td>Activity Behav.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONSISTENT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CARELESS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>WASTES TIME AND MATERIALS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OVER-RELATES TO OTHER WORKERS</td>
<td></td>
</tr>
<tr>
<td>Skill Level</td>
<td>COMMENTS RE: GENERAL FUNCTIONAL CAPACITY</td>
<td></td>
</tr>
<tr>
<td>EXCELLENT ALL ASPECTS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GOOD COMPETITIVE STANDARD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAIR BUT MARKETABLE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POOR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNACCEPTABLE / INCOMPLETE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LIMITATIONS
A. Task would become manageable with these modifications:

B. Task unmanageable even with gross modifications:

SIGNATURE: __________
Appendix D: Remedial Therapy Report Form
<table>
<thead>
<tr>
<th>E.D.T.E: Physical Evaluation</th>
<th>This form is specific to &quot;Workers&quot; on W.C.B. Vocational Evaluation Programs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Claimant's view of his functional and related problems</td>
<td>The W.C.B. clinical view</td>
</tr>
<tr>
<td>Evaluators first impressions</td>
<td></td>
</tr>
</tbody>
</table>

**Physical Findings**
### MAIN ASSESSMENT

<table>
<thead>
<tr>
<th>LIFTING</th>
<th>CARRYING</th>
<th>SUCCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PULLING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UP</td>
<td>BOTH ARMS</td>
<td></td>
</tr>
<tr>
<td>DOWN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PUSHING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UP</td>
<td>BOTH ARMS</td>
<td></td>
</tr>
<tr>
<td>DOWN</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FACTOR &amp; COMPONENT</th>
<th>RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLIMBING &amp; BALANCING</td>
<td>CLIMBING BALANCING</td>
</tr>
<tr>
<td>BODY DEXTERITY</td>
<td>POSITIONS TASKS</td>
</tr>
<tr>
<td>HANDLING</td>
<td>REACH MANIPULATE FINGER</td>
</tr>
<tr>
<td>TALKING</td>
<td></td>
</tr>
<tr>
<td>HEARING</td>
<td></td>
</tr>
<tr>
<td>SEEING</td>
<td></td>
</tr>
<tr>
<td>COORDINATION</td>
<td>VISUAL NON VISUAL</td>
</tr>
</tbody>
</table>

**MAIN OBJECTIVE RESULT**

<table>
<thead>
<tr>
<th>FACTORS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
</table>

Final opinion or recommendation
Appendix E: Functional Evaluation Referral Form
The above named worker is referred to this department for the evaluation detailed below:

<table>
<thead>
<tr>
<th>REMEDIAL THERAPY DEPARTMENT</th>
<th>INDUSTRIAL DEPARTMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Assess P.A. status as it correlates to vocational options identified</td>
<td>□ Assess or confirm capacity for vocational options identified below</td>
</tr>
<tr>
<td>□ Assess total P.A. status including highest possible strength components</td>
<td>□ Job sampling assessment to demonstrate highest possible functional capacity</td>
</tr>
<tr>
<td>□ Cybex</td>
<td>□ Skill Level Assessment (comment below)</td>
</tr>
</tbody>
</table>

Additional Requirements/Comments:

**VOCATIONAL OPTIONS IDENTIFIED**

<table>
<thead>
<tr>
<th>TITLE</th>
<th>CCD#</th>
<th>PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 2:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 3:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 4:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identify critical tolerances:

Medical, physical and environmental restrictions:

Medical screening: UMA □ AP □
Appendix F: Industrial Report Form
NAME:
Claim No.:

FUNCTIONAL EVALUATION
UNIT REPORT
Evaluation Report

Name: ____________________________
Claim No.: _________________________
Appointment date: ___________________
Consultant: _________________________
Date: ______________________________

PREAMBLE

EVALUATION PLAN
<table>
<thead>
<tr>
<th>FACTOR</th>
<th>TOLERANCE</th>
</tr>
</thead>
</table>

FINDINGS
WORK BEHAVIOUR

ATTENDANCE:

PUNCTUALITY: Number of times late

PAIN BEHAVIOUR

VERBAL/NON-VERBAL:

BODY MECHANICS:

CONSISTENCY:

INTERPRETATION WITH CLIENT

CONCLUSIONS/RECOMMENDATIONS

MAXIMUM FUNCTIONAL CAPACITY IN AREAS ASSESSED:

FOLLOWING VOCATIONAL OPTIONS CONFIRMED AS BEING VIABLE:

OPTION 1:
OPTION 2:
OPTION 3:
OPTION 4:

SPECIFIC TOLERANCES:
Name: ______________________
Claim No.: ____________________

VOCATIONAL RECOMMENDATIONS

- Direct access to labour market
- Access to labour market via work assessment or TOJ
- Upgrading course in specific trade
- Complete trades training
- Other (specify):

COMMENTS/DISCUSSION
Appendix G: Coopersmith Self-esteem Inventory
COOPERSMITH SELF-ESTEEM INVENTORY

Please read the following list of sentences and decide whether they are similar or "like you". Use the scale from 1 to 5 (see below) to describe how you feel about each sentence and indicate by circling the number beside the statement that best describes how you feel.

1 = always like me
2 = usually like me
3 = sometimes like me
4 = seldom like me
5 = never like me

<table>
<thead>
<tr>
<th>Always like me</th>
<th>Never like me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I often wish I were someone else.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. I find it very hard to talk in front of a group.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. There are lots of things about myself I'd change if I could.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. I can make up my mind without too much trouble.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. I'm a lot of fun to be with.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. I get upset easily at home.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. It takes me a long time to get used to anything new.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8. I'm popular with people my own age.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9. My family expects too much of me.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>10. My family usually considers my feelings.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>11. I give in very easily.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>12. It's pretty tough to be me.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>13. Things are all mixed up in my life.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

160
14. Other people usually follow my ideas. 1 2 3 4 5
15. I have a low opinion of myself. 1 2 3 4 5
16. There are many times when I'd like to leave home. 1 2 3 4 5
17. I often feel upset about the work that I do. 1 2 3 4 5
18. I'm not as nice looking as most people. 1 2 3 4 5
19. If I have something to say, I usually say it. 1 2 3 4 5
20. My family understands me. 1 2 3 4 5
21. Most people are better liked than I am. 1 2 3 4 5
22. I usually feel as if my family is pushing me. 1 2 3 4 5
23. I often get discouraged at what I am doing. 1 2 3 4 5
24. Things usually don't bother me. 1 2 3 4 5
25. I can't be depended upon. 1 2 3 4 5

_________________________   _______________________
Name                      Date

* Reprinted with permission of the author
Appendix H: Demographic Data
APPENDIX D - DEMOGRAPHIC DATA

1. Age: average - 33.32 years

<table>
<thead>
<tr>
<th>Value</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>26</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>27</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td>28</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>29</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>30</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td>31</td>
<td>4</td>
<td>8.0</td>
</tr>
<tr>
<td>32</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>33</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>34</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>35</td>
<td>6</td>
<td>12.0</td>
</tr>
<tr>
<td>36</td>
<td>6</td>
<td>12.0</td>
</tr>
<tr>
<td>37</td>
<td>5</td>
<td>10.0</td>
</tr>
<tr>
<td>38</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>39</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>40</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td>42</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>44</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>45</td>
<td>1</td>
<td>2.0</td>
</tr>
</tbody>
</table>

2. Injury Type:

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Body</td>
<td>12</td>
<td>24.0</td>
</tr>
<tr>
<td>Lower Body</td>
<td>22</td>
<td>44.0</td>
</tr>
<tr>
<td>Spine</td>
<td>16</td>
<td>32.0</td>
</tr>
</tbody>
</table>
### 3. Degree of Disability:

<table>
<thead>
<tr>
<th>Value (%)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>24.0</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>14.0</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>12.0</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>16.0</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>2.0</td>
</tr>
</tbody>
</table>
4. Timeloss: average - 245 days

<table>
<thead>
<tr>
<th>Value</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>28</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>31</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>43</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>45</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>68</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>85</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>108</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>111</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>125</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>131</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>143</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>160</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>164</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>166</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>169</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>174</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>175</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>180</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>187</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>194</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>215</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>221</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>240</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>245</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>254</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>269</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>284</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>322</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>323</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>348</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>356</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>362</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>381</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>394</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>414</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>425</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>430</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>443</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>463</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>466</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>476</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>482</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>524</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>633</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>639</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>641</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>847</td>
<td>1</td>
<td>2.0</td>
</tr>
</tbody>
</table>
5. Marital Status:

<table>
<thead>
<tr>
<th>Value</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>18</td>
<td>36.0</td>
</tr>
<tr>
<td>Married</td>
<td>32</td>
<td>64.0</td>
</tr>
</tbody>
</table>

6. Language:

<table>
<thead>
<tr>
<th>Value</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>42</td>
<td>84.0</td>
</tr>
<tr>
<td>ESL</td>
<td>8</td>
<td>16.0</td>
</tr>
</tbody>
</table>

7. Education: average - Grade 11

<table>
<thead>
<tr>
<th>Value</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>8</td>
<td>6</td>
<td>12.0</td>
</tr>
<tr>
<td>10</td>
<td>12</td>
<td>24.0</td>
</tr>
<tr>
<td>11</td>
<td>5</td>
<td>10.0</td>
</tr>
<tr>
<td>12</td>
<td>20</td>
<td>40.0</td>
</tr>
<tr>
<td>13</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>2.0</td>
</tr>
</tbody>
</table>
8. Wage Difference:

<table>
<thead>
<tr>
<th>Value ($)</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2236.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>-1415.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>-1391.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>-872.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>-701.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>-648.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>-343.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>-313.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>-130.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>-87.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>0.00</td>
<td>8</td>
<td>16.0</td>
</tr>
<tr>
<td>96.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>165.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>600.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>814.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>943.00</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>1217.00</td>
<td>1</td>
<td>2.0</td>
</tr>
</tbody>
</table>

9. Rehabilitation Consultant:

<table>
<thead>
<tr>
<th>Consultant #</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>8.0</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>8.0</td>
</tr>
<tr>
<td>6</td>
<td>9</td>
<td>18.0</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>8.0</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>6.0</td>
</tr>
<tr>
<td>10</td>
<td>6</td>
<td>12.0</td>
</tr>
<tr>
<td>11</td>
<td>4</td>
<td>8.0</td>
</tr>
<tr>
<td>12</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>13</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>16</td>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>17</td>
<td>1</td>
<td>2.0</td>
</tr>
</tbody>
</table>