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SELECTED NEUROPSYCHOLOGICAL AND REHABILITATION
ASSESSMENT MEASURES WITH CHRONICALLY MENTALLY ILL ADULTS

The University of Arizona

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SELECTED NEUROPSYCHOLOGICAL AND REHABILITATION
ASSESSMENT MEASURES WITH
CHRONICALLY MENTALLY ILL ADULTS

by
Philip Cotter Barry II

A Dissertation Submitted to the Faculty of the
DEPARTMENT OF REHABILITATION
In Partial Fulfillment of the Requirements
For the Degree of
DOCTOR OF PHILOSOPHY
In the Graduate College
THE UNIVERSITY OF ARIZONA

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THE UNIVERSITY OF ARIZONA
GRADUATE COLLEGE

As members of the Final Examination Committee, we certify that we have read the dissertation prepared by Philip Cotter Barry II entitled SELECTED NEUROPSYCHOLOGICAL AND REHABILITATION ASSESSMENT MEASURES WITH CHRONICALLY MENTALLY ILL ADULTS

and recommend that it be accepted as fulfilling the dissertation requirement for the degree of Doctor of Philosophy.

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I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

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A handwritten signature in cursive script, appearing to read "R. G. Bailey", is written over a horizontal line. The signature is positioned to the right of the word "SIGNED".

To
Wendy
and
Josh

PREFACE

In the beginning of this project, the VIP Club was a challenge without a name, an idea that developed into a program. Of the many people who recognized the need for such a program in Tucson, Paul Lindsey, then Executive Director of COPE, Inc., committed himself and his agency to the project from which the VIP Club, and hence this dissertation, eventually emerged. Thanks to Mr. Lindsey, the COPE Board of Directors and the Mental Health Association of Greater Tucson, the VIP Club has become an important component in the community support network for chronically mentally ill adults in Tucson. Their support allowed this program to survive its critical first year of operation in the face of tightening government fiscal policies and widespread skepticism for new social programs.

In a society which places so much emphasis on work for establishing individual identity and self-esteem, these opportunities have too often remained a difficult abstraction for those with severe disabilities. The VIP Club has become a vehicle for severely psychiatrically disabled citizens of Tucson to realize these goals. Certainly not everyone who enters the program will achieve competitive employment. But many have already demonstrated that given the opportunity and the support of dedicated staff, they can become productive and responsible employees in business and industry. Through his commitment and tireless effort on behalf of his clients, Ed Cotgageorge has been the person most responsible for the VIP Club's success to date. He also generated the test data on which much of this dissertation is based. The author

wishes to express his deep thanks and admiration for Mr. Cottageorge's perseverance and nurturance that have brought fruition to an idea. His dedication has allowed the VIP Club and its members to begin realizing potentials many others have doubted.

While the design and development of the VIP Club was a major challenge and excellent learning experience for the author, transforming outcome data from the program into a doctoral thesis was also rewarding. Thanks to my dissertation committee, Drs. Marlene Bence, Paul Leung, Keith Meredith and Amos Sales for their interest and support throughout the project. Special acknowledgment is due Dr. Meredith, who was most generous with his computer and statistical expertise, and to Dr. Leung, my dissertation director.

Finally, whatever merits and faults are to be found in this dissertation are solely the responsibility of the author. It is my hope that the information reported herein will be a useful contribution toward the understanding of chronic mental illness and the rehabilitation of those whom it afflicts.

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ABSTRACT

This project represents a descriptive study of 35 chronically mentally ill (CMI) adults enrolled in a community-based vocational rehabilitation program during the 1981 calendar year. As part of their first month in the program, subjects were administered a screening battery consisting of the Trail Making Test, Reitan-Indiana Aphasia Screening Test, Reitan-Klove Sensory Perceptual Examination, Valpar Independent Problem Solving Work Sample (IPSWS) and Wide Range Interest Opinion Test (WRIOT). Correlations were derived among these and with other variables, including the Work Adjustment Rating Form, schizophrenic versus nonschizophrenic psychiatric diagnosis, time in program and period of competitive employment resulting from program involvement. The issue of medication and its potential for impacting on subjects' performance in the program was also addressed.

The neuropsychological measures in the battery were significantly correlated among themselves and discriminated between schizophrenic and nonschizophrenic CMI subjects in the sample with 100% accuracy. However, results on neuropsychological tests did not predict whether or not a subject would realize competitive employment during the year of the study. Both schizophrenic and nonschizophrenic subjects produced average performances in the impaired range of functioning according to published criteria for the neuropsychological instruments, although schizophrenic subjects consistently performed closer to the normal population.

Vocational instruments included in the battery appeared to measure a more heterogeneous set of functions than the neuropsychological tests,

and did not appear to represent a vocational factor. Two scores from these vocational instruments, Valpar IPSWS Time and WRIOT Negative Bias, were combined with Trail Making Test (Part A) scores in a discriminant function that classified subjects with 81% accuracy on attainment of competitive employment status. Over half (56%) of the people who participated for three months or more experienced some competitive employment, and 39% of those who completed three months or more were able to maintain full-time or part-time competitive employment for longer than 60 days. These results supported the effectiveness of Fountain House Model programs in achieving vocational rehabilitation goals with the difficult CMI population. Support was also provided for community-based research to study both social programs and their clientele.

CHAPTER 1
INTRODUCTION

Since implementation of the federal Community Mental Health Centers Act of 1963, emphasis for the treatment of the chronically mentally ill (CMI) has shifted from long-term institutionalization to a network of community-based services (Cutler, 1981). Developments in drug technology contributed to the evolution of the psychiatric service delivery model for the CMI population, and today Cutler (1981) estimates "roughly 900,000 schizophrenic persons under the care of the community, about half of whom have been hospitalized at least once (p. 347)." Add to this number those CMI adults with non-schizophrenic disorders, and the national total is greater than 1.5 million (Turner & Shifrin, 1979).

As communities have gained experience in providing CMI support services, it has become clear that much more than traditional psychotherapeutic intervention is required. One component of this community support network receiving increasing attention in the professional literature is commonly referred to as psychosocial rehabilitation (Turner & Shifrin, 1979; Grob, Note 1)). This category of service addresses the social, residential and vocational needs of the CMI adult. Psychosocial rehabilitation also contributes to the community support network in the areas of advocacy, crisis intervention, utilization of community resources, protection of client rights and case management services.

Within the realm of psychosocial rehabilitation, the unique vocational needs of the CMI adult have been especially problematic. The State-Federal Vocational Rehabilitation (VR) System has traditionally worked for vocational opportunities and greater independence of disabled people regardless of the nature of their disability (Wright, 1980). This system is designed to provide services on a time-limited basis, is oriented toward job placement as a final resolution of the case, and discourages unsuccessful closures and recidivism. An alternative approach has emerged out of the community support system concept, referred to as "effective operant technology" by Spooner, Algozzine and Saxon (1980) and The Fountain House Model by Beard (1976). Programs of this sort provide long-term contact with the goal of gradually increasing the individual's capacity for responsible vocational activities. This concept of gradual transition includes volunteer work activities and part-time entry-level employment leading toward opportunities for formal training and full-time competitive employment.

The present study was done within the context of a community-based vocational rehabilitation program for CMI adults in Tucson, Arizona. Based on the principles espoused by the Fountain House program in New York City (Brown, 1977), the C.O.P.E. VIP Club has completed its first year of service, and provides the basis for this research project.

Unfortunately, the chronic nature of the CMI disability has been cause for higher rates of denial of eligibility, unsuccessful closures and recidivism within the VR spectrum of services (Finley,

Note 2). Contributing to this negative image has been the ability of many CMI adults to perform relatively well in diagnostic testing, including vocational evaluation (e.g., Field, Sink & Cook, 1978). This particular disability group has a propensity for appearing either much better or much worse on vocational diagnostic instruments than they really are (Goldstein, 1978). In fact, Matarazzo, et al (1978) suggest that unreliable test performance be considered a contributing characteristic to the diagnosis of this disability group. Early assessment of skills and abilities to establish optimal vocational goals is therefore often inappropriate for them. The testing situation may be aversive and side effects from medication may invalidate results, especially if medication levels can be expected to decrease over time. In these instances, comprehensive diagnostic testing is best postponed until much later in the rehabilitation process.

A "prevocational screening" may be of more immediate use in the individual program planning process. Anthony (1980) suggests a matrix approach to rehabilitation diagnosis that categorizes skill behaviors according to type of skill (physical, emotional, intellectual) and environment (living, learning, working). Limited psychometric assessment should add appreciably to the information available for rehabilitation planning. Expressive and receptive language skills, routine, nonverbal decision-making, sensory perception and basic sequential thought processing appear to be critical variables in the person's ability to benefit from a vocational rehabilitation program. However, the application

of neuropsychological testing as part of a comprehensive rehabilitation program for CMI adults has not been investigated. Heaton (1976) states that "the clinical value of the neuropsychological evaluation would be increased considerably if it could also provide some reliable information regarding the patients' abilities to meet the demands of his everyday life (p. 11)."

Such a prevocational screening was initiated as part of the orientation process for new participants at the outset of the VIP Club in Tucson. A standard battery of neuropsychological and rehabilitation instruments was administered individually, with the data used to assist in rehabilitation planning. Statistical analysis of this accumulated data is a major aspect of this dissertation project.

A related issue is reflected in Anthony's (1980) statement that "the diagnostic labeling of psychiatric clients does not provide any uniquely relevant information about a person's rehabilitation potential." This perspective, found in the rehabilitation literature, suggests that psychiatric diagnoses are of no value in rehabilitation programming of CMI adults. However, neuropsychological literature states that schizophrenic individuals consistently perform more poorly than other psychiatric populations on standardized neuropsychological instruments (Heaton, Baade & Johnson, 1978). If, as Heaton (1976) suggests, these instruments provide useful information regarding everyday functional capacities, solving the riddle presented by these apparently opposing viewpoints may provide additional insights into the rehabilitation process of this disability group.

Statement of the Problem

A review of pertinent literature in the fields of community mental health, neuropsychology and rehabilitation suggests that each of these fields has unique contributions to make in understanding the CMI adult. However, it still remains for them to be brought together in a cohesive blend of ideas. This project is an attempt to blend selected data of CMI adults in a community program from these areas and explore their combined implications for serving this population in a vocational rehabilitation context. Twenty variables were identified as potentially important contributors to vocational success in a program such as the VIP Club. They include demographic variables (age, sex, education), neuropsychological test scores (Trail Making Test, Reitan-Indiana Aphasia Screening Test, Sensory-Perceptual Exam), psychiatric variables (diagnosis, medication) and vocational measures (Valpar Independent Problem Solving Work Sample, Work Adjustment Rating Form, Wide Range Interest Opinion Test, Competitive Employment). Together, they represent an opportunity to systematically describe characteristics of the CMI population that may be helpful in understanding their vocational rehabilitation needs from a more comprehensive perspective than is provided by any one of these fields.

Hypotheses.

Based on the problem as stated above, and within the limits of the data generated, the following hypotheses were investigated:

1. Psychiatric diagnosis accounts for a significant ($p < .05$) portion of the variance on common outcome variables, identified as length of competitive employment and scores on the Work Adjustment Rating Form.

2. Significant ($p < .05$) correlations exist among neuropsychological measures of the CMI adults sampled. These measures include the Trail Making Test, Parts A and B, the Reitan-Indiana Aphasia Screening Test and the Sensory-Perceptual Exam.

3. Significant ($p < .05$) differences exist between scores obtained for CMI adults in this study and published standards (Reitan, 1979a; Wheeler & Reitan, 1962) for normal controls on the neuropsychological measures identified in Hypothesis 2.

4. Differences on neuropsychological measures are significant ($p < .05$) between subjects divided according to psychiatric diagnosis. Specifically, subjects diagnosed as schizophrenic differ significantly ($p < .05$) from those diagnosed as having nonschizophrenic disorders.

5. The neuropsychological measures identified in Hypothesis 2 represent a statistically identifiable ($p < .10$) "neuropsychological factor" among the variables investigated.

6. The "neuropsychological factor" postulated in Hypothesis 5 accounts for a significant ($p < .05$) portion of the variance on the common outcome variables identified in Hypothesis 1.

7. Significant ($p < .05$) correlations exist among vocational measures of the CMI adults sampled. These measures include the Valpar Independent Problem Solving Work Sample, the Work Adjustment Rating

Form, and the eight supplemental scales of the Wide Range Interest Opinion Test - Sedentariness, Risk, Ambition, Skill Level, Sex Stereotype, Agreement and Positive and Negative response biases. Further, these variables represent a statistically identifiable ($p < .10$) "vocational factor" among the variables investigated.

8. The "vocational factor" postulated in Hypothesis 7 accounts for a significant ($p < .05$) portion of the variance on the common outcome variables identified in Hypothesis 1.

9. Neither age, sex nor education level account for a significant ($p < .05$) portion of the variance on the common outcome variables identified in Hypothesis 1 for the CMI adults in the sample investigated.

Significance of the Problem

The research contributes to a better understanding of psychosocial rehabilitation in several ways. Perhaps the most fundamental issue addressed relates to the etiology of mental illness. Prominent contemporary theories discuss neurochemical abnormalities (Bowers, 1980; Flekkov, 1977) as well as behavioral, neuropsychological and rehabilitation characteristics of mental illness (Goldstein, 1978; Haier, 1980). Several psychiatric classification systems exist and are being used concurrently (Haier, 1980), and this complex issue appears to be far from resolved.

With respect to the neuropsychological characteristics of mental illness, Goldstein (1978) says the issue is no longer whether brain

dysfunction occurs among schizophrenics, but the specific nature of the dysfunction. He states that investigations of neuropsychological models of schizophrenia "including sensory input (coding of the output in an organized way), and motor activity" are most promising. From another perspective, Heaton (1976) and Heaton and Pendleton (1981) have called for research into the application of neuropsychological data to practical concerns of everyday living for the CMI adult.

Results of this project also have implications for rehabilitation efforts on behalf of the CMI population. An ongoing problem within the network of community resources has been the coordination of efforts between the mental health community and the VR community. While the former is in place to provide long-term supportive services to these people on an open-ended basis, the VR system is not. Fewer resources are available for rehabilitation services across the spectrum of disability groups, and CMI adults, as indicated earlier, have not fit well into the linear VR process resulting in successful closures. If data from a prevocational screening and experience in a program such as the VIP Club can improve the probability of successful closure for this group, they may eventually enjoy greater access to VR services. Indeed, one issue is the appropriateness of various rehabilitation services for this population. Ciardiello (1981) reported significantly fewer placements for psychiatrically disabled clients versus other disability groups following work adjustment services in traditional sheltered workshops. A greater understanding of the characteristics of

the CMI population among rehabilitation workers will help enhance these outcomes. To date, this understanding has been generally limited to the clinical, intuitive level. Considering the complexity of the disability group, statistical evidence might be expected to contribute substantially to the efficacy of what Cook (1980) refers to as the ubiquitous activity of decision making in the rehabilitation process.

Assumptions Underlying the Problem

1. The sample of CMI adults used for this study are representative of a larger population of CMI adults. This larger population is limited to individuals who have been diagnosed as having a chronic psychiatric disability, are actively receiving outpatient psychiatric services, are motivated to participate in a vocational rehabilitation program and who have been referred to a program such as the VIP Club by their mental health therapists.

2. The program of services offered by the VIP Club is essentially the same as the 94 programs identified by Fountain House (1981) as participating in the Fountain House model of psychosocial rehabilitation, including transitional employment placements with local businesses.

3. The measures identified represent variables important to the psychosocial rehabilitation of CMI adults.

Limitations of the Study

1. Generalizations to the larger population described in Assumption 1 may be limited due to the nonrandom selection process for

participants. The project was dependent upon referrals from mental health centers within the Tucson metropolitan area, and any individual characteristics unique to this geographic location may not be generalizable. However, the sample does represent participation from all three mental health catchment areas of Tucson.

2. The approach used in this study is "quasi-experimental" (Campbell & Stanley, 1963; Cook & Campbell, 1979). Its two-fold purpose is description and exploration. The sample represents an analysis of individuals participating in a service-delivery program over a one-year period of time. The primary intent of the program was the delivery of services, rather than experimentation. However, it appears that information gathered as a result of the program's operation may contribute to a greater understanding of the population it is designed to serve.

The exploratory aspect of the study focuses on statistical relationships among descriptive variables. The relatively uncontrolled community setting represents the milieu in which such programs must work toward greater effectiveness. It also represents the limitations of research in applied settings.

3. The size of the sample ($n=35$) will also limit the generalizability of results.

4. Diagnoses, psychiatric histories and current medications were provided routinely by mental health therapists and clinicians at the time of referral. It is recognized that psychiatric nosology continues to evolve, and several classification systems are currently in

use (Haier, 1980). The literature suggests sufficient disagreement among these systems to warrant continued research (Haier, 1980); Flekkoy, 1977) and place the issue well beyond the scope of this project. Therefore, psychiatric diagnostic criteria for subjects in this study were neither investigated nor controlled, but accepted as received. Diagnoses were then reduced to two groups, schizophrenic and nonschizophrenic, to allow for statistical analysis.

Similarly, strict controls of prescribed medications were beyond the scope of this study. Descriptive data regarding type of medication reported in referral information is provided, but are not included in the analyses of relationships among variables.

CHAPTER 2
REVIEW OF THE LITERATURE

This chapter provides a framework for the present study, including a brief orientation to some of the major sources of influence. First, the program model that provides the basis for the VIP Club is presented. Next is a rationale for the testing component of the program. Finally, a review of neuropsychological literature as it pertains to the psychiatrically disabled is presented. In addition, much of the literature is presented in other chapters as part of the discussion.

The Fountain House Model

The psychiatrically disabled individual who requires vocational rehabilitation services is actually part of a small subgroup of a much larger psychiatric population. Grob (Note 1) established that 70% of released ex-mental patients are substantially employed, and roughly half of those who are unemployed are either unable or unwilling to work. The remaining 15% of this population are those considered appropriate for vocational rehabilitation services. Grob (Note 1) refers to these people as "the chronic, long-term patient in mid-passage between the institution and the community... frequently characterized by long periods of remission, punctuated by acute, recurrent episodes, obscure

and ambiguous in nature, onset and outcome (p. 2)." They are marginal members of the community, chronically dependent upon mental health centers and other social service agencies. Many live in half-way houses, while others live isolated and alone. Although these people are frequently able to secure jobs on their own, they are generally unable to maintain employment for long. Yet they continue to demonstrate a willingness to strive for regular employment and greater independence despite repeated setbacks, disappointments and rejections.

Effective operant technology using reinforcers found in the environment, e.g., peer/supervisor approval, recognition, status and acceptance, has been found to be successful with the CMI population (Spooner, Algozzine, & Saxon, 1980; Beard, 1976; Brown, 1977). The Fountain House Model (Beard, 1976), named after the parent program in New York City, is presently found in 38 states, including the VIP Club in Tucson. The model involves psychosocial rehabilitation combined with a medical support system which provides medication and therapy. This has led to successful vocational rehabilitation of CMI adults. Spooner, et al, (1980) indicated "it is likely that effective operant technology as well as psychoactive medication will become the treatments of choice in the near future (p. 66)." An aspect of this model of rehabilitation that makes it suited to the needs of a chronic mentally ill client is that it is available as long as it is needed. Services are not terminated upon placement in a competitive job (Bean & Beard, 1975). In fact, the person who achieves a half-time employment position outside

the program is encouraged to continue with the program and to receive reinforcement for positive behavior both on and off the job. Such a rehabilitation program thus becomes a "club" that is part of the ongoing community support system, and the "client" becomes a "member" of the club. In some programs sheltered wages are paid, but it is more common that activities are strictly voluntary. Clubs publish their own newsletters and the newsletters of other charitable organizations, prepare and share meals, help maintain the facility and engage in other activities similar to volunteer support services that might be provided by a traditional "service organization."

Members are supported and maintained in this environment until they have demonstrated over a period of months the consistent, responsible behavior necessary for entry-level competitive employment. Then they are given the opportunity of placement in a part-time job in the community. The goal is to succeed in this position over a limited time period of up to six months. Members remain active in the club during this transitional placement. The concept of operant reinforcement is designed to encourage them during this trial stage, with the emphasis on success, whether it is limited to a brief attempt or six months of paid employment. Should a member choose not to continue working, his/her position is filled by another job-ready member, and s/he is absorbed back into club activities until ready for another trial. Some are able to gradually return to full-time permanent employment their first time through this process. Others require several attempts. An

important aspect of these programs is their lack of time limitations imposed on individuals.

Provocational Assessment

Vocational evaluation has received widespread attention because of its emphasis on assessing a person's occupational skills and aptitudes directly. On the basis of a client's performance on a set of tests and work samples, rehabilitation planning toward realistic vocational goals can begin. Some assumptions inherent in this process are: 1) The client differs significantly from the population on the basis of a disability; 2) Once optimal functional levels are identified, the rehabilitation problem becomes one of assisting the client to achieve a vocational goal (possibly among other goals); 3) Vocational assessment should occur early in the rehabilitation process to facilitate planning and establish goals and objectives (Vocational Evaluation Project Final Report, 1975).

This orientation for providing vocational evaluation services comes from traditional vocational rehabilitation. Within this context of providing rehabilitation services, eligibility is determined, diagnostics obtained, and a rehabilitation plan is developed, implemented and terminated as the client passes through the system. With regard to the CMI the role of assessment might best be regarded as shifting positions in the sequence of services delivered, as well as

changing in emphasis. An early need in the process with this population is assessment of functions directly related to how much the client will benefit from the program. As with many others within the "severely disabled" category, the CMI client may have multiple disabilities that are collectively referred to under a general category, in this case "mental illness."

According to Anthony (1980) "the diagnostic labeling of psychiatric clients does not provide any uniquely relevant information about a person's rehabilitation." Early assessment of skills and abilities to establish optimal vocational goals is often inappropriate. The testing situation may be aversive and side effects from medication may invalidate results, especially if medication levels can be expected to decrease over time. In these instances, comprehensive diagnostic testing is best postponed until much later in the rehabilitation process.

An alternative approach is presented in this study. It consists of a relatively brief screening to measure basic global skills. Testing is deemphasized in favor of daily participation in program activities. The tests themselves are short, relatively nontechnical in appearance and administration, and selected for their potential contributions to the target population of CMI adults in a rehabilitation setting. Expressive and receptive language skills, routine, nonverbal decision making, sensory perception and basic sequential thought processing are particularly important variables to be considered. If these are essentially intact, then the primary rehabilitation problem reverts to

shaping consistent, appropriate work behavior. If this can be done successfully, additional services such as vocational evaluation, training and education can be considered at a later point in the rehabilitation process.

Should any of these areas be dysfunctional, there may be additional implications for rehabilitation. Communication deficits may require individualized instructional methods (McCray, 1979). Basic problem solving and decision making might be minimized in the work setting in favor of highly structured tasks that do not rely on these skills. Impulsivity and poor planning ability are frequently documented problems among CMI adults, and in some cases may be the result of organic deficits (Goldman, 1977). If so, rehabilitation goals and treatment processes should be adjusted accordingly. Such deficits may best be regarded as ongoing behavior management problems rather than targets for change through traditional psychotherapy.

The information generated by an evaluation such as the one used in the present study focuses specifically on the behavioral problems associated with this population, regardless of such factors as intelligence, previous training, work experience or education. Vocational goals are "reduced" to successfully completing at least six months of transitional employment in a half-time, entry-level job in the community. More detailed information regarding career alternatives, specific work skills and aptitudes can be collected once this immediate goal is

accomplished. This often means delaying comprehensive vocational assessment for a year or more while the person is involved in the psychosocial rehabilitation "club." This focus on short-term, attainable goals has been found to be an effective strategy for dealing with characteristic deficits related to overgeneralization, difficulty in selecting and attending to relevant information and complex problem solving (Pueschel, 1980; Lewis, Nelson & Eggertsen, 1979; Purisch, Golden, & Hammeke, 1978; Schneider, 1976). This technique is not only useful in intermediate and long-term rehabilitation program planning for psychiatric populations, but also for shaping more effective attention to relevant stimuli in the daily work setting.

Neuropsychological Considerations

The basic functions measured by the prevocational assessment battery--communication skills, sensory perception and nonverbal problem solving--are generally considered to be directly related to the integrity of the brain (Reitan, 1979b; Filskov & Boll, 1981; Lezak, 1976). This simultaneously suggests the utility of readily available neuropsychological tests for measuring these functions and the opportunity to address several current issues in neuropsychology. These basic functions are also among those traditionally assessed within vocational evaluation settings for rehabilitation planning.

Since the emergence of reliable psychometric instruments designed to measure brain-related functions, there has been interest in

their ability to distinguish between patients with organic brain damage and those with inorganic psychiatric disorders. Filskov and Boll (1981) reviewed a myriad of studies that compared disability groups on a variety of measures. Three primary reasons were identified--the opportunity to improve differential diagnostic ability between these groups, identification of an organic etiology for psychiatric illnesses and the need to develop behavioral objectives for individual treatment planning. Their summary of these studies indicated that length of hospitalization, degree of chronicity and characteristically unreliable performances by psychiatric groups were confounding variables which make both interpretation and replication of results difficult at best. In a separate review, Heaton, et al (1978) concluded that "all psychiatric diagnostic groups except chronic/process schizophrenics rather consistently perform better than organics on neuropsychological tests (p. 153)." It is important to note that this body of literature refers to patient groups that were hospital inpatients at the time of testing, whether for psychiatric, neurological or other medical reasons. This setting provides the opportunity for greater control of extraneous variables and readily available experimental groups. However, psychiatric patients in particular may be expected to behave much differently on such tests during periods of hospitalization than when they are functioning in the community and participating in a rehabilitation program. It is therefore reasonable to question the generalizability of previously reported studies to noninstitutional settings (Watson, 1974).

The third reason given by Filskov and Boll (1981) of the need for comparative research between organic and psychiatric groups is of particular interest to a community-based rehabilitation program. Specifically, neuropsychological testing offers a means of identifying behavioral deficits that can be targeted for remediation. This is more critical than diagnostic classification in such a setting, since all clients referred to a program such as the VIP Club are already being treated by the mental health network in long-term outpatient care programs. Filskov and Boll (1981) suggest that "what is of greater importance than organic-schizophrenic comparisons is the examination of psychiatric groups for differential patterns of neuropsychological disorders, since this may aid in our conceptual understanding of what these disorders are and how they develop (p. 22)." Also, Goldstein (1978) stated that the question of organic involvement in psychiatric disorders has become moot, and the issue has shifted to a need for greater understanding of the nature of organic involvement in these illnesses.

The present study attempts to combine elements of vocational evaluation and neuropsychology in a noninstitutional community setting, where the emphasis is on maintenance and gradual improvement of behavior approximating wellness.

CHAPTER 3
METHODOLOGY

Subjects

In order to become a member of the VIP Club and participate in its rehabilitation program, an individual must have a chronic psychiatric illness (i.e., of longer duration than six months), be at least 18 years old, not be dangerous to self or others, and be referred by a mental health therapist. The VIP Club is thus a voluntary vocational rehabilitation program for CMI adults receiving outpatient psychiatric services from a recognized mental health facility.

Thirty-five people referred to the VIP Club during its first year of operation represent the sample for this study. Psychiatric histories reflect ongoing mental health treatment for periods ranging from 18 months to 20 years, and all were characterized as chronically mentally ill by referring therapists. Twenty-four of these VIP Club members were included in the diagnostic category of "schizophrenic" on the basis of referral information, ten were categorized as "non-schizophrenic" and one was indeterminate due to incomplete referral data.

The sample was evenly divided on the basis of sex, with 17 males and 18 females. Their mean age at time of referral was 31.2 years, with a range from 20 to 54 years. The mode and median for age were also at 31 years. Most of these subjects (n=25) had never been married. Of the remaining ten people, five were married and five were separated or divorced.

The mode for years of education was 12, with a range from 9 to 14. The mean number of years of education was 12.5 and the median was 12.3.

Instrumentation

Following is a brief description of the tests comprising the prevocational screening battery developed for the VIP Club. These instruments are used as adjuncts to behavior observation and assess a variety of basic adaptive skills and abilities.

1. The Valpar Independent Problem-Solving Work Sample (IPSWS) is commonly used in vocational evaluation settings as a measure of routine nonverbal problem-solving ability (Valpar Corporation, 1974). It appears to require selective attention to detail, shifting between sets of stimuli for the purpose of routine comparison and responding in a yes/no fashion to each comparison. The ability to concentrate on such a task over a 15-30 minute period has implications for employment aside from specific speed and accuracy scores, although these obviously are useful data as well.

Test-retest reliability figures are provided in the Valpar IPSWS Manual (1974) for one sample of 50 employed workers. For this group the test-retest reliability coefficient is .88 for completion time, and .79 for errors. Content validity is claimed on the basis of development of the instrument according to worker traits identified in

the Dictionary of Occupational Titles (1966) "in those occupations requiring rapid comparisons and the solving of problems based on minute details (Valpar, 1974)."

2. The Reitan-Indiana Aphasia Screening Test (AST) helps identify specific brain-related behavior problems, such as expressive/receptive language dysfunction and spatial-perceptual deficits (Lezak, 1976; DeMeyer, 1974; Wheeler & Reitan, 1962). It has been reported to have a high degree of reliability among chronic schizophrenic adults (Matarazzo, et al, 1976). Further, performances on the AST are relatively unaffected by psychotropic medications or degree of psychosis (Heaton, et al, 1978; Cox & Ludwig, 1979). While the effective use of the Aphasia Screening Test requires formal instruction on scoring and interpretation, its implementation in the VIP Club suggests that it can provide valuable additional information for the individual rehabilitation program plan.

3. The Reitan-Klove Sensory Perceptual Examination (SPE) is included to augment results from other neuropsychological tests in the prevocational screening battery. It is designed to check for lateralized sensory imperception when both sides of the body are stimulated simultaneously (Reitan & Davison, 1974; Reitan, 1979). Standardized procedures are used to test for visual, auditory and tactile imperception. The subject is also asked to identify numbers written on his/her fingertips in a standardized manner. When administered in addition to other neuropsychological tests it can contribute information regarding

the laterality of brain lesions (Reitan & Davison, 1974). It may also be sensitive to peripheral neurological disorders. Together, the SPE and AST take about thirty minutes to administer. Items from the SPE have been in general use as part of the medical neurological examination for many years (DeMeyer, 1974; Reitan & Davison, 1974). The pathognomic sign approach taken by the test makes it a useful adjunct to other standardized tests used in a neuropsychological context. However, reliability studies specific to the SPE have not been reported.

4. Another neuropsychological instrument employed is the Trail Making Test (TMT) (Reitan, 1979; Lezak, 1976; Reitan & Davison, 1974). Administered in two parts, the TMT requires the subject to use a pencil to connect a set of numbered circles in correct sequence on Part A, and on Part B connect a series of circles alternating between alphabetical and numerical sequences (e.g., 1, A, 2, B, 3, C). This test requires about five minutes of administration time, and is included as a measure of adaptability (Horton, 1979) and sequential thought processing (Heaton & Pendleton, 1981), as well as basic fine motor skill. The TMT is significantly correlated with tests of intelligence among normal subjects (Brown, et al, 1958), and has test-retest reliability coefficients among a sample of chronic schizophrenics of .84 (Part A) and .81 (Part B) over a 52 week test-retest period ($p < .001$) (Matarazzo, et al, 1976).

5. The Work Adjustment Rating Form (WARF) is included as a measure of job readiness behaviors (Bitter & Bolanovich, 1970). Al-

though designed for use in programs serving mentally retarded individuals, its emphasis on appropriate observable work behaviors suggests potential as a behavior rating scale for other disability groups as well. According to Esser (1975) "the WARF can be used to assess areas of strength and weakness for persons in workshop programs. It can also be used for formulating goals for workshop training for the individual, and as a means of assessing progress towards achieving these goals (p. 44)." The WARF contains forty items, with five in each of eight subscales--Amount of Supervision Required, Realism of Job Goals, Teamwork, Acceptance of Rules/Authority, Work Tolerance, Perseverance in Work, Extent Client Seeks Assistance, and Importance Attached to Job Training. These subscales seem particularly appropriate to the needs of CMI adults in rehabilitation programs as well as the original target population.

Bitter and Bolanovich (1970) report interrater reliability product moment correlation coefficients ranging from .67 to .98. Further, they report significant correlations ($p < .01$) between WARF scores and employment records of a sample of mentally retarded clients, obtained at two-year follow-up. WARF observations were made at three weeks and sixteen weeks into the training program. They found that WARF scores at three weeks were almost as predictive of employment as the sixteen week scores, and still significant at the .01 level (Bitter & Bolanovich, 1970). In the VIP Club, WARF scores were obtained after one month in the program.

6. Finally, an interest inventory is administered as part of the prevocational screening battery. The Wide Range Interest Opinion Test (Jastak & Jastak, 1979) was selected as appropriate to the needs of the setting and the clientele. The use of an interest inventory at this stage of the rehabilitation process is to determine the strengths of the client's likes and dislikes as much as the identification of specific career areas for further exploration. For the purposes of this study, only scores on the supplemental scales are included for data analysis. These scales include Sedentariness, Risk, Ambition, Skill Level, Sex Stereotype, Agreement, Negative Bias and Positive Bias.

The WRIOT Manual (1979) reports split-half reliability coefficients for 150 males and 150 females. Reliability coefficients for the supplementary scales range from .84 to .95 for males, and .86 to .93 for females. The normative sample for standardization totals 9,184. This population sample is divided into seven age groups and separated by sex. The manual states that representative sampling was attempted on the basis of ethnic, economic and intellectual criteria.

The issue of validity of the WRIOT is also addressed in the manual. However, the WRIOT supplementary scales are not included in a criterion-referenced validation study of WRIOT occupational scales.

Supplemental Data

In addition to individual scores on the test battery, the following information has been collected:

Psychiatric Diagnosis

For the purpose of this study, psychiatric diagnoses are identified simply as "schizophrenic" or "nonschizophrenic." Diagnostic criteria of subjects referred to the VIP Club were not investigated. Diagnoses, psychiatric histories and current medications were provided routinely by mental health therapists and clinicians at the time of referral. Several considerations precluded more in-depth treatment of diagnostic categories.

The study was limited to a sample size of 35. Inadequate representation among the various nonschizophrenic disorders did not allow for reliable statistical analysis. By combining them, it was at least possible to examine the relationships between diagnoses within what Kety, et al (1968) refer to as "schizophrenic spectrum disorders" and other variables in the study.

Schizophrenic disorders represent more than half (approximately 60%) of the people included in estimates of the CMI population receiving community support services in this country (Turner & Shifrin, 1979; Cutler, 1981). So the dichotomy of schizophrenic versus nonschizophrenic disorders may be a useful method of representing this population in the context of supportive services.

Theoretical issues concerning psychiatric classification systems, including subtypes of schizophrenia, suggest that without the opportunity to control diagnostic criteria, more detailed diagnostic categories may be of limited value for purposes of generalization.

However, Wing and Nixon (1975) were able to identify a "nuclear syndrome" of schizophrenic diagnosis applicable to over 1200 patients in nine countries "based on auditory hallucinations, thought disorder, or loss of will" (Haier, 1980). These criteria were present and identifiable in over 95% of the patients diagnosed schizophrenic or paranoid psychotic in the study, and suggest a cross-cultural basis for the phenomenon of schizophrenia.

Finally, neuropsychological literature (Heaton, et al, 1978; Cox & Ludwig, 1979; Heaton, 1976) has provided a context for analysis of test scores among schizophrenic and nonschizophrenic psychiatric populations that makes this a meaningful dichotomy. At the same time, differentiation in the above cited studies tend to identify chronic or process schizophrenics as demonstrating greater neuropsychological deficits than other psychiatric groups, not limited to nonschizophrenic, chronically mentally ill persons. The issue of neuropsychological differentiation between schizophrenic and nonschizophrenic CMI adults has not been directly addressed in the literature. However, this is precisely the population addressed by community mental health support networks as needing a myriad of supportive services.

Medication

Although types of medication were generally available, dosage levels were not consistently reported. Also, since most participants receive maintenance levels and frequently self-administer their

medications, dosage control was not realistic. Nonetheless, five major drug groups are represented neuroleptics/antipsychotics, antiparkinson agents, sedative hypnotics, tricyclic antidepressants and lithium carbonate. While a limitation of this study is the lack of experimental control of medications, some problems associated with this issue deserve to be addressed.

Heaton (1976) reports on the basis of an exhaustive literature review that "most psychotropic medications either improve patient performance or do not affect it" when administered in clinically effective doses over two to three week periods. Further, he says withdrawal from medication for up to six weeks does not affect the performance of chronic schizophrenic subjects, but long-term, chronic use of major tranquilizers (neuroleptics) appears to be related to neuropsychological impairment.

An awareness of the potential impact of psychotropic medication not only on test performance but on everyday functioning deserves continued emphasis. In the extreme, irreversible tardive dyskinesia may result from years of using major neuroleptics (Crane, 1968). Specific drugs may also have differing, more immediate effects. Spooner, et al (1980) report that a sample of chronic schizophrenics improved their performances on manual assembly tasks significantly ($p < .01$) when fluphenazine decanotate was used instead of chlorpromazine. They suggest that "the ideal equilibrium for managing the patient in the community would be achieved by the drug that provided both clinical

control of symptoms and enhanced work performance" (Spooner, et al, 1980, p. 65).

The complexity of issues surrounding medication maintenance of CMI adults in the community underlines the need for close communication and cooperation among the various components of their community support network, including vocational rehabilitation. As Spooner, et al (1980) suggest, a combination of appropriate psychoactive medication and effective operant technology may be the most effective treatment approach for CMI rehabilitation programs in the future.

Time in Program

This variable is included to aid in understanding the clientele who drop out of the program early as well as those who continue beyond the first few months. For this study Time in Program was recorded for each participant as less than one month, one to three months and over three months. With one exception, each of the 35 subjects had the opportunity to participate in the VIP club for more than three months. However, because the duration of the program under study was limited to twelve months, it was not feasible to divide Time in Program into specific segments beyond three months.

Competitive Employment

This variable represents not only a primary goal of the VIP Club for each of its members, but an integral component of the rehabilitation program as well. Members who demonstrate work readiness during

volunteer projects over a period of at least one month are given opportunities for part-time, entry-level work in temporary positions around the community. Emphasis is placed on successful performance, whether the person succeeds for two days or two months. For this study, Competitive Employment was divided into four criterion levels--none, two weeks or less, two to eight weeks and over eight weeks. Participants in the program are encouraged to limit their jobs to part-time (although some move quickly into full-time work), so the distinction between part-time and full-time is not reported.

Data Collection

As indicated previously, the prevocational screening battery is administered as a regular part of the orientation process for new participants of the VIP Club. This project includes all participants who completed the battery during the 1981 calendar year, roughly corresponding to the first year of operation of the VIP Club. The battery was administered by a staff member other than the author, trained at the Master's level as a Vocational Evaluator/Rehabilitation Specialist.

Data retrieval for the purpose of this study required access to confidential client files. Written permission was obtained from the parent agency's governing body, the Board of Directors of C.O.P.E., Incorporated. Strict confidentiality of individual identities of VIP Club participants has been maintained. A formal request for approval from the Rehabilitation Department's Human Subjects Committee is on

file with the chairman of that committee. The author has been advised that this study does not constitute experimental procedures with human subjects according to University of Arizona regulations; but is instead considered to be an analysis of previously existing data.

CHAPTER 4

RESULTS

In this chapter the data are organized according to variables in the study. Descriptive variables other than test scores, i.e., psychiatric diagnosis, medication, time in program and competitive employment are presented first. Tests included in the prevocational assessment battery are presented thereafter.

Psychiatric Diagnosis.

Psychiatric diagnostic categories were reduced to two, schizophrenic and nonschizophrenic, for reasons stated in Chapter 2 (pp. 16-17). Table 1 reflects the frequency distribution within these categories for the 35 subjects in the sample. Diagnostic information was not provided by the referring therapist for one subject, resulting in an indeterminate classification for that person.

Table 1. Frequency Distribution of Diagnostic Categories.

| <u>Diagnosis</u> | <u>f</u> | <u>%</u> |
|------------------|----------|----------|
| Schizophrenic | 24 | 68.6 |
| Nonschizophrenic | 10 | 28.6 |
| Indeterminate | 1 | 2.9 |
| Total | 35 | 100 |

Treating psychiatric diagnosis as a binary variable allowed for additional statistical investigation. Table 2 reflects those variables which have a statistically significant relationship (Pearson

product-moment correlation, $p < .10$) with psychiatric diagnosis for the sample studied. Three timed tasks related to sequential thought processes and routine nonverbal problem solving, TMT (A), TMT (B) and the Valpar IPSWS, were completed faster by the schizophrenic group than by the nonschizophrenic CMI sample. The schizophrenic group also committed significantly fewer errors on the Valpar IPSWS, the Aphasia Screening Test (AST) and the Sensory-Perceptual Exam (SPE). Finally, the schizophrenic group had significantly higher scores on the WRIOT scales purporting to measure a preference for sedentary activities, higher chosen skill levels and a tendency to respond positively to a variety of vocational options.

Table 2. Significant Product-Moment Correlations ($p < .10$) Between Diagnosis and Other Variables.

| Variable | r | P |
|--------------------------|--------|------|
| TMT (A) Time | .4846 | .004 |
| TMT (B) Time | .6798 | .001 |
| Valpar IPSWS Time | .5051 | .002 |
| Valpar IPSWS Errors | .3306 | .032 |
| AST Errors | .4711 | .003 |
| SPE Errors | .4944 | .004 |
| WRIOT Sedentariness | -.3492 | .047 |
| WRIOT Chosen Skill Level | -.3547 | .045 |
| WRIOT Positive Bias | -.4552 | .013 |

Thus, as a group, the schizophrenic subjects in this sample demonstrated fewer positive signs of neuropsychological impairment (TMT (A) Time, TMT (B) Time, AST Errors, SPE Errors), faster and more accurate nonverbal problem solving ability (Valpar Time and Errors), and a tendency to choose options on an interest inventory that reflect more sedentary, higher skilled jobs.

On the basis of these findings, a discriminant analysis was conducted to more accurately explore the differences between these diagnostic groups. This procedure takes into account the interrelations and partly overlapping information among the variables that contribute to the group differences (Tatsuoka, 1970). In order to consider discriminant analysis, Tatsuoka (1970) states that the number of variables should exceed the number of groups, the sample size should be at least three times the number of variables and the size of the smallest group should be no less than the number of variables used. Originally, all nine of the above variables were considered for the discriminant analysis. However, due to missing data for some subjects, sample size was drastically reduced, especially within the nonschizophrenic group. Missing WRIT scores were most responsible for the reduction in sample size, so they were eliminated from the discriminant analysis reported here.

Five of the remaining six variables were included in a stepwise discriminant analysis. Valpar Time does not account for a significant portion of the variance apart from the other measures included, and therefore did not enter the discriminant function. Table 3 presents the five variables contributing to the stepwise discriminant function in their order of entry. On the basis of this function, 100 percent of the cases included in the analysis were correctly classified according to psychiatric diagnosis. That is, each of the 16 cases included in the schizophrenic group was correctly placed in the schizophrenic group on the basis of her discriminant function score. Likewise, each of the

seven nonschizophrenic cases was correctly placed in the nonschizophrenic group. Incidentally, on the basis of his/her discriminant score, the case of indeterminate diagnosis would be placed in the schizophrenic group.

Table 3. Summary of Discriminant Function Analysis for Psychiatric Diagnosis (Chi-square = 89.04, df = 5, p < .0001).

| Step | Variable | Wilks Lamda | Significance | Discriminant Function Coefficient |
|------|---------------|-------------|--------------|-----------------------------------|
| 1 | TMT (B) Time | .539818 | .0004 | -.73492 |
| 2 | TMT (A) Time | .421533 | .0002 | -.91642 |
| 3 | SPE Errors | .299410 | .00001 | 1.68685 |
| 4 | Valpar Errors | .242776 | .00001 | -1.04762 |
| 5 | AST Errors | .208134 | .00001 | -.61424 |

Discriminant analysis performed on samples as small as those available in this study is subject to question regarding overestimation of the predictor-criterion relationship, or "shrinkage" (Fletcher, Ray & Rice, 1978). For this reason cross-validation to estimate the error rate of the discriminant function is recommended. A "jackknife" procedure suggested specifically for discriminant functions derived from small samples was used (Lochenbruch & Mickey, 1978). This procedure involves the computation of group means and cross products for each n-1 combination. Probabilities are then computed for the distance between each case and the group means formed by the remaining cases. These probabilities are combined to provide a jackknifed estimate of the error rate of the primary discriminant function.

In the present study, the jackknife procedure estimated the primary discriminant function to be inflated by 8.7% after the third

and fourth steps of the stepwise analysis. This was resolved after the fifth and final step, when the jackknife function also obtained a 100% hit-rate for both groups.

A second issue related to the validity of discriminant analysis is the subject/variable ratio. When this ratio approximates 1:1 the likelihood of inflated estimates of prediction is greater than when subjects outnumber variables by three to one or more (Fletcher, et al, 1978). Stepwise analysis allows the researcher to consider the effect of including fewer variables, thus improving the subject/variable ratio at the expense of obtained prediction accuracy.

In the present study the first variable to enter the discriminant function, i.e., the variable responsible for the greatest amount of variance in the analysis, was the Trail Making Test (Part B). On the basis of TMT (B) alone, an overall accuracy of 87% was obtained and confirmed by the jackknife procedure. While the next two variables to enter, TMT (A) and SPE, improved the primary discriminant function to 95.7% in overall accuracy, the jackknife procedure did not confirm this improvement. Thus, in the present sample, TMT (B) alone provides discrimination between schizophrenic and nonschizophrenic subjects with 87% accuracy, with the least likelihood that this figure is inflated.

Medication

The class of drugs referred to as neuroleptic/antipsychotic is clearly the most prevalent prescription psychotropic medication among the sample of CMI adults studied here, as reflected in Table 4. Twenty-eight of 35 subjects (80 percent) receive neuroleptics alone or in combination with other drugs. They are prescribed for at least some

nonschizophrenic disorders, since these comprise only 70 percent of the sample, including schizophrenia subtypes and schizo-affective disorders.

Table 4. Frequency Distribution of Prescribed Psychotropic Medication.

| <u>Medication</u> | <u>F</u> |
|--|----------|
| Neuroleptic/Antipsychotic only | 16 |
| Neuroleptic + Antiparkinson Agent | 4 |
| Neuroleptic + Antiparkinson Agent + Tricyclic Antidepressant | 1 |
| Neuroleptic + Antiparkinson Agent + Lithium Carbonate | 1 |
| Neuroleptic + Sedative Hypnotic | 1 |
| Neuroleptic + Sedative Hypnotic + Tricyclic Antidepressant | 1 |
| Neuroleptic + Sedative Hypnotic + Lithium Carbonate | 2 |
| Neuroleptic + Tricyclic Antidepressant | 1 |
| Neuroleptic + Lithium Carbonate | 1 |
| Tricyclic Antidepressant only | 1 |
| NONE | <u>6</u> |
| | n = 35 |

Time in Program

Of the 35 subjects studied, all but one had the opportunity to participate in the program for at least three months. The one exception entered the program with slightly less than three months remaining in the calendar year, and remained active at the end of the year, when data collection ended for this project. Two of the remaining 34 subjects (5.9 percent) dropped out after less than one month, and nine more (26.5 percent) left after less than three months in the program. The remaining 23 subjects (67.6 percent) continued in the program longer than three months.

Table 5 lists those variables which correlate with Time in Program at the .10 or higher level of significance. The negative

correlation with Age suggests some tendency for younger people to stay in the program longer. TMT (B) Errors is the only neuropsychological test variable on the list, and suggests a tendency for subjects with more errors to remain in the program for a longer period of time. However, other error scores in the prevocational screening battery do not reflect this tendency at a significant level.

With respect to the significant correlations with the three WRIOT scales, it appears that people who perceive themselves as most in need of vocational rehabilitation services are most likely to remain in the program. That is, the lower a person's score on the Ambition scale, the less the WRIOT response pattern agrees with the normative sample and the more it is characterized by a negative response bias, the more likely that person is to remain in the program. Conversely, the more positively a person is reflected on these scales, the less likely it is that he/she will remain in the program beyond three months.

Table 5. Significant product-moment correlations ($p < .10$) between Time in Program and Other Variables.

| Variable | r | P |
|-----------------|--------|------|
| Age | -.2607 | .065 |
| TNT(B) Errors | .3101 | .040 |
| WRIOT Ambition | -.5342 | .004 |
| " Agreement | -.4064 | .024 |
| " Negative Bias | .4789 | .009 |

Competitive Employment

Out of the sample of 35 people included in this study, nine (25.7 percent) of them maintained competitive employment for more than 60 days by the end of the 1981 calendar year. Thirteen of the 23

subjects (56 percent) who participated in the program for three months or more experienced some competitive employment, and nine (39 percent) of those in the program longer than three months maintained full-time or part-time competitive employment for longer than 60 days. Table 6 shows the distribution of the sample according to length of time employed.

Table 6. Frequency Distribution of Sample According to Period of Competitive Employment.

| Period Employed | f | % |
|-----------------|----|------|
| Ø | 21 | 60 |
| 2 weeks or less | 4 | 11.4 |
| 2 to 8 weeks | 1 | 2.9 |
| over 8 weeks | 9 | 25.7 |
| Total | 35 | 100 |

A positive relationship exists between length of time spent in the program and length of time spent in competitive employment (Table 7). In fact, Time in Program appears to be the best predictor of competitive employment among the variables included in the study. A negative correlation between Competitive Employment and Valpar Time indicates that subjects who were slower on the routine problem solving task were less likely to realize competitive employment. A stronger relationship appears to exist between a subject's negative response pattern on the WRIOT and period of competitive employment. However, as has been noted ($p < .29$), a strong correlation ($r = .479$, $p < .009$) also exists between the WRIOT Negative Bias scale and Time in Program.

Considering the importance placed on competitive employment as an outcome variable for vocational rehabilitation programs, further investigation attempted to differentiate the characteristics of those

Table 7. Significant Product-Moment Correlations ($p < .10$) Between Competitive Employment and Other Variables.

| Variable | r | P |
|---------------------|--------|------|
| Time in Program | .4554 | .003 |
| WRIOT Negative Bias | .4250 | .019 |
| Valpar IPSWS Time | -.2808 | .057 |

subjects who realized this goal in the VIP Club from those who did not.

The 35 subjects were divided into two groups, employed ($n = 14$) and not employed ($n = 21$). Discriminant analysis was conducted allowing all variables from the prevocational screening battery to enter in a stepwise fashion on the basis of how much each variable contributed to the remaining variance at each step. At the end of this process three variables remained. Discriminant function coefficients were derived for these three variables (TMT (A) Time, Valpar Time, and WRIOT Negative Bias) from the 16 cases for whom there was no missing data. Twenty-one of the 35 cases had scores of all three of these variables present. When discriminant function scores were assigned to these 21 subjects, 81 percent of them were correctly classified as employed or not employed. Unfortunately, 14 of the 35 cases had at least one missing discriminating variable. When they were included for classification according to discriminant scores, the accuracy of prediction dropped to 63 percent.

Table 8. Summary of Discriminant Function Analysis for Competitive Employment.

| Step | Variable | Wilks Lambda | Significance | Function Coefficient |
|------|---------------------|--------------|--------------|----------------------|
| 1 | WRIOT Negative Bias | .787030 | .0720 | .83915 |
| 2 | Valpar Time | .717756 | .1158 | -1.12012 |
| 3 | TMT(A) Time | .514447 | .0406 | 1.07059 |

Three variables were identified as contributing to the difference between the employed and unemployed groups (Table 8). Despite efforts to collect data on each variable for all subjects in the sample, insufficient data was accumulated to provide conclusive results for this discriminant analysis. Nonetheless, the discriminant function obtained a chi-square value of 8.31, with 3 degrees of freedom, which was significant at the .04 level. With the 21 subjects having all three variables present, 78.6% of the unemployed people were correctly assigned to that group on the basis of their performance on these three tests and 85.7% of the employed subjects were correctly classified.

Valpar Independent Problem Solving Work Sample

Thirty-three subjects in the sample were administered the Valpar. Means and standard deviations for this CMI sample are included in Table 9, along with published statistics for a sample of employed workers (Valpar Corporation, 1976). Time and error means for the two groups were compared via two-tailed t-tests. The formula used is one recommended by Meyers (1979, p. 69) for unequal 'n's and heterogeneity of variance. This formula calls for adjusting degrees of freedom according to sample variances as well as the t statistic itself. The difference between the group means for time is not significant, while their error means differ at the .01 level of significance. Thus, for these two samples, CMI adults are competitive on the Valpar IPSWS with respect to completion time, but they commit significantly more errors than employed workers.

Table 9. Group Mean Comparisons Between Samples of Employed Workers and CMI Adults on the Valpar IPSWS.

| Variable | Group | n | Mean | StdDev | r | P |
|----------|------------------|----|--------------|--------|-----------|-----|
| Time | Employed Workers | 50 | 1089.23(sec) | 415.84 | .933 | ns |
| | CMI | 33 | 1185.21(sec) | 484.89 | (df = 61) | |
| Errors | Employed Workers | 50 | .81 | 1.10 | 3.450 | .01 |
| | CMI | 33 | 4.18 | 5.54 | (df = 34) | |

Significant correlations between Valpar Time and Error scores and other variables in the study are presented in Table 10. The high degree of relationship ($r = .5045$, $p < .001$) between the two Valpar scores themselves indicates that subjects in the sample with slower completion times tend to commit more errors. Both of these measures correlate highest with results from two neuropsychological tests in the battery--the Trail Making Test (TMT) and the Reitan-Indiana Aphasia Screening Test (AST)--indicating considerable overlap of content measured among these instruments.

Diagnostic category is also highly correlated with both time and error scores on the Valpar IPSWS, with the nonschizophrenic CMI sample recording slower completion times and more errors than their schizophrenic counterparts. The modest correlation between Valpar Time and age suggests that younger subjects tended to obtain faster completion times.

Considering that this instrument is generally more prevalent in vocational rehabilitation settings than psychiatric or neuropsychological diagnostic centers, its degree of relationship with other

Table 10. Significant Product-Moment Correlations ($p < .10$) Between Valpar Scores and Other Variables

| Variable | Valpar Time* | | Valpar Errors* | |
|--------------------------|--------------|------|----------------|------|
| | r | P | r | P |
| TMT (B) Time | .7497 | .001 | .6290 | .001 |
| TMT (B) Errors | .2979 | .062 | .3877 | .014 |
| AST Errors | .4565 | .004 | .7816 | .001 |
| Diagnosis | .5051 | .002 | .3306 | .032 |
| TMT (A) Time | .4725 | .006 | .2872 | .069 |
| TMT (A) Errors | .2979 | .062 | .2720 | .081 |
| WRIOT Positive Bias | ns | ns | -.4795 | .010 |
| WRIOT Chosen Skill Level | -.3888 | .033 | .3969 | .030 |
| WRIOT Negative Bias | ns | ns | .3071 | .077 |
| WRIOT Sedentariness | -.3035 | .080 | ns | ns |
| WARF | -.3533 | .030 | ns | ns |
| Competitive Employment | -.2808 | .057 | ns | ns |
| SPE Errors | ns | ns | .2723 | .080 |
| Age | .2394 | .090 | ns | ns |

*Correlation coefficient between Valpar Time and Valpar Errors = .5045 ($p < .001$).

vocational measures is of some interest. Among WRIOT scales, high scores on chosen Skill Level are associated with faster times and fewer errors on the Valpar. A high score on the Sedentariness scale correlates with faster time, and a response pattern dominated by dislikes corresponds with more Valpar errors. Scores on the WARF increase as a person's work related behaviors are considered more appropriate, and higher WARF scores correlate significantly with faster Valpar times. Finally, a correlation between Valpar Time and Competitive Employment ($r = .2808$, $p < .057$) suggests a tendency for CMI subjects with faster Valpar times to succeed in entry level positions for longer periods of time.

Work Adjustment Rating Form (WARF)

In keeping with its function as a behavior rating scale, a person's obtained score on the WARF is the sum of positive scores on 40 observation items. Thus, a person at an optimal level of work readiness can receive a maximum of 40 points. Thirty subjects in this study were rated on the WARF after one month in the VIP Club. Their scores ranged from 14 to 39, with a mean of 28.3. Table 11 lists other variables in the study which correlate significantly with individual WARF scores.

A tendency is noted for females in the sample to score higher than males. A positive relationship also exists between WARF scores and scores on the WRIOT Sex Stereotype scale, designed to assess a person's preference for jobs within traditional sex roles.

Other WRIOT scales correlated significantly with WARF scores are Agreement, Negative Bias and Positive Bias. These relationships suggest that as subjects' WRIOT response patterns more closely approximate the published norms (Agreement) and reflect more occupational likes and dislikes (rather than neutrality), the higher their work adjustment ratings tend to be. The WRIOT manual (Jastak & Jastak, 1979) notes that people with well developed sets of occupational likes and dislikes report greater job satisfaction than workers with relatively "flat" interest profiles. This study appears to reflect similar pattern relationships for a sample of CMI adults in a work adjustment setting.

Neuropsychological impairment is associated with lower WARF scores in this sample. In particular, errors in the Reitan-Indiana

Table 11. Significant Product-Movement Correlations ($p < .10$) Between WARF Scores and Other Variables

| Variable | r | p |
|----------------------|--------|------|
| Sex | .3631 | .024 |
| WRIOT Sex Stereotype | .3071 | .077 |
| WRIOT Agreement | .3290 | .063 |
| WRIOT Negative Bias | .2813 | .097 |
| WRIOT Positive Bias | .4246 | .022 |
| AST Errors | -.5081 | .002 |
| Valpar Errors | -.4216 | .011 |
| Valpar Time | -.3533 | .030 |
| TMT (B) Time | -.2812 | .066 |

Aphasia Screening Test (AST) are negatively correlated with WARF results. Negative correlations with Valpar Time and Error and TMT (B) Time also reflect this inverse relationship between neuropsychological impairment and work behavior ratings. These last items are also associated with routine problem-solving, sequential thought processing, concentration and adaptability in everyday situations (pp. 13-14). Their inverse relationships with the WARF in this study reflect the significance of these attributes in a rehabilitation setting.

Wide Range Interest Opinion Test (WRIOT)

Eight supplemental scales from the WRIOT were included for purposes of data analysis. This data was available for 24 of the 35 subjects in the sample, 13 males and 11 females. Sixteen of these 24 subjects were classified as schizophrenic, and eight were classified nonschizophrenic. Scoring procedures require the conversion of raw scores to T-scores, or converted normalized standard scores (Anastasi,

1976). Thus, subject scores are directly comparable to published norms (Jastak & Jastak, 1979). Table 12 shows the means obtained on the eight supplemental WRIOT scales for the CMI sample. Formal significance testing of the differences between these means and published norms (T-score mean = 50) was not conducted, due to varying sample sizes in the stratified age categories of the norm group. Examination of Table 12, however, provides a clear indication of the extent to which the CMI sample varied as a group from the published norms.

CMI sample means for Sedentariness and Positive Response Bias closely approximate norm group means of $T = 50$. Sample means for Chosen Skill Level and Agreement were lowest compared to norm group means, at almost one standard deviation below $T = 50$. These scores indicate that CMI subjects chose occupations at lower levels of difficulty for themselves than the norm group, and their patterns of likes and dislikes were also different from the norm. They also tended to score somewhat lower as a group on Ambition and the importance of working within traditional sex roles. The group's Negative Response Bias was one standard deviation higher than the published norm.

Table 12. CMI Sample Means and Standard Deviations on WRIOT Supplementary Scales, Expressed as T-scores from Published Norms (Jastak & Jastak, 1979).

| WRIOT Scale | CMI Mean | Std Dev |
|--------------------|----------|---------|
| Sedentariness | 51.33 | 16.49 |
| Risk | 44.96 | 11.04 |
| Ambition | 44.67 | 9.38 |
| Chosen Skill Level | 42.25 | 8.15 |
| Sex Stereotype | 44.79 | 10.98 |
| Agreement | 42.88 | 8.41 |
| Negative Bias | 59.88 | 11.19 |
| Positive Bias | 50.42 | 10.78 |

Significant correlations between each of the eight supplementary WRIOT scales and other variables in the study are presented in Table 13. Diagnostic category correlates significantly with three scales-Sedentariness, Chosen Skill Level and Positive Response Bias. The schizophrenic group was associated with higher scores on each of these scales compared to nonschizophrenics. Sedentariness and Chosen Skill Level scores also correlated negatively and significantly with five scores each from the prevocational screening battery related to neuropsychological impairment. That is, subjects who demonstrated greater impairment on neuropsychological measures tended to choose less sedentary and lower skilled activities on the WRIOT.

An inverse relationship is noted between Age and Negative Response Bias. Younger subjects in the CMI sample tended to record fewer likes and more dislikes than older subjects. Individuals with high scores on the Negative Response Bias scale also tend to remain in the program longer, obtain higher work adjustment ratings and enjoy greater success in competitive employment.

Trail Making Test Part A (TMT (A))

Though TMT(A) has shown a lack of sensitivity to brain impairment (Reitan, 1979; Horton, 1979), it has been used to provide a degree of practice and orientation prior to the administration of TMT(B) as well as a screening device for studies focusing on results from TMT(B) (Brown, et al, 1958; Chelune, et al, 1979).

For this study results on TMT(A) were available for 29 of the 35 subjects in the sample. Their mean completion time was 56.2 seconds,

well beyond the cutoff of 39 seconds established by Reitan (1955; 1979) to differentiate between normal versus brain-damaged subjects. However, this average is below the mean of 67.3 seconds reported by Goldstein and Halperin (1977) for a group of long-term institutionalized schizophrenic patients. Twenty-five of the 29 subjects in the present study completed the task without error, the remaining four subjects committing one error each.

Significant correlations between TMT (A) Time and other variables in the study are reported in Table 14. Among subjects in this CMI sample, those in the nonschizophrenic diagnostic category obtained slower times on TMT (A) than schizophrenic subjects. TMT (A) Time also correlates significantly with more complex tasks involving sequential reasoning (TMT (B) Time and Valpar I PSWS) and the untimed Reitan-Indiana Aphasia Screening Test. Subjects with slower times on TMT (A) tended to obtain lower scores on the WRIOT Ambition scale, purported to measure degree of interest in self-improvement (Jastak & Jastak, 1979).

Table 14. Significant product-moment correlations ($p < .10$) between TMT (A) Time and Other Variables.

| Variable | r | p |
|----------------|--------|------|
| Diagnosis | .4846 | .004 |
| TMT (B) Time | .4119 | .013 |
| Valpar Time | .4725 | .006 |
| Valpar Errors | .2872 | .069 |
| AST Errors | .5016 | .003 |
| WRIOT Ambition | -.3152 | .077 |

Trail Making Test Part B (TMT (B))

This component of the TMT has been referred to by Reitan (Note 3) as "the third most sensitive measure in the Halstead-Reitan Battery of the biological integrity of the brain after the Halstead Impairment Index and the Category Test." It has been used as a screening device to differentiate between brain damaged and schizophrenic patients with inconclusive results (Horton, 1979; Goldstein & Halperin, 1977; Chelune, et al, 1979; Heaton, et al, 1978; Brown, et al, 1958).

Horton (1979) recommends that interpretation of TMT results among schizophrenic patients be confined to "the patient's ability to adapt to the demands of daily living (p. 21)" until more conclusive results on the diagnostic issue are available.

With the chronic psychiatric sample in this study, however, TMT (B) Time scores correlate most significantly with diagnosis and scores on other neuropsychological instruments and the Valpar IPSWS (see Table 15). Slower completion times on TMT (B) were associated with nonschizophrenic CMI diagnoses and poorer performances on the Reitan-Indiana Aphasia Screening Test, the Sensory-Perceptual Exam and other TMT measures.

TMT (B) Time also correlated significantly with vocational instruments--the Valpar IPSWS, the Work Adjustment Rating Form and three supplementary WRIOT scales. Longer times on the TMT (B) were associated with poorer performances on the Valpar and lower work adjustment ratings. Subjects with slower TMT (B) Time scores also obtained lower scores for Sedentariness, Chosen Skill Level and Positive Response Bias on the WRIOT.

The mean completion time for the 33 subjects in this CMI sample was 139.76 seconds. While well beyond Reitan's cutoff of 90 seconds for brain impairment (Reitan, 1979), this represents a faster average time than the sample of long-term institutionalized schizophrenics (182.2 seconds) reported by Goldstein and Halperin (1977).

Table 15. Significant Product-Moment Correlations ($p < .10$) Between TMT (B) Scores and Other Variables.

| Variable | TMT(B) Time* r | p | TMT(B) Errors r | p |
|-------------------------|-------------------|------|--------------------|------|
| Diagnosis | .6798 | .001 | | ns |
| Sex | | ns | .2940 | .048 |
| TMT (A) Time | .4119 | .013 | | ns |
| AST Errors | .5947 | .001 | .2761 | .060 |
| SPE Errors | .4250 | .011 | .3889 | .019 |
| Valpar Time | .7497 | .001 | .3576 | .022 |
| Valpar Errors | .6290 | .001 | .3877 | .014 |
| WARF | -.2812 | .066 | | ns |
| WRIT Sedentariness | -.3628 | .041 | | ns |
| WRIT Chosen Skill Level | -.3663 | .039 | -.2981 | .079 |
| WRIT Positive Bias | -.4115 | .023 | | ns |
| Time in Program | | ns | .3101 | .040 |

*Correlation coefficient between TMT(B) Time and Errors = .5939 ($p < .001$)

Although Reitan (1979) states that "errors count only in the increased time in performance (p. 57)" (since the subject is to be corrected by the examiner as errors occur), error frequency on the TMT was recorded. Table 15 includes significant correlation coefficients between TMT (B) Errors and other variables. Nineteen of the 33 subjects who were administered TMT (B) committed no errors. Of the remaining 14 subjects, five each had either one or two errors, and two

each had either three or four errors. TMT (B) Errors correlates highest with TMT (B) Time. Moderate correlations are noted between this variable and Sex and Time in Program. Those subjects in the sample who committed more TMT (B) errors tended to obtain more impaired scores on other neuropsychological tests and the Valpar IPSWS as well.

Reitan-Indiana Aphasia Screening Test (AST)

Thirty-three subjects in this sample were administered the AST. Error scores represented the occurrence of positive signs among the 19 categories identified by Wheeler and Reitan (1962) as contributing to a determination of brain impairment. Seventeen of the 33 subjects (51.5 percent) produced no positive signs of impairment, and 24 subjects (72.7 percent) showed one sign or less. The remaining nine subjects (17.3 percent) produced from two to six positive signs. Table 16 presents a cumulative frequency distribution of these results.

Table 16. Frequency Distribution of Positive Signs (Errors) on the Reitan-Indiana Aphasia Screening Test.

| <u>Errors</u> | <u>F</u> | <u>Cum. Freq. (%)</u> |
|---------------|----------|-----------------------|
| 0 | 17 | 51.5 |
| 1 | 7 | 72.7 |
| 2 | 3 | 81.8 |
| 3 | 2 | 87.9 |
| 4 | 1 | 90.9 |
| 5 | 2 | 97.0 |
| 6 | 1 | 100.0 |

Significant correlations between the AST and other variables are presented in Table 17. Strong correlations occur between the AST

and three TMT scores, Valpar IPSWS scores, the Sensory-Perceptual Exam and psychiatric diagnosis.

Positive signs on the AST are negatively correlated with subjects' work adjustment ratings (WARF) and three supplementary WRIOT scales. Thus, an increased frequency of signs of neuropsychological deficit among subjects in this CMI sample is associated with poorer work readiness skills and fewer above average preference scores on WRIOT occupational scales. Subjects with high AST error rates also tend to prefer less sedentary work and have lower chosen skill levels.

Table 17. Significant Product-Moment Correlations Between the Reitan-Indiana Aphasia Screening Test and Other Variables.

| Variable | r | p |
|--------------------------|--------|------|
| Diagnosis | .4711 | .003 |
| TMT (A) Time | .5016 | .003 |
| TMT (B) Time | .5947 | .001 |
| TMT (B) Errors | .2761 | .060 |
| SPE Errors | .2656 | .082 |
| Valpar Time | .4565 | .040 |
| Valpar Errors | .7816 | .001 |
| WARF | -.5081 | .002 |
| WRIOT Sedentariness | -.3118 | .069 |
| WRIOT Chosen Skill Level | -.2771 | .095 |
| WRIOT Positive Bias | -.4500 | .014 |

Reitan-Klove Sensory-Perceptual Examination (SPE)

Thirty-three of the 35 subjects in the sample were administered the SPE. Of these, four had recognized sensory impairment such as visual or hearing deficits. Their SPE scores were excluded for purposes of data analysis, leaving a sample size of 29. Although Reitan

(1979) recommends a simple frequency count of impaired responses, scoring for this study was limited to presence or absence of eight types of imperception. These include right or left auditory, visual and tactile imperception and right or left finger dysgnosia. Thus, a maximum score of eight represents impairment in each of these categories.

The prevalence of sensory imperception among this group can be seen from the frequency distribution in Table 18. Only six of the 29 subjects (20.7 percent) obtained perfect SPE scores. All others in the sample gave impaired responses on at least two of the SPE categories.

Table 18. Frequency Distribution of Impaired Responses (Errors) on the Reitan-Klove Sensory-Perceptual Examination.

| Errors | f | Cum. Freq. (%) |
|--------|---|----------------|
| 0 | 6 | 20.7 |
| 1 | 0 | 20.7 |
| 2 | 4 | 34.5 |
| 3 | 4 | 48.3 |
| 4 | 4 | 62.1 |
| 5 | 5 | 79.3 |
| 6 | 4 | 93.1 |
| 7 | 1 | 96.6 |
| 8 | 1 | 100.0 |

The Sensory-Perceptual Exam is one of the tests which contributed to the discriminant function analysis of psychiatric diagnosis. Table 19 reflects the significant relationships between SPE and other elements of that discriminant function. Scores on the SPE also correlate with sex, women tending to give impaired responses for more categories than men. High SPE scores correlate with high scores on the

WRIOT Risk scale as well, suggesting a relationship between sensory imperception and a preference for the more dangerous activities presented in the interest inventory.

Table 19. Significant Product-Moment Correlations Between the Reitan-Klove Sensory-Perceptual Examination and Other Variables.

| Variable | r | p |
|----------------|-------|------|
| Diagnosis | .4944 | .004 |
| Sex | .3821 | .020 |
| TMT (B) Time | .4250 | .011 |
| TMT (B) Errors | .3889 | .019 |
| AST Errors | .2656 | .082 |
| Valpar Errors | .2723 | .080 |
| WRIOT Risk | .3249 | .081 |

CHAPTER 5

DISCUSSION

This chapter will review the results presented in Chapter 4 in relationship to the hypotheses postulated in Chapter 1.

Hypothesis 1

Psychiatric diagnosis accounts for a significant ($p < .05$) portion of the variance on common outcome variables, identified as length of competitive employment and scores on the Work Adjustment Rating Form (WARF) (Table 2).

Discussion

Data in the present study does not support this hypothesis. Indeed, while discriminant analysis was able to categorize subjects in the sample as schizophrenic or nonschizophrenic with 100% accuracy, diagnostic category did not correlate significantly with either Competitive Employment or WARF scores. This is consistent with data previously reported by Anthony (1980; 1979), in which he found "diagnostic labels or elaborate descriptions of symptomatology and hypotheses tied to various psychotherapeutic theories have little relevance to the attainment of rehabilitation goals (Anthony, 1980, p. 19)."

Hypothesis 2

Significant ($P < .05$) correlations exist among neuropsychological measures of the CMI adults sampled. These measures included the

Trail Making Test, Parts A and B, the Reitan-Indiana Aphasia Screening Test and the Sensory-Perceptual Exam (Table 20).

Discussion

This hypothesis was confirmed. Each of the neuropsychological variables correlates significantly with at least two others. Table 20 is a correlation matrix showing these relationships.

Table 20. Significant Product Moment Correlations ($p < .05$) Among Neuropsychological Variables

| | TMT(B) Time | | TMT(B) Errors | | AST | | SPE | |
|---------------|----------------|------|------------------|------|-------|------|-------|------|
| | r | p | r | p | r | p | r | p |
| TMT(A) Time | .4119 | .013 | | ns | .5016 | .003 | | ns |
| TMT(B) Time | | | .5939 | .001 | .5947 | .001 | .4250 | .011 |
| TMT(B) Errors | | | | | | ns | .3889 | .019 |
| AST | | | | | | | | ns |

TMT(A) is essentially an introduction to a sequencing task that is the basis for the more sensitive TMT(B). So it is not surprising that a significant relationship exists between completion times for the two parts of the Trail Making Test. Both of these measures are also strongly correlated with the untimed Aphasia Screening Test. The TMT has been characterized variously as a general measure of the biological integrity of the brain (Reitan, Note 3) and a measure of "the patient's ability to adapt to the demands of daily living (Horton, 1979)." Heaton and Pendleton (1981) suggest that poor performances on the TMT often reflect attentional deficits and "general difficulties following detailed new procedures and adapting to other significant changes (p. 817)."

The AST is a series of simple tasks based on the pathognomic sign approach to identification of specific aphasic and related deficits (DeMyer, 1974; Reitan & Davison, 1974; Wheeler & Reitan, 1962). Together, the AST and TMT appear to assess a wide range of basic cognitive functions including attention, adaptability, sequential reasoning, expressive and receptive language functions, form recognition and simple arithmetic calculation. The significant positive relationship between these two instruments in the present sample of CMI adults lends support to the position that the TMT is indeed a valid indicator of brain impairment among this population and need not be limited to interpretation as a measure of attention and adaptability (Pueschel, 1980; Horton, 1979). At the same time, information provided by the TMT is greatly enhanced by the addition of the AST.

They become more useful when considered in conjunction with other neuropsychological data. While a positive relationship was found in this study between SPE and AST ($r = .2656$, $p < .082$), a higher degree of relationship exists between SPE and TMT (Table 20). Theoretical considerations suggest that a measure of generalized neuropsychological function such as the TMT should correlate higher with various measures of specific functions than the specific measures with each other. In the present instance, this is the case, lending additional validity to the TMT as a neuropsychological instrument.

Hypothesis 3

Significant ($p < .05$) differences exist between scores obtained for CMI adults in this study and published standards (Reitan, 1979;

Wheeler & Reitan, 1962) for normal controls on the Trail Making Test, the Aphasia Screening Test and the Sensory-Perceptual Exam (Table 21).

Discussion

With regard to the Trail Making Test, Parts A and B, published norms (Reitan, 1979; 1959) focus on cut-off scores used to differentiate between normal controls and brain-damaged subjects. Using this method, Reitan (1979) reports that approximately 23% of adult subjects may be misclassified by TMT(A) scores and 15% misclassified according to TMT(B) scores. Within this context it is perhaps more meaningful to compare current sample means against these cut-off scores.

Table 21. Comparison of Sample Means with Reitan's (1979) Cut-Off Scores for the Trail Making Test, Parts A and B

| | Schizophrenic | Nonschizophrenic | CMI Total | Cut-off Scores |
|-------------|---------------|------------------|-----------|-------------------|
| TMT(A) Time | 49.2 | 72.6 | 56.2 | 40 |
| TMT(B) Time | 98.5 | 201.1 | 139.8 | 92 |

Examination of Table 21 suggests that schizophrenic subjects in the sample obtained average times on both parts of the TMT near Reitan's cut-off scores, while nonschizophrenic subjects were much slower on both measures.

AST and SPE data need also be compared to published standards without the benefit of significance testing for similar reasons. Wheeler and Reitan (1962) combined these two instruments and reported

that for a control group of 104 normal adult subjects, "all of the control cases showed fewer than four signs, 96.2% of them showed one sign or less, and 68.3% of them gave no positive responses at all. Of the damaged cases (n = 158) 84.8% showed one or more signs, 65.2% showed two or more, and 39.2% gave four or more positive responses (p. 787)." On the basis of these results, a cut-off between zero and one or more errors on the AST and SPE combined was established (Wheeler & Reitan, 1962). Among the present sample of CMI adults, mean error scores were calculated for the AST and SPE combined. Subjects within the schizophrenic diagnostic category averaged 1.5 errors on this index, and nonschizophrenic subjects obtained a sample mean of 3.5 errors. The combined CMI sample mean is 2.4 errors. Each of these means reflects a greater degree of impairment than expected for the general adult population according to Wheeler and Reitan (1962). This finding is consistent with previously published studies reporting neuropsychological deficits among psychiatric groups (Goldstein, 1978; Poeschel, 1980; Purisch, 1979; Chelune, et al, 1979; Heaton, et al, 1979; Goldstein & Halperin, 1977).

While direct tests of significant differences between obtained results and published norms for neuropsychological variables were not conducted, information regarding Hypothesis 3 can be inferred. On the basis of published cut-off scores (Reitan, 1979; Wheeler & Reitan, 1962), subjects in the present sample do differ from the general population in the direction of more impaired neuropsychological performance.

Hypothesis 4

Differences on neuropsychological measures are significant at the .05 level between subjects divided according to psychiatric diagnosis. Specifically, subjects diagnosed as schizophrenic differ significantly from those diagnosed as having nonschizophrenic disorders (Table 22).

Discussion

This hypothesis was confirmed for the CMI adults in this study. As can be seen in Table 22, subjects differed consistently on each of the four neuropsychological variables according to psychiatric diagnostic categories at statistically significant levels. Differences between group means were measured with the t-test for use when heterogeneity of variance is suspected (Heyers, 1979).

Table 22. Comparisons Between Schizophrenic (Group 1) and Nonschizophrenic (Group 2) Group Means on Four Neuropsychological Tests

| <u>Variable</u> | <u>Group</u> | <u>n</u> | <u>Mean</u> | <u>Std.Dev.</u> | <u>t</u> | <u>p</u> |
|-----------------|--------------|----------|-------------|-----------------|----------|----------|
| TMT (A) Time | 1 | 18 | 49.22 | 16.20 | 2.478 | .05 |
| | 2 | 10 | 72.60 | 27.28 | | |
| TMT (B) Time | 1 | 22 | 98.55 | 32.57 | 4.290 | .01 |
| | 2 | 9 | 201.11 | 68.64 | | |
| SPE Errors | 1 | 21 | 2.62 | 2.01 | 4.224 | .01 |
| | 2 | 7 | 5.14 | 1.07 | | |
| AST Errors | 1 | 22 | .50 | .55 | 2.760 | .05 |
| | 2 | 10 | 2.40 | 4.49 | | |

Questions of differential diagnosis have previously been explored within institutional contexts and between chronic (process) schizophrenic and brain-damaged groups (Pueschel, 1980; Heaton, et al, 1979; Goldstein, 1978; Goldstein & Neuringer, 1966; Brown, et al, 1958). Heaton, et al (1978), in review of reported studies comparing psychiatric populations and brain-damaged groups, indicated that chronic/process schizophrenics "show greater deficits than other psychiatric groups when they are both included in the same study (p. 153)." Huweiler (1976) suggested that "in more chronic settings, distinctions between schizophrenic and brain-damaged patients (on neuropsychological instruments) would be expected to become blurred (p. 74)."

Results from the present study indicate that within a sample of noninstitutionalized chronic psychiatric adults, those with schizophrenic disabilities more closely approximate the normal population than their nonschizophrenic counterparts.

This divergence between previous research and the present study may involve the difference in test settings. The studies cited above were conducted with in-patients in institutional settings. Subjects were receiving either chronic or acute hospital care at the time they were tested. In the case of long-term hospitalization, schizophrenic patients can be assumed to generally lack the functional skills necessary to survive in a more independent community setting, even with supportive services. Experimental subjects in an acute care hospital setting may be capable of more independence in general, but require

in-patient services during times of extreme crisis. CMI adults receiving services primarily through community support networks may be hospitalized for relatively brief periods a few times each year. In this hospital setting their behavior may not be representative of everyday functioning outside the hospital. Attempts to generalize results obtained in institutional settings to community-based programs may not be appropriate.

Subjects in the present study were stabilized with regard to their disability enough to be involved in a vocational rehabilitation program. Their residential situations varied from group home arrangements to supervised apartments to totally independent living. The program offered by the VIP Club was not available to them during times of hospitalization. The focus of this environment was on maintaining or approximating wellness in order to participate in the program. In such a setting, schizophrenic subjects consistently performed closer to the normal population on neuropsychological tests than did the nonschizophrenic group.

A second possibility may be that the nonschizophrenic group might more appropriately be characterized as brain-damaged rather than chronically mentally ill. This would, of course, move the present results into harmony with previously cited research. It is plausible that people receiving services through community mental health networks suffer primarily from organic deficits, not functional psychiatric disorders. They may become involved in the mental health network

because it appears appropriate to their needs and/or because the behavioral manifestations of their disability approximate those of mental illness.

A review of diagnoses attributed to the nonschizophrenic subjects in this sample may help clarify the issue. Table 23 lists these diagnoses as received from clinicians.

Table 23. Frequency Distribution of Nonschizophrenic Diagnoses as Reported by Mental Health Clinicians

| Diagnosis | f |
|--|----|
| Borderline character disorder | 1 |
| Manic depressive psychosis | 1 |
| Depression | 2 |
| Bipolar affective disorder, manic type | 1 |
| Deaf, "emotional problems" | 1 |
| Borderline mental retardation with anxieties | 2 |
| Borderline personality with depression | 1 |
| Psychotic organic brain syndrome | 1 |
| Total | 10 |

Clearly, the opportunity for inferring static organic deficits is present for at least three of these classifications--deafness, borderline mental retardation and "organic brain syndrome." This does not provide conclusive evidence, however, that the sample represents primarily brain-damaged individuals. Diagnostic criteria and small sample size, particularly for this nonschizophrenic group, were

limitations of this study. Regardless, the data reported here raise issues that can best be explored through carefully designed community-based research. One obvious step is an attempt to replicate the discriminant analysis for diagnostic categories with additional CMI samples. Comparing samples of chronic schizophrenic adults in in-patient versus out-patient settings is also recommended.

Hypothesis 5

The neuropsychological measures represent a statistically identifiable "neuropsychological factor" among the variables investigated (Table 3).

Discussion

The discriminant analysis presented in Table 3 supports this hypothesis. Along with the Valpar Independent Problem Solving Work Sample, the neuropsychological tests (TMT, AST, SPE) combined to place subjects in schizophrenic or nonschizophrenic categories with 100% accuracy. Purisch (1979; Purisch, Golden & Hammeke, 1978) was able to achieve 100% accuracy in the discrimination of chronic schizophrenic and brain-damaged in-patient groups using 60 items from the Luria-Nebraska Neuropsychological Test Battery. Application of discriminant analysis techniques has obviously contributed to the success of these diagnostic differentiations first between in-patient chronic schizophrenic and brain-damaged subjects (Purisch, 1979; Purisch, et al,

1978) and now between community-based chronic schizophrenic and non-schizophrenic CMI subjects. However, these successes are tempered by findings reported earlier that psychiatric diagnosis does not contribute appreciably to functional outcomes.

Hypothesis 6

The "neuropsychological factor" postulated in Hypothesis 5 accounts for a significant portion of the variance on the outcome variables of Competitive Employment and work adjustment ratings (WARF) (Tables 7 and 11).

Discussion

This hypothesis is not supported by data from the present study. A discriminant analysis was conducted among available measures, including neuropsychological tests, with Competitive Employment as the criterion variable. Their measures were included upon completion of the stepwise discriminant analysis, and only TMT(A) represented the "neuropsychological factor." Since TMT(A) is a relatively weak neuropsychological test, its presence here does not support differentiation between employed and unemployed CMI subjects on the basis of neuropsychological test results.

A review of zero-order correlations between Competitive Employment and other variables in the study also contributes to the rejection of this hypothesis. Only three variables correlate with Competitive

Employment at the .10 level of significance or higher. These are Valpar IPSWS Time, WRIOT Negative Bias and Time in Program. Neuropsychological functioning, therefore, does not appear to be a discriminating factor among the present CMI sample for predicting employability.

Work adjustment ratings were negatively correlated with scores on the Reitan-Indiana Aphasia Screening Test ($r = -.5081$, $p = .002$) and TMT(B) Time ($r = -.2812$, $p = .066$). These results suggest that greater neuropsychological impairment corresponds to less appropriate work behavior during the subject's first month in a program such as the VIP Club. However, work adjustment ratings (WARF scores) after one month in the VIP Club are not significantly correlated with other vocational outcome variables, Time in Program ($r = -.038$) and Competitive Employment ($r = .132$).

A separate study might explore WARF scores in a repeated measures experimental design to determine the extent scores change over the course of a subject's time in the program. Such change scores might provide stronger correlates with desired outcome measures. Neuropsychological test scores might also be expected to correlate higher with such change scores, since schizophrenic subjects in previous studies have demonstrated greater variability on such tests compared to brain-damaged subjects, who are more likely to perform more consistently at more impaired levels (Pueschel, 1980; Goldstein, 1978; Heaton, et al, 1978; Goldman, 1976).

Hypothesis 7

Scores on vocational instruments used in the study are correlated at the .05 level of significance, and represent an identifiable "vocational factor" among the variables studied. These tests included the Valpar IPSWS, the WARF and the eight supplemental WRIOT scales (Table 24).

Discussion

The first part of this hypothesis, that vocational test scores are significantly intercorrelated, is supported by the data. Table 24 presents a correlation matrix of these variables, and shows that 14 of 55 correlations (25.5%) are significant at the .05 level or above. Only five of these 14 correlations are between WRIOT scale scores, suggesting that in general these scales represent relatively independent constructs, a desirable trait for an instrument of this type. Three of the five correlations among WRIOT scales involve the Negative Response Bias scale. A person in the sample with a relatively high score on Negative Bias is likely to score lower on Sedentariness and Ambition, and higher on Risk. Sedentariness is also negatively correlated with Risk and Sex Stereotype. None of the correlations among the last five WRIOT scales listed in Table 24 obtained chance probabilities of less than .05.

The remaining nine significant correlations are between WRIOT scales, the Valpar IPSWS and the WARF. Subjects who chose items on the WRIOT reflecting lower skill levels also obtained longer completion

times and more errors on the Valpar IPSWS. Valpar time and error scores themselves are positively correlated at the .01 level of significance. Finally, individual work adjustment ratings at the end of one month in the program (WARF scores) are significantly positively correlated with scores on WRIOT Sex Stereotype and Positive Bias scales. WARF scores are also negatively correlated with Valpar time and error scores.

Regarding the question of a "vocational factor" among the variables, the answer appears negative. Two of these vocational scales (Valpar Time and WRIOT Negative Bias) contributed to the discriminant function that classified subjects according to competitive employment with 81% accuracy (p. 32). The third variable in the function is TMT(A), a brief measure of sequencing and fine motor speed. In terms of predictability of employment during the first year in the VIP Club, these three variables might be termed a vocational factor.

Scores on the remaining vocational instruments/scales did not contribute significantly to the discriminant function. There is no statistical support for postulating a vocational factor consisting only of the 11 measures identified in Hypothesis 7.

Hypothesis 8

The vocational factor postulated in Hypothesis 7 accounts for a significant portion of the variance on Competitive Employment and WARF scores.

Table 24. Zero-Order Correlation Matrix For Vocational Test Scores.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---------------------|---------|----------|--------|----------|--------|---------|
| 1) Valpar Time | 1.0 | | | | | |
| 2) Valpar Errors | .5045** | 1.0 | | | | |
| 3) WARF | -.3533* | -.4216* | 1.0 | | | |
| <u>WRIOT Scales</u> | | | | | | |
| 4) Sedentariness | ns | -.3538* | ns | 1.0 | | |
| 5) Risk | ns | ns | ns | -.5160** | 1.0 | |
| 6) Ambition | ns | ns | ns | ns | ns | 1.0 |
| 7) Skill Level | -.3888* | ns | ns | ns | ns | ns |
| 8) Sex Stereotype | ns | ns | .4657* | -.5053** | ns | ns |
| 9) Agreement | ns | ns | ns | ns | ns | ns |
| 10) Positive Bias | ns | -.4795** | .4246* | ns | ns | ns |
| 11) Negative Bias | ns | ns | ns | -.3942* | .4831* | -.4533* |

*p < .05; **p < .01

Discussion

The rejection of this hypothesis follows from the discussion of Hypothesis 7. Three variables from the study appear to contribute significantly to the prediction of competitive employment for CMI subjects in this sample. Insofar as these variables represent a "vocational factor," this part of Hypothesis 8 is confirmed.

Valpar time and error scores and those of four WRIOT scales (Sex Stereotype, Agreement, Negative Bias and Positive Bias) correlated significantly with WARF scores. This does not represent the same set of variables identified as a vocational factor to predict employment. The failure of WARF scores themselves to contribute to the prediction of employment argues further against the notion of a unitary vocational factor.

Hypothesis 9

Neither age, sex nor education level account for a significant portion of the variance on Competitive Employment or WARF scores (Tables 7 and 11).

Discussion

This hypothesis was included as a check on the significance of demographic variables in the absence of experimental control. The hypothesis was confirmed for Competitive Employment. Sex, age and education were not significantly related to psychiatric diagnosis.

However, gender was significantly related to WARF scores ($r = .3631$, $p = .024$), with women tending to obtain higher work adjustment ratings at the end of their first month in the program. This may be attributed to superior performance among women compared to men in the sample during this period, or to rater bias or the WARF itself. The use of the WARF in future research or applied settings may need to consider the possible effect of subject gender upon results. This also reinforces the need reported by Bitter and Bolanovich (1970) for more reliable standardization of behavior observations using the WARF.

CHAPTER 6

SUMMARY AND CONCLUSIONS

This project represents a descriptive study of 35 chronically mentally ill adults enrolled in a community-based vocational rehabilitation program during the 1981 calendar year. All were referred to the program by mental health workers who maintained traditional therapeutic relationships with the subjects on an outpatient basis, in addition to the subjects' rehabilitation program involvement. In general, subjects included in the study participated in the rehabilitation program for a minimum of two weeks, and had the opportunity for at least three months of participation during the 1981 calendar year. Their involvement was strictly voluntary.

As part of their first month in the program, subjects were administered a prevocational screening battery of five instruments. These were the Trail Making Test, Reitan-Indiana Aphasia Screening Test, Reitan-Klove Sensory Perceptual Examination, Valpar Independent Problem Solving Work Sample and Wide Range Interest Opinion Test. In addition, the Work Adjustment Rating Form was used to evaluate work related behaviors at the end of the subjects' first month in the program. Descriptive statistics were compiled for each of these instruments, and correlation coefficients derived to investigate relationships among them.

Along with scores on the prevocational screening instruments, several other variables were included in the study. These included

schizophrenic versus nonschizophrenic psychiatric diagnosis, time in program and period of competitive employment resulting from program involvement. Descriptive statistics were compiled with each of these, and were included in the correlational analysis with the test scores mentioned above. Two discriminant function analyses were conducted using psychiatric diagnosis and competitive employment respectively as dependent variables.

The issue of medication and its impact on subjects' performance in the program was addressed. Frequency and types of psychotropic medication prescribed to subjects in the sample were also reported. In addition, age, sex and education characteristics of the sample were reported and included in the correlational analysis. Significant relationships between age and time in program ($r = -.26$, $p = .07$) and between sex and work adjustment ratings ($r = .36$, $p = .03$) were found. Otherwise, demographic variables were not significant factors in the major outcomes of the study.

Nine formal hypotheses were postulated prior to analysis of the data. Four of these were confirmed, three rejected and responses to two were equivocal. The neuropsychological measures in the prevocational screening battery were significantly correlated among themselves and did discriminate between schizophrenic and nonschizophrenic CMI subjects in the sample with 100% accuracy. However, results on neuropsychological tests did not predict whether or not a subject would realize competitive employment during the year of the study. Both

schizophrenic and nonschizophrenic CMI subjects produced average performances in the impaired range of functioning according to published criteria for the neuropsychological instruments.

Vocational instruments included in the prevocational screening battery appear to measure a more heterogeneous set of functions than the neuropsychological tests. Nonetheless, several significant correlations were noted among these vocational measures. Together they do not appear to represent a vocational factor, and as a group were unable to predict subject outcome on the critical variable of competitive employment. However, two scores from these vocational instruments, Valpar IPSWS Time and WRIOT Negative Bias, were combined with TMT(A) scores in a discriminant function that classified subjects with 81% accuracy on attainment of competitive employment status.

Major Findings

Considerable data was generated with respect to the neuropsychological and rehabilitation instruments used as well as other variables specific to the sample of CMI adults. These results were presented in detail in Chapter 3, and reviewed in the context of nine research hypotheses in Chapter 4. Some notable outcomes from this study are briefly summarized below.

1. Over half (56%) of the people who participated for three months or more experienced some competitive employment, and 39% of those who completed three months or more were able to maintain full-time or part-time competitive employment for longer than 60 days. By

comparison, Ciardiello (1981) reported a combined placement rate of 16% for two traditional sheltered workshops over several years with a sample of schizophrenic clients. These workshops were able to obtain a 37% combined placement rate during the same period for a sample of nonschizophrenic clients "predominantly mentally retarded or physically disabled (Ciardiello, 1981)." These results support the improved effectiveness of Fountain House Model programs in achieving vocational rehabilitation goals with the difficult CMI population.

2. An analysis of variables significantly related to clients being placed in entry-level competitive positions led to a greater understanding of the rehabilitation process for the CMI disability group. For participants in the VIP Club, the most significant factor appears to be a willingness to spend at least three months in the program. Psychiatric diagnosis did not help determine a person's employment outcome, nor did neuropsychological test results contribute significantly to this outcome. However, three scores from the prevocational screening battery were combined in a discriminant function that classified subjects according to employment status with 81% accuracy. Two of these were completion times on nonverbal sequencing tasks, TMT(A) and Valpar IPSWS. The third contributing variable was the WR10T Negative Response Bias scale. These results support Anthony's (1979; 1980) findings that psychiatric diagnosis does not contribute appreciably to predicting rehabilitation outcomes. Ciardiello (1980) reported that schizophrenic clients "who performed well on the assembly

task (of the General Aptitude Test Battery) were more likely to successfully complete workshop programs and be placed in jobs." This finding was complemented by the two timed tasks in the discriminant function for predicting employment outcome in the present study. Work speed on various tasks appeared to be a critical variable, though not the sole determining variable, in the placement of CMI adults in entry-level jobs.

3. This study demonstrated the utility of the Valpar Independent Problem Solving Work Sample in a setting such as the VIP Club. Completion times on this instrument contributed significantly to the discriminant function classifying subjects according to employment status, while error scores contributed to the discriminant function for diagnostic categories. The Valpar IPSWS is strongly correlated with traditional neuropsychological instruments included in the study as well as traditional vocational measures. It appears to have considerable promise for further research as a diagnostic tool.

4. Similarly, the Wide Range Interest Opinion Test supplementary scales contributed appreciably to the data. Subject scores on the Negative Bias scale were significantly related to work adjustment ratings, time in program and employment outcomes. The Sedentariness, Chosen Skill Level and Positive Bias scales also appear to contribute valuable information in a psychosocial rehabilitation context. Along with the nonverbal format, the data generated by these scales supports the use of this instrument for rehabilitation planning purposes other than the identification of specific vocational goals. However, it

should be noted that significant correlations between supplementary scale scores and other variables were sometimes in unexpected directions. Therefore, caution should be used in interpreting individual results. For example, higher scores on the Negative Response Bias scale were associated with longer periods of time spent in the program and a greater likelihood of competitive employment. To have screened individuals out of the program on the basis of their "negative attitudes" reflected by this scale would clearly have been unwarranted and ill advised.

5. The Trail Making Test emerged as an extremely useful component of the prevocational screening battery. Completion times for Part A contributed significantly to the discriminant functions for both diagnostic and employment outcome classifications. Part B contributed to the discriminant function for psychiatric diagnosis and is highly correlated with scores on both neuropsychological and vocational measures. Slower completion times on TMT(B) are associated with non-schizophrenic CMI diagnoses and poorer performances on the Reitan-Indiana Aphasia Screening Test and the Reitan-Klove Sensory Perceptual Exam. These results provide support for its use with CMI adults not only as a measure of adaptability, but as a neuropsychological diagnostic tool. In this regard the present study contributes to the validation of the Trail Making Test for use with CMI clientele in community settings.

6. The use of the Work Adjustment Rating Form as an early predictor of job success for CMI adults was not confirmed. Subjects with

greater neuropsychological impairment as measured by the Aphasia Screening Test and the TMT(B) tended to obtain lower WARF scores at the end of one month in the program. In general, the WARF does not appear to have contributed meaningfully to the rehabilitation process or an improved understanding of the sample. Although prediction of job success was achieved at a significant level for mentally retarded clients after three weeks in a sheltered workshop setting (Bitter & Bolanovich, 1970), similar results were not obtained for the present sample of CMI subjects. In addition, the WARF may be subject to rater bias.

7. Results from the prevocational screening battery differentiated between schizophrenic and nonschizophrenic subjects in the CMI sample with 100% accuracy using discriminant analysis. This was accomplished with three recognized neuropsychological tests--the Trail Making Test, Aphasia Screening Test and Sensory Perceptual Exam--and the Valpar Independent Problem Solving Work Sample. Previously Purisch (1979) and Purisch, Golden and Hammeke (1978) reported similar success in differentiating institutionalized samples of schizophrenic and brain-damaged subjects using the Luria-Nebraska Neuropsychological Test Battery. The present study lends support to the use of discriminant analysis as a method of diagnostic classification. It also contributes to the accumulating body of knowledge that postulates neuropsychological correlates to schizophrenic disorders (Goldstein, 1978; Cox & Ludwig, 1979; Heston, et al, 1978; Chelune, et al, 1979). The present study differs from these in that it dealt with chronically mentally ill adults living in the community rather than in institutional settings.

It appears that the neuropsychological characteristics of outpatient psychiatric clients classified as CMI may differ from those of inpatient psychiatric clients. While several studies have indicated that inpatient schizophrenic subjects performed more poorly on neuropsychological tests than other psychiatric groups (Huweiler, 1976; Heaton, et al, 1978; Goldstein, 1978), schizophrenic subjects in the present sample performed significantly better than their nonschizophrenic counterparts. This may be due in part to the inclusion of some brain-damaged clients in the community support service network provided by mental health centers. It may also be anomalous to the present sample and not generalizable to the 1.5 million CMI adults currently living in noninstitutional community settings (Turner & Shifrin, 1979).

Implications for Future Research

As mentioned in the first chapter, a primary purpose of a descriptive study such as this is to explore issues and relationships among the data that might generate more systematic research efforts in the future. Several issues that may deserve such consideration are summarized below.

1. In order to establish greater confidence in the relative effectiveness of various community-based psychosocial rehabilitation programs, direct comparisons of programs within communities and across communities is recommended. This might best be accomplished by controlling referrals from community mental health and/or state vocational rehabilitation agencies to programs providing services toward

common outcomes. Clients might be randomly assigned to participating programs, controlling for diagnostic and demographic variables.

2. Further research is recommended toward understanding the utility of discriminant analysis for predicting desirable client outcomes. The present study focused on employability as an outcome variable, and further research with larger samples seems warranted along these lines. However, other outcome variables commonly addressed by social programs might also benefit from this approach.

3. Systematic comparison of neuropsychological characteristics of institutionalized versus community-based chronically mentally ill adults appear necessary. The deinstitutionalization movement has been replaced with a community support network that now serves many people who have never experienced long-term institutionalization. It is important to understand these people in their community environment, rather than attributing characteristics to them that may be manifested primarily during brief periods of acute crisis. The present study suggests that CMI adults living in the community may not correspond well to either the normal adult population or institutionalized psychiatric groups.

4. Within the population of outpatient CMI adults, further analysis of individual differences is recommended. This group tends to receive identical services, regardless of etiology or subtle differences of their respective disabilities. They are frequently combined with other needy and/or disability groups for social and rehabilitation

services. Chronic schizophrenic adults are characterized in the literature as having a greater degree of neuropsychological deficit than other psychiatric groups, yet chronic psychiatric subjects in the present sample with nonschizophrenic disabilities consistently performed more poorly on neuropsychological measures. Systematic investigation of this chronic psychiatric subgroup could clarify these issues and perhaps lead to more effective and more efficient programs in the future.

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