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UTILIZING DISCRIMINANT ANALYSIS TO QUANTIFY TREATMENT REFERRAL DECISIONS FOR ADULT SCHIZOPHRENICS

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UTILIZING DISCRIMINANT ANALYSIS TO QUANTIFY TREATMENT REFERRAL DECISIONS FOR ADULT SCHIZOPHRENICS

by

TERRY LEE RUDOLPH

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Approved by:

Donald L. Mueller 5/9/84

Advisor date

Maurice Ogburt

Joseph Z Rosh Jr

Joseph A. Lalonde

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CHAPTER I

STATEMENT OF THE PROBLEM

The treatment of persons with mental health problems has shifted dramatically over the last twenty years to smaller, community based centers from state operated institutions. The 1961 report of the Joint Committee on Mental Illness and the subsequent founding of the Community Mental Health Centers created the opportunity for clients to be treated near their own homes. The community centers made it possible for clients to be treated with minimal disruption to their own lives and the lives of their families. Additionally, the clients' dependency on institutions and the resulting stigma of being associated with a state hospital were lessened through the decreased use of this modality of treatment. Alternatives to hospitalization such as Counseling Centers, Day Treatment Centers and Aftercare programs have emerged. This reliance on community-based treatment grew so that the major thrust of mental health services is the movement of clients back to their home communities from the institutions. The Governor's Report on Mental Health, 1976, as well as the 1983/84 Department of Mental Health Program Planning Guidelines have proposed a goal of almost total deinstitutionalization in Michigan by 1984. Deinstitutionalization has also begun in Massachusetts, Wisconsin, and California (Klerman, 1977).

Along with the movement from institutional to community treatment, there has been an increasing emphasis on the use of paraprofessional workers in the field of mental health. As McFadden and Reinehr (1971) state, one of the most significant changes in the area of mental health treatment has been the modification of traditional work roles. Many

activities once regarded as professional are now conducted by non-professional personnel. These paraprofessionals have job titles such as "case aides", "mental health assistants", or "social work technicians", (Isaacson, 1982).

Paraprofessionals were first recruited to serve in the mental health field by the New Careers Movement of the War on Poverty (Reif and Reissman, 1964). With the adoption of the Schuer amendment to the Economic Opportunity Act in 1966, the Federal Government required that efforts be made to employ members of economically deprived groups as para-professionals in human service jobs. Paraprofessionals quickly entered positions in the field of mental health treatment. The National Institute of Mental Health has established a New Careers Training Branch to provide support for para-professional training programs. The development of such educational programs has been rapid, with at least 8000 students at some 200 community colleges preparing for employment in child care, mental health, and human services generally (Schindler, 1972; Young, True and Packard, 1976). It is estimated that 150,000 psychiatric paraprofessionals constitute more than fifty percent of the mental health manpower (Moffic, Patterson, Laval, Admas, 1984).

The roles fulfilled by paraprofessionals can be classified generally into three categories: 1) Those which subserve the work of professionals; for example, administering and scoring tests which are interpreted and reported by a professional; 2) Those which are adjunctive to professional functions such as serving as a companion to patients; and 3) Those which are parallel, at lease in part, to professional functions; for example, providing therapy or social work to particular clients (Korchin, 1976, p.521). Research studies such as Poser (1966), Rioch (1966), Berman and Dolan (1974),

Carkhuff and Truax (1965), Terry (1982) and Greenblatt, Becerra, and Serafetinides (1982), have demonstrated the contributions of paraprofessionals serving in these roles. Kadushin (1976, p.368) suggests that paraprofessionals are most effective in their roles when they are given clearly delineated functions to perform. He sees the major responsibility of the professional who supervises paraprofessionals as providing structure, training and direction to the workers so that they may accomplish the tasks assigned to them. Bayes and Neill (1978), as well as Forman and Hagan (1983) state that roles and task assignments for paraprofessionals should be clearly defined.

The movement of mental health clients from institutions to community centers has brought attention to the problem of making accurate and appropriate referrals of clients for services. Some problems which may arise in a setting where a variety of programs are available include unnecessary and overlapping services, unmet client needs, inappropriate referrals, and resulting inappropriate matching of needs to services (Feldman and Wodarski, 1974). A Government Accounting Office report (1977) criticized the deinstitutionalization movement for failing to provide accountability for service delivery; as a result, there has been failure to deliver services to a significant number of clients who have "fallen into cracks between agencies" (Herbert, 1977). The American Personnel and Guidance Association (1982) has established a task force to begin to look at more effective ways to assess individual differences through research, and match those differences with alternative treatments.

Paralleling these movements in the field of mental health has been the growth of the utilization of multivariate statistical techniques in social science research. The increased application of the computer

to the analysis of data, and the growing realization that social phenomena are complex and many-faceted, has led to the development and expansion of multivariate techniques (Kerlinger and Pedhazur, 1973, p.V; Baggaley, 1981). This has allowed the social science researcher to move away from the traditional methods of studying the relationship between one dependent and one independent variable at time, towards being able to study the relationships among one dependent and several independent variables, or even a group of dependent variables and a group of independent variables. Thus, the researcher has been able to study more of the aspects and relationships of social phenomena than was possible with the traditional experimental/control group arrangement. Additionally, studies can be done in settings that are natural rather than contrived.

One of the techniques that has emerged in multivariate statistics is discriminant analysis. This technique addresses the question of how individuals can be assigned to groups on the basis of several predictor variables. These predictor variables are used to form discriminant function equations in which the dependent variable represents group membership. The functions are constructed so that they give the best probable membership of subjects from a sample in separate groups. The classifications are based on subjects' characteristics as expressed by predictor variables. These functions can be used to assign future individuals to groups on the basis of their scores on the measures (Legge and Ziegler, 1979).

Purpose

The goal of this research was to construct a quantitative measurement procedure to assist in referring adult schizophrenic mental health

clients to community programs which were congruent with their needs in treatment. Specifically, the study investigated three levels of programming that could be arranged on a continuum from most restrictive/intense to least restrictive/intense. How the mental health clients served by these levels of programming differed from each other based on a set of predictor variables was examined using discriminant analysis.

The major question asked by the research was whether a combination of brief scales which assessed outward behavior and symptomatology and social abilities could be used in the framework of discriminant analysis to classify adult schizophrenic mental health clients into three levels of community treatment; Day Treatment, Outpatient Services, and Aftercare Services. The study also sought to determine which of the independent variables, outward behavior and symptomatology, and social abilities, as well as the sub-scales which made up each variable, effectively discriminated between levels of programming. The best combination of these independent variables which accounted for the greatest amount of variability in the dependent variable, type of program, was ascertained. The resulting quantitative measurement procedure should provide mental health professionals and paraprofessionals with an objective and quantifiable basis for placing adult schizophrenics into different treatment programs. Researchers indicate that currently, such decisions are usually based on clinical judgment and are not made in a standardized or replicable fashion (Dowell and Jones, 1980; Henisz, 1982; Klar, Frances and Clarkin, 1982; Wiggins, 1973). This often results in referrals which are inappropriate to the needs of the client.

The quantified procedure developed in this study clarifies the referral process by demonstrating which factors have the most influence

in classifying to different treatment groups. This information could aid mental health workers by providing them direction in making referral decisions. Also, this type of structure is often helpful to para-professionals or new professionals in accomplishing their assignments in treating clients.

Outside of the pragmatic aspects of this research as applied in a community mental health setting, this project also sought to test the viability of using multivariate statistics as decision-making aids in a complex social setting. While discriminant analysis has been proposed as a selection device in industry (Hemphill, Griffiths and Frederickson, 1962; Rulon, Tiedeman, Tatsuoka and Langmuir, 1967; Veazey, 1981; and Fox, 1982) and other areas (Levine, 1982; Gould, 1982), its application in making referral decisions in the human or social field appears relatively scarce. A survey of the sixteen largest Community Mental Health Boards in Michigan prior to the initiation of this study indicated that none of them used discriminant analysis or standardized assessment batteries to assist in referral decisions. Only four boards indicated that they had a standardized procedure for making referral decisions in their programs.

Levels of Programming

The three levels of programming examined were Day Treatment, Outpatient Services, and Aftercare Services. Day Treatment is the most restrictive and the most intense. Sometimes referred to as partial hospitalization, this treatment originated in Russia in the late 1930's, and soon extended to Canada and England. It has been used extensively in the United States since the middle 1960's (Linn, Caffey, Clett, Hogarty,

and Lamb, 1979). While taking many forms, and emphasing many different approaches, Day Treatment is for the most part a program which brings the therapies usually found in a hospital setting (group and individual psychotherapy, occupational therapy, recreational therapy, milieu, etc.) into the community. Clients reside in their own domiciles and come to the program for therapy. While less restrictive than a hospital, Day Treatment is demanding in that it is usually a day long program and clients attend one to five days per week.

The Michigan Department of Mental Health (1977, p.35) states:

> "Day Treatment includes a planned and systematic sequence of training or therapy delivered by mental health or related human service professionals in a setting other than where the client resides and is directed at increasing client functioning in basic self-care, advanced daily living skills, and work-related skills. Partial day programs must be planned to equal or exceed an average of twelve hours per week per client within a month."

The second level of programming was Outpatient Services. Outpatient services are grounded in more traditional modalities such as group and individual psychotherapy. According to the Department of Mental Health, this element includes less intensive methods of providing specialized mental health services than Day Treatment. Services are provided through individual, family, or group treatment interventions. These services may be provided on a walk-in basis, or by appointment at agency locations. In this program, a client would see a therapist or attend a group therapy session at prescribed intervals. Outpatient services are less inclusive and afford the client much more time to pursue activities other than therapy.

Aftercare is the least restrictive modality of community treatment. Mendel (1975, p.108) defines Aftercare as the treatment that is provided after crisis intervention and resolution have taken place. The Michigan

Department of Mental Health refers to Aftercare as those services provided to clients who are released from institutions on an outpatient basis. Aftercare provides services to clients on an "as needed" arrangement. That is, upon discharge from a hospital or community treatment program, such as Day Treatment or Outpatient services, Aftercare provides clients with counseling or social work as is necessary to assist them in maintaining themselves in the community. Thus, the client has more independence and spends less time in treatment than in the previously described modalities. The level of programming - Day Treatment, Outpatient Services, or Aftercare - served as the dependent variable for the discriminant analysis.

Predictor Variables

The formulation of discriminant functions to assist in making referral decisions regarding the treatment of adult mental health clients with a diagnosis of schizophrenia depends on the selection and use of predictor variables which are both relevant to the question of mental health treatment and which provide sufficient predicting power to be used in placement decisions. This situation would appear to be multivariate in nature, since many factors contribute to making referral decisions in treatment. Discriminant analysis is a multivariate technique which reveals the relative contribution of a set of predictors to group membership. The technique allows differentiation of a group of clients based on treatment modality.

The variables included for consideration in this research were derived from issues found in literature concerning clinical decision-making. The predictor variables reflect those factors which have been

identified empirically or logically by clinicans and administrators as effective determinants for assignment to treatment. Studies by Wolkon and Peterson (1980), Paritzsky (1981), Goldman and Singer (1974) and Washburn, Vannicelli and Sheff (1976), support the factors presented below as essential to the referral process.

The first set of predictor variables identified were outward behavior and symptomatology of the clients. These were chosen to determine if a difference existed between treatment groups in their actions toward and interactions with other people. What was sought here was a measure of a client's severity and symptomatology as related to schizophrenia, and what were the distinguishing behaviors between treatment groups. Fulkerson and Barry (1961) have shown, for example, that some chronically hospitalized patients who still exhibited "psychopathology" but were adjusted behaviorally, were able to leave the hospital and adjust well in both community and job settings.

The second set of predictor variables used in the study were ratings of social ability. Social ability refers to the client's handling of day-to-day social responsibilities such as the use of money, personal appearance, personal habits, vocational responsibility, social group attendance, participation, and interactions with family, associates and employers. Whereas outward behavior and symptomatology, as outlined previously, investigated the client's actions towards, and interactions with other people, social ability measures relate to operating in a social environment and handling the activities of daily living. Ewalt (1980), Test (1981) and Lehman, Ward, and Linn (1982) have shown that social ability is rated as being very important to persons exiting an institutional setting and therefore may be a

predictive factor in the type of programming a client requires in the community. Also, since social ability may be related to needs in treatment, and may dictate the type and intensity of modality used, it was included in this study as a set of predictor variables.

A major constraint in selecting predictor variables for possible inclusion in the measurement procedure was that they were measured in an efficient manner. Limited monies available for mental health services brought on by the difficult economic situation of the 1980's lead to a decrease in the numbers of mental health workers. Because there are increased caseloads for those who are still employed, mental health treatment staffs are expected to perform more work in less time.

For referral decisions to be useful and used, several requirements had to be met for the proposed procedure of delineating quantified criteria. First, the procedure must contribute referral information that is reliable and consistent over time and with different samples. If so, the procedure can be used by paraprofessionals and/or inexperienced professionals to assist them in making referrals. Second, the procedure should function with minimal cost of time and effort so as not to detract from other clinical duties. Third, the scales used in the procedure must be short, simple to administer, score and interpret, and accurate. Additionally, the scales had to be usable by both professionals and paraprofessionals with a wide range of disciplines.

Identification of Population

The population of mental health clients used for this research was restricted to those with a major diagnosis of schizophrenia. Coleman

and Broen (1972, p.268) Lipkowitz and Idupvganti (1981) and others indicate that schizophrenia is a descriptive term for a group of psychotic disorders characterized by gross distortions of reality and a disorganization of thought processes. Included in this disorganization is difficulty in concentrating, impaired ability to maintain order in the association of thoughts, a sense of being "locked in" on specific thoughts, and a severe impairment of problem solving and decision-making abilities.

There were several reasons for limiting this sample to schizophrenics. It is estimated that roughly fifty percent of the mental health clients who are at risk of becoming long term institutional residents are schizophrenics; the other clients at risk represent multiple diagnostic groups (Klerman, 1977). Thus, with the movement towards deinstitutionalization, a majority of the clients seen in a community treatment setting are schizophrenics. Further, the diagnosis represents differing levels of impairment where the need for various types and modalities of treatment are indicated (Schooler, Goldberg, Boothe, and Cole, 1967; Meyerson and Herman, 1983).

Reasons for the Study

The need for this research was prompted by the movement in the field of mental health treatment toward community treatment, the use of paraprofessionals, and the difficulty in making accurate and appropriate referrals for service. Across the country numerous articles such as "What Are We Going To Do With Alan Teasel", (Detroit Free Press, December 6, 7, 8, 1981); "Ex-Mental Patient Shot To Death", (The Macomb Daily, December 23, 1981); or "Mental Center's Decline is a Blow", (Detroit Free Press, July 25, 1982) demonstrate the publics' concern that patients who

were formerly treated in public mental health hospitals are being prematurely discharged into inadequate or inappropriate residential settings or community programs. Well documented are the loss and hardship endured by mental health clients and their families when the client is improperly or insufficiently treated. While research cannot create programs where none exist, it can provide information necessary to assist in making decisions.

As the general public has raised questions about the efficiency and efficacy of community based treatment, a group of related research questions have emerged around the matching of mental health clients with therapeutic programs. Klar, Frances, and Clarkin (1982) state:

> "Despite twenty years of expansion, specialization and proven efficacy of community treatment, we still lack knowledge about the relationship between the structure and treatment methods of a particular program and the impact it will have on specific patient populations. Clinicians must use intuition and judgement in matching type of program to patient need."

Thus, the relationship between a community treatment program's methodology and the characteristics of mental health clients referred there for treatment remains largely a matter of clinical intuition rather than scientific evidence. Hogarty (1968) has commented, "Preconceptions of who can or cannot be treated under outpatient or other community conditions lead to the referring agent choosing the treatment with less risk, namely, Hospitalization." What is required is that the characteristics of clients in different treatment modalities be ascertained and then these characteristics be delineated in such a way that they can be used for future treatment decisions.

The present research provides three sources of decision making information. Questions answered by this dissertation include the

the following. First, can accurate and appropriate individual referral decisions be made in a community mental health setting through the use of multivariate statistical techniques? Can a quantified measurement process for making referral decisions be constructed so that both professional and paraprofessional clinical staff can readily use it to make treatment recommendations? An objective procedure, as proposed here, would help paraprofessionals in the referral process in that it would provide them with a tool to aid in screening and assigning clients for treatment.

The second type of decision making information derived from the research is an assessment of the needs and strengths of adult schizophrenics in a community setting. Since programming is based on a foundation of remediation and rehabilitation, it is expedient to evaluate the existing skills and deficiencies of clients prior to establishing or implementing treatment. Therefore, the research provides an indication of the types of intervention required for a sample of schizophrenics in a community setting and suggests the course for administrative decisions.

There is a third type of decision making information available from this study. Besides planning and referral decisions, the variables in this research also provide a basis for individual and program evaluation. Once the quantified measurement procedure is used to provide a framework for client referrals, periodic assessment of client's status in relationship to the procedure can be made to evaluate the progress towards less restrictive programming and greater community independence.

The possibility of using shortened measurement instruments in a discriminant function was assessed for its power and applicability. Generally speaking, scales of longer length tend to be more reliable

(Mehrens, 1972). What was sought in this study were scales that were not only short and easy to administer but also having high discrimination value.

Limitations

The quantitative measurement procedure constructed was to assist paraprofessionals and professionals in making referral decisions. The congruence between clients' needs in treatment and the characteristics of other clients with whom they were grouped for treatment was examined in order to place clients in essentially homogenous treatment modalities relative to their outward needs. A limitation is that the study focuses on quantifying and objectifying the variables used in making referral decisions, but does not concern itself with client's success in treatment after they are placed. Many factors influence success or failure in treatment, however, this research addresses only the question of what factors need to be considered regarding a client's outward behaviors and social abilities when making initial decisions of where they should be referred for treatment.

The sample for this study was limited to clients with one diagnosis, schizophrenia. It is recognized that many diagnostic groups are seen at community treatment centers. Schizophrenics were studied for two reasons. First, limiting the study to one diagnosis controls the variability in subjects so that any differences between treatment groups is due to variance in behaviors or social abilities and not due to diagnosis. Second, schizophrenics are the most prevalent community mental health clients.

It was previously stated that schizophrenia is a descriptive term for a group of psychotic disorders (Coleman and Broen, 1972). There

are five key categories of symptoms which have consistently identified schizophrenia (Suinn, 1972, p.382): 1. Breakdown of perceptual filtering; 2. Disorganization of thought processes; 3. Emotional distortion and feelings of panic; 4. Delusions and hallucinations; and 5. Withdrawl from reality. Price (1972, p.292) states that while consistency in the general diagnosis of schizophrenia has been obtained, the reliability of the diagnosis of sub-types is extremely suspicious due to the wide variety of symptoms within and among diagnostic groups. The population for this research was confined to those subjects broadly classified as being schizophrenic. Specific sub-categories of schizophrenia was not addressed. This was because the specific diagnostic sub-categories tend to be transient in nature. They are based on whatever behaviors or symptoms the subject is manifesting at a given time. Thus, while someone may be classified as schizophrenic based on the five criteria outlined above and this diagnosis will be relatively durable, the sub-category diagnosis does not tend to be so resilient (James and May, 1981; Deutsch and Davis, 1983). As a result, for the purposes of this study, the consideration of diagnostic sub-categories was not as important as the identification of overall characteristics of persons in the treatment modalities.

Summary

A quantified measurement procedure was created for assessing mental health client's needs in treatment in order to facilitate programming referral and placement. This quantified approach was developed for adult schizophrenics, which would result in more beneficial treatment for those persons with mental health problems.

The proposed quantified procedure could also assist in the increased utilization of paraprofessionals in mental health treatment. It would provide paraprofessionals and/or inexperienced professionals with a basis for making referrals to community programming. This procedure could be used in a practical setting for making referrals, or in educating mental health workers to train them in making evaluations and referrals for treatment based on valid and reliable assessments.

CHAPTER II

LITERATURE REVIEW

An investigation concerning the efficacy of utilizing discriminant analysis to classify adult, schizophrenic mental health clients into appropriate treatment modalities requires a review of literature covering the following: 1) multivariate statistical techniques, 2) multivariate statistical applications in a mental health setting, 3) the referral process, 4) materials which address social abilities, outward behavior, and assessment. The aforementioned outline will serve as the pattern for this literature review.

Multivariate Statistical Techniques

Multivariate analysis may be defined as the branch of statistics which is concerned with the relationships among sets of dependent variables and the individuals which bear them (Kendall, 1975, p.1). Multivariate analysis asks such questions as; can one construct an index of social class from assorted measures on an individual such as possession of a telephone, type of education, amount of rent paid, etc. A similar question exists in medicine when a number of symptoms are noted for patients who may or may not be diagnosed as having a disease. The question then becomes: which symptoms discriminate most effectively and is it possible to use this information to make a preliminary diagnosis? These questions and all other in multivariate analysis examine how several factors or variables as a group affect the qualities, performances, or outcomes of another variable or set of variables.

The use of multiple measurements or factors to describe an event or predict a performance enables the researcher to discover more evidence which can lead to an understanding of the causal process (Leary and Altmaier, 1980). While investigating more variables may lead to broader and more precise understanding of phenomena, one must be cautious not to assume that a sheer increase in the number of variables taken into consideration also represents an increase in the quality of the investigation (Phillips, 1971, p.251). The purpose of multivariate analysis, therefore, is not to add variables for the sake of covering all contingencies, but to provide variables which adequately address the research question at hand and add eloquence to answer the questions of the study.

At times when working with mental health clients, it is important to determine whether two or more groups of patients have certain more or less consistent characteristics or combinations of characteristics that help to differentiate them from each other. Towards this purpose, it was suggested by Fisher (1936) that a linear function be formulated which has the greatest variance between samples relative to variance within samples. Thus, the variability between groups will be maximized so that distinct groups exist and the variability within groups will be minimized so they are homogenous. If the membership of the group is already known, discriminant analysis (Anderson, 1959, p.122) can determine which characteristics or combination of characteristics discriminate among groups. Once discriminating characteristics have been determined, this technique can also be used to assign an individual to one or the other of the groups. The most important characteristics in discriminating the groups are those weighed most heavily in deciding

where a subject belongs. Baggaley (1981) states that discriminant analysis is most useful where naturally occuring groups -- for example, ethnic, occupational, psychiatric-diagnostic (rather than groups formed by experimental manipulation) -- are to be compared.

Discriminant analysis becomes closely related to multiple regression in the special case of there being only two classification groups (Lindeman, Merenda, and Gold, 1980, pp.176-179). In this case, one linear combination of predictor variables, or one discriminant function is sufficient to describe the differences between the two classification groups. The discriminant function is a regression equation with a dependent variable that represents group membership. There are usually several independent measures for each individual in a sample. These measures are used as independent variables and a vector of 1's and 0's as the dependent variable in this two group case. The problem is then solved as a regression equation with the result being the single, maximally discriminating function (Kleinbaum and Kupper, 1978).

The extension of discriminant analysis to problems involving more than two groups was explored independently by three different statisticians, Rao (1948), Tukey (1949), and Bryan (1950). In the case of more than two groups, the number of discriminant functions is less than the number of groups, unless the number of variables in the original set is smaller. When this occurs, the number of discriminant functions is equal to the original number of variables. Generally, however, the number of significant variables will be smaller. Tatsuoka (1970), asserts that wherever an analysis of variance could be used if there were but one criterion variable, discriminant analysis

can be used when more than one criterion variable is employed. He utilizes this analysis of variance concept to explain how the differences between three or more groups may be provided by the variance of the three or more quantities which describe the groups.

Fisher's original two group discriminant function has been generalized in two different ways for the case of three or more groups (Green, 1979). Both of these generalizations have been called discriminant functions, which has lead to confusion in the literature. First, when the functions are being used primarily to describe differences between groups based on a linear combination with the largest ratio of between-group to within-group variance, they might be more aptly labeled as canonical discriminant functions. This application illustrates the major ways in which group centroids vary. The second means of utilizing a discriminant function is to find a set of linear combinations, one for each group, that indicates the relative closeness of an individual case to each group centroid. These functions might be most appropriately labeled classification discriminant functions because they provide a convenient linear basis for classifying new cases.

Aldrich and Cnudde (1975) state that discriminant analysis can be thought of as a means of dividing up a geometrical space of n-dimensions. The basic idea behind discriminant analysis is to divide this n-dimensional space into m-mutually exclusive and exhaustive regions, say R1, R2,....Rm, such that if an observation falls into region Ri, it would be predicted as belonging to group Yi. They further state that one of the possible uses for discriminant analysis is to ascertain if a measured dependent variable is approximately ordinally related to the independent variables of concern.

Several techniques are applicable to delimit predictor variables so that the most important characteristics with regards to classification are discerned. Wherry and Doolittle (1940) outlined a technique for obtaining short, predictive batteries of tests. The principle involved is a forerunner of today's stepwise analysis. Briefly, the procedure is as follows: One starts with a single measure which seems best to predict the criterion. A second measure is then selected that will add the most to the prediction when combined with the first measure. A third or fourth or more measures can be added to the prediction based on their ability to contribute. At each step a shrinkage formula is applied to determine whether the shrunken R is appreciably larger than the previous R. At the point where no further gain according to these standards is apparent, no more tests are added.

Snedecor and Cochran (1969, p.412) delineate several methodologies for the selection of variates for prediction. They state that such methods are necessary because of the X-variables selected for study. Perhaps several or most of them may contribute little or nothing to the accuracy of the prediction. To avoid the tedious, although thorough approach of working out the regression of Y on every subset of K, X-variables, the step methods are proposed. In the step-up procedure, which parallels Wherry and Doolittle, X-variables are added one by one to ascertain their contribution to prediction. The step-down procedure requires a regression of Y on all X-variables be calculated and then one by one each X-variable is eliminated to determine the best prediction. This procedure has also been described by Kerlinger (1973, p.654).

The formulation of a linear functions for the purposes of prediction

and the manipulation of multiple factors within the function so that the maximum discrimination is attained is made easier by the use of computers and computer related statistical packages. Indeed, the advent of computer systems has made the utilization of multivariate methods both more practical and applicable. Three major packages available for discriminant analysis are SPSS--Statistical Packages for the Social Sciences (Nie, Noll, Jenkins, Steinbrenner and Bent, 1975, 1981, 1983), the BMD--Bio-Medical Computer Programs (Dixon, 1968, 1981), and the Statistical Analysis System (SAS Institute, 1979). All provide for stepwise procedures as outlined earlier, as well as allowing the researcher to select a number of optional statistics ranging from descriptive group characteristics to covariance matrices. The SPSS sub-program DISCRIMINANT was adapted for several other discriminant analysis programs, in particular Dixon's BMD07M. These programs enable a researcher to not only describe the data set, but also to ascertain its structure. Therefore, explanations of the differences between groups can be formulated and the structure can be exploited for future predictions. This is the goal of discriminant analysis.

Three purposes for using discriminant functions were delineated by Snedecor and Cochran (1969, P.414): classification and diagnosis, the study of relations between populations, and as a multivariate generalization of the t-test. The focus of this study was a combination of the first two, in that mental health clients were classified according to the relationships between the various populations. Guilford (1965, p.434) argued that for the purposes of differential prediction that the methodology of choice should be discriminant analysis.

The accuracy or power of a discriminant function to predict group membership has been handled in the literature in several ways. Hope (1969) believes that the ability of the discriminant function to classify subjects correctly is a good test of its performance. Thus, the researcher should enter his/her investigations with some pre-conceived idea as to what the acceptable rate of correct classifications should be for the study in question. The success of the study and the functions is related to the ability to meet this classification rate. Aside from this rather pragmatic and utilitarian method of assessing discriminant functions, Cohen (1960) proposes that they be evaluated based on the Kappa statistic. Cohen's Kappa compares the classification rate attained for a function with the rate that could be expected by chance alone. The significance of the function's classification rate is judged by its ability to clarify decisions beyond the level of chance. Legge and Ziegler (1979) suggest that in addition to assessing the efficacy of discriminant functions by correct classification rates or by comparison with chance classification rates, that researchers examine the canonical correlation. This statistic is a measure of the functions ability to differentiate among groups and, when squared, can tell the amount of variance in the discriminant function explained by the groups.

Given the purposes for discriminant functions and their efficacy, the next section reviews the application of these and other multivariate methods in a community mental health setting and the pragmatic aspects of the factors proposed as independent variables in the functions of the present research.

Literature Pertaining to the Utilization of Discriminant Analysis in a Mental Health Setting

A computer search of the data bases of the National Clearinghouse for Mental Health, Psychological Abstracts, and the Educational Resources Information Center revealed that over 12,000 multivariate research studies have been done in the field of mental health over the last fifteen years. These studies are of a broad nature, encompassing many different multivariate techniques and a wide range of mental health concerns. Limiting the topic area specifically to referral or placement in a treatment setting along with social factors such as support, competence, or community success lead to the acquisition of 132 related articles. These articles can be divided into three broad categories: those dealing with differential diagnosis, those dealing with community success after discharge from a hospital setting, and those dealing with referral questions.

Discriminant Analysis and Differential Diagnosis

The majority of the studies which have used discriminant analysis have dealt with the verification of diagnostic procedures. For the most part, these are concerned with the differentiation of two diagnosic groups or the separation of mental health clients from so called "normals".

An example of the former is provided by Purisch, Golden, and Hammeke (1979). Their study concerned the differentiation of brain injured and schizophrenic patients. Using a standardized battery of tests suggested by the work of A.R. Luria, Purisch, Golden and Hammeke were able to achieve 88% diagnostic accuracy. A similar study by the same authors in 1978 reported a 100% discrimination rate between brain injured and

schizophrenic patients. Golden (1977) showed that the Halstead-Reitan Neuropsychological Test Battery could be used to differentiate between brain injured individuals and those who were psychotic but not organically involved.

Other studies have used discriminant analysis to differentiate between people who are and are not diagnosed as being depressed. Berndt and Berndt (1980) were able to use the Multiscore Depression Inventory to separate mildly depressed from non-depressed college students. Their results suggested that mild depression is associated with a deficit in energy both during initial perceptual processing and organization and execution of psychomotor tasks.

Sheslow and Erickson (1975) differentiated between depressed and non-depressed college students on the basis of their activity preferences. Utilizing a stepwise discriminant analysis, they found that depressives tend to have fewer activities and social contacts. They also found that small changes in many activities rather than large reductions in overt behavior are characteristic of depressed college students.

Discriminant analysis was used by Feinberg and Carroll (1982) to separate subtypes of depression. They derived a discriminant function based on clinical features to classify patients with endogenous depression (melancholia) and non-endogenous (neurotic) depression. Feinberg and Carroll found that the difference between the groups was not one of overall severity of illness alone. They were able to construct a discriminant index which classified endogenous and non-endogenous patients with comparible accuracy. Approximately 80 percent of all cases received a definite classification with the discriminant index.

A study to identify those independent variables which would

statistically discriminate between a group of Viet Nam veterans who were experiencing post-traumatic stress disorder and those who were not was conducted by Frye and Stockton (1982). The discriminant function produced in the study attained a canonical correlation of .79, which can be interpreted as meaning that 62.1% of the variance between the two groups was accounted for by the function. Frye and Stockton based their functions on pre-service, in-service, and post-service variables. The results indicate that the perceived helpfulness of the veteran's family on his return home was critical in his post-combat transition.

Discriminant analysis has been used recently to differentiate between schizophrenics and organics, depressives and normals, organics and normals, various types of schizophrenia and various types of organicity. One of the more unusual studies was Brown (1975), who studied the correlation between physicial characteristics and propensity to affective illness. Using a large battery of anthropometric measurements, Brown was able to classify subjects into one of four clinical groups: normal, unipolar depressed, bipolar affective disorder, or an "other" category.

Discriminant Analysis and Community Success

The second body of articles concerning the use of discriminant analysis in a mental health setting has centered around discerning which factors contribute to the success or failure of clients in a community setting. A study typical of such research was done by Glick, Hargreaves, and Goldfield (1974). Glick, et al. looked at the efficacy of short versus long term hospitalization in a one year follow-up of schizophrenics. Using independent variables such as Global Outcome,

Post-Hospital Treatment, Symptoms, Family Functioning, Use of Leisure Time, and Socialization and Work Functioning, the study was unable to draw definitive differences between the two groups and suggests that further analysis of the problem is required.

One of the more classic studies in this area was that of Katz and Lyerly (1963) to substantiate the discriminative validy of the Katz Adjustment Scales. The study was concerned with two questions: how well did the scale differentiate between clients exhibiting good and poor social adjustment, and how did the clients' self-ratings compare with those of their relatives. For the purposes of validation, 15 clients were selected, who, in the collective judgement of the clinic staff, were doing well in the community and 15 other clients were chosen who were maintaining poor or marginal adjustment. Based on this sample, the ratings on the Katz Adjustment Scale and the judgement of the clinical staff corresponded highly and provided scales which discriminated accurately between groups. Specifically, measures based on relative's reports of the amount and frequency of socially-expected activities, general symptomatology, disturbed social behavior and amount of free time activity discriminated at very high levels of confidence between the groups. Patients' self-reports discriminated well, but not with as high levels of consistency.

Clark and Cullen (1974) investigated the effects of varying levels of social support and varying levels of conflicting communications to test Bateson's (1956) theory that schizophrenia is largely a result of double bind communications. Clark and Cullen's study indicated that, between two groups, even the normal group people experience "double bind" communications. The mediating factor appears to be the amount of social support a person receives or perceives that they receive. Those

persons in the normal group had dramatically higher ratings of social support than did the schizophrenics.

Serban, Gidynski, and Melnick (1975) studied the social performance and readmission rates to a hospital of acute and chronic schizophrenics. The study looked at 125 acute and 516 chronic schizophrenics. All subjects were administered the Zigler/Phillips Social Competence Scale and the Social Stress and Functionability Inventory for Psychotic Disorders (SSFIPD). Using three separate multiple discriminate function analyses, it was found that both measures together resulted in higher rates of classification than did using either scale alone. The SSFIPD was found to have more discriminating power for the sample than the Zigler/Phillips Scale. Therefore, the chronics exhibited fewer social contacts and less social participation than did the acute population.

Discriminant Analysis and Clinical Decision Making

Discriminant analysis has become utilized over the last few years as both a tool for research explorations and in practical applications as a classification device to aid the clinical decision making. Examples of the former include Clor's (1982) and Posch's (1976) investigation of Dupuytren's Contracture, while the latter has seen such uses as predicting AWOL discharges from open psychiatric units (Miller, Stone, Beck, Fraps, and Shekim, 1982). As multivariate statistical methods have increased in the number and scope of applications, concern has been raised that the predictive models suggested by discriminant analysis actually reflect the variables which have meaning and pragmatic utility in the question at hand.

Bartko, Carpenter and Strauss (1981) and Strauss and Carpenter (1978) suggest that an interactive approach between clinician and statistician is needed to ensure the optimal combination of clinical judgement and systematic data in applying multivariate statistical methodology to the study of schizophrenia. These authors have been primarily interested in the classification of psychiatric patients through the use of multivariate statistical techniques. They view psychiatric problems as multifactorial disorders of function. To be able to classify patients, clinicians must be able to consider a number of variables. The pattern of these variables can be extremely complex and the clinician may intuitively grasp these patterns. However, it is often difficult to recall and determine the patterns formed by these distinguishing variables. Bartko, Carpenter and Strauss call for the application of multivariate statistical methodology such as discriminant analysis to assist in this process because the techniques are capable of considering and organizing large sets of data in a clearly defined manner.

The issue of the collaboration of the clinician and statistician in both research and treatment is a parallel concern. As with any issue, arguments can be made for either side, and the issue of clinical versus statistical/actuarial decision making is no exception. Researchers such as Meehl (1978), Montayne (1982), Einhorn and Hogarth (1978) have called for reliance on clinical judgement, while Dawes (1976), Bentler and Bonett (1980), Arkes (1981) and others favor the utilization of statistical or actuarial decision making processes.

At the heart of this debate is the concept of whether or not clinician's decisions can be addressed by a linear or configural model

(Garb, 1983). Configural models refer to decision making processes where the effect of one item of information may depend on what other information is learned about the client. That is, the clinician uses information in a contextual manner. Linear models, on the other hand, are additive in that information is summed to form a whole picture. Meehl (1959) wrote that an advantage a clinician has over a linear regression model is that the clinician can use information in a configural manner. However, a common finding in clinical judgement studies is that a linear model can account for most of the variance in clinician's judgements (Anastasi, 1982; Goldberg, 1968; Hoffman, Slovic and Roer, 1968; and Wiggins, 1973).

Aside from clinical aspects regarding the clinical/statistical decision paradigm, there are also research aspects to be considered in this theoretical approach. Lunneborg and Lunneborg (1978) contend that measures should make psychological sense so that researchers find answers to their inquiries. This is the role of the clinician with regards to research, to contribute and insure that the research does fill gaps in the existing body of knowledge and clarifies that which is not well defined.

A concern expressed by Howe (1981) is that, in addition to diagnosis, clinicians must take on the additional role of assessing treatment modality and determining the best match between the description of the client that emerges from tests and other data and the available treatments that exist in the referral context. Thus, to examine schizophrenics based solely on psychiatric symptoms or social behaviors is not to get a complete picture of their needs or capabilities. Whereas medical diagnosis connotes the prescription of treatment,

psychological diagnosis represents a starting point from which the impact and importance of many factors must be weighed, interpreted and dealt with in the course of treatment. This is in part due to the fact that psychology does not have the laboratory tests or other instruments to confirm diagnostic suspicions that the medical disciplines do at this point in time (Alper, 1983). The key to gaining a level of scientific consistency is to work toward the better defining and describing of phenomena and the confirmation of these observations.

Discriminant Analysis and the Referral Process

Few of the articles located and examined related to the utilization of discriminant analysis to classify mental health clients into different treatment programs. Froland, Brodsky, Olson and Stewart (1979) used network analysis to examine the differences in the social networks of mental health clients in order to identify factors associated with positive adjustment. Sampling three client populations, a state hospital inpatient ward, a day treatment program and an outpatient clinic, the study compared the social networks of clients with that of persons in the general population. All groups were administered the Denver Community Mental Health Questionaire (Ciarlo and Reichman, 1978) and the Social Network Assessment Questionaire (Froland, 1978).

Relative to the general population sample, the average profile of the social network of clients in the three treatment groups can be described as smaller in size, with fewer ties to kin, fewer long term friends, less interaction with family, friends and relatives, fewer friends who know family members, fewer different sources of friends

and greater feelings of loss of help from relationships. Overall, the networks of clients in the treatment groups were more limited, involving greater amounts of instability or change in the availability of support than were the networks of the general population. State hospital clients scored significantly lower than either of the other three groups in psychological well being and productivity. They also had poorer treatment history, with greater numbers of prior hospitalizations, greater use of public services, and more legal difficulties.

A discriminant function analysis was used to determine which set of social characteristics would statistically predict a client's treatment program. It was felt that the characteristics of social networks were significantly different enough between treatment groups such that they could be used as a predictor of appropriate programs. Together these characteristics were able to classify correctly 79.2% of the clients according to the type of treatment programs from which they were sampled.

Greene and Monahan (1981) utilized multiple discriminant functions to predict level of care assignments for patients in skilled nursing homes. They sought to match the patient's skill in the activities of daily living with the services offered in various facilities. Greene and Monahan looked at three levels of services: Skilled nursing, intermediate care, and personal care. Their predictor variables included ten items associated with activities of daily living, nine psycho-social impairment measures, and three measures of sensory-communication impairment. Overall, the classification analysis correctly predicted 69.9% of all cases. The authors note that their classification functions tended to misclassify cases in the direction of "over-care" as opposed to "under-care".

Discriminant analysis was proposed as a means of measuring psychotherapeutic change by Sloat, Leonard and Gutsch (1983). These authors developed discriminant functions based on the Sixteen Personality Factor Questionaire (Cattell, Eber, and Tatsuoka, 1970) to ascertain what personality factors distinguished drug users from non-users. They found that nine personality factors differentiated between users and non-users. Sloat, et al., propose that the discriminant functions derived from their study can be used in a number of ways. First, the results of a subject's 16 PFQ could be used to determine if the subject should be included in substance abuse therapy. After several months of therapy, the therapist could again administer the 16 PFQ to determine the effectiveness of his or her efforts. Further, they proposed three basic advantages to using discriminant techniques in therapy. Firts, the results of using this approach define where a client is when therapy is initiated. Second, it provides both the therapist and the client with an understanding of what direction the client is taking and to what extent the client has moved. Finally, it gives criteria by which change can be measured which are pragmatic and definitive.

A study by Ogborne, Annis and Miller (1982) explored the use of discriminant analysis to aid in the selection of alcoholics for controlled drinking programs. The researchers were able to classify 76.2% of a sample of problem drinkers into three outcome groups. They caution that researchers who utilize discriminant analysis to classify subjects into differential groups should pay attention to the respective probabilities of group membership for the members of the sample. The clinician is concerned not only with optimizing the percentage of all clients correctly diagnosed, but also with minimizing the chances of serious clinical error

in diagnosis and improving predictions for individual clients whenever possible. The procedures involved in discriminant analysis provide estimates for individual subjects of the exact probability of membership in different criterion groups beyond just group classification rates. The clinician can use these probabilities in formulating decisions that will minimize the risk of serious clinical error and increase the confidence of diagnosis and consequently advice that can be given to clients. Ogborn, Annis and Miller go on to suggest that factors outside the discriminant model need to be taken into consideration in some cases when making placement decisions. These include the previous history of the subject's success in treatment and their present attitude and motivation towards treatment.

The Referral Process

Shertzer and Stone (1968, p.433) state that "referral is the act of transferring an individual to another person or agency for specialized assistance not available from the original source." Paritzky (1981) reports that a literature search he conducted revealed that little has been written about the process of making an effective referral. He further states that besides the limited number of articles available which deal with the referral task, few of the standard texts used in counselor training programs present guidelines for making referrals. An empirical investigation of the referral process by O'Neil, Price, and Eads (1978) indicated that there is a need for paraprofessional and even professional counselors to increase their knowledge about making effective referrals.

A conceptualization of the referral process was outlined by Corazzini and Shelton (1974). They state that the first requirement to improve referrals is to establish role definitions. The counselor should define the limitations and purpose of his or her role, set forth the expectations of what their agency can do for the client and establish the client's need for service. Corazzini and Shelton go on to emphasize that it is important to establish a positive expectation for those clients that are referred. The client should understand that the services they will receive are both adequate and required. They feel that one of the best ways to facilitate the referral process is to provide training for referral agents. Training should not only cover referral process, but should also stress knowledge of the strengths, weaknesses, and programming available at the agencies to whom referrals are made. In this way, clients might best be fitted with agencies which provide services that are congruent to their needs. They close by iterating that positive regard for clients and following up on referrals are two important characteristics of counselors who make successful referrals.

Wolkon, Peterson and Rogawski (1978) found that the success rate, or chances of a client keeping a scheduled referral appointment, were increased if several factors were attended to. Most notably, they felt that it was important for outpatient appointments to be scheduled within three days of discharge from a hospital inpatient unit. Further, chances were greatly enhanced for successful referral if the client themselves called and confirmed the appointment. If the appointment was not kept, then a follow-up telephone call to the client was found to be helpful in engaging them in treatment. A parallel study by Betz and Shullman (1979) indicated that client follow-up was greatly enhanced if

the client was seen by a female intake worker.

The process of deciding where to refer individuals for services is analogous to making clinical judgements about clients. Dowell and Jones (1980) state that the main difference is that referrals involve less detailed assessment of the presenting problem and much more knowledge of the practical issues associated with service delivery. They conducted a study of the inter-judge agreement regarding referral choices by social service and mental health professionals. The study revealed that there is very little agreement among professionals about which agency is most appropriate to provide services to an individual client. In fact, the agreement of simulated referral choices by professionals in the study did not exceed the level of agreement expected by chance alone. Dowell and Jones' study found that some agencies tended to refer clients to particular programs with little apparent regard for client differences. They termed this pattern "referral habit".

The literature on referrals has little to say about referral patterns. There have been few studies of the choices made by counselors about where to refer a given individual for services. Available data suggests that some professionals may be reluctant to refer outside of their own profession (Meile, 1974) and that there may be several relatively distinct referral networks in a given community (Gerdine and Bragg, 1970).

A study by Gearing, Metthey and Heckel (1980) stated that personnel who were untrained in making psychiatric referrals could be easily taught to complete referrals which were both adequate and appropriate by utilizing a shaping process. One of the prerequisites for this shaping process involved providing positive feedback to referral

agents for their efforts and for there to be standardized procedures for making referrals. Primarily, the shaping process involved providing positive feedback to referral agents for appropriate referrals to a prison inpatient psychiatric unit and reprimands for those which were not correct.

The referral accuracy, adequacy and appropriateness of paraprofessionals counselors can be increased by adherance to regular training and supervision (Paritzky, 1981). Specifically, paraprofessionals should have opportunities for consultation with a supervising professional to explore needs for referral and to determine what type of referral is most appropriate. Additionally, paraprofessionals need to exchange information with each other so as to share experience, both positive and negative, they have had in making referrals. Supervision, peer feedback, and training in the referral process can promote improved task performance. Similar recommendations were advocated by Altman (1983).

Social Skills, Outward Behavior and Assessment

This dissertation, in addition to exploring the efficacy of utilizing discriminant analysis for referral decisions regarding the treatment of adult schizophrenics, also considers within its framework the use of social factors to classify mental health clients according to treatment needs.. As such, related literature pertaining to the effects of social abilities on mental health, the measurement of social competence, overt behavior and social abilities, and the advantages and disadvantages of various assessment tools such as self reports, ratings by professionals, ratings by significant others and global versus specific ratings must

be considered. This portion of the literature review will address these concerns.

Social Abilities

The effects of social abilities as they pertain to mental health problems and the use of mental health treatment services have come to be increasingly studied. It has been indicated that today's psychotrophic medications have made it possible for mental health clients to be better, but not well. As a result, the patient is better enough to live outside the institution, but not well enough to be fully self-sufficient. Therefore, the patient in the community comes to require some degree of social support, for example, the patient may need welfare or disability payments, special residential placements, and social and recreational supervision (Klerman, 1977).

Liberman, Wallace, Vaughn, Snider and Ruse (1980) state that while vulnerability, central nervous system dysfunction, and responsiveness to neuroleptic medication are presented to influence inter-individual variability in schizophrenia, another source of variability likely stems from the social skills possessed by individuals suffering from schizophrenia before, during, and after periods of psychotic decompensation. Social skills exert a significant influence on the onset, prognosis, course, and outcome of schizophrenia. Works by Moller, Zerssen, Werner-Eilert, and Wuscher-Stockheim (1982), Summers (1981) and Dohrenwend, Dohrenwend, Link, and Levav (1983) indicate that diagnosis and social ability may be separate entities and need to be measured independently.

The influence of social competence is a factor in a person's will being. Phillips (1966) states that social competence corresponds to the individual's level of psychosocial development and refers to the ability to meet expectations set by society. Social competence is a trait which is tempered by two factors, the first being the developmental maturity of the individual and the second being the relative achievements of the individual as an active member of society. Considered here are attainments such as meaningful relationships, employment, educational level, marital status and to some extent income and social class.

Turner and Zabo (1968) conducted a four to six year follow-up of male schizophrenics who were discharged from a hospital setting. They found that increased ratings of social competence lead to decreased numbers and durations of hospital admissions. In their research, they discovered that the performance of patients was roughly congruent with the expectations of family members. It was observed that patients who returned to the hospital had relatives who neither expected or insisted on socially mandated behaviors such as participation in work or recreation.

A similar follow-up study was conducted by Rosen, Kein, Levenstein and Shanian (1968). They also found that increased social competence corresponded to decreased hospitalization. However, they point out that the age of onset is a crucial factor in psychiatric outcome. The later a person has a psychotic episode, the more time and opportunity they have had to establish their social competence. Thus, it appears that the better entrenched a person is in society, the better his/her prognosis for recovering from a schizophrenic break.

A majority of the work on social competence and treatment outcome

is based on the work of Leslie Phillips. Phillips' original work (1953) viewed schizophrenia as having two primary factors which influence the outcome of an episode: the level of social maturity reached previous to the breakdown and how far the person deviates from normality, particularly in the loss of affective ties during the psychosis itself. Phillips developed a prognostic rating scale based on the events and achievements contained in a client's history, including possible precipitating factors and signs of the disorder.

The scale itself has evolved through the years, but remains one of the principle instruments and major theoretical views of social adjustment. An adaptation of the Phillips' scale was that of White, McAdoo and Phillips (1971). They produced a prognostic scale based on present adaptation rather than premorbid status called the Worcester Scale of Social Competence. Harris (1975) stated that parts of the Phillips scale may be redundant and therefore not totally necessary. For example, research literature demonstrates that a variable as gross as marital status has predicted much the same performance as Phillips' full scale of social and sexual adjustment. Harris created an extensively shortened version of the scale that had interrater reliabilities ranging from .91 to .97. The abbreviated scale correlated with the original Phillips scale at .95. The shortened Harris version thus appears an efficient and adequate substitute for the full scale.

The Phillips scale has been used in a wide variety of studies including research into social competence and post-hospital outcome, Rosen, Klein, et al. (1968), and Phillips and Zigler (1961); the differentiation between process and reactive schizophrenias, Zigler and Phillips (1961); and to distinguish between paranoid and non-paranoid status, Zigler and Levine (1973).

Assessment Scales

The assessment of social skills may be looked upon as being in the early stages of development (Liberman, 1982). Presently, there are three major approaches taken in assessing social skills: topographical, functional, and information processing. Topographical approaches review both the verbal content and non-verbal elements in person-to-person communication. The functional definition of social skills focuses on the outcome of the interaction between "actor" and "respondent" as reflected in the achievement of the "actors" instrumental and social-emotional goals. The information processing approach builds on the topographical and functional definitions. It adds an information processing and problem solving view to produce an overarching approach to social skills. The information processing approach has particular relevance to the schizophrenic because of its emphasis on cognitive functions.

Weissman (1975) states that the criteria for evaluating social adjustment scales should include a review of the following: 1) Content--The areas assessed should be extensive and have broad coverage. 2) Method of Obtaining Information-- A number of options (self-report, mail questionaires, telephone interviews and in-person interviews) are viable depending on cost, intent, and feasibility. 3) Source of Information--Whether the informant is the patient, significant others, or case records, the sources of information must be uniform between patients to assure comparability. 4) Psychometric Properties--An instrument should possess demonstrated reliability, validity, norms, and sensivitity to change. 5) Time Period Assessed--The time period assessed should be specifically stated. 6) Length of Time to Administer--A balance between comprehensiveness and time required should be sought. 7) Scoring--Scoring should be

straight-forward and quantifiable. 8) Training--An instrument with a developed training program and instructional materials is desirable.

One of the major issues to take into account in the assessment of a client's social functioning in the community is the community itself. Cook and Josephs (1970) point out in their study using the Community Adaptation Schedule (Roens and Burnes, 1968), that a primary concern in evaluating how well a person has adapted to the community is the average level of social competence evidenced by members of the community. How much deviance is tolerated in the community should also be considered. Libo, in his review of the Community Adaptation Schedule which appeared in Buros (1972), criticizes the scale as being largely composed of questions that appear to concern and revolve around middle-class values. Hence, a scale may not be valid for a population of mental health clients because it is assessing their community adaptation based on socio-economic levels, or norms which the community itself does not contain. The nature of the broader community may also be expected to have impact on the nature of the individual's social network, both in terms of a person's experience of community (Glynn, 1978) and participation in community resources (Mitchell, Barbarin, and Hurley, 1979).

A researcher has several options in selecting methodologies to assess community adjustment and the requirements in treatment of mental health clients. These include self-reports, interviews, case record material, outside raters, and significant others' ratings. Additionally, one can look at whether the measurements are based on global or specific frame of reference.

Straus and Carpenter (1972) suggest that researchers should abandon the use of global outcome measures such as "improved"/"unimproved" or

"adequate"/"inadequate". Instead, they should develop criterion measures that delineate observable and measurable factors in the community adjustment of schizophrenic patients. Paul (1969) states that assessment of global level of functioning is similarly useful for definition of the patient sample. However, such measures are not adequate for treatment, programming, nor, are they sufficiently specific for use as measures of improvement for most patient groups. Contrastingly, Lentz, Paul and Calhoun (1971) state that for a chronic population, global measures of level functioning may provide meaningful comparative data on the overall effectiveness of total treatment programs. This is due to the extent of bizarre characteristics and deficits within a hardcore, chronic population.

Regarding the issue of client self-reports, Weissman and Bothwell (1976) state that self-report scales have two attractive features. They are inexpensive and simple to administer since no training program or reliability studies between raters are required. Moreover, interviewer bias, which can enter the interview situation, is removed. Results show that the self-report technique is comparable to the interview for assessing role areas and overall adjustments.

A study by Glazier, Sholomskas, Williams, and Weissman (1982) indicated that the chronic schizophrenics in a community setting are able to report their social adjustment and their ratings were congruent with those of significant others. There is a tendency for clients to consider themselves as more impaired than they are rated by an interviewer, but this may be an artifact related to the time the assessment was conducted.

Two disadvantages of self-reports that Weissman and Bothwell report are that missing data occurs unless there is a trained assistant who remains with the patient to insure completeness and the delusional or psychotic patients who tend to under-report their impairments may not be appropriate for this method. Additionally, Liberman (1982) reports that clients abhor self-report inventories related to social skills.

Paralleling the use of client self-reports is the utilization of interviews to assess client status. While this technique has been the basis of psychiatric intervention and evaluation, it has several severe deficiencies which limit its use as a client assessment tool. Roen, Ottenstein, Cooper, and Burnes (1966) note that interviews are costly in terms of time and staff training. Further, the information gleened from an interview is often subjective, unreplicable, and not comparable from subject to subject. It often takes a highly trained or specialized individual to conduct an interview assessment. While the interview itself may be rich in what is referred to as "clinical data", it does not provide the control and objectivity for rigorous decision making processes. Further, it is possible for clients to fake bad or good interviews.

The assessment of client status by perusal of case records has several distinct advantages and disadvantages which recommend or limit its use. Weissman (1975) points out that the use of records is the least expensive or reliable method, for unless records are specifically set up for research purposes, they tend to be variable in content, or incomplete. Phillips (1953), however, based a good deal of his research on case history materials. He felt the key to understanding a patient

and his prognosis lie in the pre-morbid history and those situations which lead to a breakdown. While he acknowledged the limitations and discrepancies in relying on case records for information, he felt the fault lay more with the way in which records were kept rather than in the research method itself.

A technique which requires trained personnel, but eliminates some of the previously enumerated faults is the staff-rating technique. Klett (1968) indicates that a major problem in selecting measuring instruments for use with chronic patients is that many of the traditional approaches to assessment are inapplicable due to a low level of functioning, apathy, uncooperativeness, or the troublesome behavior of the patients. Thus, the use of traditional psychological tests, whether self-report or performance, is impractical due to the inability or unwillingness of these clients to participate in the assessment procedures. In cases such as this, instruments based on staff observations are indicated for use. A recent study by Lindsay (1982) indicated that psychiatric labels have little influence on the objectivity of raters perceptions of client's social skills.

Schaeffer and Martin (1966) state that:

> "given the kind of constraints in the assessment of clients, the most desirable form of assessment for mental health clients in treatment programs would appear to consist of continuous frequency counts of situationally defined appropriate and inappropriate behaviors, or the exhaustive time-sampling of all relevant classes of behavior".

Moos (1969) proposed that ratings by paraprofessional staff are likely to be the most valid and economical due to the greater patient contact of this staff group. In order to enhance the validity of ratings of global functioning, ratings should cover a range of situations,

behaviors, and instruments in order to avoid "method" factors and situational specificity of behavior.

Goldman and Singer (1974) propose that paraprofessionals' ratings of chances for recovery or mental competence can be predicted by a small number of their behavioral observations, or inferences about the clients with whom they are working. Specifically, paraprofessionals attend to ideation, attitude towards staff and personal appearance in making clinical judgments about clients. Blackman (1981) came to similar conclusions and stated that paraprofessionals do not typically make diagnoses or patient evaluation predictions on the basis of standardized measures. They rely on day to day interactions as a basis for their evaluations. Blackman's study, also, suggested that while paraprofessionals use a multidimensional scheme to evaluate clients, the clients tend to rate themselves more on the basis of a bivariate scale of feeling better or worse.

Outward Behavior

The assessment of a mental health client's outward behavior is important in evaluating the probable success of his/her tenure in the community. Depending on the circumstances, a community will tolerate many things, but behavior which is bizarre or odd can prove to be a tremendous deficit to the client who is seeking social support or acceptance in the community. As previously stated, a client may be actively symptomatic and still be able to live and perform in the community (Fulkerson, et al., 1961). At the same time, there are clients who are well adjusted in terms of psychopathology, yet are

unable to leave hospitals or adjust satisfactorily to the community situation. A client's outward behavior would appear to have a tempering effect on the client's acceptance and treatment needs in the community.

A majority of the scales which have been developed to assess the outward social behavior of mental health clients have been applied to inpatient settings. The purpose here is to evaluate a client's behavior in the hospital in order to assess his/her readiness to be discharged back into the community.

One such scale developed by Ellsworth (1971) is the MACC Behavioral Adjustment Scale. Originally designed for inpatient use, the scale is now used in community settings. The scale was built from a critical incident study in which nurses were asked to list essential differences between a socially withdrawn patient in good contact as compared with a socially outgoing patient also in good contact. Ten items were consistently mentioned. The socially withdrawn client lacked in sense of humor, was selfish, had few friends, did not enter into conversations easily with other patients, spent most of his time alone, was not "sought out" by other patients, did not know much about others on his ward, was not concerned about others, did not take part in group social activities, did not "work out" difficulties with others, but "let them go".

From these ten areas were drawn 16 items in groups of four that assess four areas: mood, cooperation, communication and social contact. The ratings on these areas were found to correlate with the ratings of both significant others and client's self ratings between professional

and paraprofessional staff. The scale has the advantage that it is quick to administer and score, and is easy to interpret.

A similar type of scale was developed by Farina, Arenburg and Guskin (1957). The Minimal Social Behavior Scale (MSBS) is a 32-item instrument with each item rates as present or absent. The scale is filled out on the basis of an interview standardized for setting as well as interviewer provided stimuli. The interview itself is highly contrived and sets up many opportunities for the client to exhibit socially appropriate behaviors. In addition to its use as a technique to determine the appropriateness of a client for discharge, the scale has also been used in research.

Kelly, Farina and Mosher (1971) used the scale with two groups of female schizophrenics. Both groups were matched for overt severity of symptomatology. However, prior to the MSBS interview, one group was instructed to fake bad. Both groups performed admirably as instructed. The authors viewed this as a strong indication of a schizophrenic's ability to control her own behavior and to act at will in socially enhancing or disparaging ways.

The Nurses' Observational Scale for Inpatient Evaluation (NOSIE-30) was developed by Honigfield (1966) to assess six areas: social competence, social interest, personal neatness, irritability, manifest psychosis, and retardation. Like the MACC, it is quick to administer. The NOSIE-30 was used by Lentz, Paul and Calhoun (1971) to assess the social functioning of chronic mental patients.

All of the previously presented scales have a common element: They assess the client's outward social behaviors and abilities. They measure how the client talked with, reacts and responds to, and acts toward other

people. They rate the most basic interchanges necessary for a person to survive in the social atmosphere of the community.

There is another aspect of social ability which must also be considered besides social behaviors and abilities. A further contributing factor to living in the community is the client's ability to handle those activities of daily living such as shopping, cooking, cleaning, etc. which are necessary to people in their day to day lives. A certain number of these skills are assessed by the Katz Adjustment Scales (Katz, 1963), and the Vineland Social Maturity Scale (Doll, 1953, 1965).

Given that social abilities and diagnosis appear to be seperate entities and need to be measured independently, it was decided in selecting instruments for the study that distinct scales should be selected to rate outward behaviors and symptomatology and social abilities. Further, given the schizophrenic population to be assessed, and the service staff to be involved in the study, it appeared most appropriate to use instruments which were based on the staff-rating technique. The next section of this literature review presents an in-depth overview of the instruments used in this research.

Assessment Tools Used in the Study

The Psychotic Inpatient Profile (PIP) developed by Lorr and Vestre (1968) is a behavioral inventory designed to measure twelve dimensions or syndromes of currently observable behavior. The inventory is intended to be completed by a nurse or psychiatric aide (a para-professional) based on the experience of interacting with and observing the patient over a period of days. The PIP is a revision and expansion of the Psychotic Reaction Profile of Lorr, O'Connor and Stafford (1960).

The inventory consists of 74 statements that are descriptive of manifest behavior and 22 statements which are descriptive of patient self-reports. Together, these statements provide ratings on eight manifest behavior syndromes and four self-report syndromes. Ten of the syndromes are essentially equivalent to those measured by the Inpatient Multidimensional Psychiatric Scale (Lorr, Klett, McNare and Lasky, 1963), which was an earlier interview schedule. There are two factors -- Seclusiveness and Need for Care, which are unique to the PIP. The syndromes in the scale were derived from a factor analysis of an experimental form of 113 items which was administered to a sample 412 cases.

The eight manifest behavior syndromes rated by the inventory are as follows: 1) Excitement (EXC) -- This syndrome represents a tendency to be noisy, overtalkative, high in mood and aggressively overactive. 2) Hostile Belligerence (HOS) -- Hostile and obscene language, belligerence, and a tendency towards combativeness define this syndrome. 3) Paranoid Projection (PAR) -- Suspicion, resistiveness, complaints concerning care and treatment, and ready annoyance to imagined slights characterize this syndrome. 4) Anxious Depression (ANX) -- An anxious

bewildered depression is defined in this pattern. While somewhat correlated with Depressive Mood in the self-report syndromes, this represents a more agitated picture than just self-depreciation. 5) Retardation (RTD) -- Movement, speech and response are slowed sometimes to the point of apathy and stupor in this syndrome. 6) Seclusiveness (SEC) -- This dimension measures the degree of interpersonal interaction. High scores represent reclusive or withdrawn behavior. 7) Care Needed (CAR) -- Evidence of this patters is an inability or unwillingness to care for oneself. Low scores may be regarded as a measure of competence. 8) Psychotic Disorganization (PSY) -- The syndrome is defined by patterns which are probably central to schizophrenic withdrawal such as motor disturbance and indicators of conceptual disorganization.

Following are the four self-report syndromes: 1) Grandiosity (GRN) -- This syndrome is briefly characterized by a delusional grandiosity. 2) Perceptual Distortion (PCP) -- Hallucinatory experiences usually associated with paranoid tendencies are represented in this syndrome. 3) Depresive Mood (DEP) -- A syndrome characterized by self-reports of dejection, hopelessness and failure. 4) Disorientation (DIS) -- This is a functional disorientation due perhaps to self-peroccupation with inner fantasies, conflicts, or hallucinatory experiences.

An assumption in constructing the inventory measures was that each syndrome was present in a greater or lesser degree in all patients. Also assumed was that the more severe the syndrome, the greater the probability that deviant behavior would manifest itself. Thus, a low score on most syndromes implies a mild degree of disturbance. Exceptions to this rule in the scale are low scores on Seclusiveness which would represent sociability, and scores on Need for Care and Disorientation

which would imply normal competence and orientation. Provisions are made in scoring these scales to assure their continuity with the scoring scaling for the other syndromes.

Two samples were used to norm the profile. The first, labeled Drug-Free, consisted of 412 cases, of which 277 were women and 135 were men. Nine state and university hospitals and clinics contributed ratings on cases diagnosed as functional psychotic. Personality disorders, psychoneurotics, drug addicts, and neurological cases were excluded. All ratings were obtained within one week of admission, and prior to drug treatment or while on minimal drug dosages. The typical case had 12 years of schooling and was 36.6 years old. Fifty seven percent of the patients were married. Initial psychiatric diagnosis classified 26 percent of the sample as paranoid schizophrenics, 47 percent as non-paranoid schizophrenics, and 27 percent as depressive.

The second norm sample consisted of 604 cases labeled as Drug Treated and were rated for the most part shortly after hospitalization. Mild or moderate dosages of tranquilizers were being used on these 236 men and 368 women. All cases, which came from 12 state and university hospitals, were diagnosed initially as functional psychotics. Forty-nine percent were diagnosed as paranoid schizophrenics, 36 percent were non-paranoid schizophrenics, 12 percent were depressives of all kinds, and 3 percent were diagnosed as manics.

Various studies (Lorr, 1966; Lorr, Klett, and McNair, 1964; and Lorr and O'Connor, 1962) have shown through factor analysis that the Psychotic Inpatient Profile measures 12 relatively independent sources of individual variation. Additionally, two studies, Lorr and Cave (1966) and Lorr, O'Connor and Stafford (1960) demonstrated that the

syndromes identified by the profile are equivalent to syndromes isolated in interview data on the same cases. Lorr and Vestre cite these studies as evidence of the content validity of the profile.

No data on the reliability of the scale is presented in the manual. However, a review by Weckowicz in the Eighth Mental Measurements Yearbook (1978) indicates that information on reliability was obtained from one study in which the intra-class correlation between ratings of two independent raters were calculated for a sample of 57 cases from one hospital. These correlations range from .74 for perceptual distortion to .99 for grandiosity, with a median of .865. No data on the internal consistency of the 12 scales was presented.

Vestre (1966) showed that the Psychotic Reaction Profile, the predecessor of the Psychotic Inpatient Profile, discriminated between closed ward and open ward patients on Withdrawl, Thinking Disorganization, and Anxious Depression. Vestre also obtained ratings on four groups of hospitalized psychotic patients; closed ward without ground privileges, closed ward with privileges, open ward, and open ward patients involved in pre-discharge planning. He found that there were significant differences between these groups on Withdrawl, Thinking Disorganization, and Paranoid Belligerence. These findings support Vestre's hypothesis that these groups represent decreasing degrees of impairment and thus their mean Psychotic Inpatient Profile Scores should show similar results.

Finally, Vestre obtained profile ratings on 54 consecutive admissions and 52 consecutive discharges from a psychiatric hospital. A discriminant analysis resulted in the correct classification of 76 percent of the patients in their respective groups. When 71 closed ward and 87 open ward patients at the same hospital were compared using discriminant

analysis, 84 percent of the cases were correctly classified.

The Psychotic Inpatient Profile has also been used in research to study the changes resulting from the use of psychotropic medications in treatment (Caffey, Diamond, Frank, Grasberger, Herman, Klett, and Rothstein, 1964; Casey, Hollister, Klett, Lasky and Caffey, 1961; Hanlon, Nussbaum, Wittig, Hanlon, and Kurlan, 1964; and Lasky, Klett, Caffey, Bennett, Rosenblum and Hollister, 1962), and tranquilizer effects (Dehnel, Vestre, and Schiele, 1968; and Hall, Vestre, Schiele and Zimmerman, 1968).

Lorr and Vestre present evidence such as this in the Psychotic Inpatient Profile Manual to provide support for the factorial validity and content validity of the scale. They also cite the studies which demonstrate its ability to discriminate between hospital groups differing in severity of illness as evidence of its criterion validity. Because of the scale's sensitivity to treatment outcome, Lorr and Vestre state that the profile appears promising for use in the classification of patients into homogenous groups for research and treatment.

Lorr and Vestre suggest that the inventory can be used in a number of ways. Among them are: 1) To provide a standard quantative description of patients in 12 areas of psychopathology prior to treatment. The profile scores should be helpful in arriving at a psychiatric diagnosis and selection of appropriate treatment. 2) If PIP ratings are made at regular intervals, they could be used as a basis for evaluating the results of treatment. 3) The PIP is especially useful in assessing withdrawn or mute patients, as well as those who are excited or assaultive. Observation is almost the only procedure which can be used to assess such patients. 4) The PIP is of value as a research instrument. It

may be used to evaluate the efficacy of new treatment modalities. PIP might also be used to match patients relative to their symptom profiles to establish homogenous groups pertinent to the target dimensions being studied. 5) The PIP has been found useful in the training of nurses, psychologists, and psychiatric residents. Use of the form, following careful observation, acquaints trainees with patient behavior and psychopathology. Thus, it represents a technique for improving observational and evaluative skills. Comparisons of independent observer ratings can serve to reveal errors and biases and to increase the uniformity of judgment. This quality would make the scale beneficial for use with paraprofessional or inexperienced professional staff.

A scale especially for rating psychiatric patients on social skills was developed by Pinchak and Rollins (1961). The Social Adequacy Rating Scale measures eight areas or traits of adjustment. 1) Responsibility for Use of Money -- The extent to which the individual is realistically responsible about his/her money, its source and its use. 2) Personal Appearance -- The degree to which the individual has been able to maintain his/her personal appearance, e.g. dressing, shaving, oral hygiene, hair, grooming, etc. in conformity with those of others in their environment. 3) Personal Habits -- The extent to which the individual has been able to maintain the standards of his/her immediate environment as to eating, sleeping, and bathing. 4) Vocational Responsibility -- How well the individual has been able to maintain responsibility for productive work. 5) Social Group Attendance -- The extent to which the individual assumes responsibility for attending social, recreational, religious, and avocational activities. 6) Social Group Participation -- The degree to which the individual is responsible for emotional interaction in a

social group. 7) Responsibility for Family and Immediate Associates -- The extent to which the individual shows responsibility for the rights and well being of family and immediate associates in his/her environment at home, at church, on the job, and so on. 8) Interpersonal Relationships -- The degree to which the individual maintains sustained relationships with others on a person to person basis, demonstrating personal-emotional involvement.

Each adjustment item is rated on a five step scale based on the following gradations of social adequacy: 1) Social Adequacy -- Regularly shows reasonable responsibility and needs no supervision. 2) Intermediate Social Adequacy -- Shows frequent responsibility with irregular exceptions and sometimes needs supervision. 3) Moderate Social Adequacy -- Shows some responsibility, but still needs supervision. 4) Minimum Social Adequacy -- Occasionally shows responsibility and needs a great deal of supervision. 5) Social Inadequacy -- Never shows responsibility and needs almost total supervision. The scale has a score range of 8 to 40, with the score value for each item corresponding to the number of the level of adequacy attained for each scale rating. Summing across the eight-trait scales yeilds a total score which can vary from 9 (highly adequate) to 40 (highly inadequate). This arithmetic sum is called the Social Adequacy Index.

An arbitrary rule of thumb derived from extensive use of the scale by Pugh and Nuemann (1976) indicates that a score of 8 to 15 usually means that a client needs minimal preparation and support to live in the community. A score of 15 to 22 indicates a client might be capable of community adjustment in a protective environment that offered supportive services. A score in the 23 to 30 range generally means that with careful

treatment planning and supportive services, a client might be able to live in the community. Scores over 30 would indicate the need for possible extended hospital treatment.

Inter-rater reliabilities range from .77 to .90 for the individual items, with an overall inter-rater reliability for the entire scale of .89. These reliabilities were established from a sample of 35 subjects and 12 raters (Roos, 1955). The same study provided validity data in that 83 percent of the patients discharged from the hospital with indices of 8 to 23 remained in the community and did not require further hospitalization. Pugh and Neumann (1976) report that a sample of 2,000 cases substantiates their rule of thumb hypothesis and points to the criterion validity of the scale.

Astrachan, Harrow, Adler, Brauer, Schwartz, Schwartz, and Tucker (1972) developed the New Haven Schizophrenia Index to formalize the apparent commonality of clinical features which together establish a diagnosis of schizophrenia through the use of a valid and reliable checklist of symptoms. The index consists of six major categories of symptoms: delusions and hallucinations, crazy thinking and/or thought disorder, inappropriate affect, confusion, paranoid ideation, and catatonic behavior. To be considered schizophrenic, a subject must score either in delusions or hallucinations, and crazy thinking and/or thought disorder, and attain a total score of at least 4 points for the entire scale.

The scale was initially tested by scoring the symtomatology of 422 patients diagnosed as schizophrenic and 100 other patients selected to confuse the diagnosis with the NHSI. The scale had a discrimination

rate of 87.4 percent with this initial sample. The scale was then revised and a new sample of 522 cases was rated. This sample resulted in a correct classification rate of 87.6 percent.

Astrachan, et al then went on to perform a factor analysis of 35 symptoms (all of the items on the original checklist, plus items such as depression, mania, suicidal thoughts, etc.) to determine whether a major factor consisting of those symptoms predicted to be associated with schizophrenia would arise. A major factor which was heavily weighted with symptoms related to thought disorder, delusions, and affect disturbance did emerge which accounted for 18.5 percent of the total variance. A multiple regression analysis on the same 35 symptoms with a clinical diagnosis of schizophrenia as the dependent variable was conducted by the same authors. The results of this analysis indicated that 48 percent of the total variance can be accounted for by seven items on the checklist: paranoid ideation, inappropriate affect, delusions, auditory hallucinations, bizarre thinking, other hallucinations, and loose associations. The reliability study of the index consisted of material from 25 randomly selected cases rated by three non-clinicians. Inter-rater agreement for checklist diagnosis of schizophrenia was 84 percent. The authors also report that schizophrenics had consistently significantly higher scores on the checklist than other diagnostic groups.

Summary

This review of the literature has covered multivariate statistical techniques, multivariate statistical applications in a mental health setting, the referral process, and materials which addressed social

abilities, outward behavior, and assessment.

Multivariate statistical techniques, and specifically discriminant analysis, have become widely used in quantifying decision making processes. Discriminant analysis is particularly useful in classification and diagnosis and for the study of relations between populations. Recently, discriminant analysis has been applied to clarifying issues around differential diagnosis, and to differentiate mental health clients who are successful in a community setting from those who are not.

One of the major contributions of applying discriminant analysis in a mental health setting has been the exploration of clinical decision making. An issue here is clinical versus statistical/actuarial decision making. Statistical/actuarial models are linear, whereas clinical models tend to be configural. A common finding in clinical judgment studies is that a linear model can account for most of the variance in clinician's judgments.

While much work has been done in defining diagnostic decisions, few studies have addressed the application of discriminant analysis to the referral process. Preliminary work in this area would appear to indicate that the utilization of the probabilities of membership for individual clients in respective treatment groups may minimize the risk of clinical errors in prescribing treatment modalities. Further, studies of the referral process seem to indicate that these decisions are often made in a subjective and unreplicable fashion. Discriminant models may help objectify this process.

Research on the assessment of mental health clients' social abilities is a relatively recent development. There are many techniques presently being studied, including self-reports, structured interviews,

and the review of case records. A technique which appears promising is that of having the mental health workers who are involved with clients observe and rate their behaviors. Three instruments which utilize this approach were reviewed in depth: the Psychotic Inpatient Profile (covering outward behavior and symptomatology), the Social Adequacy Rating Scale (measuring social abilities) and the New Haven Schizophrenia Index (objectifying the diagnosis of schizophrenia).

CHAPTER III

METHODOLOGY

This chapter refers to the selection of subjects, the design of the study, instruments, procedures, and statistical analyses used in the dissertation to study the feasibility of quantifying outward behavior and social abilities to facilitate the referral of adult schizophrenics into one of three mental health treatment modalities. First to be presented are the subjects for the study, followed by an outline of the instruments and procedures used for gathering data. Finally, the rationale for the selection of the statistical analyses used in this dissertation will be explained.

Subjects

The sample for this dissertation was drawn from a population of adult mental health clients involved with the Community Mental Health System of St. Clair County, Michigan. This population represented a pool of approximately 1300 subjects distributed in three Outpatient Clinics, three Adult Day Treatment Centers, and an Aftercare Program. Not all of the subjects within this population could be classified diagnostically as being schizophrenic, or appropriately placed, so the actual pool of subjects of interest to this dissertation was 433. All subjects sampled in the dissertation were required to have a working diagnosis of schizophrenia to be included. This diagnosis was verified by means of the New Haven Schizophrenia Index (Astrachan, Harrow, Adler, Brauer, Schwartz, Schwartz,

and Tucker, 1972). The sample contained both men and women ranging in age from 18 to 55. Additionally, a majority of the subjects sampled were receiving some form of chemotherapy in conjunction with their treatment. All subjects included in the sample were rated by treatment staffs as being presently treated in appropriate modalities. The form for rating the appropriateness of modality may be found in Appendix A.

The sample was drawn from programs which were located in only one county. As Cook and Josephs (1970) pointed out, the assessment of community adaptation and social abilities should be limited to one specific community. In this way the adaptation between clients can be more easily compared because the community standards, opportunities, and social supports available, and the adaptation of the client, will be more of an indication of their abilities and needs rather than a reflection of the community in which they reside. Only one county and one diagnostic group was used in this study to provide an element of experimental control. This arrangement allowed any variation between treatment modalities to be due to variation of the subjects on the predictor variables and not on the location of the programs or the diagnosis of the subjects.

Of the 433 potential subjects who were involved in the three modalities of treatment, 417 were rated by treatment personnel participating in the study. This included 215 subjects in the first sample, and 202 subjects in the cross-validation sample.

The respective demographic characteristics of these two samples are presented in Tables 1 and 2.

TABLE 1

SUBJECT DEMOGRAPHICS
FIRST SAMPLE

CHARACTERISTIC	GROUP		
	OUTPATIENT (N = 26)	AFTERCARE (N = 86)	DAY TREATMENT (N = 103)
AGE (mean)	37.0	38.55	32.704
INCOME SOURCE	17 employed (65%) 5 Soc. Sec. (17.5%) 5 unemployed (17.5%)	8 employed (9%) 41 Soc. Sec. (48%) 21 Pub. Asst. (24%) 11 pensions (12%) 5 none (6%)	42 Soc. Sec. (41%) 37 Pub. Asst. (36%) 24 dependent (23%)
MARITAL	11 married (42%) 11 single (42%) 4 divorced (16%)	15 married (17%) 33 single (38%) 24 divorced (28%) 9 separated (10%) 6 widowed (7%)	16 married (16%) 57 single (55%) 24 divorced (23%) 4 separated (4%) 2 widowed (2%)
EDUCATION (mean years)	13.1428	11.517	11.2727
SEX	15 males (57%) 11 females (43%)	46 males (53%) 40 females (47%)	63 males (61%) 40 females (39%)
LIVING ARRANGE.	26 independent (100%)	68 independent (79%) 18 dependent (21%)	63 independent (61%) 40 dependent (39%)
TIME IN PROGRAM (mean, in months)	13.428	16.051	15.136

TABLE 2

SUBJECT DEMOGRAPHICS
SECOND SAMPLE

CHARACTERISTIC	GROUP		
	OUTPATIENT (N = 25)	AFTERCARE (N = 72)	DAY TREATMENT (N = 105)
AGE (mean)	35.6	36.366	34.0
INCOME SOURCE	10 employed (40%) 5 Soc. Sec. (20%) 5 Pub. Asst. (20%) 5 dependent (20%)	29 Soc. Sec. (40%) 24 Pub. Asst. (33%) 19 pensions (27%)	51 Soc. Sec. (48%) 46 Pub. Asst. (44%) 8 dependent (8%)
MARITAL	10 married (40%) 10 single (40%) 5 divorced (20%)	7 married (10%) 34 single (47%) 24 divorced (34%) 5 separated (7%) 2 widowed (2%)	43 married (41%) 53 single (50%) 9 divorced (9%)
EDUCATION (mean years)	14.2	12.33	10.74
SEX	15 males (60%) 10 females (40%)	41 males (57%) 31 females (43%)	69 males (65%) 36 females (35%)
LIVING ARRANGE.	25 independent (100%)	65 independent (90%) 7 dependent (10%)	36 independent (35%) 69 dependent (65%)
TIME IN PROGRAM (mean, in months)	21.6	17.9	18.7

Design

A design which utilized an initial investigation of the feasibility of the proposed measurement procedure followed by a cross-validation sample was used in this dissertation. The first sample and corresponding statistical analyses were conducted to answer three questions: One, did three distinct populations exist with regard to outward behavior, symptomatology, and social abilities? Two, could discriminant functions be formulated to predict membership in the three distinct modalities? Three, which scales and items of the rating scales used had the most power in making treatment group membership predictions?

Group membership in one of the three modalities, Outpatient, Adult Day Treatment, or Aftercare, was the dependent variable for the study. The independent variables included measures of outward behavior and symptomatology (Excitement, Hostile Belligerence, Paranoid Projection, Anxious Depression, Retardation, Seclusiveness, Care Needed, Psychotic Disorganization, Grandiosity, Perceptual Distortion, Depressive Mood, and Disorientation), as well as measures of social adequacy (Responsibility for Money, Personal Appearance, Personal Habits, Vocational Responsibility, Social Group Attendance, Social Group Participation, Responsibility for Family, Interpersonal Relationships, and a Social Adequacy Index). These independent variables provided the basis for the distinction of the three treatment modalities and the classification functions.

Once it was ascertained that there was indeed three distinct treatment programs, and that the independent variables provided adequate predictions for the classification functions, a cross-validation sample was conducted. The purpose here was to verify the consistency of the

information derived from the first sample and to assure that the classification procedure was effective.

Instrumentation

Two major constraints were placed on the scales used in this study. First, the time required to administer the scales had to be brief. Second, ratings by treatment personnel had to be used. There were two reasons for the brief scales. Long involved assessments were not practical because workers do not have the time to complete them given their already heavy workloads. Also, the measurement procedure proposed here is to be used by both professionals and paraprofessionals of several different disciplines. Therefore, the scales had to be ones which were objective and easily interpretable. The second consideration in selecting scales was that ratings by treatment personnel be highlighted. The purpose of this research was to create an objective measurement process to quantify referral decisions which are currently based on clinical intuition and judgment. For this reason, scales which require workers to observe behaviors and record their observations in a standardized manner were used. They were scales which could be completed quickly by the clinical staff who dealt with the subject. The scales selected for this research fulfilled a pragmatic role, because they should increase the amount of objective information workers have in making referral decisions without significantly increasing their workload.

For the purposes of this dissertation, two scales were utilized. Only one scale was selected to measure either outward behavior or social abilities. There were two reasons for this. First, the factors to be included in the discriminant functions were relatively distinct from

each other. This is a feature that is preferable when attempting to determine which qualities distinguish one group from another. Only one measure was included so that the predictive power of each factor could be ascertained. Further, by using one scale for each factor and analyzing the contributions of each subscale of the instruments in predicting group membership, a procedure could then be constructed which was both accurate and brief. Only those factors which had significant discriminatory power were included in the completed quantitative measurement procedure.

The following scales were used in this dissertation because they met the above criteria for instrumentation. The utilization of these scales in research and practical application is documented and indicates they can be validly used to classify subjects in homogenous groups. Additionally, inter-rater reliabilities for both scales appear reasonably high and consistent. This is a desirable quality in any measurement scheme using rating scales (Phillips, 1971, p. 202). Further, inter-rater reliability studies were done as part of this research to verify the accuracy and consistency of raters who participated in the study.

The outward behavior of the subjects was assessed by the Psychotic Inpatient Profile of Lorr and Vestre (1968). Though originally designed for use with hospitalized subjects, the scale was used in this research because one of the basic premises of community treatment is that people who are symptomatic can often be as readily treated in the community as in a hospital (Glick, Hargreaves, and Goldfield, 1974). Therefore, many if not all of the behaviors that a patient might exhibit in a hospital setting could also be expected to appear in those modalities which have come to replace the hospital.

The Psychotic Inpatient Profile (PIP) is a behavioral inventory designed to measure twelve dimensions or syndromes of currently observable

behavior. The inventory is intended to be completed by a nurse or psychiatric aide (a paraprofessional) based on the experience of interacting with and observing the patient over a period of days. The inventory consists of 74 statements that are descriptive of manifest behavior and 22 statements which are descriptive of patient self-reports. Together, these statements provide ratings on eight manifest behavior syndromes and four self-report syndromes.

The Psychotic Inpatient Profile was utilized for several purposes in this dissertation. First, the PIP was used to verify that three distinct treatment groups existed, and that the PIP could be used to identify present or future members of those groups. Second, the PIP served as a part of a quantitative procedure to provide paraprofessional and professional mental health workers with an objective means to obtain information for making decisions in the course of treating adult schizophrenics. Third, the procedure which resulted from this research can be used to evaluate the progress and effectiveness of treatment.

The social ability of clients, or their ability for handling day to day social responsibilities and activities of daily living was assessed by the Social Adequacy Rating Scale (Pinchak and Rollins, 1960). The Social Adequacy Rating Scale (SARS) was developed to provide social workers with an objective means of rating the social adjustment of former patients on trial visits homes, or who were discharged from state hospitals. The scale has been used in research with schizophrenics (Moran, 1976, Pugh and Neuman, 1976, and Roos, 1955).

The sample for this dissertation was comprised exclusively of subjects who had been diagnosed as being schizophrenic. The New Haven Schizophrenic Index (NHSI) developed by Astrachan, Harrow, Adler, Brauer,

Schwartz, Schwartz, and Tucker (1972) was utilized to verify and confirm that subjects selected for the study did indeed have a bonafide diagnosis of schizophrenia.

Procedures

The first step in carrying out the research necessary for this dissertation was to meet with the staffs of the treatment programs involved to briefly explain the purpose of the study and to train them in the use of the instruments to be employed. The training session for each of the treatment staffs was uniform and followed the format and materials presented in Appendix B. The training began with an explanation of the project and what was to be the role of staff in the research. A description of the instruments to be used and a discussion on how to complete the scales was presented in the meeting. Following this, the treatment staffs completed a trial assessment package on an identified subject who was familiar to all of the raters at the particular program where the training was being held. The treatment staffs then shared and discussed their respective ratings. Ratings that deviated grossly from the majority were highlighted and efforts were made through further training or discussion to rectify these variances.

A total of 22 treatment personnel, including seven Outpatient staff (all Master's level clinicians) twelve Day Treatment staff (two Master's level clinicians, two Bachelor's level specialists, and 8 paraprofessional aides), and three Aftercare staff (two Bachelor's level specialists, 1 paraprofessional) participated in the study by providing ratings of clients. Further, one program from each modality provided ratings to be used to establish inter-rater reliabilities for

the scales which were utilized. Thus, three Outpatient, six Adult Day Treatment, and three Aftercare staff were each presented with three common clients found in their respective programs. The ratings of each of these modalities clients by raters were assessed for their reliability using the SPSS Subprogram RELIABILITY. The results of these inter-rater reliability studies may be found in Chapter IV.

The staffs of the programs sampled were used to administer and complete the scales because they dealt with the subjects on a day to day basis, had better rapport established with the subjects, and were more knowledgable of the types of information required to complete the ratings. This enhanced the validity and thoroughness of the measurement process. Also, since the evaluations had little or no effect on the program or clients due to their research nature, it was felt that service staffs were able to give an accurate and fair assessment of the current level of functioning of the clients.

Once the staffs were informed and trained, they were asked to create a pool of all their active cases with a working diagnosis of schizophrenia whom they considered as being in appropriate placements. These cases were then listed and numbered. A random numbers table was used to select an appropriate number of subjects for each program. This allowed a random and representative sample of the schizophrenic clients in each treatment modality to be obtained. Following the selection of this first sample, written permission was obtained from each of the subjects selected to participate in the study. This was necessary since observations of subjects' behavior were required for the research. Once written permission for the subject to be involved in the study was obtained, the program staffs verified the subjects' diagnosis by means

of the New Haven Schizophrenia Index. There was some attrition in the total possible sample due to the refusal of actively paranoid clients to participate (7 cases), two cases being commited to the state hospital during the study, five cases not being verified as schizophrenic by the New Haven Schizophrenia Index, and two cases who refused without explanation.

Following the verification of the diagnosis and obtaining written permission, the service staff in each program completed the scales necessary to the dissertation. A concern in the study was the confidentiality of the client observations and the privacy of the subjects. This condition was achieved by the following method. From a list of clients in each program, the client had a number which corresponded with his/her position on the list and which was used in the random selection process. This number then became the identifying number for each client and was used as an identifier on each rating scale so that they could be collated by the service staff. This list was only seen by the service staff who dealt with the clients regularly and was destroyed once the research was complete. The only materials which reverted to the author were the completed scales. While numbers and location appear on these scales as identifiers, they could not be linked back to clients because the assignment list never left the facility where the data was gathered.

The scales were completed by the clinical staff who were directly involved in the treatment of the subject. The time line for completion of these scales on each subject was two weeks. The initial scales for the first sample were all completed by service staffs in the various modalities during the first two weeks of February, 1983. All raters were observing and rating clients during the same temporal period. Each scale could be reviewed as rating the same segments of time and behaviors. Thus, the

integrity of the relative predictive power of each scale was preserved.

Once the scales were completed, and double checked by the service staff, they were submitted to the author. The instruments were checked by the author for completeness and correctness. Since the staffs at the programs collated and compiled the data and the bulk of it was staff generated information, there was little or no missing data. Service staffs were cautioned on the necessity for complete data in all cases. Upon receipt of the completed information, the author then proceeded to organize and code the data for the purpose of statistical analysis.

The training and data collection procedure for the cross-validation sample replicated those processes used for the first sample. That is, treatment staffs were once again familiarized with the project and the shortened rating scales. A common client was selected for the treatment staffs at each program location to conduct practice ratings. These ratings were compared and discussed. Any extreme scores were examined and remediation of rating errors was attempted. Following this training, staff members then approached the 218 subjects who had not been sampled in the first rating. Permissions were secured, diagnosis and appropriateness verified, and scales completed. The timeline for observing subjects and completion of scales was during the first two weeks of June, 1983. No inter-rater reliability studies were conducted on this second sample as the same raters, and the same rating scales (with the deletion of five complete scales) were used as had been the case in the first sample.

Statistical Analysis

Analysis of the data in this dissertation was a two-step process. The first step, as outlined above, involved the collection of data from each of the three treatment modalities. Analysis at this point was for the purpose of determining that three distinct treatment populations existed. Also of concern in this first analysis were which of the predictor variables sampled in the study had the greatest discriminatory power. These variables were then used in the second phase of the research to cross-validate that the quantified measurement procedure created with the discriminating variables of the first phase was consistent and could be of use in making referral decisions in the treatment of adult schizophrenics. The variables entered in the first phase included the twelve subscales of the Psychotic Inpatient Profile, and the eight subscales and Social Adequacy Index of the Social Adequacy Rating Scale.

Statistical analysis was accomplished through the use of the Statistical Packages for the Social Sciences Subprograms DISCRIMINANT and NEW REGRESSION. The primary interest of this study was to discover what factors maximally differentiated adult schizophrenics into different treatment groups and from this information to create a quantified measurement procedure to assist in making referral decisions.

The utilization of multiple regression and discriminant analysis is based on the assumption that 1) the sample is drawn at random, 2) each array of Y for a given combination of X's follows the normal distribution, 3) the regression of Y on the X's is linear, and 4) all of the Y arrays have the same variance. The linearity assumption and

homogeneity of variance are important and need to be assessed to determine if the regression equation fits the data adequately and if the proportion of variance explained by the equation is sufficient for the requirements of the decisions to be made. Assurance that these assumptions have not been violated is best evaluated through the direct examination of the scatterplots for the residuals (Kim and Kohouts in Nie,, et al, 1975, pp.341-342). This examination provides information regarding the appropriate modifications to the discriminant functions to accommodate the lack of linearity in cases where the variables are interactive or curvilinear. The statistical analysis used in this dissertation includes the examination of residuals so that the structure and nature of the relationships of the discriminant functions can be ascertained and explained in the construction of the predictive measurement procedure.

The first analysis of the data was done with the DISCRIMINANT subprogram. The purpose of this analysis was to determine if three distinct treatment groups existed and to discover which predictor variables had the greatest discriminatory power. Two methods of discriminant analysis were used in the first phase. First, all of the predictor variables were entered concurrently into the analysis by the direct method to test the overall predictive power of the factors measured by the scales in making referral decisions in mental health treatment. The method of separation was the Wilks' method. The criterion for the Wilks' method is the overall multivariate F ratio for the test of differences among group centroids. This method was used to acquire insight into discrimination based on the characteristics of the typical group member as well as the degree of homogeneity within the

group. The question of whether three distinct treatment populations existed was approached in this manner. Once the overall predictive power of the factors had been ascertained by utilizing the direct method with the Wilks' criterion, a stepwise analysis was conducted to determine the optimal discriminant functions to describe the differences between groups. This stepwise analysis was also conducted based on the Wilks' criterion.

Statistics to describe the groups themselves were used to delineate what differentiated an Adult Day Treatment population from the population of an Aftercare Program from Outpatient Services. A classification results table, means, standard deviations, and the matrix of pairwise F ratios was obtained to determine that three distinct treatment groups existed.

The main purpose of the research was to obtain a basis for classifying subjects into treatment groups, so the analyses had to go beyond describing group differences. Green (1979) states that classification may be reasonably based directly on the Mahalahobis distance. The criterion for the Mahalanobis distance in discriminant analysis is the largest distance between two groups for the two closest groups on a given variable. The squared Mahalanobis distance between two groups has three components: the squared distance to the discriminant space, the squared distance to the centroid within the discriminant space, and the classification function value for the respective groups. The Mahalanobis criterion was used in a stepwise analysis to determine the optimal discriminant functions for referral decisions. These optimal discriminant functions were used as the quantified measurement procedure to aid in the referral decision making process throughout the remainder of the study.

Besides the method of selecting independent variables for the discriminant functions, several other options within the DISCRIMINANT subprogram were important in analyzing the data in this dissertation. A classification results table was sought to determine the accuracy of classifications based on the proposed quantified measurement procedure. Cohen's Kappa (1968) was utilized to determine the probability of obtaining these classifications by chance alone. Kappa is defined as the sum of the observed proportion of agreement ΣPo, minus the sum of the proportion of agreement expected by chance ΣPe, divided by change ΣPe. In this way a measure of the significance of the classifications generated by the discriminant analysis was obtained.

Also, discriminant scores and classification information were requested to determine any similarities or patterning among cases in all the treatment modalities. The closeness of fit between a Day Treatment client and an Aftercare client, or a Day Treatment client and an Outpatient client, or any other pairing could be observed in this way. Regarding the question of least restrictive treatment, this could be an issue in assigning a client to a modality which is a close fit to his/her characteristics. What was sought here was a clinical decision which was based on the results of the process, tempered by the practical reality of the client's capacity to participate in treatment. This capacity may, at times, influence the course of treatment, and represents one consideration in the question of clinical versus actuarial decision making.

The plots of membership of each group and the classification functions were also examined. These options allowed explanation of the classification process. A Varimax rotation of the discriminant function

axis was also sought. This Varimax rotation improved the interpretability of the contributions of the main variables in the discriminant function. Again, means, standard, deviations, and the matrix of pairwise F ratios from the stepwise analysis were used to determine what differentiated an Adult Day Treatment client from those of Aftercare or Outpatient treatment.

The SPSS subprogram, NEW REGRESSION was utilized once the proposed quantified measurement procedure was obtained from the stepwise, Mahalanobis procedure in DISCRIMINANT. NEW REGRESSION was used to explore the structure of the data set and to ascertain if any of the assumptions of multiple regression or discriminant analysis had been violated. NEW REGRESSION Provides procedures for the analysis of residuals. The predictor variables identified by the stepwise analysis were inserted in the regression equation by forced entry with the dependent variable for the regression being treatment modality. NEW REGRESSION was run for this design and display histograms, probability plots, and outlier plots of the residuals and related statistics were obtained. These were examined to clarify the composition of the predictive measurement procedure.

Following the completion of the first phase of the research, the verification that three distinct populations existed, the determination of what factors maximally discriminate among these three populations and the structure of the discriminant functions; the second phase attempted to cross-validate that the procedure which was established in the first phase was consistent and could be used in clinical decision making to predict treatment referrals. This cross-validation was performed using the previous procedures for gathering the information about subject.

The sample for the second phase was drawn from the same population and treatment programs that were used to establish the procedure. Two-hundred fifteen subjects were used in the first phase from the pool of 433 available. For the purposes of cross-validation, the 202 cases not sampled initially were measured. This allowed for 25 Outpatient, 105 Adult Day Treatment, and 72 Aftercare clients to be sampled in this second phase.

Written permission once again was obtained from the subjects to be sampled in the second phase. Service staffs of the treatment programs that the clients attended verified the subjects' diagnosis with the New Haven Schizophrenic Index, and completed the other scales as required. The major difference in the scales used during this phase centered on the fact that only those scales which contributed significantly to the discrimination of the treatment groups sampled in the first phase were included. Thus, the scales for this phase differed from those used initially in that they were fewer in number. These fewer scales provided correct classification rates for clients which were equal to or better than those obtained in constructing the discriminant functions. The methods of obtaining, recording, and reporting the data were the same as previously used. The author received the completed data and coded it for analysis.

Statistical analysis was done using SPSS subprogram DISCRIMINANT. The method of selecting variables was the direct placement of all the predictor variables from this phase in the discriminant functions. The direct method with the Mahalanobis criterion was used to validate that the variables chosen in the first phase had predicting power and could be used for referral decisions. The classification table was obtained

to determine the accuracy of the procedure, and Cohen's Kappa was used to determine the significance of the classifications.

Plots of membership for each group and classification functions, as well as means, standard deviations, and pairwise F ratios were obtained and reviewed to determine the effectiveness of the procedure. From this information, recommendations for using the procedure were developed. Suggestions for utilizing the classification functions to facilitate referral decisions and discriminant "cut off" scores for each modality were formulated.

CHAPTER IV

RESULTS

The major question asked in this study was whether or not a combination of shortened rating scales could be used in the context of discriminant analysis to classify adult schizophrenics into three levels of treatment; Outpatient, Aftercare, or Day Treatment. Those variables which discriminated most effectively between treatment levels and the viability of multivariate analysis as a decision-making tool in a mental health setting were to be ascertained from the study.

A number of sub-questions pertaining to these major questions were explored. First, did a difference exist between treatment groups in the way they acted towards and interacted with other people? Considered here were not only the degree of severity and symptomatology exhibited by subjects, but also the distinguishing behaviors between groups. Second, based on outward behaviors and symptomatology, did three distinct treatment groups exist? If three distinct existed, could their discriminating characteristics be used in making treatment decisions? Finally, based on the subjects' social abilities, did three distinct groups exist? Again, if three distinct groups existed with regard to social abilities, could these characteristics contribute to making treatment referral decisions?

This chapter will present results of the analysis of data gathered to indicate whether or not three distinct treatment groups existed. Information regarding which factors discriminated most effectively between groups will be reviewed, as will variables which provided the best classification of cases. Finally, data to cross-validate the results of

the first samplings of subjects will be covered.

The Distinction of Three Treatment Groups

Prior to the initiation of data gathering for the dissertation, inter-rater reliability studies were conducted on participating service staffs. Tables 3, 4, and 5 present the inter-rater correlations and reliability coefficients for the Outpatient, Adult Day Treatment, and Aftercare modalities, respectively, for the Psychotic Inpatient Profile.

TABLE 3

INTER-RATER CORRELATIONS, OUTPATIENT PSYCHOTIC INPATIENT PROFILE

SCALE	RANGE OF INTERCORRELATIONS		ALPHA	STANDARDIZED
	Minimum	Maximum		ITEM ALPHA
Excitement	.1372	.4921	.3216	.34
Hostile Belligerence	.2766	.4513	.4919	.39
Paranoid Projection	.26219	.85510	.68616	.71
Anxious Depression	.04386	.78091	.71364	.73
Retardation	.29231	.98198	.68108	.58
Seclusiveness	.3028	.4641	.3992	.36
Care Needed	.3225	.5789	.38308	.44
Psychotic Disorg.	.2361	.4743	.3575	.30
Grandiosity	.1930	.4147	.3163	.28
Perceptual Distort.	.59604	.91766	.90680	.92
Depressive Mood	.37115	.99983	.90446	.88
Disorientation	.63394	.99972	.97187	.97

TABLE 4

INTER-RATER CORRELATIONS, ADULT DAY TREATMENT
PSYCHOTIC INPATIENT PROFILE

SCALE	RANGE OF INTERCORRELATIONS		ALPHA	STANDARDIZED
	Minimum	Maximum		ITEM ALPHA
Excitement	.41484	.81526	.80846	.79
Hostile Belligerence	.24831	.7326	.62917	.63
Paranoid Projection	.28004	.94572	.92554	.89
Anxious Depression	.40064	.95759	.90175	.90
Retardation	.23019	.99718	.83671	.83
Seclusiveness	.21097	.89198	.61873	.58
Care Needed	.14278	.71596	.76855	.64
Psychotic Disorg.	.79185	.97610	.91367	.91
Perceptual Distort.	.75454	.95944	.92892	.95
Depressive Mood	.29056	.89183	.83262	.88
Disorientation	.99050	.9979	.99670	.98
Grandiosity	.54414	.725626	.70129	.69

TABLE 5

INTER-RATER CORRELATIONS, AFTERCARE
PSYCHOTIC INPATIENT PROFILE

SCALE	RANGE OF INTERCORRELATIONS		ALPHA	STANDARDIZED
	Minimum	Maximum		ITEM ALPHA
Excitement	.76403	.85771	.84220	.84
Hostile Belligerence	.21984	.99745	.80766	.71
Paranoid Projection	.47256	.94512	.89475	.93
Anxious Depression	.50126	.94766	.94181	.91
Retardation	.75465	.89981	.85416	.82
Seclusiveness	.55645	.71892	.64289	.66
Care Needed	.55103	.86873	.79636	.79
Psychotic Disorg.	.69499	.92423	.89892	.92
Grandiosity	.59146	.89416	.76954	.77
Perceptual Distort.	.61831	.90067	.88363	.89
Depressive Mood	.70861	.95823	.81496	.81
Disorientation	.91073	.93326	.91184	.92

As can be seen from these tables, the inter-rater correlations and standardized item alpha's were consistently high. This is indicative of substantial agreement between raters with regard to the scales making up the profile. It should be noted that most disparate alpha coefficients were exhibited between raters in the Outpatient group. Since the

reliability studies took place as part of the training sessions and prior to actual ratings as part of the research, further discussions and explanations were held with the Outpatient staffs to rectify any difficulties they were having in completing ratings.

Tables 6, 7, and 8 represent the inter-rater correlations and reliability coefficients for the three modalities on the Social Adequacy Rating Scle.

TABLE 6

INTER-RATER CORRELATIONS, OUTPATIENT SOCIAL ADEQUACY RATING SCALE

SCALE	RANGE OF INTERCORRELATIONS		ALPHA	STANDARDIZED
	Minimum	Maximum		ITEM ALPHA
Resp./Money	.27735	.90784	.82005	.83
Personal Appear.	.1181	.6757	.55405	.54
Personal Habits	.21429	.4996	.36371	.37
Vocational Resp.	.1667	.79669	.63132	.61
Soc. Grp. Attnd.	.2365	.5698	.53368	.54
Soc. Grp. Part.	.1292	.63866	.59561	.56
Resp./Family	.09261	.55870	.47570	.47
Interpersonal Relationships	.1384	.3494	.23209	.22
Total Score	.23245	.6182	.44574	.40

TABLE 7

INTER-RATER CORRELATIONS, ADULT DAY TREATMENT
SOCIAL ADEQUACY RATING SCALE

SCALE	RANGE OF INTERCORRELATIONS		ALPHA	STANDARDIZED
	Minimum	Maximum		ITEM ALPHA
Resp./Money	.61831	.87512	.75929	.77
Personal Appear.	.67361	.92578	.87899	.89
Personal Habits	.18898	.79536	.38183	.54
Vocational Resp.	.02530	.47365	.4473	.44
Soc. Grp. Attnd.	.02724	.64941	.6154	.63
Soc. Grp. Part.	.43693	.72487	.6556	.66
Resp./Family	.0015	.59872	.56602	.55
Interpersonal Relationships	.26461	.87118	.66437	.64
Total Score	.36571	.95161	.94344	.94

TABLE 8

INTER-RATER CORRELATIONS, AFTERCARE
SOCIAL ADEQUACY RATING SCALE

SCALE	RANGE OF INTERCORRELATIONS		ALPHA	STANDARDIZED
	Minimum	Maximum		ITEM ALPHA
Resp./Money	.81484	.96139	.94221	.94
Personal Appear.	.13846	.71575	.5275	.53
Personal Habits	.15133	.47658	.4667	.42
Vocational Resp.	.61581	.85676	.81723	.82
Soc. Grp. Attnd.	.56972	.95523	.76249	.79
Soc. Grp. Part.	.52884	.89988	.65412	.66
Resp./Family	.01387	.85974	.82475	.76
Interpersonal Relationships	.36565	.53255	.43355	.48
Total Score	.52447	.88462	.86774	.86

The inter-rater reliability studies reflect a trend of consistency between raters in their perceptions of the social abilities of clients in their respective modalities. Further training was held with Outpatient staffs in an effort to clarify discrepancies between raters.

The first step in ascertaining whether or not a combination of brief rating scales could be used in the context of discriminant analysis to classify adult schizophrenics into three levels of treatment was to determine that three distinct groups existed. Table 9 peresents the group means from the first sample of subjects.

TABLE 9

FIRST SAMPLE GROUP MEANS

GROUP	EXCITEMENT	HOSTILE BELLIGERENCE	PARANOID PROJECTION	ANXIOUS DEPRESSION
1 Outpatient	47.26923	48.15485	47.84615	49.32308
2 Aftercare	55.52326	59.05814	53.75581	50.91860
3 ADT	59.31068	61.10680	55.58252	54.66019
TOTAL	56.33953	58.72093	53.91638	52.53023

GROUP	RETARDATION	SECLUSIVE.	CARE NEEDED	PSYCHOTIC DISORGANIZATION
1 Outpatient	50.23077	42.15385	44.15385	44.96154
2 Aftercare	50.02326	45.43023	51.55814	54.45349
3 ADT	51.25243	46.74757	57.55430	58.59223
TOTAL	50.63721	45.66512	53.53488	52.669081

GROUP	GRANDIOSITY	PERCEPTUAL DISTORT.	DEPRESSIVE MOOD	DISORIENTATION
1 Outpatient	49.96154	47.73077	47.50000	40.00000
2 Aftercare	57.72093	65.12791	54.47674	44.84884
3 ADT	59.01942	56.90291	59.85437	44.02913
TOTAL	57.40465	59.08372	56.20930	43.86977

GROUP	RESPONS. MONEY	PERSONAL APPEAR.	PERSONAL HYGIENE	VOCATIONAL RESPONSIBILITY
1 Outpatient	2.26923	1.57692	1.88462	2.88462
2 Aftercare	2.74419	2.68605	2.79070	3.93023
3 ADT	3.17476	3.07767	3.06796	4.01942
TOTAL	2.89302	2.73953	2.81395	3.61142

GROUP	SOCIAL GRP. ATTEND.	SOCIAL GRP. PARTICIPAT.	RESPONS. ASSOCIATES	INTERPER. RELATIONSHIPS
1 Outpatient	2.34615	2.65385	2.15385	2.69231
2 Aftercare	3.12791	3.22093	3.50000	3.34883
3 ADT	3.68932	3.79612	3.78641	3.98058
TOTAL	3.30233	3.42791	3.47442	3.57209

GROUP	TOTAL SCORE
1 Outpatient	18.42308
2 Aftercare	25.39535
3 ADT	28.65049
TOTAL	26.11163

It can be seen that the means tended to increase in magnitude from being lowest in the Outpatient group to highest in the Adult Day Treatment group, with Aftercare falling between the other two. Based on the two instruments used (the Psychotic Inpatient Profile and the Social Adequacy Rating Scale), the lower scores are indicative of less active symptomatology and more social adequacy, while higher scores point to more active symptoms and decreased social abilities. Exceptions to this trend were the following variables: Retardation, where the Outpatient mean was slightly higher than the Aftercare mean, and both Perceptual Distortion and Disorientation where the Aftercare means were higher than those of the Adult Day Treatment subjects. Of these three means, the only one exhibiting a larger difference is Perceptual Distortion where the Aftercare group was 8.2187 points higher than the Adult Day Treatment group. The group standard deviations, Table 10, reveal the amount of dispersion of the group scores around the group means. These standard deviations indicate that there was some overlap in the range of score values with ± 1 standard deviation of the respective group means on a given variable. Specificially, there was overlap between the scores of the Outpatient and Aftercare groups on the variables of Retardation and Seclusiveness. Also notable in this sample is the lack of variance of the Outpatient group on the variable of Disorientation.

TABLE 10

FIRST SAMPLE STANDARD DEVIATIONS

GROUP	EXCITEMENT	HOSTILE BELLIGERENCE	PARANOID PROJECTION	ANXIOUS DEPRESSION
1 Outpatient	6.33440	8.00346	9.11128	6.98096
2 Aftercare	11.96832	17.52467	11.76129	8.48697
3 ADT	11.31373	11.43688	8.22064	9.67566
TOTAL	11.70913	14.42792	10.13288	9.12774

GROUP	RETARDATION	SECLUSIV.	CARE NEEDED	PSYCHOTIC DISORGANIZATION
1 Outpatient	9.54697	7.46025	3.14569	6.70534
2 Aftercare	9.50910	7.45266	9.81688	7.37926
3 ADT	8.56546	6.95746	9.62098	7.65456
TOTAL	9.04911	7.32933	10.17774	7.24639

GROUP	GRANDOSITY	PERCEPTUAL DISTORT.	DEPRESSIVE MOOD	DISORIENTATION
1 Outpatient	8.96875	4.73757	9.23147	0.0
2 Aftercare	15.84532	17.83242	12.78393	15.90968
3 ADT	16.24324	15.26531	9.99255	13.83974
TOTAL	15.58543	16.51146	11.80163	13.93012

GROUP	RESPONS. MONEY	PERSONAL APPEAR.	PERSONAL HYGIENE	VOCATIONAL RESPONSIBILITY
1 Outpatient	1.04145	0.80861	0.99305	1.69842
2 Aftercare	1.04246	0.99719	1.00722	1.98248
3 ADT	0.82161	1.01643	0.86616	2.00485
TOTAL	0.98716	1.08820	1.00596	1.89525

GROUP	SOCIAL GRP. ATTEND.	SOCIAL GRP. PARTICIPAT.	RESPONS. ASSOCIATES	INTERPER. RELATIONSHIPS
1 Outpatient	1.05612	1.16421	1.12044	1.08699
2 Aftercare	0.97975	0.95056	0.99114	1.02633
3 ADT	0.75445	0.74570	0.80013	0.77940
TOTAL	0.98907	0.96826	1.04928	1.01997

GROUP	TOTAL SCORE
1 Outpatient	6.53099
2 Aftercare	5.89771
3 ADT	4.21879
TOTAL	6.14594

Table 11, presents the Wilks' Lambda (U statistic) and Univariate F-Ratios for the first sample. The Univariate F-Ratios represent a One-Way Analysis of Variance to test the equality of the mean for this first Discriminant Analysis, in which all of the variables were directly entered into the functions.

TABLE 11

FIRST SAMPLE WILKS' LAMBDA AND UNIVARIATE F-RATIOS

2 AND 212 DEGREES OF FREEDOM

VARIABLE	WILKS' LAMBDA	F	SIGNIFICANCE
X1 Excitement	0.89415	12.55	0.0002
X2 Hostile Belligerence	0.92145	9.037	0.0021
X3 Paranoid Projection	0.94328	6.373	0.0032
X4 Anxious Depression	0.94718	5.911	0.6320
X5 Retardation	0.99568	0.4599	0.0151
X6 Seclusiveness	0.96120	4.278	
X7 Care Needed	0.80659	25.42	
X8 Psychotic Disorganization	0.86032	17.21	
X9 Grandiosity	0.96696	3.622	0.0284
X10 Perceptual Distortion	0.88031	14.41	
X11 Depressive Mood	0.87926	14.56	
X12 Disorientation	0.98858	1.225	0.2958
X13 Responsibility for Money	0.90315	11.37	
X14 Personal Appearance	0.81388	24.24	
X15 Personal Habits	0.86541	16.49	
X16 Vocational Responsibility	0.88452	13.84	
X17 Social Group Attendance	0.80027	26.46	
X18 Social Group Participation	0.83439	21.04	
X19 Respons. Family/Associates	0.76476	32.60	
X20 Interpersonal Relationships	0.81315	24.36	
X21 Total Score	0.72227	40.76	

As can be seen from this table, a majority of the means differed from one and other significantly and these can be considered as not being equal. Those variables whose means did not differ significantly from others were Anxious Depression and Disorientation.

Given that there were three groups in this Discriminant Analysis, two Discriminant Functions were derived to distinguish between the groups. Table 12, shows the Canonical Discriminant Functions derived from this analysis.

TABLE 12

CANONICAL DISCRIMINANT FUNCTIONS

FIRST SAMPLE, DIRECT ENTRY

FUNCTION	EIGENVALUE	VARIANCE	PERCENT	CORRELATION	FUNCTION
1	1.00336	68.53	68.53	0.7076993	0
2	0.46084	31.47	100.00	0.5616594	1

WILKS' LAMBDA	CHI-SQUARED	D.F.	SIGNIFICANCE
0.3416955	216.91	42	
0.6845388	76.560	20	

The first function attained a Canonical Correlation of .71. An estimate of the percentage of variance in a sample accounted for by a given function may be obtained by squaring the Canonical Correlation. This function, therefore, accounted for about 50.08% of the total variance in the sample. The second function had a Canonical Correlation of 0.56, which means it explained approximately 31.55% of the total variance. Together, the two functions accounted for 81.63% of the variance in the sample. The Chi-squared statistics presented in this table are significant and indicate that the functions derived in this analysis discriminate between groups at a level that is better than can be

expected by chance alone.

Those variables contributing primarily to the first function included Excitement, Paranoid Projection, Retardation, Care Needed, Psychotic Disorganization, Depressive Mood, Responsibility for the Use of Money, Social Group Attendance, Social Group Participation, and Responsibility for Family and Associates. The variables weighted most heavily for the second function were Hostile Belligerence, Anxious Depression, Seclusiveness, Grandiosity, Perceptual Distortion, Disorientation, Personal Appearance, Personal Hygiene, Vocational Responsibility, Interpersonal Relationships, and the Total Score on the Social Adequacy Rating Scale. The relative contributions of each of these variables to the respective Discriminant Functions can be found in Table 13.

TABLE 13

STANDARDIZED FUNCTION COEFFICIENTS, DIRECT ENTRY

VARIABLE	CANONICAL FUNCTION 1	DISCRIMINANT FUNCTION 2
X1 Excitement	0.56342	0.17974
X2 Hostile Belligerence	-0.10869	0.16876
X3 Paranoid Projection	-0.63796	-0.32092
X4 Anxious Depression	0.14040	-0.20959
X5 Retardation	-0.27723	-0.08076
X6 Seclusiveness	-0.06608	0.23014
X7 Care Needed	0.24937	-0.16116
X8 Psychotic Disorganization	0.19023	0.06389
X9 Grandiosity	0.33227	-0.58048
X10 Perceptual Distortion	-0.47703	0.96023
X11 Depressive Mood	0.58053	0.12010
X12 Disorientation	-0.10390	0.25541
X13 Responsibility for Money	-0.14475	-0.24295
X14 Personal Appearance	0.12861	0.42366
X15 Personal Habits	-0.00127	0.22255
X16 Vocational Responsibility	-0.03837	0.51156
X17 Social Group Attendance	0.32446	0.03595
X18 Social Group Participation	0.37481	-0.12516
X19 Responsibility Family/Associates	0.15206	0.90492
X20 Interpersonal Relationships	0.06537	-0.43946
X21 Total Score	0.17931	-0.79862

The Classification Results shown in Table 14 indicate that 77.21% of the "grouped" cases were correctly classified by the functions derived from this first Discriminant Analysis in which all of the variables were entered directly.

TABLE 14

CLASSIFICATION RESULTS SUMMARY

FIRST SAMPLE, DIRECT ENTRY

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP 1	2	3
Group 1	26	20 76.9%	5 19.2%	1 3.8%
Group 2	86	12 14.0%	59 68.8%	15 17.4%
Group 3	103	1 1.0%	15 14.6%	87 84.5%

Percent of "grouped" cases correctly classified: 77.21%

The Adult Day Treatment Group had the highest percentage of correct classifications at 84.5%, with the Aftercare group being lowest at 68.6%. Those cases which were incorrectly classified by the discriminant functions in the Outpatient and Adult Day Treatment groups tended to be classified into the Aftercare group, while those Aftercare cases incorrectly classified tended to be placed in the Adult Day Treatment group. These classification results attained a Cohen's Kappa of .0.66.

A stepwise analysis utilizing the Wilks's criterion was conducted on the first sample to determine the optimum Discriminant Functions to describe the differences between groups. The criterion for the Wilks' method is the overall multivariate F-Ratio for the test of differences

among group centroids. Table 15 displays the Pairwise F tests derived from this stepwise Analysis.

TABLE 15

PAIRWISE F TESTS

FIRST SAMPLE, WILKS' STEPWISE

Group	1 (Outpatient)	2(Aftercare)
2 Aftercare	7.3971	
3 Adult Day Treatment	12.250	9.5996

As can be seen from this table, all of the pairwise F tests were significant, indicating the existence of three distinct treatment groups.

The Canonical Discriminant Functions derived from this Wilks' stepwise analysis attained a Canonical Correlation of 0.7 (49.12% of the total variance) for the first function and .54 (29.4% of the total variance) for the second function. These functions accounted for 78.52% of the total variance of this sample. The Chi-squared statistics from both of these functions indicate that they discriminated between groups at an accuracy level which was greater than that expected by chance alone. Table 16 displays the results.

TABLE 16

CANONICAL DISCRIMINANT FUNCTIONS

FIRST SAMPLE, WILKS' STEPWISE

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMMULATIVE PERCENT	CANONICAL CORRELATION
1	0.96539	69.86	69.86	0.7008533
2	0.41648	30.14	100.00	0.5422386

AFTER FUNCTION	WILKS' LAMBDA	CHI-SQUARED	D.F.	SIGNIFICANCE
0	0.3592046	210.40	28	
1	0.7059773	71.549	13	

TABLE 17

VARIABLES SELECTED BY THE WILKS' STEPWISE

Variables in the Analysis After Step 14

Variable	Tolerance	F to Remove	Wilks' Lambda
X1 Excitement	0.4366021	7.5240	0.3863669
X3 Paranoid Projection	0.3881012	10.651	0.3976568
X5 Retardation	0.6250646	1.9058	0.3660846
X7 Care Needed	0.5223634	4.1090	0.3740384
X9 Grandiosity	0.5021986	6.4296	0.3824158
X10 Perceptual Distortion	0.4891353	23.749	0.4449422
X11 Depressive Mood	0.7710018	18.563	0.4262195
X12 Disorientation	0.8541309	1.2663	0.3637762
X13 Responsibility/Money	0.3994485	5.1624	0.3778413
X17 Social Group Attendance	0.3783747	2.0893	0.3667472
X18 Social Grp. Participation	0.3083740	3.3337	0.3712396
X19 Respons. Family/Associates	0.3523309	3.9037	0.3732973
X20 Interpersonal Relations.	0.3894315	6.2330	0.3817064
X21 Total Score	0.0940377	4.3258	0.3748211

Variables Not in the Analysis After Step 14

Variable	Tolerance	F to Enter	Wilks' Lambda
X2 Hostile Belligerence	0.2370051	0.10816	0.3588125
X4 Anxious Depression	0.5341649	0.97675	0.3556952
X6 Seclusiveness	0.4239034	0.69899	0.3566862
X8 Psychotic Disorganization	0.5360873	0.92015	0.3558967
X14 Personal Appearance	0.2765936	0.25343	0.3558967
X15 Personal Habits	0.3518982	0.29606	0.3581335
X16 Vocational Responsibility	0.3821411	0.86330	0.3560993

Variables included after 14 steps of the analysis are presented in Table 17, as are those which were eliminated as a result of the Wilks' stepwise criterion. The variables contributing to the first function were Excitement, Retardation, Perceptual Distortion, Depressive Mood, Responsibility for the Use of Money, and Responsibility for Family and Associates. Included in the second function were Paranoid Projection, Care Needed, Grandiosity, Disorientation, Social Group Attendance, Social Group Participation, Interpersonal Relationships, and Total Score on the Social Adequacy Rating Scale.

A total Correct Classification rate of 75.35% was achieved from these discriminant functions (Table 18).

TABLE 18

CLASSIFICATION RESULTS AND TABLE

FIRST SAMPLE, WILKS' STEPWISE

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP 1	2	3
1 Outpatient	26	21 80.8%	4 15.4%	1 3.8%
2 Aftercare	86	16 18.6%	55 64.0%	15 17.4%
3 Day Treatment	103	2 1.9%	15 14.6%	86 83.5%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 75.35%

The Adult Day Treatment group again had the highest percentage of the correct classification at 83.5%, while the Outpatient group attained an 80.8% correct rate. Aftercare posted a correct classification rate of 64% in this analysis. As was the case in the first Discriminant

Analysis, those subjects which were incorrectly classified by the functions in the Outpatient and Adult Day Treatment groups tended to be classified into the Aftercare group. Those Aftercare cases that were incorrectly classified placed equally in the Adult Day Treatment and Outpatient Groups.

The Determination of Classification Functions

The final analysis of the date from the first sample was a stepwise procedure based on the Mahalanobis distance. This stepwise analysis was conducted to determine the optimum discriminant functions for the quantified measurement procedure to clarify referral decisions. The primary focus here was the classification of subjects into their respective treatment groups based on the functions derived from the Mahalanobis stepwise Discriminant Analysis. The criteria for the Mahalanobis procedure is to maximize the distance between the two groups who are closest together on a given variable.

Table 19 presents the Pairwise F tests derived from the Mahalanobis analysis. The results shown in the table indicate that all of the Pariwise F tests were significant and that there were three distinct treatment groups.

TABLE 19

PAIRWISE F TESTS

FIRST SAMPLE, MAHALANOBIS STEPWISE

Group	1 (Outpatient)	2 (Aftercare)
2 Aftercare	6.6845	
3 Adult Day Treatment	10.913	8.5928

The Canonical Distriminant functions selected by this stepwise procedure accounted for 80.21% of the total variance of the sample. The first function attained a Canonical Correlation of 0.71 and the second 0.55. Both functions discriminated between groups at a level significantly greater than expected by chance, as evidenced by the Chi-squared statistics. These results may be seen in Table 20.

TABLE 20

CANONICAL DISCRIMINANT FUNCTIONS

FIRST SAMPLE, MAHALANOBIS STEPWISE

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMMULATIVE PERCENT	CANONICAL CORRELATION
1	0.99009	69.33	69.33	0.7053446
2	0.43801	30.67	100.00	0.5518992

AFTER FUNCTION	WILKS'S LAMBDA	CHI-SQUARED	D.F.	SIGNIFICANCE
0	0.3494345	215.02	32	
1	0.6954073	74.386	15	

The variables selected for inclusion in these Discriminant Functions, as well as those excluded from the analysis are displayed in Table 21. Contributing primarily to the first function were the following variables: Excitement, Paranoid Projection, Retardation, Care Needed, Psychotic Disorganization, Depressive Mood, Social Group Attendance, and Social Group Participation. This parallels the variables which were selected for the first function of the Wilks' stepwise analysis, with the exception that Responsibility for Money, Responsibility for Family and Associates and Perceptual Distortion which appear to contribute less to this equation.

TABLE 21

VARIABLES SELECTED BY THE MAHALANOBIS STEPWISE ANALYSIS

Variables in the Analysis After Step 20

Variable	Tolerance	F to Remove
X1 Excitement	0.4295201	6.3303
X3 Paranoid Projection	0.3829417	10.310
X5 Retardation	0.6101005	2.1949
X7 Care Needed	0.4086173	1.9002
X8 Pyschotic Disorganization	0.5258766	1.1668
X9 Grandiosity	0.4952620	6.4041
X10 Perceptual Distortion	0.4756114	24.004
X11 Depressive Mood	0.7706195	18.470
X12 Disorientation	0.8225592	1.6366
X13 Responsibility/Money	0.5678250	3.2778
X14 Personal Appearance	0.4850737	2.6434
X16 Vocational Responsibility	0.7194598	2.8518
X17 Social Group Attendance	0.4446843	2.5903
X18 Social Group Participation	0.3472753	3.4672
X19 Respons./Family & Associates	0.4600279	10.200
X20 Interpersonal Relationships	0.4203936	4.3875

Variables Not in the Analysis After Step 20

Variable	Tolerance	Min. Tolerance	F to Enter
X2 Hostile Belligerence	0.2334167	0.2334167	0.14723
X4 Anxious Depression	0.5316819	0.3428640	0.99319
X6 Seclusiveness	0.4080903	0.3335372	0.57794
X15 Personal Habits	0.4630559	0.3458533	0.81908E-01
X21 Total Score	0.0256197	0.0256197	0.83332E-02

The second function of the Mahalanobis stepwise analysis is comprised of Grandiosity, Perceptual Distortion, Disorientation, Responsibility for Money, Personal Appearance, Vocational Responsibility, Responsibility for Family and Associates, and Interpersonal Relationships. The relative contribution of each of these variables is presented in Table 22.

TABLE 22

CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS
FIRST SAMPLE MAHALANOBIS STEPWISE
STANDARDIZED CANONICAL DISTRIMINANT FUNCTION COEFFICIENTS

VARIABLE	FUNCTION 1	FUNCTION 2
X1 Excitement	0.50792	0.20048
X2 Paranoid Projection	-0.68512	-0.21364
X5 Retardation	-0.26442	-0.05564
X7 Care Needed	0.26718	-0.18833
X8 Psychotic Disorganization	0.21024	0.02990
X9 Grandiosity	0.27976	-0.52616
X10 Perceptual Distortion	-0.45521	1.00704
X11 Depressive Mood	0.64177	-0.00116
X12 Disorientation	-0.09008	0.22798
X13 Responsibility/Money	-0.10908	-0.40838
X14 Personal Appearance	0.17469	0.35642
X16 Vocational Responsibility	0.00338	0.35830
X17 Social Group Attendance	0.33802	-0.05057
X18 Social Group Participation	0.40199	-0.23983
X19 Responsibility/Family & Assoc.	0.19279	0.78037
X20 Interpersonal Relationships	0.07693	-0.56865

A Varimax Rotation of the discriminant function axes from the Mahalanobis stepwise procedure was obtained to improve the interpretability of the contributions of the variables selected. The Rotated Standardized Discriminant Function Coefficients displayed in Table 23 indicate that all of the variables in the Varimax Rotation provide essentially the same relative contribution to the functions as was obtained in the original, unrotated Mahalanobis Functions.

TABLE 23

VARIMAX ROTATION COEFFICIENTS
FIRST SAMPLE, MAHALANOBIS STEPWISE

ROTATED STANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS

VARIABLE	FUNCTION 1	FUNCTION 2
X1 Excitement	0.45635	0.29986
X3 Paranoid Projection	-0.62715	-0.34888
X5 Retardation	-0.24751	-0.10840
X7 Care Needed	0.29997	-0.12988
X8 Psychotic Disorganization	0.19972	0.07216
X9 Grandiosity	0.38119	-0.45804
X10 Perceptual Distortion	-0.65103	0.89303
X11 Depressive Mood	0.62851	0.12976
X12 Disorientation	-0.13469	0.20482
X13 Responsibility/Money	-0.02349	-0.42204
X14 Personal Appearance	0.09833	0.38456
X16 Vocational Responsibility	-0.06977	0.35146
X17 Social Group Attendance	0.34122	0.01943
X18 Social Group Participation	0.44245	-0.15280
X19 Respons./Family & Associates	0.02958	0.80328
X20 Interpersonal Relationships	0.19129	-0.54100

TABLE 24

CLASSIFICATION RESULTS TABLE

FIRST SAMPLE, MAHALANOBIS STEPWISE

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP 1	2	3
1 Outpatient	26	21 80.8%	4 15.4%	1 3.8%
2 Aftercare	86	13 15.1%	57 66.3%	16 18.6%
3 Day Treatment	103	1 1.0%	15 14.6%	87 84.5%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED 76.74%

The Classification Results Table (Table 24) obtained from this analysis shows that in total, 76.74% of the cases were correctly classified. The Mahalanobis stepwise procedure provided the highest classification rate in the Outpatient group of all the analyses, and equaled the classification rate recorded for Adult Day Treatment in the direct analysis. The Aftercare group was not classified as accurately with the Mahalanobis procedure as it had been with direct entry (66.3% versus 68.6%), but it did attain higher accuracy than with the Wilks' criterion (64%). Cohen's Kappa for these classification results was 0.66.

The SPSS sub-program, NEW REGRESSION was used to explore the structure of the data set from the discriminating variables suggested by the Mahalanobis procedure to ascertain if any of the assumptions were violated. Figure I shows that the Histogram for the standardized residuals from this equation essentially follow a normal curve.

Additionally, Figure II illustrates that the normal probability plot of Studentized residuals shows no dramatic departure from linearity. A total of ten standardized residuals that were classified as outliers were identified from the total sample of 215 cases. The Durbin-Watson Test for this sample was 0.90819.

FIGURE 1

HISTOGRAM - STANDARDIZED RESIDUALS

0	0.24	out
0	0.12	3.00
0	0.17	2.87
0	0.25	2.75
0	0.34	2.62
0	0.47	2.50
0	0.64	2.37 .
0	0.86	2.25 .
1	1.12	2.12 :
0	1.45	2.00 .
3	1.85	1.87 *:*
1	2.32	1.75 *.
4	2.87	1.62 **:*
4	3.48	1.50 **:*
3	4.17	1.37 ***.
6	4.91	1.25 ****:*
8	5.70	1.12 *****:**
5	6.50	1.00 *****.
7	7.31	0.87 ******:
11	8.09	0.75 *******:***
11	8.82	0.62 ********:**
12	9.46	0.50 ********:**
11	9.99	0.37 *********:*
10	10.39	0.25 *********:
8	10.63	0.12 ******** .
12	10.71	0.00 **********:*
12	10.63	-0.12 **********:*
9	10.39	-0.25 *********.
11	9.99	-0.37 *********:*
7	9.46	-0.50 ******* .
7	8.82	-0.62 ******* .
5	8.09	-0.75 ***** .
9	7.31	-0.87 ******:**
6	6.50	-1.00 ******.
7	5.70	-1.12 *****:*
6	4.91	-1.25 ****:*
3	4.17	-1.37 ***.
1	3.48	-1.50 * .
3	2.87	-1.62 **:
2	2.32	-1.75 *:
3	1.85	-1.87 *:*
2	1.45	-2.00 :*
3	1.12	-2.12 :**
1	0.86	-2.25 :
0	0.64	-2.37 .
0	0.47	-2.50
0	0.34	-2.62
0	0.25	-2.75
1	0.17	-2.87 *
0	0.12	-3.00
0	0.24	out

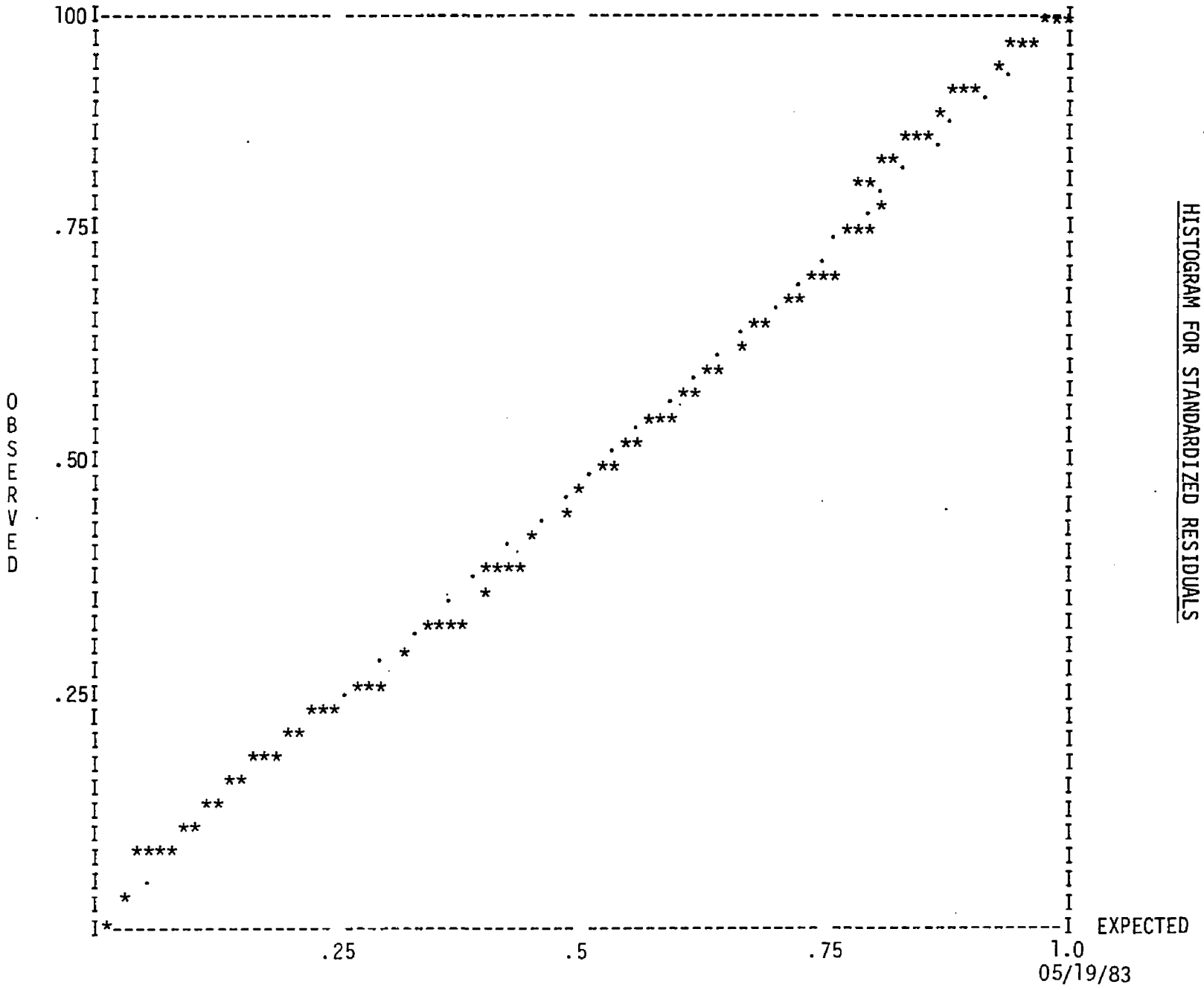

FIGURE 2
HISTOGRAM FOR STANDARDIZED RESIDUALS

Results of the Cross-Validation Sample

A second sample consisting of 202 different cases was drawn to cross-validate that the measurement procedure established as part of the first phase was consistent and therefore had potential as a method for quantifying clinical decisions with regards to predicting treatment placements. The group means and group standard deviations obtained from this sample are presented in Tables 25 and 26 respectively. The means tended to follow the same pattern as those of the first sample increasing in magnitude from being lowest in the Outpatient group to highest in the Adult Day Treatment group, with the Aftercare means falling in the middle. Exceptions to this tendency were the variables of Grandiosity, Perceptual Distortion, and Disorientation, where the Aftercare group scored higher than the Adult Day Treatment group. Both the means for Grandiosity and Perceptual Distortion are considerably higher for Aftercare subjects as opposed to those sampled from Adult Day Treatment.

The group standard deviations (Table 26) indicate, as they did in the first sample, that there was some overalp in the range of scores with ± 1 standard deviation of the respective group means on a given variable. Overlap is noted between Aftercare and Adult Day Treatment on the variables of Retardation, Care Needed and Vocational Responsibility. Also observable in the sample is the lack of variance in the Outpatient group on the variable Disorientation.

TABLE 25

GROUP MEANS SECOND SAMPLE

GROUP	EXCITEMENT	PARANOID PROJECTION	RETARDATION	CARE NEEDED
1 Outpatient	46.44000	43.48000	45.00000	44.84000
2 Aftercare	56.18056	53.58333	50.84722	50.81944
3 ADT	58.79048	54.57143	50.91429	56.22857
TOTAL	56.33168	52.84653	50.15842	52.89109

GROUP	PSYCHOTIC DISORGANIZ.	GRANDIOSITY	PERCEPTUAL DISTORTION	DEPRESSIVE MOOD
1 Outpatient	44.28000	47.64000	48.32000	45.12000
2 Aftercare	54.15278	63.02778	69.77778	53.12500
3 ADT	59.64762	59.42857	59.95238	58.88571
TOTAL	55.78713	59.25248	62.01485	52.37690

GROUP	DISORIENT.	RESPONSIB. MONEY	PERSONAL APPEARANCE	VOCATIONAL RESPONSIBILITY
1 Outpatient	40.00000	1.68000	1.52000	2.56000
2 Aftercare	45.79167	2.94444	2.77778	3.81944
3 ADT	45.23810	3.35238	3.24762	4.06667
TOTAL	44.78713	3.00000	2.86634	3.79208

GROUP	SOC. GRP. ATTENDANCE	SOC. GRP. PARTICIP.	RESPONSIB. FAM./ASSOC.	INTERPERSONAL RELATIONSHIPS
1 Outpatient	2.24000	2.44000	2.12000	2.40000
2 Aftercare	3.27778	3.30556	3.48611	3.37500
3 ADT	3.69524	3.89524	3.83810	4.01905
TOTAL	3.36634	3.50495	3.50000	3.26468

TABLE 26

GROUP STANDARD DEVIATIONS SECOND SAMPLE

GROUP	EXCITEMENT	PARANOID PROJECTION	RETARDATION	CARE NEEDED
1 Outpatient	5.50818	4.49184	6.60177	5.18556
2 Aftercare	12.74598	12.45244	9.35024	9.99201
3 ADT	11.53731	8.94842	9.60880	8.71588
TOTAL	12.05063	10.54869	9.36144	9.66412

GROUP	PSYCHOTIC DISORGANIZ.	GRANDIOSITY	PERCEPTUAL DISTORTION	DEPRESSIVE MOOD
1 Outpatient	6.69278	4.22177	4.89660	6.71714
2 Aftercare	13.17345	18.90821	18.70017	7.28869
3 ADT	12.03998	16.46491	15.90016	7.67370
TOTAL	12.91762	17.04634	17.44515	7.23719

GROUP	DISORIENTAT.	RESPONSIBIL. MONEY	PERSONAL APPEARANCE	VOCATIONAL RESPONSIBILITY
1 Outpatient	0.0	0.85245	0.82260	1.19304
2 Aftercare	17.24793	1.12449	1.02397	1.10475
3 ADT	14.52751	0.80838	0.85238	0.69706
TOTAL	14.75131	1.07435	1.06363	1.03968

GROUP	SOC. GRP. ATTENDANCE	SOC. GRP. PARTICIPATION	RESPONSIB. FAM/ASSOC.	INTERPERSONAL RELATIONSHIPS
1 Ouptatient	0.96954	0.91652	0.78102	1.54919
2 Aftercare	0.93782	0.94405	0.97855	1.83711
3 ADT	0.85624	0.81952	0.73542	2.00476
TOTAL	1.00963	0.99874	0.99376	1.78702

The Wilks' Lambda (U Statistic) and Univariate F-Ratios are presented in Table 27. The F-Ratios in the table indicate that a majority of the means for the variables in this sample were not equal to each other. An exception is Disorientation, which had an F-Ratio that was not significant.

TABLE 27

SECOND SAMPLE

WILKS' LAMBDA (U-STATISTIC) AND UNIVARIATE F-RATIO WITH 2 AND 199 DEGREES OF FREEDOM

VARIABLE	WILKS' LAMBDA	F	SIGNIFICANCE
X1 Excitement	0.89439	11.75	
X2 Paranoid Projection	0.88622	12.77	
X3 Retardation	0.95689	4.483	0.0125
X4 Care Needed	0.83457	19.72	
X5 Psychotic Disorganiz.	0.84891	17.71	
X6 Grandiosity	0.92465	8.108	0.0004
X7 Perc. Distortion	0.84512	18.24	
X8 Depressive Mood	0.85549	16.81	
X9 Disorientation	0.98475	1.541	0.2168
X10 Resp./Money	0.75508	32.27	
X11 Personal Appearance	0.73110	36.60	
X12 Vocational Resp.	0.78864	26.27	
X13 Soc. Grp. Attend.	0.78701	26.93	
X14 Soc. Grp. Particip.	0.76453	30.64	
X15 Resp./Family, Assoc.	0.69962	42.72	
X16 Interper. Relation.	0.73625	35.64	

Table 28 displays the Canonical Discriminant Functions derived from this discriminant analysis. The first function had a canonical correlation coefficient of 0.73, meaning that it accounted for 52.9% of the total variance in the sample. The second function's canonical correlation was 0.55 (30.24% of the variance). These two functions in combination accounted for 83.14% of the total variance in the sample.

TABLE 28
CANONICAL DISCRIMINANT FUNCTIONS
SECOND SAMPLE

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMMULATIVE PERCENT	CANONICAL CORRELATION
1	1.12295	72.15	7.215	0.7272952
2	0.43339	27.85	100.00	0.5498666

AFTER FUNCTION	WILKS' LAMBDA	CHI-SQUARED	D.F.	SIGNIFICANCE
0	0.3286207	213.11	32	
1	0.6976467	68.849	15	

Those variables contributing most heavily to the first function included Excitement, Paranoid Projection, Depressive Mood, Responsibility for Money, and Social Group Attendance. Contributing predominately to the second function were Retardation, Care Needed, Psychotic Disorganization, Grandiosity, Perceptual Distortion, Disorientation, Personal Appearance, Vocational Responsibility, Social Group Participation, Responsibility for Family and Associates, and Interpersonal Relationships. The contributions of each of these variables to the functions can be reviewed in Table 29.

TABLE 29

SECOND SAMPLE
DISCRIMINANT FUNCTION COEFFICIENTS

	Function 1	Function 2
X1 Excitement	0.28990	0.00444
X2 Paranoid Projection	-0.27144	0.11888
X3 Retardation	-0.21360	0.28695
X4 Care Needed	0.24941	-0.48446
X5 Psychotic Disorganization	0.06722	-0.19999
X6 Grandiosity	0.17773	-0.22363
X7 Perceptual Distortion	-0.66039	0.89525
X8 Depressive Mood	0.64231	0.01114
X9 Disorientation	-0.02215	0.20372
X10 Responsibility/Money	0.12991	0.07926
X11 Personal Appearance	0.14786	0.28018
X12 Vocational Responsibility	0.19994	0.30129
X13 Soc. Group Attendance	0.03438	0.22392
X14 Social Group Participation	0.30666	-0.44376
X15 Respons./Family & Associates	0.26346	0.61446
X16 Interpersonal Relationships	0.17822	-0.63761

The two discriminant functions derived from this analysis were able to correctly classify 81.19% of the cases in the sample. The Classification Results are presented in Table 30. The Outpatient group had the highest percentage of correct classifications, followed in order by Adult Day Treatment and Aftercare. The trend in these classifications, as noted in the previous analysis, was for these cases incorrectly classified from the Outpatient and Adult Day Treatment groups to be placed in Aftercare by the functions. Similarly, the incorrect classifications in the Aftercare group tended to be placed in Adult Day Treatment.

TABLE 30

CLASSIFICATION RESULTS TABLE

		SECOND SAMPLE		
ACTUAL GROUP	CASES	1	2	3
1 Outpatient	25	23	1	1
		92.0%	4.0%	4.0%
2 Aftercare	72	7	56	9
		9.7%	77.8%	12.5%
3 Adult Day Treatment	105	5	15	85
		14.8%	14.3%	81.0%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED 81.19%

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CHAPTER V

CONCLUSIONS

The final chapter of this dissertation presents the conclusions drawn from the data collected and analyzed as part of the research. First, a summary of the results of the study will be presented, followed by a discussion of the unexpected results. Then, the theoretical implications and practical applications of the research findings will be reviewed. Finally, suggestions for further research will be proposed.

Summary of Results

The goal of this research was to explore the feasibility of constructing a quantitative measurement procedure to assist in referring adult schizophrenic mental health clients to community treatment programs. Could a combination of brief scales which assessed outward behavior, symptomatology, and social abilities be used, in the framework of discriminant analysis, to classify adult schizophrenics into Day Treatment, Outpatient, or Aftercare services?

A number of subquestions and intermediate results need to be addressed in order to draw final conclusions regarding this research. Prior to the development of a quantitative measurement procedure to assist in referring adult schizophrenics to community treatment programs, it was necessary to determine that three distinct treatment populations actually existed, and that the variables proposed to discriminate between the groups did indeed have predictive power. Towards this

end, a discriminant analysis utilizing the direct entry of all the proposed variables, and a second discriminant analysis using the Wilks' stepwise criteria was conducted on data gathered on subjects in the first sample.

The initial discriminant analysis, in which all the variables were directly entered into the equation, yielded a correct classification rate of 77.21%. This indicated that the variables selected for review in the study did have power to discriminate between treatment groups. The Cohen's Kappa of 0.66 attained for this classification rate demonstrates that these predictions were most likely not attained by chance alone and therefore could be considered as significant.

The Wilks' stepwise analysis was conducted both to determine that three distinct treatment groups existed among schizophrenics being treated in community-based programs in this study and to ascertain the differences between treatment groups. Based on the Pairwise F-Ratios for this analysis that were presented in Table 15 of the Results Chapter, it appears that there were three distinct groups of schizophrenic subjects being served respectively by the three treatment modalities studied. Further, the review of the group means for this sample displayed in Table 9 showed, for the most part, that mean scores for each of the three groups tended to follow a pattern of being lowest for the Outpatient group, with higher means following for the Aftercare and Adult Day Treatment groups. Since both scales used in the study (the Psychotic Inpatient Profile and the Social Adequacy Rating Scale) were constructed so that lower scores were indicative of less active symptomatology and great social adequacy, it is concluded that for this

sample the least disordered individuals were seen in the Outpatient modality, those persons served by Aftercare fell between the extremes, and that the most disordered persons are seen in Day Treatment.

Based on outward symptomatology, the major distinguishing feature of the Outpatient group was that they did not display any signs of disorientation, meaning that they were oriented to time, place and person. Statistically, there was no significant difference between the three treatment groups on the variable of disorientation. This is evidenced by the Univariate F-Ratios for this variable in Tables 11 and 27. However, when the mean scores for each individual group are reviewed, it is striking that in both samples the Outpatient Groups manifested little disorientation, while there is evidence of this symptom in some subjects in both the Aftercare and Day Treatment groups. Taken singularly, this variable appeared to contribute little to the discriminating power between groups; yet when combined with other factors in the stepwise analysis, it was included as a discriminant variable. The observation that Outpatient subjects are well oriented, while Aftercare and/or Day Treatment subjects may be disoriented, can be a mitigating factor in clinical decision making.

The Outpatient group also exhibited considerably lower scores on the variables of Excitement, Hostile Belligerence, Psychotic Disorganization, Grandiosity, Perceptual Distortion, and Depressive Mood. It appears with regard to active psychiatric symptoms, the Outpatient group manifested less severity than the other treatment groups. Those subjects in the Outpatient group also displayed more responsibility for Personal Appearance and Vocational matters than subjects in Aftercare or Day Treatment, as well as requiring less care from others to maintain

their personal needs. The Outpatient group seemed better able to provide for themselves in the community.

The Aftercare group was typified as displaying more Grandiosity and Perceptual Distortion than subjects in either Outpatient or Day Treatment. The Total Score for this group on the Social Adequacy Rating Scale indicates that while Aftercare subjects were actively symptomatic, they still exhibited better social skills in performing day-to-day activities in the community than their Day Treatment counterparts. They also scored lower on Care Needed, meaning they were able to provide for their own basic needs and displayed better abilities in personal care.

The Day Treatment subjects, with the exception of Grandiosity and Perceptual Distortion mentioned above, appeared to be the most severely disordered group of this sample based on both symptomatology and social adequacy. As such, this group seemed to require more care from others to maintain both their basic and personal needs. The Day Treatment group scored higher on Excitement, Hostile Belligerence, and Paranoid Projection than the other groups, indicating that this group had more "acting out" types of behavior.

Once it was determined that three distinct treatment groups existed and that the variables proposed for use in the study did have predictive power with regard to treatment modality, the analysis of the data proceeded towards answering the question of whether or not a quantitative measurement procedure to aid in referral decisions for adult schizophrenics could be derived. Further, a reduction of the number of variables was sought to make the measurement procedure less lengthy and cumbersome to use. Another stepwise discriminant analysis

of the data, based on the Mahalanobis criterion, was conducted for this purpose.

The Mahalanobis procedure selected sixteen out of the original twenty-one variables as making significant contributions to the two discriminant functions derived from the stepwise analysis. A review of the pooled within-groups correlation matrix for the five variables which were eliminated indicates that each had high correlations with other variables which were already included in the discriminant functions. These variables dropped included Hostile Belligerence (which correlated with Paranoid Projection at 0.79143), Anxious Depression (which had a 0.45541 correlation with Depressive Mood), Seclusiveness (correlated at 0.60872 with Social Group Participation) and Personal Habits (which correlated at 0.66395 with Personal Appearance). A discriminant function differentiates between groups more accurately when the variables contained in the function are distinct from each other and have low inter-correlations. It appears that the Mahalanobis stepwise procedure was able to decrease the redundancy of the variables in the discriminant functions.

While the redundancy of the variables was reduced, the predictive power of the analysis was still maintained. The Mahalanobis stepwise analysis was able to correctly classify 76.74% of the cases, and attained a Cohen's Kappa of 0.66. Functions derived from this analysis accounted for 80.12% of the total variance of the sample and were statistically significant. All of these factors contribute to the classification scheme of the Mahalanobis analysis as being a powerful, accurate, and potentially useful statistical technique in assisting with referral decisions.

Discriminant functions can sometimes be interpreted in the manner that factors are in factor analysis (Klecka in Nie, et al, 1975, p.443). The first function of the Mahalanobis stepwise analysis was comprised of Excitement, Paranoid Projection, Retardation, Care Needed, Psychotic Disorganization, Depressive Mood, Social Group Attendance, and Social Group Participation. The variables making the strongest contributions to this function were Excitement, Paranoid Projection, Depressive Mood, and Social Group Participation. Each of these variables is based on a behavior or action which can be observed, and seems to be related to dealing with others on an outward, superficial level. The second function was composed of Grandiosity, Perceptual Distortion, Disorientation, Responsibility for Money, Responsibility for Family and Associates, and Interpersonal Relationships. A number of these variables (Grandiosity, Perceptual Distortion, and Disorientation) are rated on the Psychotic Inpatient Profile on the basis of self-reports, while the other variables are based on ratings on the subjects' facility of dealing with other people. The variables which had the greatest contributions to the second function included Grandiosity, Perceptual Distortion, Responsibility for Family and Associates and Interpersonal Relationships. Given the variables making up each function and their relative contributions, it is proposed that the first function explains variability in the sample clustering around outward, observable behaviors, while the second function covers the area of internal or cognitive processes, and using these abilities to relate to others in an interactive manner.

The Varimax rotation of these functions highlighted the centering of one function around variables dealing with outward behaviors, while

the second function focused on internally controlled behaviors. Variables selected in the Varimax rotation for the first function included Excitement, Paranoid Projection, Retardation, Care Needed, Psychotic Disorganization, Depressive Mood, Social Group Attendance, and Social Group Participation. Excitement, Paranoid Projection and Depressive Mood had the largest weights. The Varimax rotation for the second function included Grandiosity, Perceptual Distortion, Disorientation, Responsibility for the Use of Money, Personal Appearance, Vocational Responsibility, Responsibility for Family and Associates, and Interpersonal Relationships. Making the largest contributions to the second function were Perceptual Distortion, Responsibility for Family and Associates, and Interpersonal Relationships. Given the composition of these discriminant functions, it could be concluded that both a subject's ability to maintain appropriate outward behavior and to contribute to more demanding interactions with others are important in classifying subjects into treatment modalities.

Once it was established that the quantified measurement procedure suggested by the Mahalanobis stepwise procedure had potential power and accuracy for predicting the placement of schizophrenic subjects, it was necessary to assure that none of the assumptions underlying multiple regression or discriminant analysis had been violated. The sample in question had been drawn at random. Figure 1 illustrates that the standardized residuals essentially follow a normal distribution, and Figure 2 shows that the regression of Y's and X's is predominantly linear. The Durbin-Watson statistic of 0.90819 may be interpreted, as Neter and Wasserman (1974, p.141) suggest, to mean that the residuals in this

sample have low intercorrelations. Thus, they can be considered random and statistically independent. It can be concluded from these results that the data set and analysis in question essentially fulfill the assumptions necessary for multiple regression and discriminant analysis. Consequently, these techniques were considered appropriate for the construction of the quantified measurement procedure established in this study.

The final step in the study was to cross-validate the quantified meansurement procedure to ensure that the proposed process could consistently discriminate between adult schizophrenics in the three treatment modalities. The means and standard deviations for this sample, presented in Tables 25 and 26 respectively, tended to have the same patterning as the first sample. That is, the Outpatient group had the lowest scores, the Day Treatment the highest, and the Aftercare scores fell in between the two groups. Exceptions to this pattern were Grandiosity, Perceptual Distortion, and Disorientation, where the Aftercare group attained higher mean scores than either the Day Treatment or Outpatient groups. This type of patterning was consistent between both samples and is indicative of the stability of the characteristics typifying these groups.

The previously noted characteristics that were unique to each treatment group in the first analysis were also present in this sample. The outwardly, though not statistically, distinguishing feature of the Outpatient group was that all subjects were oriented to time, place and person. Day Treatment subjects tended to exhibit the highest mean scores in severity of symptomatology and demonstrated the least social adequacy. The Aftercare group again was typified as having higher mean

scores on Grandiosity, Perceptual Distortion, and Disorientation, indicating that active psychiatric symptomatology was present in this group. Aftercare, however, exhibited lower scores on the Social Adequacy Rating Scale, which would seem to indicate that they had more facility in the activities of daily living than did subjects in the Day Treatment group. Overall, the patterning of the group means and the characteristics which distinguished each treatment group seemed stable between the original and cross-validation sample. This can be taken to mean that the first and second sample were essentially equal with regard to manifested behaviors, symptomatology, and social adequacy. Additionally, the stability of the measures of client characteristics would appear to demonstrate the efficacy of utilizing this measurement procedure as part of the treatment referral decision-making process.

There was agreement between those variables selected for the discriminant functions in the first Mahalanobis stepwise analysis, which was used as a basis for the proposed quantified measurement procedure, and those variables having power in the functions derived in the cross-validation discriminant analysis. Figure III illustrates this congruence. As can be seen in the figure, four variables were contained in both first functions derived for each sample: Excitement, Paranoid Projection, Depressive Mood, and Social Group Attendance. Also, the three variables contributing most to the first function were the same for both samples (Excitement, Paranoid Projection, and Depressive Mood). A similar finding is demonstrated for the second function derived in both samples, where a number of variables were consistent.

FIGURE 3

COMPARISON OF CONTRIBUTING VARIABLES
DISCRIMINANT FUNCTIONS OF SAMPLE ONE VERSUS SAMPLE TWO

SAMPLE 1	SAMPLE 2
Function 1	**Function 1**
Excitement !	Excitement !
Paranoid Projection !	Paranoid Projection !
Retardation	Depressive Mood !
Care Needed	Responsibility/Money !*
Psychotic Disorganization	Social Group Attendance
Depressive Mood !	
Social Group Attendance	
Social Group Participation	
Function 2	**Function 2**
Grandiosity !	Retardation *
Perceptual Distortion !	Care Needed !*
Disorientation	Grandiosity
Responsibility/Money	Perceptual Distortion !
Personal Appearance	Personal Appearance
Vocational Responsibility	Vocational Responsibility
Responsibility/Family, Assoc. !	Social Group Participation *
Interpersonal Relationships !	Responsibility/Family, Assoc. !
	Interpersonal Relationships !
	Disorientation
	Psychotic Disorganization *

! Indicates which variables contributed the most to the function

* Indicates which variables crossed over to the other function in the second sample

While the second function of the second sample had more variables "crossover" from the first function of the first sample, the three variables which contributed the most to the second functions of each sample remained constant. Perceptual Distortion, Responsibility for Family and Associates, and Interpersonal Relationships were strong contributors in both samples. However, Care Needed, a crossover from the first function of the first sample had the largest canonical coefficient for the second function of the second group. Canonical discriminant function coefficients can and do change from sample to sample. The placement of the variables in the respective functions and the pattern of their relative contributions in these discriminant functions would appear to mean that those symptoms, behaviors, and skills which differentiated between the treatment groups in this study were both stable and constant for both samples and therefore could be used as a basis for future classifications.

The discriminant analysis conducted on the second sample for cross-validation purposes was able to classify 81.19% of the "grouped" cases correctly. This yielded a Cohen's Kappa of 0.72, indicating that the analysis discriminated between groups at a level considerably better than expected by chance alone. The classification rate and the Kappa statistic are evidence of the power of this quantified measurement procedure to consistently assign cases to their appropriate treatment groups.

A feature of the data sets from both samples, and in all analyses was the similarity of the mean scores between the Aftercare and Day Treatment groups, and the patterning of "missed" classifications between these two groups. Across all analyses (the first direct discriminant

analysis, Mahalanobis stepwise, and the last direct discriminant analysis), a majority of the cases incorrectly classified from the Aftercare group were placed in the Day Treatment group, and vice-versa. The major distinguishing factors between these two groups seemed to be the outward symptomatology or behaviors the subjects were exhibiting and their respective abilities to control internal processes and interact with others in an effective fashion. The social adequacy of the subjects in the Aftercare and Day Treatment groups was a mitigating factor to predict to which group they should be assigned for treatment.

The results summarized and discussed above illustrate that discriminant analysis appears to be a feasible tool for constructing a quantitative measurement procedure to assist in referring adult schizophrenics to community treatment programs. The various analyses conducted consistently showed that a combination of shortened scales which assess outward behavior and symptomatology and social abilities can be used in the framework of discriminant analysis to classify cases into either Day Treatment, Outpatient, or Aftercare services.

Three distinct groups existed for the sample of subjects in this study. There was an Outpatient group which manifested less severe symptoms and behaviors. The Aftercare group displayed moderate outward acting out and severe internally directed psychiatric symptomatology. Yet, they appeared able to control these behaviors and maintain their personal needs in at least a minimally adequate fashion. Finally, there was the Adult Day Treatment group. While subjects in the Aftercare group tended to exhibit more grandiosity and perceptual distortion than those in the Day Treatment group, the Day Treatment

group, overall, manifested the most severe symptoms and behavioral disorders. Further, this group appeared least equipped to care for its basic and personal needs, and therefore required intensive, supportive treatment.

The Mahalanobis stepwise analysis conducted on the first sample suggested that sixteen variables could be used to obtain an optimum classification of cases into treatment modalities. A second sample was analyzed based on these sixteen variables and the results of the discriminant analysis conducted on that data confirmed that these variables could be used in a quantified measurement process to classify schizophrenics to one of the three available treatment modalities. The relative placement of variables and their contributions to the discriminant functions was congruent between both samples, and suggests that the discriminating variables were consistent and stable in their ability to differentiate between treatment modalities.

Unexpected Results

The description of the treatment modalities outlined a continuum that extended from the most intensive programs (Day Treatment) through Outpatient services to the least intensive modality, Aftercare services. This continuum was based on the programmatic descriptions of the Michigan Department of Mental Health and the frequency and types of treatments and interventions offered in each modality. It was predicted that there would be congruence between the severity of subjects' symptomatology, behaviors, lack of social adequacy, and the level or intensity of the treatment modality in which they were placed.

The hypothesized linear relationship between the level of severity of symptoms and behaviors and level of treatment generally held true. However, an unanticipated difference emerged between the Aftercare and Day Treatment groups on certain variables in both samples reviewed. The mean scores for the Aftercare group on Grandiosity, Perceptual Distortion and Disorientation were elevated over those of the Day Treatment group. It could be concluded that in psychiatric symptomatology, the Aftercare group exhibited more dysfunctional behaviors on these variables than the Day Treatment group. It would appear that the Day Treatment group had more "acting out" types of symptoms, while the Aftercare group presented more "crazy" or thought disordered symptoms. However, the Aftercare group exhibited lower scores on social adequacy measures, indicating that they were better able to handle day-to-day responsibilities in the community.

There are several possible explanations as to why this phenomenon occurred. First, from a purely demographic viewpoint, those subjects in the Aftercare group tended to be older. While the length of time they had been involved with Aftercare services did not differ appreciably from the duration of treatment for subjects in the Day Treatment group, the Aftercare group appears to have a longer overall involvement with the mental health system. Thus, they have a longer duration of mental health problems and more psychiatric hospitalizations, which might lead to a conclusion that they had more severe difficulties.

Second, examination of the overall referral pattern between the treatment modalities indicates that Aftercare may be utilized in this system as a supportive care program. It appears that those subjects who get "better" in the Day Treatment group are referred to vocational

training programs, while those in Outpatient settings graduate back to their families and jobs. The subjects in either of these modalities who were no longer progressing in treatment, and yet still required some type of therapeutic/supportive contact were referred to Aftercare. Thus, the Aftercare subject could be viewed as operating on a level of social adequacy which no longer justified intensive treatment, and yet exhibited symptomatology which was clinically indicative of need for treatment. It appears for this particular system that Aftercare filled the need for supportive services.

Theoretical Implications

Discriminant analysis has become widely utilized over the last few years both as a tool for research exploration and in practical applications as a classification device to aid in decision making. Despite the increased use of the technique, the application of discriminant analysis to the process of making referrals in mental health treatment has been limited. The results of this study would appear to indicate that discriminant analysis is a viable tool for clarifying and objectifying referral decisions.

As multivariate statistical methods have increased in the number and scope of applications, concern has been raised that the predictive models suggested by discriminant analyses actually reflect the variables which have meaning and pragmatic utility in the question at hand. A means of addressing this concern is to utilize an interactive approach between clinicians and statisticians. The clinician's input can provide information regarding the relevance of the variables chosen for

inclusion as predictors. The statistician can ensure the systematic and structured application of multivariate methodology to the data set and assist in drawing objective conclusions.

The results of this dissertation lend support to the idea that an interactive approach between clinician and statistician is needed in research. The approach taken by the study was to select variables for inclusion in the research which had been identified in the literature and by clinicians as being the most pertinent and germaine to the treatment of schizophrenics in a community setting. Moving from this initial clinical approach, data was then gathered and analyzed statistically which confirmed the suspicions and hypotheses of the clinicians as to what differentiated between treatment groups. The present study demonstrates that this approach to decision making research is tenable and can be used in a constructive fashion.

The collaboration of the clinician and statistician in both research and treatment is necessary. It has sometimes appeared that clinical decision making and statistical/actuarial decision making have been viewed as mutually exclusive propositions. One side would argue that clinical decision making was an art, based on the experience and insight of the clinician. The key here was the idea that clinical decision making could use information in a contextual manner, and was not limited to the additive, linear models of the statistician. However, the linear models were replicable. Thus, there was clinical decision making which was flexible, but not always objective, and statistical decision making which was objective, but not always flexible.

This research would seem to indicate that a blending of these approaches, particularly in the application of discriminant analysis to referral decisions is preferable. The quantified measurement procedure that was developed in this dissertation can be viewed, based on the results of the cross-validation study, as being stable and accurate. The procedure itself is based on a linear regression technique, and the data collected essentially follow a linear model. The interpretation of the procedure, however, is not necessarily overtly linear in fashion, but rather suggests a more configural pattern. For example, based on the procedure, if a client were actively symptomatic but demonstrated no acting-out behaviors and seemed minimally socially adequate, he/she might be placed either in Aftercare or Day Treatment. Chances are if they were exhibiting Grandiosity or Perceptual Distortion, but seemed able to fend for themselves, the procedures would predict Aftercare placement. However, if they were socially inadequate, the prediction would be for Day Treatment. Let us suppose further than when presented with the proposition of attending a Day Treatment program, the client in question balks at getting into treatment, even though the measurement process indicates that he/she should. At this point the linear, discriminant model offers no other alternatives because it operates on probabilities that either a subject belongs in one group, or does not. This is where the configural model of clinical judgment becomes applicable. Since a certain closeness of fit has been established in the quantified procedure that the subject could go either to Aftercare or Day Treatment, it might be reasonable to assign him to Aftercare. Of course, the assignment to Aftercare would have to be "clinically" appropriate decision based on the congruence of the treatment with the

perception of the client's needs.

The application of multivariate techniques to referral decision making should most likely embrace these two approaches. It should utilize statistical/actuarial methods to set parameters for decisions, and then introduce configural approaches to aid in the interpretation of these parameters. While the statistician looks at aggregated data, the clinician is interested in individual data points. Therefore, if research is to have meaning both as a description of the reality of phenomena and in the pragmatic application of knowledge, it must present information which is pertinent to global and specific concerns.

The study provides information regarding the characteristics of schizophrenics who are involved in community treatment in addition to its commentary on the viability of discriminant analysis as an aid in referral decision making. The mental health system studied in the dissertation offered three distinct modalities of treatment to schizophrenic clients. The results of the research indicate that three distinct groups of clients are treated in three respective modalities. These range from the Out-patient group who exhibit some active symptomatology, but have adequate social skill, to the Aftercare group who are actively symptomatic but socially adequate, to the extreme of the Day Treatment group who are actively symptomatic and socially inadequate. Schizophrenics in community treatment programs appear to exhibit a continuum of symptomatology which ranges from little evidence of disorder and socially adequate to being quite disordered and unable to fend for oneself.

The psychiatric symptomatology and the social adequacy of clients were discriminating factors regarding the classification of the groups.

It would appear that in making referral decisions, it is important to consider both factors. Therefore, referral decision making procedures regarding schizophrenics should not be based on either diagnosis, symptomatology, nor social adequacy along, but rather on a combination of outward behavior, internal processes, and interactive abilities.

Social adequacy appeared to be a mediating factor for the quantified classification process developed in this research. Evidence of this phenomena is provided by the differentiation of the Aftercare and Day Treatment groups. Both groups appeared psychiatrically symptomatic. While the Aftercare group seemed to manifest more evidence of disorders of thinking and perception, and the Day Treatment group exhibited more acting out types of behavior, the difference between the groups appeared to be their abilities to deal with the activities of daily living. Symptomatology and social adequacy appear to be separate entities and should most likely be measured independently of each other. However, the results of assessing both factors should be weighed in developing a profile of the needs, strengths, and abilities of schizophrenics. There are not just schizophrenics in community treatment, but different and varying levels of schizophrenics with regard to symptomatology, behaviors, and social skills.

This dissertation demonstrates that there are distinct treatment groups of schizophrenics and that the collaborative efforts of statisticians and clinicians can further define the characteristics and needs of adult schizophrenics. This is the point for the fusion of the efforts of the statistician and the clinician, to continue to improve the quality and quantity of knowledge about schizophrenia. Research consistently shows the

that schizophrenia is a multi-faceted, multi-dimensional disorder requiring the review and weighting of numerous variables. Through the identification of variables of meaning and interest to clinicans by clinicians and the exploration and confirmation of their contributions by statisticians, a theory of the etiology and remediation of schizophrenia can emerge. This study indicates that this type of collaborative effort utilizing multivariate statistical techniques can prove productive.

Practical Applications

The results of this dissertation research indicate that discriminant analysis can be used as a tool to assist in treatment referral decisions for adult schizophrenics. Discriminant analyses were performed on two different samples, and in each analysis, a combination of sixteen treatment variables consistently predicted to which treatment group a subject belonged. The quantitative measurement procedure suggested by this research gives the mental health worker a tool to use in making treatment referral decisions which will predict the appropriate placement for a subject approximately eight out of ten times. This prediction requires a time investment on the part of the worker of about twenty minutes to complete and score the scales and determine the subject's discriminant scores. An example of how this quantitative measurement procedure might be used is presented in Appendix D.

The quantified measurement procedure could also be used in training professional and paraprofessionals to make referrals. The procedure provides trainees with a specific, objective and quantified process for

observing and recording behaviors and skills. It also delineates decisions which can be drawn from those observations and ratings, thus giving trainees an aid in referral decisions.

As the clients progress in treatment at the program they were referred to in the mental health system, they could be evaluated by the same procedure outlined in Appendix D to ascertain if they were still appropriate for treatment in the modality where they were referred for services. The process would be the same as that used for initial referrals, with the mental health worker observing the client, completing the scales, determining the discriminant scores, and then consulting the cut-off tables for each group. A change of modality might be considered if the discriminant scores indicated that the clients' current behaviors, symptomatology, and social skills were more like those persons being treated in another group. The worker might also wish to compare the client's present scores with his/her original scores to determine if there had been any improvements or deteriorations. This information could be used for future treatment planning.

Over time, this quantified measurement process should most likely be resampled for all groups to assure that the norms used are accurate descriptions of the behaviors, symptoms, and social skills typifying each modality at that point in time. This re-norming process would not only serve to improve the accuracy and validity of the procedure, but could also be used to measure the progress of the group of clients who were present in both pre-and post-norming samples. The clients' progress, or lack of it, might be used in the evaluation of programs as an impact measure.

Finally, other mental health systems may want to establish their own quantified measurement procedure to aid in referral decisions. These mental health systems could use the procedure outlined in this dissertation to establish quantified referral criteria for their various treatment modalities. The derivation of the discriminant functions and the determination of which variables discriminated between groups would provide the mental health system with a clearer definition of their respective treatment modalities. As outlined above, the quantified measurement procedure could be used to evaluate the progress of individual clients, the evaluation of impact of treatment programs, and as an aid in making placement decisions.

Suggestions for Further Research

Further research and verification of the proposed quantitative method presented in this study could begin with actually using the proposed quantified measurement procedure to place persons in treatment modalities. After the clients had been placed for approximately sixty to ninety days, a check could be made on the accuracy of the procedure. Were clients appropriately placed in treatment by the procedure in the estimation of the raters of the program receiving the referral? What was the actual correct classification rate? How did this compare with the expected rate from the discriminant analysis?

Another area of research would be the cross-validation of this process in another community mental health system to determine the universal predicting power of the method. The same scales and variables could be used with a different schizophrenic population and different raters.

Questions that could be asked include: Do the variables retain their discriminating power in different sample locations? Do the same variables contribute to the discriminant functions, and describe the symptoms, behaviors and social skills of the respective treatment modalities?

Finally, given that this quantified measurement procedure was effective for a sample of schizophrenic clients in one mental health system, its use should be expanded in research on other diagnostic groups which are treated by the modalities, such as Bi-polar Affective Disorders, or Psychotic Affective Disorders.

APPENDIX A

DOCTORAL RESEARCH
Terry L. Rudolph
Wayne State University

PROGRAM:_____

Subject Code Number:_____

Client Age_____ Sex_____

Income Level_____ Living Arrangements_____

Marital Status_____ Employment Status_____

Educational Level_____ Length of time in Program_____

Based on the clients your program serves and the typical client treated by your program, was the initial referral of this client to your program justified?

excellent referral_____ good referral_____ appropriate referral_____

questionable referral_____

Does this client, as compared to the typical client in your program and the services offered, contine to be appropriate for inclusion in your program?

excellent_____ good_____ appropriate_____ questionable_____

poor_____

APPENDIX B

Terry L. Rudolph

Wayne State University

Agenda

Inservicing Staffs on Instrument Administration

I. Introduction of the Study
   a. Review steps involved

II. Overview and Instruction on the New Haven Schizophrenia Index
   a. Reasons for including the index
   b. Instructions in its use
   c. Definition of terms
   d. Scoring
   e. Trial administration on a commonly known subject

III. Overview and Instruction on the Psychotic Inpatient Profile
   a. Rationale for using the PIP
   b. Instructions in its use
   c. Scoring
   d. Trial administration on a commonly known subject

IV. Overview and Instruction on the Social Adequacy Rating Scale
   a. Rationale for using the PIP
   b. Instructions in its use
   c. Scoring
   d. Trial administration on a commonly known subject

V. Reliability Confirmation
   a. Presentation of commonly known subject
   b. Staff complete instruments regarding chosen subject
   c. Statistical analysis of completed instruments and raters with the SPSS Subprogram RELIABILITY

DOCTORAL RESEARCH

Terry L. Rudolph
Wayne State University

Introduction

You are being asked to assist Terry Rudolph in the collection of data for his doctoral dissertation in Evaluation and Research from Wayne State University. Terry will be asking you to obtain permission from the clients you work with so that you may complete several rating scales about them. The rating scales will be completed in such a way that you will know the identity of the clients, but beyond that they will remain anonymous for the purposes of the study. It will take you around twenty to twenty-five minutes to complete the instruments for each client and you will receive training on the administration and completion of each scale.

Purpose

The purpose of the study is to find out what differences exist in the behavior, symptomatology, and social abilities of schizophrenic clients in Outpatient, Aftercare, and Adult Day Treatment. Those factors which discriminate best between clients in each of these modalities will then be used to create a quantitative model for predicting where future clients should be referred for services.

Instruments to be Used

The New Haven Schizophrenia Index
The Psychotic Inpatient Profile
The Social Adjustment Rating Scale

Points to Keep in Mind

1. Client participation in this research is voluntary.
2. All client information will be collected in such a way that the client will remain anonymous.
3. This is strictly a research project, so the outcome of the study will have no bearing on the treatment or programming

of clients or the future utilization of staff.

4. You will be asked to sample clients twice. The first time will be to assist in finding out what differentiates one group of clients from another. The second will be to cross-validate the information from the first sample
5. It is important to be as objective and realistic in filling out the questionnaires as possible. In this way a true picture of what is going on in the research question will be obtained.
6. It is important that the instruments be answered in a complete and timely fashion to protect the integrity of the research design.

DOCTORAL RESEARCH
Terry L. Rudolph
Wayne State University

New Haven Schizophrenic Index (NHSI)

Introduction

The New Haven Schizophrenic Index (NHSI) is a checklist designed to verify the diagnosis of schizophrenia. Astrachan, Harrow, Adler, Brauer, Schwartz, Schwartz and Tucker abstracted specific Symptoms that clinicians consistently identified as being associated with schizophrenia and which represented minimal and sufficient criteria for a diagnosis of schizophrenia. The presence of these symptoms as evidenced by their being checked on the index, established the validity of a working diagnosis of schizophrenia.

Instructions

1. Information to complete the NHSI may either be drawn from observations of the subject in question or review of the subject's case record (admission or discharge summaries, intakes, or psychological reports would be the most helpful).
2. For the NHSI, a diagnosis of schizophrenia is justified if the subject has or has had previously the symptoms on the checklist and attains a sufficient score on the index.
3. Definitions of the symptoms used in the NHSI are attached.
4. Symptoms are checked if they are currently present, or have been previously exhibited by the subject. Symptoms are left blank if they are not being exhibited by the subject or it no evidence can be found in the record of previous exhibition.
5. Total points on the index is the sum of the point values for the symptoms checked. The point values appear next to each symptom.

Scoring

1. To be considered part of the schizophrenic group, the subject must score on either Item 1 or Items 2a, 2b, 2c, and must

attain a total score of at least four points.

2. A maximum of four points can be attained for Item 1: two for the presence of delusions, and two for the presence of hallucinations.
3. On Item 2, a subject may score two points for any of symptoms a through c. One point is scored for the presence of either or both of symptoms d and e. Symptoms f and g are one point each. The maximum score for item 2 is five points.
4. Items 3, 4, 5, and 6 receive one point each.
5. To be considered schizophrenic, a subject must attain a Total score of 4 or greater.

DOCTORAL RESEARCH
Terry L. Rudolph
Wayne State University

Symptom Definitions
New Haven Schizophrenic Index

1. Delusions - False beliefs which are contrary to objective fact and maintained in spite of evidence of its invalidity. These false beliefs are often part of an elaborate "delusional system".

2 Hallucinations - A sense perception for which there is no appropriate external stimulus
   a. Auditory - hearing things which have no external basis.
   b. Visual - seeing things which have no external basis.
   c. Others - sensations of taste, smell, or touch which have no objective external basis.

2. Bizarre Thinking - Inconsistent, confused, or contradictory statements which dramatically demonstrate an unexplained gap in the reasoning process.

   Autism - An inability to relate to others and a lack of response to attempts to communicate

   Loose Associations - Thinking which is illogical and operates with ideas and concepts which have little or no connection with the main idea being discussed.

   Blocking - Sudden cessation of the flow of thought or speech, or the interruption of a train of thought due to emotional factors.

   Concreteness - A pattern of thought and feeling in which the ability to abstract and generalize is impaired and thinking is limited to the immediate environmental stimuli.

   Derealization - Loss of sense of reality concerning oneself in relationship to one's surroundings, that one's circumstances have somehow changed so that the real environment is in some way no longer the way it used to be.

Depersonalization - A sense of unreality or estrangement from oneself. Everything seems dreamlike and the actions of oneself or others are watched with detachment.

3. Inappropriate Affect - Any experience of emotion or feeling which is not consistent with the stimulus situation, such as lack of depth and consistency, or lability.

4. Confusion - Disturbed orientation with respect to either person, place, or time.

5. Paranoid Ideation - The presence of paranoid thoughts, specifically suspiciousness, persecutory thinking, or grandiosity.

6. Catatonic Behavior - Behavior which is characterized by bizarre motor actvities including stuperous inactivity, waxy flexibility, or sudden impulsive excitement.

DOCTORAL RESEARCH
Terry L. Rudolph

Wayne State University

Psychotic Inpatient Profile (PIP)

Introduction

The Psychotic Inpatient Profile (PIP) was developed by Lon and Vestre to measure twelve dimensions or syndromes of currently observable psychotic behavior. The PIP consists of seventy-four statements descriptive of manifest outward behavior and twenty-two statements descriptive of subject self-reports. The inventory is completed based on three days of observations.

Instructions

1. The scale should be completed based on the client's most recent behavior, specifically behavior observed over the last three days or for a period of three days.
2. Raters should read each of the statements numbering 1 through 74 and place the number in the box next to each statement which corresponds to the subject's frequency of behavior.
3. The frequencies are as follows: 0 = Not al all, 1 = occasionally, 2 = Fairly often, 3 = Nearly always.
4. If you are not absolutely certain about a rating, record the answer which is MOSTLY TRUE for the subject being rated.
5. Items 75 through 96 are rated as mostly True or Mostly Not True based on your judgment after talking to the patient. Please note the respective weights for items 75 - 91 and 92 - 96 printed on the scale.

Scoring

1. Items 1 through 74 are scored by adding together all the ratings within the columns designated A, B, C, D, E, F, G and H.

**2. Two of these dolumns are scored in a slightly different fashion.

   COLUMN F Total the column, subtract item #37, multiply the remainder by -1 and add a constant of 39.

   COLUMN G Total the column, subtract the rating on item #47, then add a constant of 3.

3. Items 75 through 96 are scored by adding together all the ratings with columns I, J, K, and L.

DOCTORAL RESEARCH

Terry L. Rudolph
Wayne State University

New Haven Schizophrenic Index (NHSI)

Introduction

The New Haven Schizophrenic Index (NHSI) is a checklist designed to verify the diagnosis of schizophrenia. Astrachan, Harrow, Adler, Brauer, Schwartz, Schwartz and Tucker abstracted specific Symptoms that clinicians consistently identified as being associated with schizophrenia and which represented minimal and sufficient criteria for a diagnosis of schizophrenia. The presence of these symptoms as evidenced by their being checked on the index, established the validity of a working diagnosis of schizophrenia.

Instructions

1. Information to complete the NHSI may either be drawn from observations of the subject in question or review of the subject's case record (admission or discharge summaries, intakes, or psychological reports would be the most helpful).
2. For the NHSI, a diagnosis of schizophrenia is justified if the subject has or has had previously the symptoms on the checklist and attains a sufficient score on the index.
3. Definitions of the symptoms used in the NHSI are attached.
4. Symptoms are checked if they are currently present, or have been previously exhibited by the subject. Symptoms are left blank if they are not being exhibited by the subject or it no evidence can be found in the record of previous exhibition.
5. Total points on the index is the sum of the point values for the symptoms checked. The point values appear next to each symptom.

Scoring

1. To be considered part of the schizophrenic group, the subject must score on either Item 1 or Items 2a, 2b, 2c, and must

attain a total score of at least four points.

2. A maximum of four points can be attained for Item 1: two for the presence of delusions, and two for the presence of hallucinations.
3. On Item 2, a subject may score two points for any of symptoms a through c. One point is scored for the presence of either or both of symptoms d and e. Symptoms f and g are one point each. The maximum score for item 2 is five points.
4. Items 3, 4, 5, and 6 receive one point each.
5. To be considered schizophrenic, a subject must attain a Total score of 4 or greater.

Terry L. Rudolph
Wayne State University

Social Adequacy Rating Scale (SARS)

Introduction

The Social Adequacy Rating Scale (SARS) was developed by Pinchak and Rollins to provide a systematic procedure for judging adaptive social behavior. Observers are asked to rate subjects ability to participate and fulfill eight areas of social functioning.

Instructions

1. Information to complete the SARS is available either directly from interviewing clients, or from observations and discussions that were recently held with the client.
2. Each item describes the conditions or expectations which you are expected to rate.
3. Each item should be rated on a continuum from 1 (Social Adequacy) to 5 (Social Inadequacy). The definitions to these terms and those which fall between (2. Borderline, 3. Intermediate, and 4. Minimum) are presented on the top of the SARS form.
4. Ratings should be based on circling the whole number which corresponds to the raters assessment of the subject's level of functioning. Partial numbers or ratings between the whole numbers are not allowed.

Scoring

1. A subject's score for each of the eight items is the number which was circled as the subject's rating. (i.e.: if item 2, Personal Appearance, has #3 circled, then the subject's score for that item is 3, etc.)
2. The Social Adequacy Index is found by summing the subject's scores on each of the eight item scores.

CONSENT FORM

Terry Rudolph is conducting this study as part of his degree requirements at Wayne State University. The information you provide will help complete this research and also give us an idea of what needs people have in the community and how treatment programs might best be able to help them.

If you give your permission, the staff at the program you attend will be completing a questionaire about how you get along with others and how well you are able to handle yourself in the community.

Please Understand That:

A) All information will remain confidential. While information will be gathered, it will be kept in such a way that you cannot be identified.

B) Your participation in this study is voluntary and will in no way affect the treatment you receive in this program.

C) The information will only be used for research purposes.

D) You may refuse at any time to continue to participate in the study.

I HAVE READ OR LISTENED TO THE ABOVE INFORMATION REGARDING THE STUDY AND AM WILLING TO HAVE INFORMATION ABOUT MYSELF USED BY STAFF AT THIS PROGRAM TO FILL OUT QUESTIONAIRES REGARDING HOW I GET ALONG WITH OTHERS AND HOW I HANDLE MYSELF IN THE COMMUNITY.

_____ _____

SIGNATURE DATE

_____ _____

WITNESS DATE

APPENDIX C

APPENDIX D

APPENDIX D

As an example of how the quantitative measurement procedure might be used, consider the following applications:

Case 1

Suppose a schizophrenic subject is about to be discharged from a local psychiatric inpatient unit and appears to require follow-up treatment. An inpatient mental health worker could screen the subject for placement by observing the client and completing the Modified Psychotic Inpatient Profile and Social Adequacy Rating Scale (Appendix C). After completing and scoring the ratings, the worker might have scores that looked like this:

Excitement = 42
Paranoid Projection = 39
Retardation = 38
Care Needed = 42
Psychotic Disorganization = 39
Grandiosity = 46
Perceptual Distortion = 45
Depressive Mood = 37
Disorientation = 40

Responsibility for Money = 1
Personal Appearance = 1
Vocational Responsibility = 1
Social Group Attendance = 2
Social Group Participation = 2
Responsibility for Family and and Associates = 1
Interpersonal Relationships = 2

The worker would then enter these raw scores into the unstandardized discriminant function equations (Table 31) as is illustrated below:

Function 1

42(.0253)+ 39(-.0272)+ 38(-.0232)+ 42(.0281)+ 39(.0056)+
46(.0108)+ 45(-.0410)+ 37(.0578)+ 40(-.0015)+ 1(.1384)+
1(.1618)+ 1(.2155)+ 2(.0382) 2(.3494)+ 1(.3154)+
2(1.995)+ (-6.702155) = -3.447655

Function 2

42.(.0004)+ 39(.0119)+ 38(.0312)+ 42(-.5047)+ 39(-.0167)+
46(-.0136)+ 45(.0555)+ 37(.0010)+ 40(.0138)+ 1(.0844)+
1(.0365)+ 1(.3245)+ 2(.2487)+ 2(-.5056)+ 1(.7355)+
2(-.7138)+ (-3.126797) = -2.438597

For this case, the sums of the two discriminant functions are -3.447655 and -2.438597. These are the predicted discriminant scores. By referring to the discriminant cut-off scores (Table 32) the worker could make a tentative decision as to where to refer this subject for services. Since the subject's predicted discriminant scores are -3.447655 and -2.438597, and both of these fall within the cut-off range for Outpatient services, the mental health worker might reasonably make a referral to this modality.

Case 2

The first application example above presented a case where the statistical/acturial prediction was fairly clear cut. For the second case, assume that the subject in question has been attending outpatient therapy. The subject has made some progress in treatment, but is presently refusing further involvement in the outpatient setting. The clinician working with the subject feels they should remain in treatment, but is not sure that the subject fits in Aftercare. A Modified Psychotic Inpatient Profile and a Social Adequacy Rating Scale are completed on the subject and yeild the following scores:

Excitement = 47
Paranoid Projection = 43
Retardation = 49
Care Needed = 53
Psychotic Disorganization = 49
Grandiosity = 46
Perceptual Distortion = 57
Depressive Mood = 42
Disorientation = 40

Responsibility for Money = 2
Personal Appearance = 4
Vocational Responsibility = 5
Social Group Attendance = 2
Social Group Participation = 2
Responsibility for Family and Family = 3
Interpersonal Relationships = 2

The clinician proceeds to place these raw scores into the unstandardized discriminant function equations:

Function 1

[illegible]	43(-.0272)+	49(-.2032)+	53(.0281)+	49(.0056)+
46(.0108)+	57(-.410)+	42(.0578)+	40(-.0015)+	2(.1384)+
[illegible]	5(.2155)+	2(.0382)	2(.3494)	3(.3154)+
[illegible]	(-6.702155)	= -1.4065		

Function 2

[illegible]	43(.0119)+	49(.0132)+	53(-.0547)+	49(-.0167)+
46(-.0136)+	57(.0555)+	42(.0010)+	40(.0138)+	2(.0844)+
[illegible]	5(.3245)	2(.2487)+	2(-.5056)+	3(.7535)+
[illegible]	= (-3.126797)	= 1.545403		

The subject in this case has attained discriminant scores of -1.4065 and 1.545403 on the respective functions. The subject's score on the first discriminant function indicated as per the cut-off scores in Table 32 that their predicted treatment should be Outpatient, while the second discriminant score is overwhelmingly in the range of Aftercare services.

The decision to be made in this case is one where configural as well as actuarial considerations need to be weighed. While the subject scores in the Outpatient range on the first function, his/her score of -1.4065 is closer to the cut-off between Aftercare and Outpatient (-1.34017) than it is to the Group Centroid for the Outpatient Group, (-2.03866). Given the fact that the subject appears to have minimum social adequacy skills, and is refusing further Outpatient treatment, it might be expedient to refer this subject to Aftercare. A case such as this is an example where the work of the statistician and the clinician coincide.

TABLE 31

DISCRIMINANT FUNCTION EQUATIONS

Function One Equation

(.0253)X1 + (-.0272)X2 + (-.0232)X3 + (.0281)X4 + (.0056)X5 +
(.0108)X6 + (-.0410)X7 + (.0578)X8 + (-.0015)X9 + (.1384)X10+
(.1618)X11 + (.2155)X12 + (.0382)X13 + (.3494)X14 + (.3154)X15+
(1.955)X16 + (-6.702155) = _____

Function Two Equation

(.0004)X1 + (.0119)X2 + (.0312)X3 + (-.0547)X4 + (-.0167)X5 +
(-.0136)X6 + (.0555)X7 + (.0010)X8 + (.0138)X9 + (.0844)X10+
(.3065)X11 + (.3245)X12 + (.2487)X13 + (-.5056)X14 + (.7355)X15+
(-.7138)X16 + (-3.126797) = _____

TABLE 32

DISCRIMINANT CUTOFF SCORES

GROUP	Range of Scores FUNCTION 1	Range of Scores FUNCTION 2
Outpatient	Less than -1.34017	Less than -.72198
Aftercare	-1.03417 to .14186	.264735 and greater
ADT	.14186 and greater	-.72198 to .264735

A second methodology for utilizing discriminant classification scores when dealing with multiple groups is suggested by Green (1979). Green states that if the main purpose for the analysis is to obtain a basis for classifying individuals into groups, classification may be based directly on the Mahalanobis distance. This methodology derives a set of linear combinations, one for each group, that indicates the relative closeness of an individual case to each group centroid. A subject's scores on the predicator variables are placed in each of the functions and a classification score is obtained for each group. These classification scores may be viewed as representing the probabilities of a subject belonging to a respective group. Thus, the classification function yielding the highest score is the group the subject should most likely be assigned to, the second highest is the next most probable, and so on.

The application of these functions is demonstrated in the following example. Let us look again at Case 2 presented above where the Outpatient clinician was unsure as to whether or not a subject fit into the Aftercare group and should be referred there for treatment. Once again, a Modified Psychotic Inpatient Profile and a Social Adequacy Rating Scale are completed on the subject and yield the following scores:

Excitement = 47
Paranoid Projection = 43
Retardation = 49
Care Needed = 53
Psychotic Disorganization = 49
Grandiosity = 46
Perceptual Distortion = 57
Depressive Mood = 42
Disorientation = 40

Responsibility/Money = 2
Personal Appearance = 4
Vocational Responsibility = 5
Soc. Group Attendance = 2
Soc. Group Participation = 2
Responsibility/Family = 3
Interpersonal Relationships = 2

The clinician then proceeds to place these raw scores into the discriminant classification functions (Table 33) as is illustrated below:

Outpatient Classification Function

47(.6657) - 43(.1152) + 49(.7672) + 53(.4207) - 49(.0841) +
46(.0082) - 57(.0189) + 42(.2799) + 40(.1442) + 2(.1012) -
4(3.196) + 5(2.224) - 2(1.336) + 2(.5791) - 3(.0137) +
2(.0197) - (50.03954) = 47.17246

Aftercare Classification Function

47(.7651) - 43(.2551) + 49(.7141) + 53(.4220) - 49(.0510) -
46(.0325) + 57(.0653) + 42(.3613) + 40(.1669) - 2(.9034) -
4(2.243) + 5(2.919) - 2(.9087) + 2(.6947) + 3(1.925) -
2(1.057) - (60.38709) = 51.87811

Day Treatment Classification Function

47(.8130) - 43(.3336) + 49(.6780) + 53(.4853) - 49(.0254) +
46(.0289) + 57(.0434) + 42(.4452) + 40(.1407) - 2(.6277) -
4(2.357) + 5(2.560) - 2(.2984) + 2(1.628) + 3(1.362) -
2(.3060) - (67.61457) = 50.32933

The respective classification scores for this case are Outpatient (47.17246), Aftercare (51.87811) and Day Treatment (50.32933). Since Aftercare had the highest classification score, a referral to this modality is reasonable. Based on the classification scores (i.e. the group membership probabilities), the clinician may also wish to investigate further the apparent closeness of fit between this case and the Day Treatment group. While the prediction for Aftercare is clear cut, it may be expedient to notify the clinician receiving the referral of any traits which could be viewed as indicative of a need for Day Treatment Services, or might signal decompensation. This is an example of using the probabilities of membership to assist in clinical descriptions and referral decisions.

TABLE 33

CLASSIFICATION FUNCTION COEFFICIENTS

	Outpatient	Aftercare	Day Treatment
Excitement	.6657	.7651	.8130
Paranoid Projection	-.1152	-.2551	-.3336
Retardation	.7672	.7141	.6780
Care Needed	.4207	.4220	.4853
Psychotic Disorganization	-.0841	-.0510	-.0254
Grandiosity	.0082	-.0325	.0289
Perceptual Disortion	-.0189	.0653	.0434
Depressive Mood	.2799	.3613	.4452
Disorientation	.1442	.1669	.1407
Responsibility/Money	.1012	-.9034	-.6277
Personal Appearance	-3.196	-2.243	-2.357
Vocational Responsibility	2.224	2.919	2.560
Soc. Group Attendance	-1.336	-.9087	-.2984
Soc. Group Participation	.5791	.6947	1.628
Responsibility/Family	-.0137	1.925	1.362
Interpersonal Relationships	-1.097	-1.057	-.3060
Constant	-50.03954	-60.38709	-67.61457

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ABSTRACT

UTILIZING DISCRIMINANT ANALYSIS TO QUANTIFY TREATMENT REFERRAL DECISIONS FOR ADULT SCHIZOPHRENICS

by

TERRY LEE RUDOLPH

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ADVISOR: DONALD R. MARCOTTE, Ph.D.

MAJOR: EDUCATIONAL EVALUATION AND RESEARCH

DEGREE: DOCTOR OF PHILOSOPHY

Presently, discriminant analysis has seldom been used in quantifying referral decisions regarding adult schizophrenics. The study developed a quantified measurement procedure to classify adult schizophrenics into one of three treatment groups: Outpatient Counseling, Day Treatment, or Aftercare. Two samples of schizophrenics involved in the mental health system of St. Clair County, Michigan, were drawn. The diagnosis of each subjects was verified by the New Haven Schizophrenia Index. 215 subjects in the first sample were rated on the Psychotic Inpatient Profile and the Social Adequacy Rating Scale. Results of these ratings confirmed that three distinct treatment groups existed. A stepwise analysis which selected 16 of the original 20 variables considered by the rating scales classified 76.74% of the cases correctly. A second sample of 202 cases was then drawn to cross-validate the predictive ability of the 16 variables. The canonical functions of this discriminant analysis correctly classified 81.19% of the cases.

Differences in the psychiatric symptomatology of all three groups were noted. The Outpatient group had the mildest psychiatric symptoms and the greatest social abilities. The Day Treatment group exhibited the most acting out behaviors and the poorest social abilities. The Aftercare group exhibited some extreme symptoms, including gross distortions of perception and grandiosity, but had few acting out behaviors and such a level of social competence that they were able to maintain themselves in the community with minimal support.

The research indicates that discriminant analysis can be utilized in a mental health setting to quantify and clarify treatment referral decisions. While this linear technique to decision making objectifies the referral process, the study points out that strict adherence to actuarial decision making may not result in the most practical nor necessarily accurate decisions in a clinical setting. The study calls for a blending of the actuarial processes of the statistician and the configural processes of the clinician in clinical research and applications.

Terry L. Rudolph was born and raised in Flint, Michigan. He attended Michigan State University, where he attained a Bachelor of Arts Degree in Psychology, and a Master's degree in Educational Psychology with a major in Measurement, Evaluation and Research Design. Mr. Rudolph has been employed as a psychologist for the past seven years. His present responsibilities include being director for St. Clair County Community Mental Health's Model Life Services Project and their Developmental Disabilities Grants Development. Mr. Rudolph is a Limited License Psychologist and a Certified Social Worker in the state of Michigan. He belongs to various professional organizations including the American Association for Counseling and Development, the Michigan Personnel and Guidance Association, the Association for Measurement in Guidance, the American Mental Health Counselors Association, the Michigan Agency and Mental Health Counselors Association, and the Michigan Educational Research Association. Mr. Rudolph is the Chairperson for the St. Clair County Community Services Council and the Secretary for the Michigan State University College of Social Science Alumni Association. He and his wife Jean are expecting their first child and reside in Mount Clemens, Michigan.