

AN EPIDEMIOLOGICAL APPROACH TO PSYCHOLOGICAL
FACTORS ASSOCIATED WITH SYMPTOM REPORT OF
HEALTH AND DISEASE IN COLLEGE STUDENTS

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Scope and Method of Study: This research investigated differences as assessed by self-report inventories among college students grouped according to health criteria. The basic hypothesis investigated was that individuals who reported greater physical concerns would have correspondingly less desirable scores in other areas of functioning including social status, psychological perception of the self and number of life stresses. This approach incorporates the psychosomatic orientation to health and disease. One hundred and thirty nine single undergraduates composed the subject pool. These individuals were considered as a member of one of five groups. Two of these groups, a "well" and a "sick" groups, were experimental groups, the other three groups served in the cross-validation procedure. A packet of information containing the following seven instruments was filled out by all participants: Tennessee Self Concept Scale, Life Events Inventory, Social Assets, Sick Role Questionnaire, Langner Psychiatric Index, Affect-Balance Score, Social Class. A stepwise multiple discriminant function analysis compared the score of individuals in the two experimental groups.

Findings and Conclusions: Individuals who reported greater physical distress were generally shown to have less desirable scores on the included questionnaire. In cross validation procedures, individuals who reported the higher degree of psychological distress were shown to have equally or in some areas less desirable scores than those with physical distress. Psychological distress was also highly associated with physical distress. The five best predictors of differences in physical symptom report were Langner Psychiatric Index, total variability in score, true/false ratio of answers, a neurotic self-assessment and social assets. Knowing that a person views himself with few psychological complaints, is consistent within his view of himself, has a balance of positive and negative views of himself, sees himself as below the norm in neuroticism and with high social assets resulted in a correct classification for all individuals who viewed themselves as having few physical disorders. Only two individuals who reported a large number of physical difficulties were classed most like those who reported little physical difficulty. A cross validation with these predictors resulted in a 86% accurate prediction with a high achievement group, an

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87% accurate prediction with a group high in psychological distress and a 43% accurate prediction of people seeking medical services. It was concluded that self report inventories may be helpful in screening individuals with large amounts of either physical or psychological distress, but that such self-assessment inventories among college students were not necessarily predictive of health-seeking behavior.

ADVISER'S APPROVAL

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The psychosomatic approach to dysfunction is not new. Since recorded history it has fired countless imaginations of observant and intuitive men. Behavioral scientists, however, with their paper and pencil "instruments" and measures of psychological function are just now able to move into this interdisciplinary sphere with important contributions aimed at principally nonpsychiatric populations. Some of this greater potential and applicability comes from changes in the focus of measurement, i. e. concepts such as stressful life events and social assets, and, also, from different statistical treatment approaches with the data.

This research is a beginning, one approach to a viable field of inquiry, that of psychosomatic medicine or medical psychology. I am indebted to many in the completion of this effort. First, to the many dedicated researchers and clinicians throughout the years who have taken time to communicate their observations, research findings and philosophies. From them my imagination was sparked and challenged. Appreciation goes to the students and others who gave of their time and effort in data collection. And, thanks to my committee and other faculty members from whom I received instruction in research and practical realities. Special thanks go to Barbara Weiner, who imparted a belief in statistics, and to Elliot Weiner, my chairman,

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CHAPTER I

INTRODUCTION

In order to cure the human body it is necessary to have a knowledge of the whole of things.

Hippocrates

Although the average life span in the United States has increased from 47 in 1900 to 71 in 1972 (Word Almanac, 1974), the mere addition of years has not necessarily created happier or more disease free people. In fact, as death due to diseases with specific causation has been drastically lowered, the nonspecific physical diseases (those with many or unknown causation such as cancer, arthritis, hypertension, the "wear and tear" diseases which have not been eliminated by the methods of classic medicine) have steadily increased. Advancements are needed in this area where physical, psychological, and social factors can be viewed together in the whole person, not one to the exclusion of the others, as in traditional medicine.

At least as long as 4500 years ago, man's interrelatedness of body and mind was emphasized in a written classic on internal medicine by the Yellow Emperor of China, Haung Ti. In the Western hemisphere observations were also made on the necessity for a comprehensive view, as in the following quotation from Plato:

The cure of many diseases is unknown to the physicians of Hellas because they are ignorant of the whole...For the part can never be well unless the whole is well...this..is the great error of our day in the treatment of the human body (Lewis and Lewis, 1972, p. 283).

During the middle ages both physical and mental illnesses were treated by administering to the whole person through the "soul"; many of the cures were by "faith". Martin Luther declared, "Heavy thoughts bring on physical maladies; when the soul is oppressed so is the body" (Lewis and Lewis, 1972, p. 284). These early concepts of etiology and treatment often emphasized the multiplicity of factors responsible for the felt distress, yet these same concepts were unenlightened ones, not based on specific knowledge of the disease process.

With the germ theory (specific etiology) of disease gaining prominence in the second half of the nineteenth century and with medicine's increasing interest in discovering specific microorganisms as causes of specific disease, much of the earlier logic of human nature and the role of emotion and life factors in disease was tossed aside (Lewis and Lewis, 1972). Although the germ theory was philosophically too simple, it was tremendously useful in that it focused attention and study on specific agents of disease which could then be attacked. The infectious diseases have been controlled to the point where they now play a relatively insignificant role in mortality and illness.

Another aspect of etiology involves consideration of the fact that disease is a consequence of the interaction between environmental conditions, specific agents, and state of the host. In some cases a known agent (germ) may or may not produce disease depending on the social, psychological, and physical state of the host. For example, with tuberculosis bacillus some hosts will be resistant while others succumb to an attack of the same virulence. This provides evidence that the bacillus can serve as a necessary but not a sufficient cause in the disease we call tuberculosis. It is becoming

increasingly evident that many of today's chronic conditions and accidents are not so amenable to understanding in terms of specific concepts of etiology as were the infectious diseases (Mechanic, 1968).

Psychosomatic Concepts of Etiology

There is a general reawakening of interest in the earlier logic of the reality of the role of physical, emotional, and social stress factors in the disease process. The modern use of the psychosomatic concept, comprehensive or multiple etiology approach, recognizes that man has multiple responses to agents threatening his health.

The term psychosomatic was popularized by Dr. Helen Flanders Dunbar in her thousand page survey of psychosomatic interrelationships, Emotions and Bodily Change (1954). Two major interpretations have been associated with the word psychosomatics. One involves a concern with labeling a particular kind of disorder as psychosomatic. In this viewpoint disease or dysfunction that cannot be traced to a primary physical agent is labeled as psychogenic or psychosomatic. The second interpretation is broader, and encompasses the unitary theory of health and disease.

This latter focus is the primary consideration here. In this view, health and disease are considered as "phases of life". Health represents the phase of positive adaptation, disease, the phase of failure in adaptation or breakdown in attempts of maintenance of adaptive equilibrium. In a psychosomatic viewpoint attention is paid to the three basic levels of functioning, the psychological, the somatic or physiological, and the social or environmental and the social or environmental and interpersonal. Changes in one

system may bring about reverberations in the other levels of organization, bringing into play defenses or adaptive devices. Stressful stimuli of physical, psychological, or social nature may thus produce adaptive breakdown or diseases when operating qualitatively or quantitatively in sufficient degree. The response to stress depends upon many factors, of hereditary, constitutional, developmental and experiential nature. If, for example, psychological stimuli occur that result in persistent emotional conflict or anxiety, physiologic concomitants may precipitate physical distress with accompanying compensation in the social system from both initial and secondary reactions. A psychosomatic approach would attend to all the areas of distress.

Theoretical constructs associated with the unitary theory of health and disease derive from concepts of Benard (1927), Freud (1940), Cannon (1932), and Meyer (1915), among many. The concepts have been illuminated by important contributions from Engel (1960), Selye (1950), Alexander (1950), and Grinker (1959), to name a select few. Excellent reviews of historical, philosophical, and research emphasis are available in Dunbar (1954), Grinker (1973), and Silverman (1968).

Much research in the psychosomatic area is under the rubric of "stress". The use of the concept stress, originally from physical and biological sciences, has become popular with many disciplines and points of view. In a general sense it has been applied to disruption in personal, social and cultural processes that have some relation to health and disease. However, the scope of the stress concept is large indeed and has been employed by different investiga-

tors to refer to divergent dimensions or processes. Often meaningful integration and interpretation of research findings is difficult or even impossible as there are so many referents to the stress concept. There are methodological difficulties in building a sound link between the concepts of biological, psychological and social stress as each investigator provides his own definition and meaning. McGrath (1970) discusses four major classifications of these definitions. Stress may be considered in terms of 1) stimuli (presence of stress defined on the basis of properties of the stimulus or situation), 2) response patterns (specification of responses which will be taken as evidence of having been under stress, in some cases a failure of adaptive responses), 3) as emotional experience (a kind of reaction to environmental events), or 4) as an engineering analogy (transactional model, stress as a consequence of the interaction of situational and individual factors). An excellent critique of major conceptual models is provided by Scott and Howard (1970). Other reviews are contained in Appley and Trumbull (1967), Levine and Scotch (1970), McGrath (1970), and Levi (1971). The present study gives emphasis to the psychosomatic viewpoint as the broader conception of health and disease functioning with stress considered as a useful focal concept.

Nature of the Evidence

Literature and theories in the area generally are complex in nature and confusing, even for a sophisticated reader, due to the influx of viewpoints from several disciplines, each with its own emphasis. Confusion is compounded by the lack of common word usage,

and the lack of integration and continuity from one discipline to the others. There are essentially four types of evidence supporting a psychosomatic viewpoint (Levine and Scotch, 1970).

One area of evidence is a philosophical position, that of logic and common sense. This is the major reasoning in historical accounts. Proponents of the position feel a relationship between physical, social and psychological processes is readily apparent and may not bother trying to prove something they know exists. Proof seems obvious; for example, who has not experienced some common physiological reactions, a pounding heart or "butterflies in the stomach", in moments with strong emotional impact (Lewis and Lewis, 1972).

Clinical impressions serve as another area. Physicians have observed that patients suffering from different diseases appear to have special life histories, peculiar vulnerabilities or distinctive personalities. The major impetus of many of these case studies have been psychoanalytic, with the premise that tensions and strains that occur in one system of the body often have pathological consequences for other body systems (Alexander, 1950; Grace and Graham, 1951; Grinker, 1973). Despite the insights and interest created in "psychosomatic disease" many of the studies have poor scientific procedure; consequently the outcomes may be inconsistent and interpreted many ways to "fit the theory" (Mechanic, 1968). Much of the work can only be considered suggestive, as lack of scientific rigor and insufficient account of social factors leave results open to speculation.

Laboratory studies, the third area of evidence, have offered the most scientific data as much painstaking research has demon-

strated measurable physiological changes in response to emotional or physical stimuli (Selye, 1956; Levi, 1970; Lazarus, 1966; Lacey, 1967). Studies of extreme situations such as natural disasters, battle situations, or graduate preliminary exams (Janis, 1951; Basowitz, 1955; Mechanic, 1962) have also revealed consistent support of the belief in alteration of bodily states in response to the situation. Most laboratory studies are excellent in terms of biochemistry and physiology, but fail to relate the findings to the larger context of daily living. The general question remains of the permanence of these bodily changes produced in laboratory or extreme situations; do these demonstrated laboratory changes cause disease?

The fourth area, epidemiological approaches, attempt to take into account the larger context of environmental and internal factors associated with disease. Such studies tend to go beyond casual observations, deal with involved theoretical and methodological issues and, not infrequently, result in complex and diverse findings. In searching for causes, the logic and approach is one of utility. Multiple factors such as genetics, nutrition, and immune mechanisms may all be made part of the single concept of "resistance" or may be investigated separately, depending on the level of specificity and the condition that can be clearly differentiated. The epidemiological approach has as its major advantage the integration of common sense, clinical and laboratory evidence into its larger schema of a search for causality (Mechanic, 1968). Frequently, this search generates clues for better controlled clinical and experimental investigation. Therefore, in placing emphasis on an epidemiological type of approach, the present study attempts a broad view of the general area of health and disease.

Topic of Investigation

Obtaining reliable data in the psychosomatic area is difficult, due in part to methodological problems in translating general social and psychological factors into terms capable of being tested and refuted. In its present state, in spite of voluminous research on stress in recent years, there are few solutions to practical problems. The traditional question remains: what facets of personality or behavior raise changes of various disease manifestations? Productive inquiry is necessary before an adequate theory of the nature and etiology of each disease can be formulated. Advancements in inquiry will in turn illuminate processes involved or further directions for research, all aimed at the goal of informed intervention, either preventive or therapeutic.

The topic of the present investigation is to further study variables which various investigators have independently proposed to be of importance in separation of health and disease. The method chosen for analysis is the multiple discriminate function. The advantages of this method, simultaneous comparison of variables for the best predictors and the use of cross validation procedures, should provide an excellent opportunity to evaluate the usefulness of current variables and methodologies as indicators for development of disease processes.

CHAPTER II

A SELECTED REVIEW OF THE LITERATURE

The nature of etiological factors in the disease process is poorly understood and defined (Cassel, 1970). Some factors may be considered predisposing, those which develop a susceptibility, tendency, or predilection toward acquiring a disease; others may be considered precipitating, those that accelerate or trigger off the onset of the aberration. Factors may also be considered in terms of source. Three broad areas are: 1) biological, such as infectious organisms or genetic predispositions; 2) personal-psychological such as perceptive ability or coping defenses, and 3) social-environmental such as family living habits or work.

The specific role of these different factors in physical disease genesis remains unresolved. One perspective adopted by the present research in that "stress", may increase the risk of ill health by increasing general susceptibility to disease. This is the nonspecificity approach. King (1963) appropriately comments on the issue:

The specificity vs. nonspecificity issue thus has implications for prediction; that is, who will become ill and with what disease. At the present time the nonspecificity approach seems to be more relevant to the question of who will become ill, while the specificity scheme has more significance for the type of illness that will ensue. (p. 105).

A number of factors will be considered which previous research has documented or associated with changes in health. Within the confines of these data, general caution can be made as to the interpretations and applications of these findings. Subjects in health research are generally those who have defined themselves as sick and, consequently, sought help for health matters. Factors that influence these people to seek help and the type of help sought may be of more importance than the actual distress state (Mechanic, 1968). It is also difficult to separate etiology from concomitants of change. As difficulties persist, additional factors come to the fore, so that the point in time in which a patient is approached and data collected also affects the interpretation of that data. Despite these cautions, there appears to be some consistency in philosophically defined issues of importance.

Stressful Events

Several previous studies have documented a significant relationship between the occurrence of "stress", "life crises", or "life events" and illness onset (Brown and Birley, 1968; Antonovsky and Kats, 1967; Graham and Stevenson, 1963; Levine and Scotch, 1970; Hinkle and Wolf, 1957; Kissen, 1958; Weiss, 1957). A sophisticated measure based on the conception of change as the critical factor of stressfulness was developed by Holmes and Rahe (1967). These researchers collected a list of social or life events which required change in ongoing life adjustment which were additionally observed to cluster at the time of disease onset. Only some of the events were stressful in a negative or socially undesirable manner. The

common theme was the adaptive or coping behavior required in association with each event. To measure total stressfulness, a refinement was added by asking judges to estimate the amount of readjustment required by each event on the list. Total exposure to stressful events was then calculated by summing the mean readjustment ratings, later labeled life change scores, of all events experienced by an individual in a given period of time. Using this measure Rahe (1968, 1969) and others (Dohrenwend, 1973; Thurlow, 1971; Theorell and Rahe, 1970) have shown that individuals who had experienced events that yielded higher total readjustment or life change scores were more likely than individuals with lower total life change scores to become ill. Also, among those who became ill, the ones with higher total scores suffered a larger number of illnesses (Rahe, 1968).

Based on the same principle of total readjustment required and using some of the same items, the Life Events Inventory (Cochrane and Robertson, 1973) seeks to remedy some of the deficiencies of the Rahe and Holmes instrument by an increase in the range of events, and by provision of more homogenous groups for judgements of readjustment norms. For these reasons, it was selected for use rather than the Rahe and Holmes measure. The focus on the total readjustment viewpoint has been challenged by several investigators (Brown, 1972; Paykel, Myers, Dienelt, Klerman, Lindenthal, Pepper, 1969). They emphasize the importance of looking at the type of changes, e. g. desirability, dimension of loss or gain, expectedness, or degree to which the event is under the control of the subject. Brown (1972) even suggests that restrictions of analysis to all events without further classification by type of event can prove misleading. Other

work has found the sheer quantity of events to consistently be the most important indicator of future health status (Myer, Lindenthal, Pepper, Ostranler, 1972). Social factors such as sex, socioeconomic status, and age have been found to contribute to the degree and direction of the individual affect associated with the event (Dohrenwend, 1973; Cochrane and Robertson, 1973; Phillips, 1968). Psychological balance, a balance of subjectivity felt stress in either a positive or negative direction has also been hypothesized to be an important dimension. An Affect Balance Scale such as that used by Phillips (1968) has been suggested by Cochrane and Robertson (1973) as a conjunctive measure with stress scales to provide an indicator of subjective balance. Heeding this recommendation, a balance scale has been included with the selected measures.

Social Status

Most people would probably agree with the researchers that the more one has of what is valued in a society, the easier it should be to adapt to its demands and challenges and to cope with physical and psychological misfortunes (Dohrenwend, 1973; Dohrenwend and Dohrenwend, 1970; Langner and Michaels, 1963; Luborsky et al, 1973; Phillips, 1968). The helpfulness of isolating specific social factors as determinants of health differences remains to be established. That health differences can be associated with different social status is a consistent finding, both in the course of disease (Dudley, Verkey, Masuda, Martin and Holmes, 1969), and in rates of illness (Langner and Michael, 1963). One foremost factor in social status would be social class as determined by indicators of occupation, education

and income. However, social status is considered a more inclusive term of the physical or psychological assets one has gained for oneself. Luborsky et al. (1973) have compiled a scale of factors considered social assets or liabilities in society. The scale will be used in the present research as a comprehensive measure of social status factors found to be useful in predicting frequency and severity of certain illnesses. Questions pertain to previous experience of hardship, failure, rejection, insecurity (economic and psychosocial) as well as demographic and social class data.

Psychological Aspects

A psychological profile alone, while valuable, doesn't seem to hold the promise of instant diagnosis as was once hoped (Grinker, 1973). That part of personality functioning which seems consistently related to prediction of impaired functioning is the self-concept, ego strength, or self-esteem as various investigators have chosen to label their scales (Fitts, 1965, Barron, 1963; Rosenberg, 1965). Major theories dealing with self-concept have focused attention on emotionally healthy people or "self-actualizers" as well as maladjusted individuals (Maslow, 1954; Rogers, 1961; Adler, 1924). Emphasis is on the position that the concept of self is closely associated with an individual's level of behavioral competence or actualized self. One instrument for evaluating self concept, the Tennessee Self Concept Scale (TSCS) was constructed "for the purpose of obtaining measures of many facets of the individual's self concept, such as self esteem, defensiveness, conflict, confusion, and variability in self-perception" (Fitts, Adams, Radford, Richard,

Thomas (B), Thomas (M), Thompson, 1971). Many studies with the TSCS lend support to the hypothesis that the self-concept is an index of self actualization or personality integration (Fitts et al., (1971).

Indication that the self-concept approach may be applicable to somatic illness is indicated in studies reporting greater utilization of medical facilities from a group low in "self esteem" in industry (Kasl and Cobb, 1966), and in university students low in "self acceptance" (Roessler and Greenfield, 1958). Research with the TSCS indicates this scale reflection of self-concept may play an important part in the process of healing by the influence of self-concept on attitudes toward illness and medical care (Schwab, Clemmons, and Marder, 1966). The TSCS also has been used successfully in identification of distinctive personality characteristics possessed by people with cancer and emphysema compared with well controls (Thomas, 1974).

Self-concept does not actually indicate impairment in functioning or serve as a symptomatic report of psychologic discomfort. Langner (1962) developed such an inventory for reporting psychiatric symptomatology as part of the Midtown studies. Using his inventory, individuals may generally be categorized as disturbed with a score of four or more; the probability of emotional disturbance increases as the scores run higher. Phillips and Segal (1969) have also shown that people with a greater number of physical illnesses show an increase in psychiatric symptoms, this effect being stronger for women compared to men. Psychological symptom scores have been shown to change over time as a function of stressful life events (Dohrenwend and Dohrenwend, 1969; Myers, Lindenthal, Pepper and Ostrander, 1972).

These findings seem consistent in conjunction with the previous discussion emphasizing stressful life events as related to physical illnesses.

That physical and psychological disorders are frequently highly correlated has often been observed (Eastwood and Trevelyan, 1972; Hinkle and Wolff, 1957; Hinkel, Christensen, Kane, Ostfeld, Thetford and Wolff, 1958). The positive correlation may be interpreted to mean that individuals with a long-standing psychological disorder are more subject to all forms of physical morbidity, that those those with physical disorder are more prone to psychological distress, or that in the community there are people who are subject to all types of illness (Eastwood and Trevelyan, 1972). Support can be found for all views. Eastwood and Trevelyan hold the view that "the intimate relationship of physical and psychiatric disorder suggests that, at least for ecological research, these categories should not be regarded as separate entities but rather as manifestations of ill-health of the organism" (1972, p. 370). The impression that some subjects are prone to "illness in general" is regarded by Mechanic (1968) as reflection of "sick role tendency", which would help account for the apparent association between psychological illness and somatic disease. In this view, persons who are likely to bring mood and behavior complaints to a psychiatric clinic are also likely to be sensitive to physical symptomatology.

Sick Role Tendency

The presence of symptoms seems to be mediated by many factors which help determine whether an individual will concern himself with his symptoms and seek treatment. The response to perceived illness has been examined in terms of "sick role behavior" as Parsons defined a unique role sanctioned during illness (Parsons, 1951; Kasl and Cobb, 1966). Under various pressures and conditions of stress people may be motivated consciously or unconsciously to seek the protection of the sick role, as the sick role takes precedence over other obligations, e.g., occupational and family roles, and provides an escape. Parsons (1951) states, "Illness may be treated as one mode of response to social pressure, among other things, as one way of evading social responsibilities" (p. 431). Other researchers have seen a tendency to adopt the sick role as a way to legitimize perceived failure (Cole and Lejeune, 1972) or performance below expectations, for example school grades and achievements (Mechanic, 1968). Thus, the individual is not held responsible for his incapacity and he is exempt from normal social and achievement obligations. The sick role is not seen as independent of other factors, such as stressful life events, social assets, sexual status, psychological constitution or actual medical symptoms; all these aspects seem to influence the adoption of the role and the clinging to this role (Kasl and Cobb, 1966; Mechanic, 1968). Mechanic (1968) and others (Mechanic and Volkart, 1962; Thurlow, 1970) have attempted to assess differences in inclination to adopt the role, using self report measures of tendencies to view oneself as easily sick, not in control

and frequently seeking medical advice. This research very closely follows the measurement and theoretical interpretations of these investigators.

Physical Symptom Report

As a report of symptoms and past illnesses from non-hospitalized subjects, paper and pencil instruments do not give the same information as records of medical visits, days off work, or information from hospitalized patients; these all involve another aspect of seeking care, not necessarily found in reporting of symptoms (Mechanic, 1968). There is a large amount of illness that never reaches a medical or hospital context; only one in three who report illness have been found to seek professional medical advice, and of those reporting illness, less than one out of 75 were hospitalized in a given time period (White 1961).

Reporting of symptoms has been used in many studies as predictors of future health behavior (Cassel, 1970; Thurlow, 1967; Kasl and Cobb, 1966). It seems the more frequently and persistently the symptom occurs, the more likely it is to be defined as a problem (Mechanic, 1968). People ultimately seeking care may have one symptom that is severe, continuous and unalleviated, or several symptoms or clusters which tend to create the same effect in feeling "sick". Use of the Cornell Medical Index with number of symptoms has been valuable as a predictor of future health behavior or vulnerability (Rahe, Biersner, Ryman, Arthur, 1972; Thurlow, 1967), as a significant inverse correlate with high social assets (Luborsky, Todd, and Katcher, 1973), and as inversely related to satisfaction with various attributes of the self (Kasl and Cobb, 1966). Retrospective self reporting of

symptoms however, is subject to bias, mainly from attitudes toward illness. Kasl and Cobb (1966) in a review, stress that under reporting of symptoms and visits to the infirmary may result when students tend to see themselves as basically healthy.

Statement of Hypotheses

The interrelatedness of variables in identification of those who will become ill and those who will stay healthy has often been documented in the literature as the previous review emphasizes. Here multiple predictors of illness behavior were examined with a battery approach in establishment of "best predictors" of distress in a college population. Predictors were established as related to the individual scores from two groups, a "well" and a "sick" group, established on the basis of symptom report.

High scores on the Life Events Inventory were expected to be associated with higher physical symptom report. This viewpoint is generally consistent with the reviewed literature (Cochrane and Robertson, 1973). A negative balance score was expected to be related to increased physical symptom report. Phillips and Segal (1969) found negative balance to generally be associated with high psychiatric symptom report, but did not test association with medical symptoms. It has been suggested that a balance score would give added dimension in providing a more complete picture to the LEI (Cochrane and Robertson, 1973).

The higher the social status, the lower the expected symptom report. Both Social Assets scale scores (Luborsky et al., 1973) and social class (Hollingshead & Redlick, 1958) were expected to

be positively related to perceived healthiness, that is, with a low symptom report.

The sick role is seen as positively related to high physical symptom report, as well as related to emotional difficulties (Cole and Lejeune, 1972). A high degree of physical symptoms was expected to be associated with high psychiatric symptoms and low physical symptom report was expected to be associated with a lack of reported psychiatric symptoms (Langner Index). A person does not need to have a physical complaint to have emotional problems, yet, as Mechanic has stated, "defining one's health as poor is highly associated with the presence of emotional complaints" (Mechanic, 1968, p. 256).

The TSCS serves as the most inclusive instrument for measurement of general personality and adaptive functioning. People low in symptom report were expected to have higher self concept scores on all positive dimensions, to have variability scores at or below the mean, to have less total conflict, and to have more positive scores on all empirical scales. These predictions are all consistent with those described by Fitts (Fitts et al., 1971) as being associated with people high in self-actualization. These same scales were expected to be in the opposite direction for people high in physical symptoms.

All factors were included initially as being of the same theoretical importance in an inclusive search. As many of these predictors are highly correlated, with the multiple discriminant function some factors were expected to become more important than initially suggested in an isolated comparison, while others became of negligible importance. This is a special advantage of this technique that the

most efficient system may be obtained from multiple predictors observed.

CHAPTER III

METHODOLOGY

Subjects

One hundred thirty-nine single, unmarried undergraduates enrolled at a large southwestern university participated individually as members of one of five groups. Of these groups, two were criterion or experimental groups, the other three were part of a cross validation procedure. Group membership criteria varied somewhat and will be included in each group description.

Criterion Groups

The criterion groups, a "well" group and a "sick" group were selected from a pool of 250 undergraduate volunteers, 96 males and 154 females. These individuals completed two symptom questionnaires, the Cornell Medical Index (CMI) and a Health Symptom Frequency Questionnaire (Health Q). Subjects chosen for participation were those individuals whose combined score totals on the two questionnaire items were in the upper or lower extremes of those subjects pooled. Appendix A contains a frequency distribution of these combined score totals. The distribution has a slightly negative skew. Summary statistics for the two criterion groups and the overall sample are presented in Appendix K. Average scores of the

CMI and Health Q were generally comparable, with scores of females on the CMI generally higher, as well as the overall total for females. The average combined score for the males was nine points less than that for females.

The "well" group included 46 individuals who completed the necessary information and whose combined score total was 20 or less. Thus, subjects in the "well" group reported both fewer symptoms or complaints and a lower frequency of occurrence, a mean of 12.76 compared with the combined group mean of 37.

The group labeled as "sick" included 42 individuals whose combined score total was 48 or greater. These subjects reported both a large number of symptoms and a high frequency of occurrence. The mean score totals of this group was 67.93 compared with the combined average group mean of 37.

Cross Validation Groups

Three separate groups were obtained for cross validation procedures. Membership was based upon subject participation in one of three areas.

The "good" group, consisting of 22 subjects (12 female, 9 male), was obtained from volunteers from on two campus groups, Motor Board for women and Blue Key for men. Members of these two groups are selected by peers and are considered to be of outstanding character, to be campus leaders, to have demonstrated responsibility toward others, and to have a 3.0 or better grade point. Publicized lists were obtained for both groups. Subject participation was requested with an initial telephone contact.

Subjects characterized as belonging to the "medical" group were those 14 individuals (8 female, 6 male) selected by two physicians at the campus hospital. Physicians were instructed to request participation from those individuals they had contact with that had been seen 10 or more times during the previous year. From prior research, (Mechanic & Volkart, 1961) normal students made from zero to two visits during the year to a campus hospital where fee payment was not a variable.

The "psychological" group consisted of students who sought therapeutic help from two on-campus outpatient facilities. Services of these facilities are either free to students or of a minimum (one dollar) rate. Therapists at these agencies requested volunteer participation from student patients under their care. Fifteen completed packets were obtained (8 female, 7 male).

Instruments

Thirty-four predictor variables were obtained from seven instruments administered to all subjects. Two additional instruments served as screening measure for the criterion groups and were routinely administered to the cross validation groups, but not used in formal analysis. A brief description of each instrument will follow.

Health Symptom Frequency Questionnaire (Health Q)

This is a frequency list of commonly encountered symptoms compiled by Mack, (1973) from several prominent lists of medical disorders. Subjects report the number of times, on a seven-point scale, with which they have suffered from each symptom over the past year.

Possible scores range from 0 (none) to 161 (more than 10 occurrences in all areas). The form takes about five minutes to complete and does not contain any items reflective of generalized mood. A copy of the form used is contained in Appendix C.

Cornell Medical Index Health Questionnaire (CMI)

This is a 195 item symptom check list. These questions are in a yes-no format and contain four broad areas of questions: those relating to bodily symptoms, past illnesses, family history, and behavior and mood (Broadman, Erdmann, & Wolff, 1949). There are two forms of the CMI, one for men and one for women. These forms are identical except for six genito-urinary questions. The "yes" answers indicate problem areas of either current or past difficulty. From data reported in the manual (Broadman et al., 1949) only 3% of the men and 5% of the women in a "normal" sample had 30 or more "yes" responses.

Life Events Inventory (LEI)

The LEI is a revision of a much used instrument, the Schedule of Recent Experience (SRE) (Holmes and Rahe, 1967) Devised by Cochrane and Robertson (1973), the LEI attempts to be more comprehensive and, additionally, has item weightings for student norms. Otherwise, it is similar in format and intent to the SRE. The LEI for single subjects consists of a checklist of 39 events. Subjects indicate which, if any, of the events have happened to them in a specified time period (generally six months to two years; here one year). Each event has an assigned weighting and may be of a desirable or undesirable nature. Events also vary as to the degree they may be brought about by the

subject, such as "moving house" which may in part be controlled by the subject, to "death of close friend" over which he may have no control. The score is the sum of the weights of the checked items. A copy of the LEI is included in the Appendix.

Langner Twenty-Two Item Mental Health Inventory (LANGNER)

These 22 items are predominately psychophysiological in content. All items, in a yes-no format, were selected on their ability to discriminate patient groups and a psychiatrically screened well group at .01 significance level or better (Langner, 1962). Two different validity studies of this instrument (Langner, 1962; Manir, Brauer, Hunt, and Karcher, 1964) report that it appears adequate for screening with the probability of emotional disturbance seen to increase as the sum of pathognomonic responses increase.

Affect Balance Score (A-B)

This score is obtained from responses to 10 feeling state items, five positive, five negative. A high Affect Balance Score reflects an excess of positive over negative feelings. These same items were employed by Bradburn (1963) and by Phillips (1968) in studies concerning degree of subjective stress in relation to social class position, psychological disturbance and experimental stress levels. Scores may range from -5 to +5. A copy of the items is included in the Appendix.

Sick Role Tendency

Inclusion of a sick role scale derives from the ideas and concepts of many researchers (Parsons, 1951; Mechanic, 1961; Cole &

Lejeune, 1972; Wilson, 1972). None, however, have devised an adequate measurement scale for the concept. Basically, the idea of sick role adoption incorporates two aspects, 1) the person is expected to quickly seek medical care, and 2) the person is released from responsibility or control of his usual expected behavior. One dimension of the questionnaire includes items that have been labeled expectancy for control (Kirscht, 1972) and include three general control items and three health related items. An additional six questions devised similar to a scale described by Mechanic (1961) reflect degree of likelihood to consult a physician when presented with general sickness symptoms. Turlow (1971) found a similarly devised scale to be related to previous illness. A total of 12 questions is included. Low or negative scores are considered to indicate one who tends to easily classify himself as sick, high scores indicate one who denies sickness and endeavors to maintain high control. Range of possible scores in this study is from -24 to +24. These questions are included in the Appendix.

Social Assets Scale (SAS)

The scale consists of a list of items considered to be social assets in the areas of occupation and education, early environmental and health, current economic status, and current social status. (Luborsky, Todd, Katcher, 1972). For the student key reliability was greater than .90 for 27 of 30 items. In comparison with other scales, high social assets correlates .53 with high ego strength and -.30 with hypochondriases and .35 with predictions of successful outcome of therapy (Luborsky et al., 1972). The scale has been used with

predicting improvement from psychiatric hospitalization and with other instruments in illness prediction (Katcher, Luborsky, Brightman & Mijuskovic, 1970; Jacobs, Muller, Anderson & Skinner, 1973). The score is the total weighted sum of the checked items. These items are included in Appendix H.

Index of Social Position

This scale is incorporated as part of the Social Assets Scale. Rating scores on occupation and education as described by Hollingshead and Redlich (1958) were used to assign one of five social classes to the individual. These classes are as follows: (1) wealth, high-prestige professionals, (2) managers and lesser ranking professionals, (3) small business proprietors, skilled laborers, (4) semi-skilled workers, (5) factory and unskilled laborers. A separate emphasis on social class, apart from general social assets, seems justified here as socio-economic status has frequently been used in studies of medical and psychological disturbance (Cole, 1957; Dohrenwend, 1966, 1973; Hollingshead & Redlich, 1958; Langner & Micheal, 1963).

Clinical and Research Form of the Tennessee

Self Concept Scale (TSCS)

One hundred self-description statements on a five-point response scale comprise the measure. Of these, 90 assess the self concept and 10 assess self criticism. These 90 items are equally divided as to positive and negative content. Retest reliability with 60 college students over a two-week period had a range from .60 to .92 with an overall reliability in the high .80's (Fitts, 1965). The test is

reported to overlap with other well known personality tests. The Taylor Anxiety Scale correlates $-.70$ with the Total Positive score and correlations with various MMPI scales are in the $.50$'s and $.60$'s. For more detailed information the TSCS manual (Fitts, 1965) is a good source. The TSCS yields up to 29 scales for measuring various aspects of the self concept. A description of 28 of these scales used in this research follows.

Self Criticism Score (SC). This scale consists of 10 items taken from the MMPI lie scale. High scores generally indicate a normal, healthy openness and capacity for self criticism, while low scores indicate defensiveness.

The positive scores are divided into nine subscales. These subscales are taken from a composite positive score and subscores from partitions reflecting an internal frame of references and an external frame of reference.

Total Positive Score (Tot P) reflects the overall level of self esteem. Greater self esteem is associated with higher scores.

Identity (I) reflects the individual as he describes himself.

Self-Satisfaction (S-Sat) measures how he feels about the self he perceives.

Behavior (B) reflects the individual's perception of the way he functions.

The external frame of reference is divided into categories reflective of five different areas.

Physical Self (Phy S)

Moral-ethical Self (MS)

Personal Self (Per S)

Family Self (FS)

Social Self (Soc S)

Variability Scores reflect the consistency of response from one area of self perception to another. A low variability score indicates consistency in self-report. Three scores are given.

Total Variability (Tot V) is the sum total variability.

Row Variability (Row Tot) contains the total variability score for items reflective of the internal frame of reference.

Column Variability (Col Tot) contains the total variability score for items reflective of the external frame of reference.

Distribution Score (D) reflects the tendency to mark extreme scores, either "1" or "5" rather than the more uncertain "3" or middle responses. High scores indicate a person is very certain about what he says; low scores may be found with people who are defensive and guarded.

True-False Ratio (T/F) yields a measure of response set or the tendency to agree or disagree with items.

Conflict scores measure the extent the individual's responses to positive items differ from or conflict with his responses to negative items reflective of the same attribute.

Net Conflict (Net C) reflects the sum of the tendency to over deny negative attributes or to over affirm the positive.

Total Conflict Score (Tot C) is the non-algebraic sum of the above scores, as variability may sometimes cause these scores to cancel each other out. Extreme scores in either direction are generally indicative of disturbed individuals. High scores indicate confusion, contradiction, and general conflict in self-perception.

Low scores have the opposite interpretation, except that extremely low scores are suspect of an artificial, defensive stereotype.

Six empirical scales were derived from an analysis of item responses from selected psychiatric groups.

Defensive Position Scale (DP) serves as a more subtle measure of defensiveness than the SC score. An extremely high score indicates defensive distortion in a positive self description, an extremely low score indicates the person is lacking in defenses to maintain self esteem.

General Maladjustment Scale (GM) serves as a general index of an adjustment-maladjustment dimension without assumptions about the nature underlying differentiation of pathology. Low scores indicate pathology; higher scores, better adjustment.

Psychosis Scale (Psy) differentiated psychotics from others. Higher scores indicate pathology.

Personality Disorder Scale (PD) differentiated those with personality defects rather than psychotic or neurotic reactions. Low scores tend to indicate defects.

Neurosis Scale (N) differentiated neurotic patients from others. Low scores indicate more neurotic tendencies.

Personality Integration Scale (PI) differentiated those with high levels of adjustment or personality integration. High scores are associated with higher levels of integration.

A complete list of the 34 predictor variables is contained in Appendix I.

Procedure

All subjects received individual packets which contained a cover letter, Life Events Inventory, Langner Psychiatric Index, Affect-Balance Measure, Sick-Role Questionnaire, Social Assets Scale and Tennessee Self-Concept Scale. Subjects in the cross validation groups additionally received the Cornell Medical Index and Health Symptom Frequency Questionnaire in their packets.

In the criterion groups, subjects were initially administered the CMI and Health Q as a procedure of group selection. Those individuals in the extreme upper and lower range of the sample were telephoned and requested to participate in further data gathering. Appointments were scheduled with each at a time he was able to come to the research area and complete the questionnaires. Most subjects were able to complete the information in less than an hour. All were assigned a number when they arrived at the research area and all material was then coded by number only.

Subjects from the "medical" and "psychology" group, selected by the personnel at the differing agencies, received the same packet of materials with the inclusion of the CMI and Health Q. These forms were returned to the clinic of origin.

Subjects in the "good" group were randomly contacted by telephone from published membership lists. Individuals who agreed to participate received the packet of materials. These were returned to the examiner at the research area. Raw scores from the original scoring of all data were used in data analysis.

Statistical Analyses

A step-wise linear discriminant function analysis was computed to examine differences between the "well" and "sick" groups. The discriminant function provides a procedure for estimating the position of an individual on a line that best separates classes or groups. All dependent variables were considered together and correlations among the variables are taken into account in selection of variables discriminating between groups.

The analysis provides a discriminant function for each group, with subjects assigned to that group whose mean discriminant function is closer to the discriminant function score of the subject. Thus, using a weighting system of the 34 dependent variables, variance between groups was maximized while within group variance was minimized (Cooley and Lohnes, 1962).

Two assumptions of the discriminant function are that misclassification costs are equal and that prior probabilities of each population are equal.

At each step an approximate test of the statistical significance of the separation of groups is available. This statistic can be transformed into an F statistic with $g - 1$ and $n - g - p$ degrees of freedom where n = total no. of subjects, g = no. of groups, p = no. of predictors (Rao, 1965).

The relative contributions of the dependent variables to a step-wise discriminate function is also available as order of selection is indicated. Each variable selected is the one which contributes most to a prediction system already containing the other variables

selected. Thus, the first variable selected is the one that accounted for the greatest amount of variance between groups. At each successive step the next variable which accounts for the great amount of non-overlapping variance is added. An F test with $g - 1$ and $n - g - p$ df is used at each step to determine whether the predictor contributed significantly to accounting for the remaining variance.

Selection of variables (out of the original 34) for the final best prediction was based on the following criteria:

1. As there is a problem of shrinkage, analogous to that in multiple regression, the number of final predictor variables were limited to the first five selected. This limit provided a subject to predictor ratio of 18:1.
2. Number of misclassifications were minimized.
3. Each variable in the final prediction system was at least significant at the .05 level, given the variables in the prediction system at that step.

Cross validation procedures test the ability of the discriminant function to correctly classify and actually serve as a prediction system. The "best" prediction system obtained with the experimental groups was applied to test the significance of separation of the cross validation groups. Individuals in all three groups were classified according to the group whose mean discriminant function based on the final prediction system was closer to the discriminant function score of the subject.

CHAPTER IV

RESULTS

The results of this study were presented with consideration of two broad questions concerning the data. These questions are the following: (1) In what ways do these symptom report groups appear to differ? (2) Which variables contributed most to a statistical discrimination between these groups?

Means and standard deviations for all variables and all groups, including those of the cross validation groups, are contained in Appendix K. The two symptom report groups will be described with consideration of significant differences reflected at F - Step 0 (Table I). Significant differences between the groups were found on all six questionnaires and on selected scales from the TSCS.

TABLE I
 PREDICTOR VARIABLES AT F-STEP 0

| Variable | F-Step 0 | Significance Level |
|---------------------------|----------|--------------------|
| 1. Life Events Inventory | 26.36 | < .001 |
| 2. Langner | 65.53 | < .001 |
| 3. Affect-Balance | 21.36 | < .001 |
| 4. Sick-Role | 9.83 | < .005 |
| 5. Social Assets | 47.68 | < .001 |
| 6. Social Class From TSCS | 4.85 | < .05 |
| 7. SC | 6.73 | < .05 |
| 8. T/F | 11.03 | < .005 |
| 9. Net Conflict | 2.52 | < .25 |
| 10. Tot Convlict | 13.93 | < .001 |
| 11. Tot Positive | 25.57 | < .001 |
| 12. Identity | 15.39 | < .001 |
| 13. Self Sat | 22.24 | < .001 |
| 14. Behavior | 30.36 | < .001 |
| 15. Physical Self | 12.50 | < .001 |
| 16. Moral-ethical Self | 18.61 | < .001 |
| 17. Personal Self | 30.26 | < .001 |
| 18. Family Self | 17.44 | < .001 |
| 19. Social Self | 8.10 | < .01 |
| 20. Tot Variability | 40.09 | < .001 |
| 21. Col Variability | 28.72 | < .001 |
| 22. Row Variability | 28.89 | < .001 |
| 23. Distribution | 2.04 | < .25 |
| 24. No. of <u>5</u> 's | .14 | N. S. |
| 25. No. of <u>4</u> 's | 2.03 | < .25 |
| 26. No. of <u>3</u> 's | 2.56 | < .25 |
| 27. No. of <u>2</u> 's | .90 | N. S. |
| 28. No. of <u>1</u> 's | 1.95 | < .25 |
| 29. Def. Position | 11.16 | < .005 |
| 30. Gen. Maladjustment | 13.50 | < .001 |
| 31. Psychotic | .94 | N. S. |
| 32. Per. Disorder | 26.68 | < .001 |
| 33. Neurotic | 30.42 | < .001 |
| 34. Per. Integration | 16.96 | < .001 |

df = 1,86

The "sick" group, as a whole, had a larger magnitude of stressful life events (as reported on the LEI) and had more group variability of stressful events than did the "well" subjects. The "sick" group endorsed a larger number of items on the Langner and, again, had more group variability in scores. A symptom score of 4 or greater places those in the "sick" group as having high potential for psychiatric symptom or impairment.

In terms of Affect-Balance, the "well" group described themselves as more positive in general feelings. The "well" group also had a higher average score on the Sick Role questionnaire, indicative of a greater tendency to deny sickness or to not adopt the sick role. With regards to Social Assets, the "well" group had higher scores and were less variable than those in the "sick" group. Social Class scores also showed differences between groups, with the "well" group tending to have slightly more prestigious scores. On all of these variables the "well" group consistently received the more positive score.

On measures from the TSCS, the groups differed along several dimensions. No averaged score from either group exceeded the normal profile limits, or was considered "deviant," as described by Fitts (1965), either high or low. As certain scales within the TSCS are highly correlated, both for the original validation groups as well as the groups studied here, only six major areas (SC, T/F, Tot C, Tot P, Tot V, & D) plus the six empirical scales will be reviewed.

Individuals in the "well" group, compared to those in the "sick" group described themselves as slightly more defensive and less open to criticism (SC score, $p < .05$) and more balanced in regard to

differentiation of what is self and elimination of what is not self (T/F ratio, $p < .005$). Additionally, those in the "well" group had less conflict in self perception in regard to affirmation or denial of either positive or negative attributes (Tot C, $p < .001$).

On all positive self perception scores the "sick" group consistently scored lower. All positive scores, except Social Self were initially significant at $p < .001$. No one area of self perception received a disproportionately high or low distribution of scores for either group. Additionally, the self perception scores of the "sick" group showed more variability and inconsistency. All three variability measures including Tot V were initially significant. There was little difference in the distribution scores (D) between the groups; there was no initial significance.

With regards to interpretation of the empirical scales, the "well" group seemed to consistently score more favorably. All empirical scales except Psychotic were initially significantly different at $p < .005$. Comparable to the lower SC score, the "well" group was slightly higher on Defensive Position, a subtle measure of defensiveness. The "sick" group had higher scores on Personality Disorder and Neurotic scales. Compared to the standardization population (Fitts, 1965), the scores for the "sick" group on General Maladjustment and Neuroticism are near the 80th percentile. On Personality Integration, a positive index, the "well" group had a higher mean.

Discriminant Function Analysis

A multiple discriminant function analysis with 1.86 degrees of freedom compared the subjects in the two groups. Table I lists all

initial predictors with F-value and significance levels at F step-0. Many of the variables, as presented earlier, were significant at $\leq .001$ level of probability in the initial discrimination of the groups.

Five variables were selected in the final prediction system for classification of the subjects into one of the two groups. The order of selection of F values to enter each variable in the discriminant function, and the F values for the final prediction system are presented in Table II. All variables in the final prediction system were significant at a probability level of .05 or less. Of the variables not included in the system, none contributed to the remaining variance at a $\leq .05$ level of significance. The variables in the final prediction system, in the order of their selection, were Langner, Total Variability (TSCS), T/F Ratio (TSCS, Neurotic (TSCS), and Social Assets.

TABLE II
SELECTION ORDER AND SIGNIFICANCE LEVELS
FOR FINAL PREDICTION SYSTEM

| # | Variable | F-Step 0 | F-entered | F-Step 5 |
|-----|---------------|----------|-----------|-----------|
| 2. | Langner | 65.53 | 65.53 | 12.70 *** |
| 20. | Tot V | 40.09 | 24.17 | 14.63 *** |
| 8. | T/F | 11.03 | 8.70 | 13.03 *** |
| 33. | Neurotic | 30.42 | 9.87 | 9.40 ** |
| 5. | Social Assets | 47.68 | 8.24 | 8.24 ** |

df = 1.82

*** = $p \leq .001$

** = $p \leq .005$

The proportions of subjects classified the same as their original group assignment, based on this prediction system, are given in Table III. Only two of the subjects were classified differently; these were both individuals originally grouped as "sick" and now classed as more like the "well" group. Eighty-three percent of the subjects were correctly classified at a probability of .80 or better. At a probability of classification of .95 or better, 60% of the subjects were assigned to their original group.

TABLE III
 FREQUENCY DISTRIBUTION OF PROBABILITY
 OF CLASSIFICATION OF "WELL"
 AND "SICK" GROUPS

| Probability of Classification | Original Group Classification | Well | | Sick | |
|----------------------------------|----------------------------------|----------|----------|----------|----------|
| | | Well | Sick | Well | Sick |
| .95 - 1.00 | | 28 | 0 | 1 | 25 |
| .90 - .94 | | 6 | 0 | 0 | 4 |
| .85 - .89 | | 3 | 0 | 0 | 2 |
| .80 - .84 | | 3 | 0 | 0 | 2 |
| .75 - .79 | | 3 | 0 | 0 | 1 |
| .70 - .74 | | 1 | 0 | 0 | 2 |
| .65 - .69 | | 1 | 0 | 0 | 2 |
| .60 - .64 | | 0 | 0 | 1 | 1 |
| .55 - .59 | | 0 | 0 | 0 | 0 |
| .50 - .54 | | <u>1</u> | <u>0</u> | <u>0</u> | <u>0</u> |
| TOTAL | | 46 | 0 | 2 | 40 |

TABLE III (Continued)

| | |
|-----------|--|
| Well/Well | = member of the Well group classified as a member of the Well group (correct classification) |
| Well/Sick | = member of the Well group classified as a member of the Sick group (misclassification) |
| Sick/Sick | = member of the Sick group classified as a member of the Sick group (correct classification) |
| Sick/Well | = member of the Sick group classified as a member of the Well group (misclassification) |

Three predictors considered to be of general importance in descriptions of differences between healthy and non-healthy functioning which were not significant ($p < .05$) in the final prediction system were LEI, Total P, and Personality Integration. Each was originally significant at F Step-0 (Table I), but did not contribute to the final prediction system. The LEI entered the prediction system at step 7, .10 level of significance. The criteria for inclusion, however, were met at step 5 and the most efficient system did not include the LEI. Both the total P and PI (from TSCS) were highly correlated with many of the other predictors, including two or more of the "best" predictors in the final prediction system. They thus could account for little of the non-overlapping proportion of variance and were not useful when added to the existing prediction system.

Cross Validation

A cross validation procedure using the final "best" prediction system was computed with the three independent samples selected for

cross validation. These groups were 1) the "good", (n=22), selected from Motar Board and Blue Key members, 2) the "psych" (n=15), obtained from patients at student mental health clinics, 3) the "med" (n=14), obtained from patients utilizing the medical services of the campus hospital. The purposes of cross validation were several fold. In general, the validity of the prediction system and its practical usefulness in the extension of classification to independent individuals may be observed. Here, the predictors obtained from two self-report groups, defined by paper and pencil questionnaires, were extended to individuals in three groups defined by independent self selection criteria.

Table IV shows a frequency distribution of the probabilities of classification into either the "well" or "sick" category for each of the three groups. In regards to the majority of classification, 86% in the "good" group were classified as "well", 87% of those in the "psych" group were classified as "sick", and 57% of those in the "med" group more closely resembled the "well" group.

TABLE IV
FREQUENCY DISTRIBUTION OF PROBABILITY
OF CLASSIFICATION OF CROSS
VALIDATION GROUPS

| Probability of Classification | Frequency | | | | | | | |
|----------------------------------|----------------------------------|------|------|-------|------|------|------|--|
| | Original Group Classification | Good | | Psych | | Med | | |
| | | Well | Sick | Well | Sick | Well | Sick | |
| .95 - 1.00 | 10 | 1 | 1 | 7 | 4 | 3 | | |
| .90 - .94 | 4 | 0 | 0 | 4 | 1 | 1 | | |

TABLE IV (Continued)

| | | | | | | |
|-----------|----------|----------|----------|----------|----------|----------|
| .85 - .89 | 1 | 0 | 0 | 2 | 0 | 0 |
| .80 - .84 | 0 | 0 | 0 | 0 | 0 | 1 |
| .75 - .79 | 0 | 0 | 1 | 0 | 1 | 0 |
| .70 - .74 | 2 | 0 | 0 | 0 | 0 | 1 |
| .65 - .69 | 1 | 1 | 0 | 0 | 0 | 0 |
| .60 - .64 | 0 | 1 | 0 | 0 | 1 | 0 |
| .55 - .59 | 1 | 0 | 0 | 0 | 1 | 0 |
| .50 - .54 | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> |
| TOTAL | 19 | 3 | 2 | 13 | 8 | 6 |

A description of each of these groups on the basis of means and standard deviations may be observed from Appendix K. In general, most scores are in the intuitive direction, high or low in relation to the "sick" and "well" groups.

To adequately compare the groups in regards to their representation on the different measures, the scores for all groups were transformed to z scores. These values are presented in Figure 1. For the sake of consistency in interpretation the z score values are represented in either positive or negative dimension in regards to the favorableness of the attribute, not necessarily in the arithmetical positive or negative calculated values. The measures selected for representation were the combined total of CMI and Health Q selection measures, the first six questionnaires and all "best" predictors in the final prediction system. One "best" predictor, the T/F ratio, was

not included as a score transformation was not appropriate for interpretation of the measure.

In the overall comparison, the scores for the "well" group can be seen to fall consistently along a positive continuum, while the "sick" group is consistently on the less favorable negative continuum. Those scores from the "psych" group followed a less consistent pattern than any of the other group scores and may be distinguished by their representation on four of the measures. The "psych" group ranked lowest in term of social class, had more complaints (Langner), and had the most negative view of themselves and their world than did any other group (Neurotic, A-B). In the cross-validation procedure, the individuals in this group were 100% classified in the "sick" group at step 1 which included only the Langner Index.

Those individuals in the "med" group, as represented by Figure 1, on the average were closely related to the "sick" scores, although overall in a more positive direction. The "med" group did not generally represent themselves with psychophysiologic complaints (Langner) and were very consistent in their self-concept (Tot V).

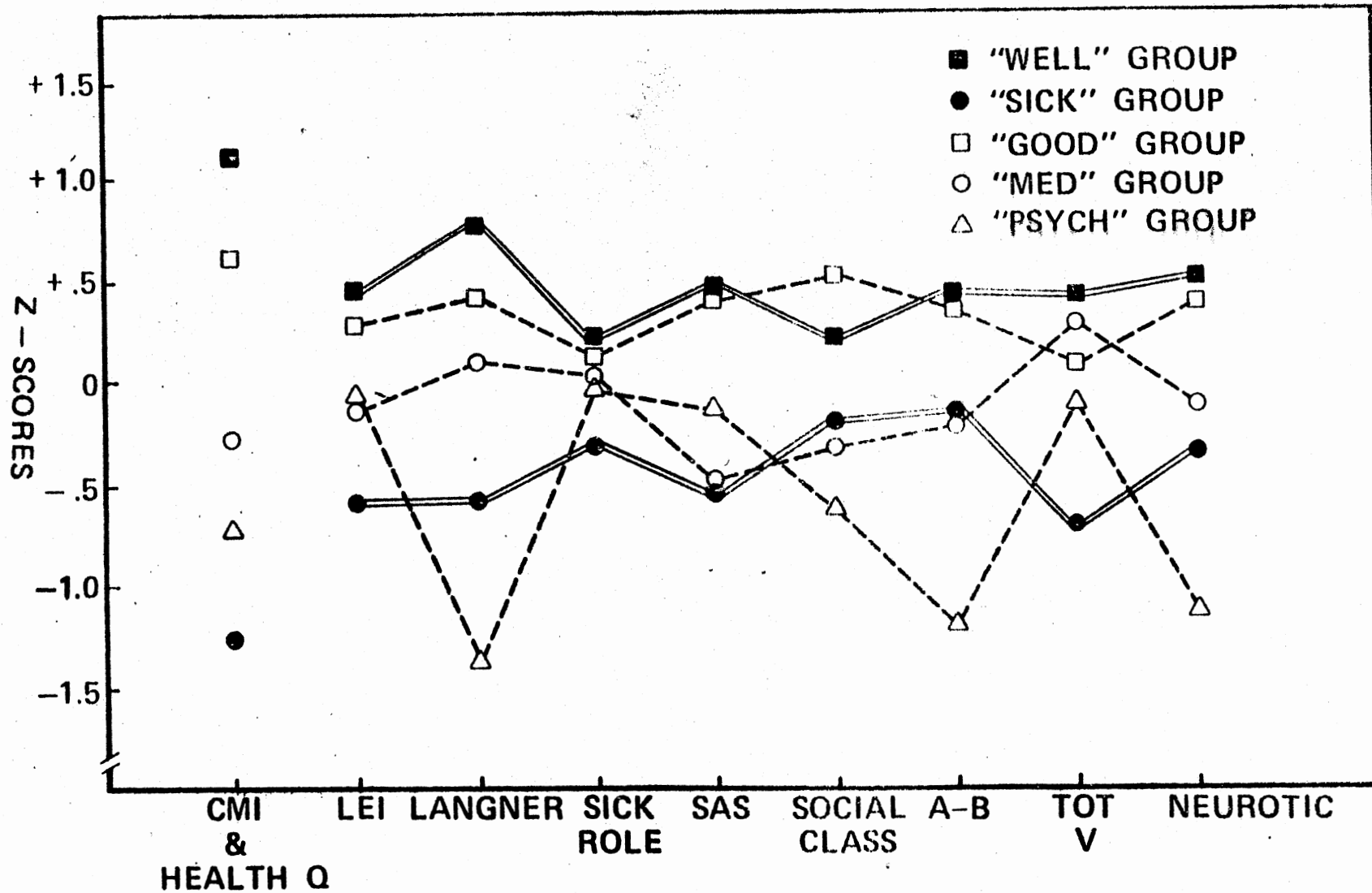


Figure 1. Z Scores for Groups on Selected Measures.

As a group the "good" individuals were distinguished by positive scores, comparable to the "well" group. They demonstrated high coping assets (SAS), the highest social class, and a positive view of themselves and the world (Neuroticism, A-B).

A separate presentation of association between health symptom report (CMI and Health Q scores) and each of the predictors is listed in Appendix L. All significant correlations with each variable are presented by groups. These two questionnaires seemingly elicited different types of retrospective reporting of symptom in that some of the predictors correlated with one of the screening measures, but not the other.

CHAPTER V

DISCUSSION

Two student groups, a "well" and a "sick" group, originated on the basis of health symptom report, were described with five "best" predictors of membership from 34 original predictor variables. This large number of variables allowed for the inclusion of a variety of factors which various researchers have investigated, yet not simultaneously. Twenty-six of the 34 variables were initially significantly different ($p < .05$), very consistent with previous research. However, in the discriminant function analysis, which serves to remove those variables which most completely account for the variability between groups, five variables were selected (Langner, Tot V, T/F, Neurotic, Social Assets). These "best" predictors must be interpreted in the context of the variables available in the prediction system and in consideration of the population of origin.

Variables were obtained from four broad areas of interest. These will be discussed as to contribution to the final system. The concept of stressful events has been popularized as a significant contributor or predictor in physical illness (Holmes and Rahe, 1967; Rahe, Mahan & Arthur, 1970). Yet, while a significant variable between groups, the LEI was not a "best" predictor. The LEI has not received as much investigation as the Rahe and Holmes Social-Readjustment Rating Scale, perhaps the best known paper and pencil measurement of stressful

events, however, it is essentially a refined version of the Readjustment Scale, and should provide similar reliability. While clinical impressions and case history examples (Lewis and Lewis, 1972; Mechanic, 1968) theoretically demonstrate the importance of stress, the research literature seems to support stressful events as of major importance mainly in severely debilitating disorders (Rahe, 1969). The individuals in the present cases were identified by symptom complaint, that is, retrospective recall of illness, instead of actual incidence and severity. Indeed, all were relatively healthy, in that they were able to actively pursue college coursework. There was a tendency for stressful events to be positively associated with recall of illness only in the "psych" and "med" groups (Appendix L). Thus, while stressful events may be an important indicator of potential difficulty, in retrospective analysis with individuals who are not currently disabled, other factors appear as stronger predictors of difficulty. This is not to discount the effect of subjectivity felt stress as a longitudinal contributor to the breakdown of the organism, yet in identification of potential difficulty there seems to be many other potent and accessible indices.

The ability to cope with stress has also been discussed as a concomitant factor in determining physical breakdown of the organism (Luborsky et al., 1973). Interpreted as a measure of social status factors (SAS) or as socio-economic status (Hollingshead, 1957), both indicators were significant between groups. These factors were highly correlated and in the discriminant function the scale with greater variability (SAS) was the better predictor. The Social Assets Scale is multifaceted and therefore taps a variety of social assets, not

just socio-economic status. Here, those individuals with low symptom report (the "well" and the "good") had the higher social assets, consistent with reviewed literature. The fact that Social Assets could contribute significantly to a nonoverlapping portion of the variance in a battery already containing psychological indices of distress, suggests that future consideration should be given to the individual who not only experiences distress but lacks the social resources to cope with that distress. Those without social resources may become the individuals with chronic difficulty unless they can receive help from sources outside of themselves and their families.

The four other "best" predictors can all be reviewed as reflecting primarily symptom report of psychologic discomfort and general self-concept. The Langner index efficiently categorized those individuals who readily admitted to psychological distress, as demonstrated by the classification of 100% of the psych group at Step 1. For two of the cross validation groups, the "med" and the "good", the Langner was highly positively correlated with the physical symptom selection criteria. In general it seems the increase in admission of physical symptom is accompanied by a corresponding increase in admission of psychiatric symptoms. This effect does not seem to hold consistent for the actual experience of physical disorder as the "med" group was not accompanied by a corresponding increase in psychiatric symptoms.

From the TSCS, the Neurotic, T/F ratio and Tot V were efficient in distinguishing the symptom report group. The observed differences on the Neurotic are intuitive in that they are consistent with admissions of difficulty or lack of difficulty in other areas. The self

concept score itself was not in the final analysis a best predictor. While Fitts (1965) suggests that self-concept is an important attitude in research batteries, the TSCS contains such a high degree of overlap and correlation on the various scales, that major contributions from more than one self-concept scale is very unlikely. Although the empirical scales (Neurotic is one) hold promise in research studies, in general, the TSCS was not an efficient measure for the present study. The same type of information was more readily available in other measures.

The actual role of Tot V and T/F, originated as measures of response set, are more difficult to understand. The observed differences are consistent with Fitts' sample data for his psychiatric patient group (Appendix M). These indices may represent significant response styles in paper and pencil measures of individuals high in symptomatology. For both scales, the more favorable scores were associated with less symptom report. The consistency with Fitts' data (1965) suggest these variables may be stable tendencies, and not merely an artifact of the present sample, although more evidence should be accumulated from other similar investigations before use as a reliable response style predictor.

The Sick Role did not emerge as a best predictor, although some promise for future research is suggested by the initial significance. While the concept of sick role seems a viable one, it is suggested that the evaluation needs greater refinement; there seems to be enough evidence to justify the effort. However, unless the measurement techniques can be strengthened, this concept may remain a clinical impression, and not a viable arithmetical indice in a research battery.

These predictors of dysfunction were generated from two symptom complaint groups. While symptom report differs from actual incidence of illness, including willingness to admit distress, remember, or emphasize such difficulties, reporting of symptoms has been used by others as predictors of future health behavior (Cassel, 1970; Thurlow, 1967). The cross validation groups served to evaluate the useful potential of the predictors generated from symptom report to individuals actively engaged in help seeking ("med" or "psych") and therefore admission of distress, and to those recognized for their achievements and success, and, therefore, lack of distress. Not surprisingly, the individuals in the high achievement group ("good") were most consistently classified as like the "well" group, both low in terms of psychological symptomatology and high in Social Assets. As four of the five predictors were psychological in nature it is also not surprising that the "psych" group was classified as most like the "sick" group, on the commonality of admission of psychological difficulty. As the individuals from the "med" group were classified almost equally between the "well" and "sick" group (Table IV), this interpretation lends itself to more speculation.

The individuals in the "med" group endorsed fewer physical symptoms, their correspondingly lower endorsement of psychological symptoms may simply reflect consistency (within the individual) of reporting symptoms. An alternative explanation suggests differences in the phenomenological experience of this group. Once the individual has defined his distress as physical, it has been diagnosed and treated, the individual may more readily assign any and all perceived discomfort to the current (mild and non life-threatening) physical distress.

Perhaps the most fruitful view, in terms of future research application, is the idea that the medical population seeking services may be grouped according to these criterion into a "well" and a "sick" group. That is, although both complain of physical difficulties, in order to adequately treat these individuals, attention must be given to the secondary difficulties and resources which these individuals bring with them to treatment; and which will, ultimately, affect the outcome of treatment. Often the severity of an illness, the debilitating consequences, and the rate of recovery are a direct reflection of these psychological and coping resources.

George Engel assessed the state of psychosomatic medicine as being "merely a cliché" to which only lip service is paid (1962). With a quick screening battery, administered while the patients are waiting, the physician would have access to a more complete view of the person and could attempt to treat the whole person. Prediction of future health difficulty from such a battery may hold promise, yet there are immediate benefits to be had in application to current physical difficulties. Some individuals will need more explanation and more resources than just a diagnosis to effectively cope with their difficulty. A similar battery would readily identify these individuals.

Another broader application to such a battery would be as an aid in differential diagnosis. Many of the individuals who come to clinics may have the same symptom complaint, yet with careful examination, may differ widely as to actual difficulty, subsequent treatment and prognosis. Pain clinics serve as an outstanding example of this type of difficulty. Individuals with the same type of pain complaint are most effectively treated, not on the basis of their

pain symptoms, but as a member of one of several currently espoused diagnostic subgroups. A highly trained research team is usually needed to effect this diagnosis. Once the characteristics of the different groups are defined, the addition of a screening battery would greatly aid in the consistency and efficiency of such diagnostic approaches.

Summary

In using a battery approach to assess physical symptom complaint, the factors which most completely accounted for the variance between groups were psychological symptom complaint (Langner and Neurotic), resources available for coping with difficulty (SAS) and two indices which may reflect characteristic response style (T/F and Tot V). These five factors were extended to cross-validation groups defined on the basis of current involvement with distress or difficulties. These were medical distress, psychological distress, or lack of distress in high achievers. Cross validation served as an aid in evaluation of these five predictors for useful application.

Individuals that were identified as achievers were readily classified in the "well" group due to a lack of admission of difficulty, either psychological or physical, as well as having greater social resources to cope with difficulties. This battery thus would seem useful to identify those individuals that will most likely have few difficulties.

This battery would serve to identify and classify individuals with potential psychological problems most frequently in the "sick" group; however, the Langner index alone is the most efficient in-

strument for this. Individuals in the "sick" group seemed to lack some of the same social resources, and felt some of the same psychological distress, although to a lesser degree, as the individuals in the "psych" group.

In general, actual physical illness of a mild nature was not readily identifiable or predictable from this symptom battery. Individuals were classified nearly equally in terms of "well" or "sick" groups. Rather than a deficit in the symptom battery, the suggestion was made that this dichotomy may actually represent the make-up of the population with mild physical distress. If this dichotomy does exist, this type of information, especially in terms of social coping resources, and psychological distress, would serve as a valuable aid in treatment of the whole person.

Thus, a battery of this nature can aid in identifying those individuals which have a high potential for difficulty, not necessarily physical in nature. This type of battery does not seem able to efficiently predict those individuals who will have physical distress versus those individuals who will define their problems as psychological. In this case, admission of psychological problems was tantamount to being classified as "sick" or in the high complaint group. The complaint of psychological difficulty and physical difficulty seem to be similar phenomenon, but certainly differ from the experience of those individuals who seek treatment for the physical difficulty.

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APPENDIX A

FREQUENCY DISTRIBUTION OF CRITERION
SELECTION SCORES

 Frequency

| Range | Male | Female | Total |
|---------|------|--------|-------|
| 1-4 | 2 | 3 | 5 |
| 5-9 | 8 | 3 | 11 |
| 10-14 | 15 | 8 | 23 |
| 15-19 | 12 | 15 | 27 |
| 20-24 | 9 | 13 | 22 |
| 25-29 | 8 | 14 | 22 |
| 30-34 | 5 | 17 | 22 |
| 35-39 | 5 | 9 | 14 |
| 40-44 | 6 | 9 | 15 |
| 45-49 | 6 | 9 | 15 |
| 50-54 | 3 | 14 | 17 |
| 55-59 | 3 | 10 | 13 |
| 60-64 | 6 | 9 | 15 |
| 65-69 | 2 | 7 | 9 |
| 70-74 | 1 | 2 | 3 |
| 75-79 | 2 | 1 | 3 |
| 80-84 | 1 | 5 | 6 |
| 85-89 | 1 | 0 | 1 |
| 90-94 | 0 | 2 | 2 |
| 95-99 | 1 | 2 | 3 |
| 100-104 | 0 | 0 | 0 |
| 105-109 | 0 | 2 | 2 |
| TOTAL | 96 | 154 | 250 |

Well Group, N=46, 18% of total sample, taken from the bottom 26% of the sample.

Sick Group, N=42, 17% of total sample, taken from the top 28% of the sample.

APPENDIX B

CMI AND HEALTH Q MEANS AND
STANDARD DEVIATIONS

| | \bar{x} | S _D | Range | Median |
|--------------------------|-----------|----------------|-------|--------|
| Subjects Sampled (N=250) | | | | |
| M(N=96) | | | | |
| CMI | 16.14 | 12.61 | | |
| Health Q | 16.14 | 12.91 | | |
| Combined Scores | 31.97 | 22.06 | 4-96 | 26 |
| F(N=154) | | | | |
| CMI | 22.64 | 14.50 | | |
| Health Q | 18.05 | 11.23 | | |
| Combined Scores | 40.50 | 22.39 | 3-106 | 37 |
| Overall Total | 37.31 | 22.53 | | 33 |
| Well Group (N=46) | | | | |
| M Combined Scores (N=22) | 11.63 | 3.72 | 4-18 | 11.5 |
| F Combined Scores (N=24) | 13.79 | 4.98 | 3-20 | 14 |
| Overall Total | 12.76 | 4.48 | | 13 |
| Sick Group (N=42) | | | | |
| M Combined Scores (N=12) | 68.58 | 14.91 | 48-96 | 66.5 |
| F Combined Scores (N=30) | 67.66 | 14.18 | 50-98 | 65 |
| Overall Total | 67.93 | 14.22 | | 64 |

APPENDIX C

HEALTH SYMPTOM FREQUENCY QUESTIONNAIRE

HEALTH QUESTIONNAIRE

Below are several frequently encountered illnesses and injuries. Circle the number of times you have had each difficulty over the past year (that is, from September, 1973 to the present). Try to be as accurate as you can. Circle the appropriate frequency.

Fractures and/or broken bones:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Sprains; accidental falls, with discomfort, bruises:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Backaches:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Stiff necks or other stiff muscles:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Burns requiring treatment:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Gum infections:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Toothaches:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Bronchitis and/or pneumonia:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Sore throat (for 24 hours or more):

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Chest colds (Chest congestion, coughing, general discomfort, for 24 hours or more)

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Head colds or nasal flu (Nasal congestion, headache, runny nose or sneezing, general discomfort for 24 hours or more):

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Sinusitis (severe nasal and sinus congestion for a week or more):

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Ear aches:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Migraine (severe headaches):

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Stomach or intestinal illness (Nausea, vomiting, or diarrhea for 24 hours or more):

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Constipation or diarrhea (not associated with flu):

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Rashes requiring treatment:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Eye disorders requiring treatment:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Mononucleosis:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Gland disorders (not associated with mononucleosis):

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Urinary or vaginal disorders:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Vitamin deficiencies:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Cysts:

none once twice 3-4 times 5-6 7-8 9-10 more than 10

Other ailments:

| <u>Type</u> | <u>Frequency</u> |
|-------------|------------------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

On the average how frequently during the past school year did you use the facilities of the OSU Hospital (or a regular doctor)

- | | |
|-------------------------|---------------------------|
| (1) never | (4) about once a month |
| (2) once or twice | (5) every two-three weeks |
| (3) three or four times | (6) once a week |

Were you hospitalized for any period of time during the past school year

- | | |
|---------------------------|-------------------------|
| (1) not at all | (4) for about two weeks |
| (2) for two to three days | (5) two to four weeks |
| (3) for a week | (6) over a month |

How much school time did you miss due to illness

- | | |
|---------------------|------------------------------------|
| (1) none | (4) two to three weeks |
| (2) one or two days | (5) a month or more |
| (3) at least a week | (6) had to drop out due to illness |

APPENDIX D

LIFE EVENTS INVENTORY

Below is a list of events which people may experience at one time or another. Place a check beside those events, if any, which have occurred to you within the past year. (Scoring weights included)

- 1 (66) Unemployment (of head of household)
- 2 (39) Trouble with superiors at work
- 3 (29) New job in same line of work
- 4 (50) New job in new line of work
- 5 (28) Change in hours or conditions in present job
- 6 (40) Promotion or change of responsibilities at work
- 7 (52) Retirement (of head of household)
- 8 (41) Moving house
- 9 (40) Purchasing own house (taking out mortgage, parents)
- 10 (16) New neighbors
- 11 (23) Quarrel with neighbors
- 12 (35) Income increased substantially (25%)
- 13 (60) Income decreased substantially (25%)
- 14 (67) Getting into debt beyond means of repayment
- 15 (27) Going on holiday
- 16 (20) Conviction for minor violation (e.g. speeding or drunkenness)
- 17 (72) Jail sentence
- 18 (31) Involvement in fight
- 19 (63) Immediate family member starts drinking heavily
- 20 (66) Immediate family member attempts suicide
- 21 (56) Immediate family member sent to prison
- 22 (67) Death of immediate family member
- 23 (54) Death of close friend

- 24 (55) Immediate family member seriously ill
- 25 (42) Gain of new family member (immediate)
- 26 (59) Problems related to alcohol or drugs
- 27 (45) Serious restriction on social life
- 28 (51) Period of homelessness (Hostel or sleeping rough)
- 29 (63) Serious physical illness or injury requiring hospital treatment
- 30 (48) Prolonged ill health requiring treatment by own doctor
- 31 (58) Sudden and serious impairment of vision or hearing
- 32 (70) Unwanted pregnancy
- 33 (65) Miscarriage
- 34 (63) Abortion
- 35 (58) Sex difficulties
- 36 (51) Break up with steady boy or girl friend
- 37 (54) Problems related to sexual relationship
- 38 (43) Increase in number of family arguments (e.g. with parents)
- 39 (77) Break up of family

APPENDIX E

LANGNER INVENTORY

SYMPTOM INVENTORY

Check the responses that most nearly applies to you.
(* indicates pathognomonic responses).

1. I feel weak all over much of the time

 * yes

 no

2. I have had periods of days, weeks, or months when I couldn't take care of things because I couldn't "get going".

 * yes

 no

3. In general, would you say that most of the time you are in high (very good) spirits, good spirits, low spirits, or very low spirits?

 high

 good

 * low

 * very low

4. Every so often I suddenly feel hot all over.

 * yes

 no

5. Have you ever been bothered by your heart beating hard? Would you say: often, sometimes, or never?

 * often

 sometimes

 never

6. Would you say your appetite is poor, fair, good or too good?
- poor
- fair
- good
- too good
7. I have periods of such great restlessness that I cannot sit long in a chair (cannot sit still very long).
- yes
- no
8. Are you the worrying type (a worrier)?
- yes
- no
9. Have you ever been bothered by shortness of breath when you were not exercising or working hard? Would you say: often, sometimes, or never?
- often
- sometimes
- never
10. Are you ever bothered by nervousness (irritable, fidgety, tense)? Would you say: often, sometimes, or never?
- often
- sometimes
- never
11. Have you ever had any fainting spells (lost consciousness)? Would you say: never, a few times, or more than a few times?
- never
- a few times
- more than a few times

12. Do you ever have any trouble in getting to sleep or staying asleep?
Would you say: often, sometimes, or never?

 * often

 sometimes

 never

13. I am bothered by acid (sour) stomach several times a week.

 * yes

 no

14. My memory seems to be all right (good).

 yes

 * no

15. Have you ever been bothered by "cold sweats"? Would you say:
often, sometimes, or never?

 * often

 sometimes

 never

16. Do your hands ever tremble enough to bother you: Would you say:
often, sometimes, or never?

 * often

 sometimes

 never

17. There seems to be a fullness (clogging) in my head or nose much
of the time.

 * yes

 no

18. I have personal worries that get me down physically (make me
physically ill).

 * yes

 no

19. Do you feel somewhat apart even among friends (apart, isolated, alone)?

 * yes

 no

20. Nothing ever turns out for me the way I want it to (turns out, happens, comes about, i. e., my wishes aren't fulfilled).

 * yes

 no

21. Are you ever troubled with headaches or pains in the head? Would you say: often, sometimes, or never?

 * often

 sometimes

 never

22. You sometimes can't help wondering if anything is worthwhile anymore.

 * yes

 no

APPENDIX F

AFFECT-BALANCE QUESTIONS

Check all that apply:

During the past few weeks, did you ever feel:
(Scoring indicated)

- 1 (+) Pleased about having accomplished something
- 2 (+) That things were going your way
- 3 (+) Proud because someone complimented you on something you had done
- 4 (+) Particularly excited or interested in something
- 5 (+) On top of the world
- 6 (-) So restless that you couldn't sit long in a chair
- 7 (-) Bored
- 8 (-) Depressed or very unhappy
- 9 (-) Very lonely or remote from other people
- 10 (-) Upset because someone criticized you

APPENDIX G

SICK ROLE QUESTIONS

Please circle your response to the following items:

- (1) if strongly agree circle SA
- (2) if agree circle A
- (3) if disagree circle D
- (4) if strongly disagree circle SD

- SA A D SD a. People can overcome bad luck if they try.
- SA A D SD b. Events usually take their own course no matter what you do.
- SA A D SD c. Good health is more a matter of luck than what a person does about his health.
- SA A D SD d. In most situations, a person can control what happens.
- SA A D SD e. Most often it is not possible to prevent sickness - if you are going to be sick, you will be sick.
- SA A D SD f. If you work at it, you can stay in good health.

During the past school year when would you have reported to the University health service given the following hypothetical situations.

1. You had been feeling generally tired and run down for a few days.
 - (1) Certainly
 - (2) Probably
 - (3) Not very likely
 - (4) Very unlikely
2. Your stomach had been feeling upset for awhile.
 - (1) Certainly
 - (2) Probably
 - (3) Not very likely
 - (4) Very unlikely
3. You had experienced a sudden onset of diarrhea.
 - (1) Certainly
 - (2) Probably
 - (3) Not very likely
 - (4) Very unlikely
4. You felt you had a temperature of about 100 degrees.
 - (1) Certainly
 - (2) Probably
 - (3) Not very likely
 - (4) Very unlikely
5. You had been feeling an overall achiness and stiffness.
 - (1) Certainly
 - (2) Probably
 - (3) Not very likely
 - (4) Very unlikely

6. You had been unable to hold any food without vomiting.
- (1) Certainly
 - (2) Probably
 - (3) Not very likely
 - (4) Very unlikely

APPENDIX H

SOCIAL ASSETS SCALE

Sex

name or number

Social Information Form

These are items of general information covering a various number of topics. Each item has a specific reason for inclusion. Please give careful consideration to each question and answer by checking the response that most nearly applies to you. (Scoring weights included).

1. How would you describe your school record?

- | | |
|--------------------------|---------------------------------|
| (1) <u>1.5</u> excellent | (4) <u>1.0</u> barely passing |
| (2) <u>1.0</u> good | (5) <u>2.0</u> frequent failure |
| (3) <u>0</u> fair | |

2. What is your father's occupation _____.
Under which of the following categories would you classify it.

- | |
|--|
| (1) <u>2</u> professional |
| (2) <u>1</u> proprietor - small business |
| (3) <u>.5</u> white-collar worker |
| (4) <u>.5</u> student |
| (5) <u>0</u> blue-collar (skilled worker) |
| (6) <u>0</u> retired |
| (7) <u>0</u> unemployed - works at home - not seeking work |
| (8) <u>-1.0</u> unskilled laborer |
| (9) <u>-2.0</u> unemployed |

3. What is your mother's occupation _____.
Under which of the following categories would you classify it.

- | |
|---|
| (1) <u>2</u> professional |
| (2) <u>1</u> proprietor - small business |
| (3) <u>.5</u> white-collar worker |
| (4) <u>.5</u> student |
| (5) <u>0</u> blue-collar (skilled worker) |
| (6) <u>0</u> retired |
| (7) <u>0</u> housewife |
| (8) <u>-1.0</u> unskilled laborer |
| (9) <u>-2.0</u> unemployed |

4. What is your race?

- | |
|---------------------------------|
| (1) <u>0</u> white |
| (2) <u>-1.5</u> black |
| (3) <u>-1.0</u> oriental |
| (4) <u>-1.0</u> American Indian |
| (5) <u>-1.0</u> other |

5. How far did your parents advance in school? (check the highest level achieved by each)

| Mother | Father | |
|-------------|-------------|---------------------------|
| <u>2.0</u> | <u>2.0</u> | (1) graduate degree |
| <u>1.5</u> | <u>1.5</u> | (2) some graduate school |
| <u>1.0</u> | <u>1.0</u> | (3) college graduate |
| <u>.5</u> | <u>.5</u> | (4) some college |
| <u>0</u> | <u>0</u> | (5) high school graduate |
| <u>-1.0</u> | <u>-1.0</u> | (6) some high school |
| <u>-1.5</u> | <u>-1.5</u> | (7) finished grade school |
| <u>-2.5</u> | <u>-2.5</u> | (8) some grade school |
| <u>-3.0</u> | <u>-3.0</u> | (9) no grade school |

6. What is your family's approximate total annual income? (not part of original scale)

| | |
|---------------------------------------|---------------------------------------|
| (1) <u> </u> under \$3,000 | (6) <u> </u> \$15,001 - \$20,000 |
| (2) <u> </u> \$3,001 - \$5,000 | (7) <u> </u> \$20,000 - \$50,000 |
| (3) <u> </u> \$5,001 - \$7,000 | (8) <u> </u> over \$50,000 |
| (4) <u> </u> \$7,001 - \$10,000 | (9) <u> </u> don't know |
| (5) <u> </u> \$10,001 - \$15,000 | |

7. Regarding parents

| Mother | Father | |
|-------------|---------------|---------------------------------------|
| <u>0</u> | <u> </u> | (1) living |
| <u>0</u> | <u> </u> | (2) died when I was over 20 years old |
| <u>-1.0</u> | <u> </u> | (3) died when I was 16-20 years old |
| <u>-1.5</u> | <u> </u> | (4) died when I was 10-15 years old |
| <u>-2.0</u> | <u> </u> | (5) died when I was 6-9 years old |
| <u>-2.5</u> | <u> </u> | (6) died before I was 6 years old |

8. What is your parents' marital status?

.5 My parents are living together
yes no

If "no", my parents were separated when I was
-.5 over 20 years old
-1.0 16-20 years old
-1.0 10-15 years old
-2.0 6-9 years old
-2.0 before I was 6 years old

9. Do you now have a step-parent:

yes no

10. How many times have you moved within the last year?
- (1) 0 have not moved (5) -2.0 four, five or six times
 (2) 0 one time (6) -2.5 seven, or more times
 (3) -.5 two times
 (4) -1.5 three times
11. How was your health in early childhood?
- (1) 1 good
 (2) 0 fair
 (3) -2.0 poor
12. When you were growing up, did you parents have trouble finding money for necessities?
- (1) -2.0 often
 (2) -1.0 sometimes
 (3) 0 rarely
13. When you were growing up, did your mother have to work outside of the home to earn money?
- (1) -1.0 yes
 (2) 0 no
14. Did your father or mother ever have the following illnesses?
 (-1.0 for each illness circled; otherwise 0 if not circled)
- | | |
|-------------------------------|-------------------------------------|
| <u> </u> arthritis | <u> </u> high blood pressure |
| <u> </u> asthma | <u> </u> neuralgia or sciatica |
| <u> </u> bladder trouble | <u> </u> nervous breakdown |
| <u> </u> colitis | <u> </u> epilepsy |
| <u> </u> diabetes | <u> </u> stomach trouble |
| <u> </u> hay fever | <u> </u> skin condition |
15. When you were growing up, were either of your parents in poor health?
- (1) -2.0 all of the time
 (2) -1.0 frequently
 (3) 0 rarely
 (4) .5 never
16. When you were growing, did your parents quarrel?
- (1) -2.0 all of the time
 (2) -1.0 frequently
 (3) 0 rarely
 (4) 0 never

17. Thinking back to the time when you were growing up, did you ever feel that

- (1) -1.0 father spends too little time with me
- (2) -1.0 mother wants to run her children's lives
- (3) -1.0 mother does not understand me
- (4) -1.0 my parents are always proud of their children

18. Job history (on basis of father's employment, or if deceased, mother's)

- (1) 1.0 Employed continuously at the same position for the last 2 years
- (2) 1.0 Employed continuously during the past 2 years, but place of employment changed
- (3) 0 Out of work sometimes for the past 2 years
- (4) 0 Unemployed in the past 2 years

19. I was born in

- (1) 0 a big city
- (2) 0 a small city (like Stillwater or Ponca)
- (3) 0 a small town
- (4) -1.0 a farm or rural area

20. Regarding social group membership:

- (1) 1.0 I am active in one or more social groups
- (2) 0 I am not very active
- (3) -.5 I belong to no social groups

21. Regarding friends:

- (1) .5 I have many close friends
- (2) .5 I have some close friends
- (3) .5 I have only a few close friends
- (4) -2.0 I have no friends

22. My family home

- (1) 1.0 is owned by the family
- (2) 0 is rented

23. Regarding an automobile:

- (1) 0 there is an automobile available for family use
- (2) -1.0 there is no automobile available

24. Television

- (1) 0 we have a television at home
- (2) -1.0 we have no television at home

25. How would you describe your physical condition?
- (1) 1.5 my physical health is usually very good
 - (2) 1.0 my physical health is usually good
 - (3) 0 I am occasionally ill
 - (4) -1.0 I am frequently ill
 - (5) -2.0 I am chronically ill
26. In regards to cigarette smoking
- (1) 0 I do not smoke
 - (2) -.5 I smoke 5-10 cigarettes per day
 - (3) -.5 I smoke 11-20 cigarettes per day
 - (4) -2.0 I smoke a pack a day
 - (5) -2.0 I smoke 20-30 cigarettes per day
 - (6) -2.5 I smoked 2 packs or more in the past 2 days
27. Were you disabled by illness or accident:
- (1) 0 for periods of less than one week
 - (2) -.5 for periods of less than one month
 - (3) -1.5 for as long as six weeks
 - (4) -2.5 continuously
28. If unmarried, are you:
- (1) 1.0 engaged
 - (2) 1.0 going steady
 - (3) .5 dating several (men, women) frequently
 - (4) -1.0 dating several (men, women) infrequently
 - (5) -1.5 no dating
29. Interest including work
- (1) 2.0 I have several major interests which are consistently absorbing and extremely gratifying.
 - (2) 1.0 I have a number of interests which are usually interesting and enjoyable
 - (3) 0 I have one major interest which is usually absorbing and satisfying.
 - (4) 0 I have a number of interests which occupy me from time to time, with a good deal of shifting from one area to another.
 - (5) -1.0 I find it difficult to maintain an interest in anything for an extended period of time.
-

All items pertaining to marriage; e. g. spouse and children were dropped from the scale; all subjects were single.

Score range -59 to +18

APPENDIX I

PREDICTOR VARIABLES

1. Life Events Inventory (LEI)
2. Langner Psychiatric Inventory
3. Affect-Balance Score
4. Sick-Role
5. Social Assets (SAS)
6. Social Class
(All remaining from TSCS)
7. Self Criticism (SC)
8. True/False Ratio (T/F)
9. Net Conflict (Net C)
10. Total Conflict (Tot P)
11. Total Positive (Tot P)
12. Identity (I)
13. Self-Satisfaction (S Sat)
14. Behavior (B)
15. Physical Self (Phy S)
16. Moral-ethical Self (MS)
17. Personal Self (Per S)
18. Family Self (FS)
19. Social Self (Soc S)
20. Total Variability (Tot V)
21. Column Variability (Col V)
22. Row Variability (Row V)
23. Distribution (D)
24. Number of $\bar{5}$'s
25. Number of $\bar{4}$'s
26. Number of $\bar{3}$'s
27. Number of $\bar{2}$'s
28. Number of $\bar{1}$'s
29. Defensive Position (DP)
30. General Maladjustment (GM)
31. Psychotic (Psy)
32. Personality Disorder (PD)
33. Neurotics (N)
34. Personality Integration (PI)

APPENDIX J

COVER LETTER

Enclosed you will find several different questionnaires you are being asked to complete. There is no precise order in which to proceed with the tests; however, try to complete all the material at one time within the next day or two. It should take you about thirty minutes to an hour. These questionnaires contain some personal questions about your health, what has happened to you and how you feel about yourself. It is important that you answer these items as accurately and honestly as you can. Each item is important because it reflects a different aspect of who you are as a person. This study, hopefully, will result in better understanding of how emotions and physical health are related. The data will be held in strict confidence and used only for experimental purposes.

If you wish feedback please enclose a self-addressed, stamped postcard including your telephone number when you return your envelope so that your data may remain anonymous and that you may be contacted individually.

Your time and cooperation in this research endeavor will be greatly appreciated.

APPENDIX K

MEANS AND STANDARD DEVIATIONS

| Variable | Criterion Groups | | | Cross Validation Groups | |
|--------------------|------------------|----------------|----------------|-------------------------|---------------|
| | Well (N=46) | Sick (N=42) | Good (N=22) | Psych (N=15) | Med (N=14) |
| 1. LEI | | | | | |
| (x̄) | 113.07** | 273.12 | 135.82 | 118.47 | 198.86 |
| (S _D) | 73.74* | 196.95 | 100.44 | 102.77 | 124.03 |
| 2. Langner B | .93 | 4.21 | 1.68 | 6.20 | 2.50 |
| | 1.06 | 2.51 | 1.89 | 2.37 | 1.83 |
| 3. Affect Balance | 2.67 | 1.42 | 2.55 | -0.67 | 1.36 |
| | 1.51 | 1.60 | 1.84 | 1.95 | 1.98 |
| 4. Sick Role | 10.52 | 7.36 | 10.95 | 9.47 | 9.50 |
| | 4.81 | 4.64 | 4.12 | 12.30 | 4.73 |
| 5. Social Assets B | 9.09 | 3.52 | 9.09 | 5.53 | 3.54 |
| | 3.28 | 4.26 | 2.98 | 10.94 | 6.07 |
| 6. Social Class | 2.57 | 2.90 | 2.31 | 3.26 | 3.00 |
| From TSCS | .66 | .79 | .65 | .80 | 1.11 |
| 7. SC B | 34.87 | 38.21 | 37.55 | 37.87 | 35.50 |
| | 6.22 | 5.84 | 5.47 | 6.14 | 4.24 |
| 8. T/F B | .99 | 1.19 | .98 | 1.01 | .92 |
| | .21 | .34 | .22 | .36 | .20 |
| 9. Net C | -3.52 | .80 | -8.05 | -3.13 | -8.21 |
| | 11.05 | 14.44 | 10.54 | 13.89 | 13.50 |
| 10. Tot C | 25.78 | 32.48 | 24.73 | 31.47 | 26.07 |
| | 7.89 | 8.94 | 6.48 | 5.62 | 7.26 |

| | Well | Sick | Good | Psych | Med |
|------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 11. Tot P | 356.57 30.60 | 324.90 27.88 | 354.64 23.75 | 299.40 46.61 | 340.86 26.83 |
| 12. Identity | 128.37 9.76 | 120.36 9.36 | 130.77 8.14 | 110.40 17.78 | 120.86 10.31 |
| 13. S. Satisfaction | 112.28 12.97 | 99.24 12.94 | 109.73 11.54 | 92.20 17.45 | 110.00 11.06 |
| 14. Behavior | 117.22 9.89 | 105.93 9.27 | 115.36 8.69 | 96.80 13.62 | 109.79 9.60 |
| 15. Physical S | 71.02 6.02 | 65.69 8.06 | 69.45 6.54 | 60.07 10.78 | 65.64 9.80 |
| 16. Moral-ethical S | 72.41 8.27 | 65.15 7.46 | 71.18 6.56 | 64.93 8.66 | 72.43 5.53 |
| 17. Personal S | 69.96 6.60 | 60.74 9.03 | 69.59 5.98 | 54.13 11.44 | 66.29 5.70 |
| 18. Family S | 73.20 6.41 | 65.81 9.95 | 74.41 5.16 | 61.47 10.56 | 68.14 7.39 |
| 19. Social S | 71.35 7.80 | 66.33 8.73 | 70.77 5.85 | 58.80 11.42 | 68.07 7.65 |
| 20. Tot V ^B | 37.50 10.98 | 52.21 10.78 | 41.86 10.48 | 45.13 10.30 | 39.71 8.84 |

| | Well | Sick | Good | Psych | Med |
|-------------------|-----------------|-----------------|-----------------|----------------|-----------------|
| 21. Col V. | 22.59 7.26 | 30.95 7.37 | 27.45 7.22 | 25.67 7.32 | 21.71 6.52 |
| 22. Row V | 14.83 4.97 | 21.26 6.24 | 14.41 5.49 | 19.47 5.24 | 18.00 5.97 |
| 23. Distribution | 113.83 26.22 | 106.53 21.19 | 114.09 17.20 | 95.33 26.37 | 101.21 18.36 |
| 24. No. of 5's | 14.87 10.78 | 14.07 9.22 | 13.41 6.95 | 11.87 10.43 | 9.50 6.90 |
| 25. No. of 4's | 27.83 9.81 | 30.76 9.50 | 30.55 8.51 | 27.87 7.32 | 28.93 6.67 |
| 26. No. of 3's | 18.39 8.46 | 20.95 7.44 | 14.68 6.41 | 24.33 11.18 | 24.36 9.29 |
| 27. No. of 2's | 21.85 8.31 | 20.24 7.58 | 23.18 6.31 | 26.13 8.31 | 22.71 7.98 |
| 28. No. of 1's | 17.46 10.18 | 14.64 8.55 | 17.68 7.00 | 9.80 7.77 | 14.50 9.16 |
| 29. Def. Position | 57.72 10.49 | 49.76 11.85 | 52.86 12.56 | 41.80 14.22 | 55.64 13.52 |
| 30. Gen. Mal. | 97.68 8.91 | 90.86 8.44 | 99.64 5.89 | 82.00 11.95 | 92.29 9.39 |

| | Well | Sick | Good | Psych | Med |
|---------------------------|---------------|----------------|----------------|----------------|----------------|
| 31. Psychotic | 47.43 6.90 | 48.86 6.85 | 43.00 5.59 | 47.07 11.81 | 48.57 4.50 |
| 32. Per. Disorder | 78.83 9.30 | 68.12 10.17 | 77.82 9.11 | 64.47 11.51 | 76.43 5.80 |
| 33. Neurotic ^B | 86.39 8.79 | 73.38 13.10 | 85.73 9.09 | 63.13 16.36 | 77.07 11.71 |
| 34. Per. Integration | 13.54 4.62 | 9.71 4.04 | 13.82 2.94 | 7.33 3.62 | 12.86 3.32 |
| 35. Cornell | 6.11 3.31 | 37.21 11.67 | 11.28 7.38 | 32.47 13.64 | 21.14 10.54 |
| 36. Health Q | 6.65 3.25 | 30.71 11.32 | 14.18 10.18 | 23.13 11.19 | 24.93 9.19 |
| 37. Combined Tot | 12.76 4.48 | 67.93 14.22 | 25.45 17.02 | 55.60 18.53 | 46.07 16.91 |

** The first number given is the mean for that variable.

* The second number given is the standard deviation for that variable.

B = "best" predictor, used in final prediction system.

APPENDIX L

SIGNIFICANT CORRELATIONS WITH ALL GROUPS OF GROUP
SELECTION CRITERIA WITH PREDICTOR VARIABLES

| Variable | Group Membership | Cornell | Health Q | Combined Tot |
|-------------------------------|------------------|--------------------|--------------------|--------------------|
| 1. LEI | Psych | - | .615* | - |
| | Med | - | .499 ^a | - |
| 2. Langner ^B | Well | .311* | - | - |
| | Sick | .307* | - | .295 ^a |
| | Good | .889*** | .804*** | .866*** |
| | Psych | .583* | - | - |
| | Med | .958*** | .537* | .889*** |
| 3. Affect Balance | Good | -.564** | -.422 ^a | -.497* |
| 4. Sick Role | Med | -.516 ^a | - | - |
| 5. Social Assets ^B | Good | -.539** | -.539** | -.556** |
| | Med | 0.620* | - | - |
| 6. Social Class | Well | .442** | - | - |
| 7. SC | Good | - | -.404 ^a | - |
| 8. T/F ^B | Sick | .406** | -.281 ^a | - |
| 9. Net C | Sick | .399* | - | - |
| 10. Tot C | Sick | .510** | - | .380* |
| 11. Tot P | Good | -.581** | -.621** | -.623** |
| | Psych | -.496 ^a | - | - |
| | Med | -.460 ^a | - | - |
| 12. Identity | Good | -.420 ^a | -.480 ^a | -.469 ^a |
| | Psych | -.493 ^a | - | - |
| | Med | -.600* | - | -.521 ^a |
| 13. S. Sat | Good | -.540* | -.526** | -.550** |
| | Psych | -.498 ^a | - | - |
| 14. Behavior | Good | -.500* | -.570** | -.556** |
| | Psych | - | +.515* | - |
| 15. Physical S | Sick | - | - | -.289 ^a |
| | Good | -.562* | -.595** | -.600** |

| | | | | | |
|-----|-----------------------|-------|--------------------|--------------------|--------------------|
| 16. | Moral-ethical S | Well | - | .257 ^a | - |
| 17. | Personal S | Good | -.637** | -.541** | -.600** |
| | | Psych | -.523* | - | - |
| 18. | Family S | Good | -.501* | -.658** | -.611** |
| 19. | Social S | Good | -.417 ^a | - | - |
| | | Psych | -.595* | - | - |
| 20. | Tot V ^B | - | - | - | - |
| 21. | Col V | - | - | - | - |
| 22. | Row V | Psych | .555* | - | - |
| | | Med | .508 ^a | - | .540* |
| 23. | Distribution | - | - | - | - |
| 24. | No. of <u>5</u> 's | Sick | .387* | -.295 ^a | - |
| 25. | No. of <u>4</u> 's | - | - | - | - |
| 26. | No. of <u>3</u> 's | Good | .444 ^a | .443 ^a | .457 ^a |
| 27. | No. of <u>2</u> 's | Sick | .402* | -.513*** | - |
| 28. | No. of <u>1</u> 's | - | - | - | - |
| 29. | Def. Position | Good | - | -.367 ^a | -.373 ^a |
| | | Psych | -.535* | - | - |
| 30. | Gen. Mal. | Good | -.524* | -.459 ^a | -.502* |
| | | Psych | -.474 ^a | - | - |
| 31. | Psychotic | Med | .504 ^a | - | .522 ^a |
| 32. | Per Disorder | Sick | - | -.289 ^a | -.301 ^a |
| | | Good | -.406 ^a | -.469 ^a | -.457 ^a |
| | | Psych | - | .487 ^a | - |
| 33. | Neurotic ^B | Good | -.651** | -.655** | -.674** |
| 34. | Per Integration | Well | -.419** | - | -.266 ^a |
| | | Sick | -.336* | - | -.301 ^a |
| | | Good | -.448 ^a | - | -.386 ^a |

B = "Best" predictor, used in final prediction system

| | ***p .001 | **p .01 | *p .05 | ^a p .10 |
|----------------|-----------|----------|----------|--------------------|
| Well, df = 40 | r = .490 | r = .393 | r = .304 | r = .257 |
| Sick, df = 44 | r = .490 | r = .393 | r = .304 | r = .257 |
| Good, df = 20 | r = .652 | r = .537 | r = .492 | r = .360 |
| Psych, df = 13 | r = .760 | r = .641 | r = .514 | r = .441 |
| Med, df = 12 | r = .780 | r = .661 | r = .532 | r = .458 |

APPENDIX M

NORM GROUPS FOR TENNESSEE

SELF CONCEPT SCALE

| Score | Patient Group (363) | | Norm Group (626) | | PI Group (75) | |
|------------------|---------------------|------|------------------|-------|---------------|-------|
| | Mean | S.D. | Mean | S.D. | Mean | S.D. |
| Self Criticism | 36.0 | 6.8 | 35.54 | 6.70 | 36.87 | 5.98 |
| T/F | 1.17 | .40 | 1.03 | .29 | .93 | .12 |
| Net Conflict | 3.0 | 18.2 | - 4.91 | 13.01 | -12.13 | 8.15 |
| Total Conflict | 35.1 | 11.3 | 30.10 | 8.21 | 25.00 | 6.52 |
| Total Positive | 323.0 | 44.5 | 345.57 | 30.70 | 376.01 | 25.46 |
| Row 1 | 116.2 | 15.7 | 127.10 | 9.96 | 132.45 | 8.52 |
| Row 2 | 99.1 | 17.7 | 103.67 | 13.79 | 120.53 | 12.14 |
| Row 3 | 108.0 | 15.4 | 115.01 | 11.22 | 123.00 | 8.85 |
| Col. A | 67.3 | 11.1 | 71.78 | 7.67 | 76.63 | 5.95 |
| Col. B | 65.2 | 11.0 | 70.33 | 8.70 | 75.79 | 7.60 |
| Col. C | 60.9 | 11.5 | 64.55 | 7.41 | 71.79 | 6.32 |
| Col. D | 64.8 | 10.8 | 70.83 | 8.43 | 77.43 | 7.34 |
| Col. E | 65.0 | 10.6 | 68.14 | 7.86 | 74.47 | 5.91 |
| Tot. Variability | 51.6 | 14.2 | 48.53 | 12.42 | 37.04 | 7.30 |
| Col. Tot. V | 28.6 | 9.8 | 29.03 | 9.12 | 20.60 | 5.96 |
| Row Tot. V | 23.0 | 7.3 | 19.60 | 5.76 | 16.44 | 4.28 |
| D | 121.4 | 31.1 | 120.44 | 24.19 | 130.10 | 20.11 |
| 5 | 20.8 | 12.3 | 18.11 | 9.24 | 19.07 | 10.28 |
| 4 | 23.3 | 10.3 | 24.36 | 7.55 | 23.40 | 7.60 |
| 3 | 19.4 | 12.6 | 18.03 | 8.89 | 15.80 | 7.49 |
| 2 | 17.0 | 7.4 | 18.85 | 7.99 | 20.73 | 8.64 |
| 1 | 19.6 | 10.6 | 20.63 | 9.01 | 24.20 | 10.30 |
| DP | 51.2 | 14.6 | 54.40 | 12.38 | 58.70 | 8.61 |
| GM | 89.2 | 13.4 | 98.80 | 9.15 | 104.04 | 7.05 |
| Psy | 49.7 | 8.4 | 46.10 | 6.49 | 42.28 | 6.02 |
| PD | 65.6 | 13.9 | 76.39 | 11.72 | 82.12 | 8.75 |
| N | 73.2 | 16.1 | 84.31 | 11.10 | 91.72 | 7.14 |
| PI | 6.74 | 4.17 | 10.42 | 3.88 | 15.0 | 3.22 |

APPENDIX N

DISCRIMINANT FUNCTION ANALYSIS

WITHIN GROUPS CORRELATION MATRIX

| VARIABLE | VARIABLES | | | | | | | | |
|----------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1 | 1.00000 | | | | | | | | |
| 2 | .07578 | 1.00000 | | | | | | | |
| 3 | -.17028 | -.37591 | 1.00000 | | | | | | |
| 4 | -.27051 | -.16536 | .34005 | 1.00000 | | | | | |
| 5 | -.21497 | -.29281 | .05588 | -.02146 | 1.00000 | | | | |
| 6 | .15813 | .15725 | .00051 | -.00047 | .55899 | 1.00000 | | | |
| 7 | .08583 | .22588 | -.25581 | -.08758 | -.12047 | .16051 | 1.00000 | | |
| 8 | -.09869 | -.00932 | .10529 | .07697 | .10097 | .00659 | .04887 | 1.00000 | |
| 9 | -.21325 | -.07566 | .21410 | .12917 | .13840 | -.05689 | -.01196 | .70997 | 1.00000 |
| 10 | -.07429 | .14436 | -.14984 | -.05820 | -.15837 | .16761 | .33482 | -.03515 | -.05722 |
| 11 | -.19741 | -.11056 | .39577 | .21784 | -.04674 | .00435 | -.17805 | .24529 | .21600 |
| 12 | -.18376 | -.15175 | .28361 | .10091 | .00633 | -.03056 | .15631 | .19528 | .15976 |
| 13 | -.01236 | .03843 | .33975 | .18740 | -.16230 | .00572 | -.11700 | .26086 | .19374 |
| 14 | -.20018 | -.18932 | .35241 | .20486 | .04530 | -.05017 | -.24269 | .23018 | .25536 |
| 15 | -.00652 | -.13970 | .11680 | .00770 | -.07096 | .08241 | -.15562 | .03805 | -.02652 |
| 16 | -.19262 | -.02952 | .23272 | .06974 | .02758 | -.11648 | .12846 | .20946 | .14368 |
| 17 | -.06375 | -.23231 | .34907 | .23862 | -.07181 | -.02032 | -.26850 | .35344 | .29870 |
| 18 | -.45338 | -.03674 | .36705 | .17571 | .14623 | -.14920 | -.17406 | .20960 | .22245 |
| 19 | .01362 | -.04004 | .21344 | .14407 | -.11128 | .00836 | -.00814 | .00413 | .01102 |
| 20 | .08496 | -.02837 | -.16013 | -.06847 | -.05720 | .08253 | .28754 | -.15754 | -.13137 |
| 21 | .02108 | -.06433 | -.20779 | -.16485 | .02556 | .03860 | .19768 | -.08243 | -.06683 |
| 22 | .13907 | .01542 | -.03629 | .07243 | -.14196 | .10487 | .28645 | -.19906 | -.16235 |
| 23 | -.00123 | -.03330 | .18236 | .18818 | -.10907 | .05213 | .08522 | .02837 | .09194 |
| 24 | -.06541 | .02615 | .17834 | .17960 | -.15641 | .17534 | .16274 | .16743 | .51419 |
| 25 | .16608 | -.02243 | -.16994 | -.16093 | .15047 | -.17225 | .01238 | .26958 | -.02195 |
| 26 | -.04111 | .01963 | -.17706 | -.14118 | .06303 | .04357 | -.14997 | -.06398 | -.04327 |
| 27 | .04836 | -.00892 | .08999 | -.10060 | .10647 | -.12136 | .01231 | -.31266 | -.16763 |
| 28 | -.02023 | -.05413 | .22373 | .17774 | -.14615 | .11026 | -.08424 | -.12097 | -.12074 |
| 29 | -.10471 | -.14860 | .36058 | .12370 | -.07691 | -.03692 | .52465 | .44961 | .45505 |
| 30 | .12960 | -.10196 | .14386 | .09447 | -.00835 | -.00572 | -.09561 | .06557 | -.01224 |
| 31 | -.04404 | .01300 | -.03662 | .03673 | .09357 | -.01375 | -.37133 | .39415 | .32287 |
| 32 | -.23725 | .08047 | .24499 | .10086 | .01445 | -.03479 | -.32574 | .16966 | .13814 |
| 33 | -.07313 | -.10045 | .32568 | -.00981 | .02928 | .04461 | -.37159 | .25513 | .27899 |
| 34 | -.05619 | -.26127 | .00149 | -.01115 | .18675 | -.21891 | -.02925 | .06114 | -.02490 |

| VARIABLE | VARIABLES | |
|----------|-----------|---------|
| | 10 | 11 |
| 10 | 1.00000 | |
| 11 | -.18646 | 1.00000 |

BMD07M • STEPWISE DISCRIMINANT ANALYSIS - REVISED MAY 17, 1971
 HEALTH SCIENCES COMPUTING FACILITY, UCLA

PROBLEM CODE MED
 NUMBER OF VARIABLES 34
 NUMBER OF GROUPS 2
 NUMBER OF CASES IN EACH GROUP 46 42
 PRIOR PROBABILITIES .5000 .5000
 VARIABLE FORMAT (12X,F3.0,F1.0,F2.0,F3.0,F5.1,F1.0,F2.0,F4.2,F3.0,F2.0,4F3.0,4F2.0,F3.0,
 SF2.0/6X,F2.0,F3.0,2F2.0,F3.0,F2.0)

DATA INPUT FROM CARDS

MEANS (THE LAST COLUMN CONTAINS THE GRAND MEANS OVER THE GROUPS USED IN THE ANALYSIS)

| VARIABLE | GROUP | | |
|----------|-----------|-----------|-----------|
| | WELL | SICK | |
| 1 | 113.06522 | 273.11890 | 189.45454 |
| 2 | .93478 | 4.21428 | 2.50000 |
| 3 | 2.67391 | 1.14286 | 1.94318 |
| 4 | 10.52174 | 7.35714 | 9.01136 |
| 5 | 9.08696 | 3.52381 | 6.43182 |
| 6 | 2.56522 | 2.90476 | 2.72727 |
| 7 | 34.86955 | 38.21428 | 36.46590 |
| 8 | .99456 | 1.19047 | 1.08806 |
| 9 | -3.52174 | .80952 | -1.45455 |
| 10 | 25.78261 | 32.47618 | 28.97726 |
| 11 | 356.56519 | 324.90454 | 341.45435 |
| 12 | 128.36955 | 120.35713 | 124.54544 |
| 13 | 112.28261 | 99.23808 | 106.05681 |
| 14 | 117.21738 | 105.92856 | 111.82954 |
| 15 | 71.02173 | 65.69048 | 68.47726 |
| 16 | 72.41304 | 65.14285 | 68.94318 |
| 17 | 69.95651 | 60.73808 | 65.55681 |
| 18 | 73.19565 | 65.80951 | 69.67044 |
| 19 | 71.34782 | 66.33333 | 68.95454 |
| 20 | 37.50000 | 52.21428 | 44.52272 |
| 21 | 22.58694 | 30.95238 | 26.57954 |
| 22 | 14.82609 | 21.26190 | 17.89772 |
| 23 | 113.82608 | 106.52380 | 110.34090 |
| 24 | 14.86957 | 14.07143 | 14.48864 |
| 25 | 27.82608 | 30.76190 | 29.22726 |
| 26 | 18.39130 | 20.95238 | 19.61363 |
| 27 | 21.84782 | 20.23808 | 21.07954 |
| 28 | 17.45651 | 14.64286 | 16.11363 |
| 29 | 57.71738 | 49.76190 | 53.92044 |
| 30 | 97.67390 | 90.85713 | 94.42044 |
| 31 | 47.43477 | 48.85713 | 48.11363 |
| 32 | 78.82608 | 68.11903 | 73.71590 |
| 33 | 86.39130 | 73.38095 | 80.18181 |
| 34 | 13.54348 | 9.71428 | 11.71591 |

STANDARD DEVIATIONS

| | | | | | | | | | | |
|----|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 12 | -.05182 | .80510 | 1.00000 | | | | | | | |
| 13 | -.25078 | .86649 | .58626 | 1.00000 | | | | | | |
| 14 | -.24923 | .87003 | .70882 | .68655 | 1.00000 | | | | | |
| 15 | -.14560 | .56062 | .54008 | .52962 | .53699 | 1.00000 | | | | |
| 16 | -.12961 | .77939 | .60416 | .75976 | .67356 | .30831 | 1.00000 | | | |
| 17 | -.22224 | .82022 | .69172 | .74989 | .78988 | .49663 | .53195 | 1.00000 | | |
| 18 | -.13678 | .72671 | .68237 | .51652 | .65588 | .21910 | .57778 | .47345 | 1.00000 | |
| 19 | -.23017 | .61096 | .56414 | .59396 | .60343 | .43599 | .44856 | .55569 | .22465 | 1.00000 |
| 20 | .42296 | -.30702 | .01610 | -.36444 | -.34808 | -.04802 | -.36782 | -.27740 | -.31479 | |
| 21 | .41706 | -.28404 | .15542 | -.45133 | -.29409 | -.04684 | -.32370 | -.21023 | -.23091 | |
| 22 | .26907 | -.23191 | -.17280 | -.12641 | -.29371 | -.02506 | -.30088 | -.27175 | -.31173 | |
| 23 | .14836 | .66219 | .68539 | .58396 | .60378 | .52604 | .47392 | .40016 | .40016 | |
| 24 | .26771 | .55612 | .56534 | .50294 | .50036 | .43627 | .37650 | .42314 | .32609 | |
| 25 | -.29216 | -.30782 | -.32690 | -.26752 | -.27180 | -.27202 | -.18646 | -.17276 | -.15343 | |
| 26 | .11082 | .54385 | -.49908 | -.50189 | -.53078 | -.40847 | -.44167 | -.36921 | -.37462 | |
| 27 | -.19648 | -.53225 | -.59980 | -.47537 | -.43282 | -.42735 | -.42101 | -.46785 | -.30344 | |
| 28 | .08320 | .63635 | .68725 | .54693 | .56415 | .55463 | .50451 | .44988 | .39031 | |
| 29 | -.24538 | .71547 | .53253 | .72577 | .68598 | .39347 | .54353 | .75895 | .48407 | |
| 30 | -.11370 | .68620 | .76537 | .52347 | .67333 | .56627 | .50022 | .66604 | .47855 | |
| 31 | -.04563 | -.10519 | -.12619 | -.08524 | -.06337 | -.20420 | -.02236 | .05412 | -.09245 | |
| 32 | -.25870 | .70731 | .54062 | .65416 | .67139 | .34897 | .78559 | .56536 | .51221 | |
| 33 | -.31453 | .47498 | .48039 | .39973 | .47636 | .31690 | .22266 | .49573 | .44616 | |
| 34 | -.34107 | .16976 | .02930 | .19708 | .24598 | .07810 | .23372 | .23489 | .09947 | |

VARIABLES

| VARIABLE | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 19 | 1.00000 | | | | | | | | |
| 20 | -.04192 | 1.00000 | | | | | | | |
| 21 | -.06504 | .88079 | 1.00000 | | | | | | |
| 22 | -.00022 | .79369 | .41321 | 1.00000 | | | | | |
| 23 | .58846 | .14297 | .06561 | .18462 | 1.00000 | | | | |
| 24 | .48209 | .17969 | .09473 | .21855 | .87208 | 1.00000 | | | |
| 25 | -.34629 | -.20913 | -.08751 | -.28766 | -.62353 | .77960 | 1.00000 | | |
| 26 | -.50934 | .01115 | .06175 | -.05639 | -.74292 | -.48414 | .08221 | 1.00000 | |
| 27 | -.35258 | -.20586 | -.15714 | -.18235 | -.65515 | -.69919 | .53429 | .15205 | 1.00000 |
| 28 | .54681 | .19418 | .11029 | .22384 | .87780 | .73430 | .65518 | .52910 | .77294 |
| 29 | .46542 | .35670 | -.32992 | -.26090 | .37616 | .42732 | -.24686 | -.23979 | .39877 |
| 30 | .55341 | -.06181 | .04526 | -.18312 | .57596 | .41913 | .23330 | -.46251 | .49345 |
| 31 | -.14421 | -.06239 | -.01734 | -.11603 | -.17854 | -.03763 | .04027 | .26562 | .00988 |
| 32 | .42946 | .36470 | .29937 | -.32451 | .37075 | .26892 | -.16013 | -.28901 | -.33083 |
| 33 | .32300 | -.13772 | -.10295 | -.12902 | .20375 | .20616 | -.07449 | -.20664 | -.18463 |
| 34 | .10164 | -.40594 | -.31138 | -.37327 | -.28707 | -.38536 | .41072 | .03496 | .33262 |

VARIABLES

| VARIABLE | 28 | 29 | 30 | 31 | 32 | 33 | 34 |
|----------|---------|---------|---------|---------|---------|---------|---------|
| 28 | 1.00000 | | | | | | |
| 29 | .34695 | 1.00000 | | | | | |
| 30 | .62746 | .39272 | 1.00000 | | | | |
| 31 | -.21338 | .34569 | -.19945 | 1.00000 | | | |
| 32 | .41548 | .54843 | .42431 | .01553 | 1.00000 | | |
| 33 | .23116 | .61720 | .35894 | .08268 | .30091 | 1.00000 | |
| 34 | -.33609 | .06631 | .12326 | -.14385 | .27833 | -.08530 | 1.00000 |

STEP NUMBER 2
 VARIABLE ENTERED 20

VARIABLES INCLUDED AND F TO REMOVE = DEGREES OF FREEDOM 1 85

2 46,1955 20 24,1691

VARIABLES NOT INCLUDED AND F TO ENTER = DEGREES OF FREEDOM 1 84

| | | | | | | | | | | | | | |
|---|--------|----|--------|----|--------|----|--------|----|--------|----|--------|----|--------|
| 1 | 6,8196 | 7 | ,6777 | 12 | 3,3938 | 17 | 1,5373 | 23 | 1,9287 | 28 | 2,2226 | 33 | 6,3536 |
| 3 | ,1083 | 8 | 8,6970 | 13 | 2,0063 | 18 | 1,5643 | 24 | 1,3957 | 29 | ,0276 | 34 | ,2866 |
| 4 | ,7735 | 9 | 4,1854 | 14 | 1,4105 | 19 | 2,1723 | 25 | 4,0196 | 30 | 2,5733 | | |
| 5 | 7,9899 | 10 | ,0315 | 15 | 1,8785 | 21 | ,0229 | 26 | ,6924 | 31 | ,7003 | | |
| 6 | ,0568 | 11 | 2,1866 | 16 | 1,3684 | 22 | ,0019 | 27 | ,1033 | 32 | 2,2249 | | |

U-STATISTIC .44189 DEGREES OF FREEDOM 2 1 86
 APPROXIMATE F 53,67784 DEGREES OF FREEDOM 2 85,00

F MATRIX = DEGREES OF FREEDOM 2 85

| | | | |
|----------|----------|-----------|--|
| | | GROUP | |
| | | WELL | |
| GROUP | | | |
| SICK | 53,67786 | | |
| | | FUNCTION | |
| | | WELL SICK | |
| VARIABLE | | | |
| 2 | ,31115 | 1,24226 | |
| 20 | ,31782 | ,44653 | |
| CONSTANT | | | |
| | -6,79777 | -14,96846 | |

| | | |
|---|----|----|
| NUMBER OF CASES CLASSIFIED INTO GROUP - | | |
| WELL SICK | | |
| GROUP | | |
| WELL | 44 | 2 |
| SICK | 5 | 37 |

STEP NUMBER 3
 VARIABLE ENTERED 8

VARIABLES INCLUDED AND F TO REMOVE = DEGREES OF FREEDOM 1 84

2 40,2355 8 8,6970 20 26,6331

VARIABLES NOT INCLUDED AND F TO ENTER = DEGREES OF FREEDOM 1 83

| | | | | | | | | | | | | | |
|---|--------|----|--------|----|--------|----|--------|----|--------|----|--------|----|-------|
| 1 | 7,4026 | 7 | ,6052 | 13 | 4,0243 | 18 | 2,8332 | 24 | 2,9487 | 29 | 1,3376 | 34 | ,2786 |
| 3 | ,2976 | 9 | ,0020 | 14 | 2,8470 | 19 | 1,8571 | 25 | 1,5680 | 30 | 2,8070 | | |
| 4 | 1,0363 | 10 | ,0754 | 15 | 1,9019 | 21 | ,0380 | 26 | ,9300 | 31 | ,1040 | | |
| 5 | 8,6905 | 11 | 4,1157 | 16 | 2,5211 | 22 | ,1459 | 27 | 1,9420 | 32 | 3,1075 | | |
| 6 | ,0266 | 12 | 5,5255 | 17 | 4,9821 | 23 | 2,1326 | 28 | 1,3299 | 33 | 9,8690 | | |

U-STATISTIC .40043 DEGREES OF FREEDOM 3 1 86
 APPROXIMATE F 41,92474 DEGREES OF FREEDOM 3 84,00

F MATRIX = DEGREES OF FREEDOM 3 84

| | | |
|----------|-----------|-----------|
| | GROUP | |
| | WELL | |
| GROUP | | |
| SICK | 41,92468 | |
| | FUNCTION | |
| | WELL | SICK |
| VARIABLE | | |
| 2 | .34208 | 1,28024 |
| 8 | 15,39271 | 18,90257 |
| 20 | .37954 | .52232 |
| CONSTANT | -15,62384 | -28,27849 |

| | | |
|-------|---|------|
| | NUMBER OF CASES CLASSIFIED INTO GROUP = | |
| | WELL | SICK |
| GROUP | | |
| WELL | 43 | 3 |
| SICK | 5 | 37 |

STEP NUMBER 4
VARIABLE ENTERED 33

VARIABLES INCLUDED AND F TO REMOVE = DEGREES OF FREEDOM 1 83

| | | | | | | | |
|---|---------|---|---------|----|---------|----|--------|
| 2 | 27,7783 | 8 | 12,2777 | 20 | 18,4817 | 33 | 9,8691 |
|---|---------|---|---------|----|---------|----|--------|

VARIABLES NOT INCLUDED AND F TO ENTER = DEGREES OF FREEDOM 1 82

| | | | | | | | | | | | |
|---|--------|----|--------|----|--------|----|-------|----|--------|----|-------|
| 1 | 6,0246 | 7 | 3,4900 | 13 | .8710 | 18 | .1834 | 24 | 1,0698 | 29 | .5678 |
| 3 | .1140 | 9 | .1237 | 14 | .1310 | 19 | .1042 | 25 | .4333 | 30 | .3523 |
| 4 | 1,2578 | 10 | 1,3605 | 15 | .1714 | 21 | .0313 | 26 | .1091 | 31 | .1278 |
| 5 | 8,2371 | 11 | .5257 | 16 | 1,1232 | 22 | .1353 | 27 | .7613 | 32 | .9312 |
| 6 | .0072 | 12 | .9518 | 17 | .8483 | 23 | .5469 | 28 | .0506 | 34 | .0102 |

| | | | | | |
|---------------|----------|--------------------|---|-------|----|
| U-STATISTIC | .35788 | DEGREES OF FREEDOM | 4 | 1 | 86 |
| APPROXIMATE F | 37,23070 | DEGREES OF FREEDOM | 4 | 83,00 | |

F MATRIX = DEGREES OF FREEDOM 4 83

| | | |
|----------|-----------|-----------|
| | GROUP | |
| | WELL | |
| GROUP | | |
| SICK | 37,23070 | |
| | FUNCTION | |
| | WELL | SICK |
| VARIABLE | | |
| 2 | .77106 | 1,64913 |
| 8 | 8,46378 | 12,94420 |
| 20 | .45575 | .58786 |
| 33 | .72826 | .62625 |
| CONSTANT | -45,26527 | -50,19754 |

NUMBER OF CASES CLASSIFIED INTO GROUP -
 WELL SICK
 GROUP
 WELL 45 1
 SICK 4 38

STEP NUMBER 5
 VARIABLE ENTERED 5

VARIABLES INCLUDED AND F TO REMOVE - DEGREES OF FREEDOM 1 82
 2 12,6984 5 8,2371 8 13,0311 20 14,6285 33 9,3970

VARIABLES NOT INCLUDED AND F TO ENTER - DEGREES OF FREEDOM 1 81
 1 3,3737 9 .2855 14 .2236 19 .4344 25 .8988 30 .4562
 3 .0119 10 2,1009 15 .5289 21 .0398 26 .2664 31 .0249
 4 1,7104 11 1,1123 16 1,1026 22 .0011 27 1,4625 32 1,0630
 6 2,8148 12 1,1279 17 2,3851 23 1,0534 28 .3921 34 .0280
 7 3,6919 13 2,6574 18 .0008 24 2,1053 29 .0004

U-STATISTIC .32521 DEGREES OF FREEDOM 5 1 86
 APPROXIMATE F 34,02904 DEGREES OF FREEDOM 5 82,00

F MATRIX - DEGREES OF FREEDOM 5 82

GROUP
 WELL
 GROUP
 SICK 34,02904
 FUNCTION
 WELL SICK
 VARIABLE
 2 1,23047 1,93584
 5 .77837 .48575
 8 7,42185 12,29397
 20 .47052 .59708
 33 .73705 .63174

CONSTANT
 -49,15523 -51,71251

NUMBER OF CASES CLASSIFIED INTO GROUP -
 WELL SICK
 GROUP
 WELL 46 0
 SICK 2 40

STEP NUMBER 6
 VARIABLE ENTERED 7

VARIABLES INCLUDED AND F TO REMOVE - DEGREES OF FREEDOM 1 81
 2 14,7416 5 8,3947 7 3,6919 8 13,6594 20 17,7061 33 12,5786

VARIABLES NOT INCLUDED AND F TO ENTER - DEGREES OF FREEDOM 1 80

| | | | | | | | | | | | | | |
|---|--------|----|--------|----|--------|----|--------|----|--------|----|--------|----|--------|
| 1 | 3,3721 | 9 | .5838 | 13 | 1,8615 | 17 | 2,4280 | 22 | .0200 | 26 | .0005 | 30 | .2831 |
| 3 | -.0001 | 10 | 1,4246 | 14 | .1541 | 18 | .0115 | 23 | .5556 | 27 | 1,5969 | 31 | 1,2546 |
| 4 | 1,9156 | 11 | .7678 | 15 | .5571 | 19 | .1465 | 24 | 1,1301 | 28 | .5040 | 32 | 1,7737 |
| 6 | 2,1420 | 12 | .9964 | 16 | .9014 | 21 | .0005 | 25 | .9826 | 29 | .7000 | 34 | .1728 |

U-STATISTIC .31103 DEGREES OF FREEDOM 6 1 .86
 APPROXIMATE F 29,90376 DEGREES OF FREEDOM 6 81,00

F MATRIX - DEGREES OF FREEDOM 6 81

| | | | |
|----------|----------|----------|--|
| | | GROUP | |
| | | WELL | |
| GROUP | | | |
| SICK | 29,90369 | | |
| | | FUNCTION | |
| | | WELL | |
| | | SICK | |
| VARIABLE | | | |
| 2 | .29461 | 1,08313 | |
| 5 | .90573 | .60179 | |
| 7 | 1,58718 | 1,44615 | |
| 8 | 4,49107 | 9,52361 | |
| 20 | .24453 | .39116 | |
| 33 | 1,02990 | .89856 | |

CONSTANT -83,92349 -80,57671

NUMBER OF CASES CLASSIFIED INTO GROUP -

| | | | | | |
|-------|----|------|--|------|--|
| | | WELL | | SICK | |
| GROUP | | | | | |
| WELL | 45 | 1 | | | |
| SICK | 2 | 40 | | | |

STEP NUMBER 7
 VARIABLE ENTERED 1

VARIABLES INCLUDED AND F TO REMOVE - DEGREES OF FREEDOM 1 80

| | | | | | | | | | | | | | |
|---|--------|---|---------|---|--------|---|--------|---|---------|----|---------|----|---------|
| 1 | 3,3721 | 2 | 13,7322 | 5 | 5,6251 | 7 | 3,6865 | 8 | 13,7843 | 20 | 15,6426 | 33 | 11,3797 |
|---|--------|---|---------|---|--------|---|--------|---|---------|----|---------|----|---------|

VARIABLES NOT INCLUDED AND F TO ENTER - DEGREES OF FREEDOM 1 79

| | | | | | | | | | | | | | |
|---|--------|----|--------|----|--------|----|--------|----|-------|----|--------|----|--------|
| 3 | .0725 | 10 | .7145 | 14 | .0060 | 18 | 1,0799 | 23 | .4609 | 27 | 1,2532 | 31 | 1,2470 |
| 4 | .7833 | 11 | .2690 | 15 | .5289 | 19 | .1456 | 24 | .7221 | 28 | .3366 | 32 | .8659 |
| 6 | 2,2680 | 12 | .4384 | 16 | .4087 | 21 | .0159 | 25 | .2945 | 29 | .4911 | 34 | .1539 |
| 9 | 1,2125 | 13 | 1,8045 | 17 | 2,1860 | 22 | .0004 | 26 | .0085 | 30 | .0926 | | |

U-STATISTIC .29845 DEGREES OF FREEDOM 7 1 .86
 APPROXIMATE F 26,86420 DEGREES OF FREEDOM 7 80,00

F MATRIX - DEGREES OF FREEDOM 7 80

| | | | |
|-------|----------|-------|--|
| | | GROUP | |
| | | WELL | |
| GROUP | | | |
| SICK | 26,86407 | | |

| VARIABLE | FUNCTION | |
|----------|----------|----------|
| | WELL | SICK |
| 1 | .00998 | .01512 |
| 2 | .28821 | 1.07344 |
| 5 | .98256 | 1.71820 |
| 7 | 1.57990 | 1.43512 |
| 8 | 4.81108 | 10.10839 |
| 20 | .23769 | .38080 |
| 33 | 1.03422 | .90511 |

CONSTANT -84.92456 -82.87415

NUMBER OF CASES CLASSIFIED INTO GROUP =

| GROUP | WELL | | SICK | |
|-------|------|----|------|--|
| | WELL | 46 | 0 | |
| SICK | 3 | 39 | | |

STEP NUMBER 8
 VARIABLE ENTERED 6

VARIABLES INCLUDED AND F TO REMOVE = DEGREES OF FREEDOM 1 79

| | | | | | | | |
|---|---------|---|--------|---|---------|----|---------|
| 1 | 3.4851 | 5 | 7.9779 | 7 | 2.9827 | 20 | 15.4743 |
| 2 | 12.6956 | 6 | 2.2680 | 8 | 14.3037 | 33 | 11.0301 |

VARIABLES NOT INCLUDED AND F TO ENTER = DEGREES OF FREEDOM 1 78

| | | | | | | | | | | | | | |
|----|--------|----|--------|----|--------|----|-------|----|--------|----|-------|----|-------|
| 3 | .1379 | 11 | .2703 | 15 | .3689 | 19 | .2206 | 24 | .5090 | 28 | .2375 | 32 | .7920 |
| 4 | .7615 | 12 | .4808 | 16 | .6465 | 21 | .0259 | 25 | .0964 | 29 | .7123 | 34 | .0226 |
| 9 | 1.0459 | 13 | 2.2478 | 17 | 2.4945 | 22 | .0029 | 26 | .0759 | 30 | .0876 | | |
| 10 | .5421 | 14 | .0067 | 18 | .8627 | 23 | .4977 | 27 | 1.0495 | 31 | .9969 | | |

U-STATISTIC .29012 DEGREES OF FREEDOM 8 1 86
 APPROXIMATE F 24.16226 DEGREES OF FREEDOM 8 79.00

F MATRIX = DEGREES OF FREEDOM 8 79

| GROUP | GROUP | |
|-------|----------|------|
| | WELL | SICK |
| SICK | 24.16214 | |

| VARIABLE | FUNCTION | |
|----------|----------|---------|
| | WELL | SICK |
| 1 | .00842 | .01375 |
| 2 | .37414 | 1.14873 |
| 5 | 1.87113 | 1.49678 |
| 6 | 8.37744 | 7.34053 |
| 7 | 1.49293 | 1.35892 |
| 8 | 3.09500 | 8.60472 |
| 20 | .21952 | .36488 |
| 33 | 1.04057 | .91068 |

CONSTANT -97.22260 -92.31625

NUMBER OF CASES CLASSIFIED INTO GROUP -
 WELL SICK
 GROUP
 WELL 46 0
 SICK 2 40

STEP NUMBER 9
 VARIABLE ENTERED 17

VARIABLES INCLUDED AND F TO REMOVE - DEGREES OF FREEDOM 1 78

| | | | | | | | | | |
|---|--------|---|--------|---|---------|----|---------|----|--------|
| 1 | 3,2217 | 5 | 9,6490 | 7 | 2,9714 | 17 | 2,4945 | 33 | 4,9704 |
| 2 | 7,6750 | 6 | 2,5758 | 8 | 16,7040 | 20 | 10,6666 | | |

VARIABLES NOT INCLUDED AND F TO ENTER - DEGREES OF FREEDOM 1 77

| | | | | | | | | | | | | | |
|----|-------|----|--------|----|--------|----|-------|----|-------|----|--------|----|-------|
| 3 | .3129 | 11 | 1,0969 | 15 | .0069 | 21 | .0541 | 25 | .0568 | 29 | .0201 | 34 | .2321 |
| 4 | .2778 | 12 | .1794 | 16 | .0089 | 22 | .0282 | 26 | .0869 | 30 | .9872 | | |
| 9 | .9978 | 13 | .3490 | 18 | 2,3447 | 23 | .0264 | 27 | .0647 | 31 | 1,3338 | | |
| 10 | .5062 | 14 | 2,1319 | 19 | .2216 | 24 | .0007 | 28 | .2031 | 32 | .0261 | | |

U-STATISTIC .28113 DEGREES OF FREEDOM 9 1 86
 APPROXIMATE F 22,16106 DEGREES OF FREEDOM 9 78,00

F MATRIX - DEGREES OF FREEDOM 9 78

GROUP
 WELL
 GROUP
 SICK 22,16095

| VARIABLE | FUNCTION | |
|----------|----------|----------|
| | WELL | SICK |
| 1 | .00955 | .01480 |
| 2 | 1,91311 | 2,57462 |
| 5 | 2,61901 | 2,18971 |
| 6 | 9,66422 | 8,53275 |
| 7 | 1,53030 | 1,39354 |
| 8 | -7,32597 | -1,05052 |
| 17 | 1,48407 | 1,37502 |
| 20 | .42743 | .55751 |
| 33 | .64416 | .54339 |

CONSTANT
 -137,20865 -126,64178

NUMBER OF CASES CLASSIFIED INTO GROUP -
 WELL SICK
 GROUP
 WELL 46 0
 SICK 2 40

STEP NUMBER 10
 VARIABLE ENTERED 18

VARIABLES INCLUDED AND F TO REMOVE - DEGREES OF FREEDOM 1 77

| | | | | | | | | | |
|---|--------|---|---------|---|---------|----|--------|----|---------|
| 1 | 5,3236 | 5 | 10,2883 | 7 | 3,4580 | 17 | 3,9864 | 20 | 12,3017 |
| 2 | 6,0269 | 6 | 2,2941 | 8 | 16,8832 | 18 | 2,3447 | 33 | 6,6906 |

VARIABLES NOT INCLUDED AND F TO ENTER - DEGREES OF FREEDOM 1 76

| | | | | | | | | | | | |
|----|--------|----|--------|----|-------|----|-------|----|-------|----|-------|
| 3 | .0540 | 11 | .0090 | 15 | .0097 | 22 | .0134 | 26 | .0474 | 30 | .3961 |
| 4 | .2972 | 12 | .4574 | 16 | .5413 | 23 | .2079 | 27 | .4429 | 31 | .7045 |
| 9 | 1,1742 | 13 | 1,1667 | 19 | .3232 | 24 | .1340 | 28 | .0422 | 32 | .2820 |
| 10 | .6541 | 14 | .7701 | 21 | .0290 | 25 | .0107 | 29 | .0057 | 34 | .3310 |

U-STATISTIC .27282 DEGREES OF FREEDOM 10 1 86
 APPROXIMATE F 20,52325 DEGREES OF FREEDOM 10 77,00

F MATRIX - DEGREES OF FREEDOM 10 77

GROUP WELL
 GROUP SICK 20,52322

| VARIABLE | FUNCTION | |
|----------|----------|---------|
| | WELL | SICK |
| 1 | .03121 | .03894 |
| 2 | 1,46258 | 2,07244 |
| 5 | 2,40786 | 1,95435 |
| 6 | 9,99718 | 8,90389 |
| 7 | 1,40385 | 1,25259 |
| 8 | -5,83758 | .60849 |
| 17 | 1,13971 | .99118 |
| 18 | .97434 | 1,08603 |
| 20 | .55635 | .70121 |
| 33 | .43808 | .31369 |

CONSTANT =153,35477 =146,70157

GROUP WITH LARGEST PROB. SQUARE OF DISTANCE FROM AND POSTERIOR PROBABILITY FOR GROUP

| GROUP WELL CASE | WELL | | | | SICK | | | |
|-----------------|------|--------|--------|--------|-------|--|--|--|
| | WELL | | | | | | | |
| 1 | WELL | 7,388 | .998, | 19,969 | .002, | | | |
| 2 | WELL | 11,516 | .999, | 25,162 | .001, | | | |
| 3 | WELL | 8,434 | .978, | 15,980 | .022, | | | |
| 4 | WELL | 3,249 | .878, | 7,188 | .122, | | | |
| 5 | WELL | 8,014 | .965, | 14,642 | .035, | | | |
| 6 | WELL | 4,028 | .999, | 18,012 | .001, | | | |
| 7 | WELL | 2,232 | .998, | 15,129 | .002, | | | |
| 8 | WELL | 10,011 | .997, | 21,589 | .003, | | | |
| 9 | WELL | 4,844 | .993, | 14,692 | .007, | | | |
| 10 | WELL | 26,780 | 1,000, | 52,457 | .000, | | | |
| 11 | WELL | 1,898 | .989, | 10,827 | .011, | | | |
| 12 | WELL | 8,818 | .995, | 19,454 | .005, | | | |
| 13 | WELL | 3,779 | .995, | 14,527 | .005, | | | |
| 14 | WELL | 4,350 | 1,000, | 23,002 | .000, | | | |
| 15 | WELL | 5,181 | 1,000, | 23,270 | .000, | | | |
| 16 | WELL | 4,094 | .952, | 10,058 | .048, | | | |

| | | | | | |
|----|------|--------|--------|--------|-------|
| 17 | WELL | 8,603 | .980, | 15,405 | .020, |
| 18 | WELL | 4,535 | 1,000, | 20,827 | .000, |
| 19 | WELL | 6,521 | .980, | 14,303 | .020, |
| 20 | WELL | 6,458 | .998, | 18,927 | .002, |
| 21 | WELL | 9,034 | .884, | 13,102 | .116, |
| 22 | WELL | 3,064 | .998, | 15,911 | .002, |
| 23 | WELL | 4,982 | .997, | 16,742 | .003, |
| 24 | WELL | 2,430 | .998, | 14,562 | .002, |
| 25 | WELL | 9,455 | .956, | 15,614 | .044, |
| 26 | WELL | 8,151 | .795, | 10,864 | .205, |
| 27 | WELL | 10,098 | .695, | 11,743 | .305, |
| 28 | WELL | 3,540 | .970, | 10,486 | .030, |
| 29 | WELL | 3,118 | .841, | 6,455 | .159, |
| 30 | WELL | 7,325 | .998, | 19,541 | .002, |
| 31 | WELL | 5,984 | 1,000, | 24,279 | .000, |
| 32 | WELL | 5,978 | .636, | 7,093 | .364, |
| 33 | WELL | 2,105 | .991, | 11,518 | .009, |
| 34 | WELL | 15,042 | .816, | 18,025 | .184, |
| 35 | WELL | 9,570 | .975, | 16,883 | .025, |
| 36 | WELL | 9,417 | .986, | 17,857 | .014, |
| 37 | WELL | 2,362 | .999, | 16,042 | .001, |
| 38 | WELL | 5,922 | .990, | 15,175 | .010, |
| 39 | WELL | 3,337 | .998, | 16,254 | .002, |
| 40 | WELL | 5,261 | .985, | 13,619 | .015, |
| 41 | WELL | 9,623 | .898, | 13,966 | .102, |
| 42 | WELL | 12,481 | 1,000, | 31,584 | .000, |
| 43 | WELL | 5,240 | .997, | 16,567 | .003, |
| 44 | WELL | 5,791 | 1,000, | 23,530 | .000, |
| 45 | WELL | 3,929 | .999, | 18,650 | .001, |
| 46 | WELL | 3,448 | .997, | 15,205 | .003, |

| GROUP | | WELL | SICK | | |
|-------|------|--------|-------|--------|--------|
| SICK | | | | | |
| CASE | | | | | |
| 1 | SICK | 11,337 | .273, | 9,375 | .727, |
| 2 | SICK | 67,409 | .000, | 45,246 | 1,000, |
| 3 | WELL | 9,976 | .722, | 11,887 | .278, |
| 4 | SICK | 9,366 | .400, | 8,557 | .600, |
| 5 | SICK | 38,662 | .000, | 17,470 | 1,000, |
| 6 | SICK | 12,542 | .029, | 5,550 | .971, |
| 7 | SICK | 24,221 | .007, | 14,259 | .993, |
| 8 | WELL | 7,305 | .548, | 7,691 | .452, |
| 9 | SICK | 12,275 | .031, | 5,420 | .969, |
| 10 | SICK | 26,325 | .001, | 12,421 | .999, |
| 11 | SICK | 15,233 | .122, | 11,277 | .878, |
| 12 | SICK | 8,308 | .323, | 6,824 | .677, |
| 13 | SICK | 36,512 | .000, | 17,167 | 1,000, |
| 14 | SICK | 21,349 | .032, | 14,520 | .968, |
| 15 | SICK | 79,508 | .002, | 67,504 | .998, |
| 16 | SICK | 25,045 | .000, | 9,156 | 1,000, |
| 17 | SICK | 50,481 | .000, | 21,360 | 1,000, |
| 18 | SICK | 37,701 | .002, | 24,907 | .998, |
| 19 | SICK | 21,762 | .006, | 11,452 | .994, |
| 20 | SICK | 14,977 | .236, | 12,623 | .764, |
| 21 | SICK | 17,109 | .030, | 10,131 | .970, |
| 22 | SICK | 18,764 | .016, | 10,543 | .984, |
| 23 | SICK | 10,181 | .022, | 2,597 | .978, |
| 24 | SICK | 27,780 | .003, | 15,964 | .997, |
| 25 | SICK | 17,598 | .019, | 9,740 | .981, |
| 26 | SICK | 14,515 | .427, | 13,927 | .573, |
| 27 | SICK | 26,055 | .000, | 10,186 | 1,000, |

| | | | | | |
|----|------|--------|-------|--------|--------|
| 28 | SICK | 26,250 | .001, | 11,475 | .999, |
| 29 | SICK | 19,488 | .001, | 6,339 | .999, |
| 30 | SICK | 26,716 | .003, | 15,013 | .997, |
| 31 | SICK | 20,400 | .017, | 12,329 | .983, |
| 32 | WELL | 5,676 | .962, | 12,130 | .038, |
| 33 | SICK | 30,026 | .000, | 9,049 | 1,000, |
| 34 | SICK | 37,537 | .000, | 19,730 | 1,000, |
| 35 | SICK | 11,321 | .112, | 7,186 | .888, |
| 36 | SICK | 21,060 | .002, | 8,182 | .998, |
| 37 | SICK | 13,656 | .014, | 5,216 | .986, |
| 38 | SICK | 35,518 | .000, | 11,764 | 1,000, |
| 39 | SICK | 23,352 | .001, | 10,000 | .999, |
| 40 | SICK | 15,861 | .020, | 8,036 | .980, |
| 41 | SICK | 20,263 | .000, | 3,995 | 1,000, |
| 42 | SICK | 21,672 | .000, | 4,381 | 1,000, |

NUMBER OF CASES CLASSIFIED INTO GROUP -

| GROUP | WELL | SICK |
|-------|------|------|
| WELL | 46 | 0 |
| SICK | 3 | 39 |

SUMMARY TABLE

| STEP NUMBER | VARIABLE ENTERED | VARIABLE REMOVED | F VALUE TO ENTER OR REMOVE | NUMBER OF VARIABLES INCLUDED | U-STATISTIC |
|-------------|------------------|------------------|----------------------------|------------------------------|-------------|
| 1 | 2 | | 65.5319 | 1 | .5675 |
| 2 | 20 | | 24.1691 | 2 | .4419 |
| 3 | 8 | | 8.6970 | 3 | .4004 |
| 4 | 33 | | 9.8691 | 4 | .3579 |
| 5 | 5 | | 8.2371 | 5 | .3252 |
| 6 | 7 | | 3.6919 | 6 | .3110 |
| 7 | 1 | | 3.3721 | 7 | .2985 |
| 8 | 6 | | 2.2680 | 8 | .2901 |
| 9 | 17 | | 2.4945 | 9 | .2811 |
| 10 | 18 | | 2.3447 | 10 | .2728 |

EIGENVALUES

| | | | | | | | | | |
|---------|--------|--------|--------|--------|--------|---------|---------|---------|---------|
| 2.66536 | .00000 | .00000 | .00000 | .00000 | .00000 | -.00000 | -.00000 | -.00000 | -.00000 |
| -.00000 | | | | | | | | | |

CUMULATIVE PROPORTION OF TOTAL DISPERSION

| | | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 | 1.00000 |
| 1.00000 | | | | | | | | | |

CANONICAL CORRELATIONS

| | | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| .85275 | .00126 | .00086 | .00061 | .00034 | .00061 | .00078 | .00083 | .00099 |
| .00164 | | | | | | | | |

COEFFICIENTS FOR CANONICAL VARIABLE -

| ORIGINAL VARIABLE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-------------------|---------|----------|---------|---------|---------|---------|---------|---------|---------|
| 1 | .00239 | .00239 | .00289 | .00164 | .00214 | .00040 | -.00475 | -.00092 | .00256 |
| 2 | .18874 | .26241 | .13212 | -.11632 | .12171 | .02738 | .18190 | .01872 | .04997 |
| 5 | -.14035 | .23384 | .12706 | .08455 | .03566 | .01840 | .06135 | .11743 | -.06590 |
| 6 | -.33836 | .25257 | .18849 | -.20206 | .36096 | .23434 | .07133 | 1.54315 | -.00921 |
| 7 | -.04681 | -.02523 | .04968 | .02513 | -.15527 | .04968 | -.03189 | .00671 | .04951 |
| 8 | 1.99494 | -1.19851 | -.50381 | 3.05189 | .10922 | -.64066 | .49788 | .66144 | .00054 |
| 17 | -.04597 | .01211 | .08549 | -.05071 | -.01072 | -.12428 | .01967 | .01239 | .01094 |
| 18 | .03456 | .04106 | -.02411 | .00664 | .02169 | .02476 | .02278 | -.01236 | .12092 |
| 20 | .04483 | .05642 | -.03282 | -.01598 | -.02453 | -.05303 | .00406 | .01195 | -.00708 |
| 33 | -.03850 | .00954 | -.05932 | .01597 | -.01954 | .02724 | -.05990 | .00694 | .00041 |

GROUP CANONICAL VARIABLES EVALUATED AT GROUP MEANS

| | | | | | | | | | |
|---|----------|---------|---------|--------|---------|---------|---------|---------|---------|
| 1 | -1.54217 | .00000 | .00000 | .00000 | -.00000 | .00000 | -.00000 | .00000 | -.00000 |
| 2 | 1.68904 | -.00000 | -.00000 | .00000 | -.00000 | -.00000 | .00000 | -.00000 | .00000 |

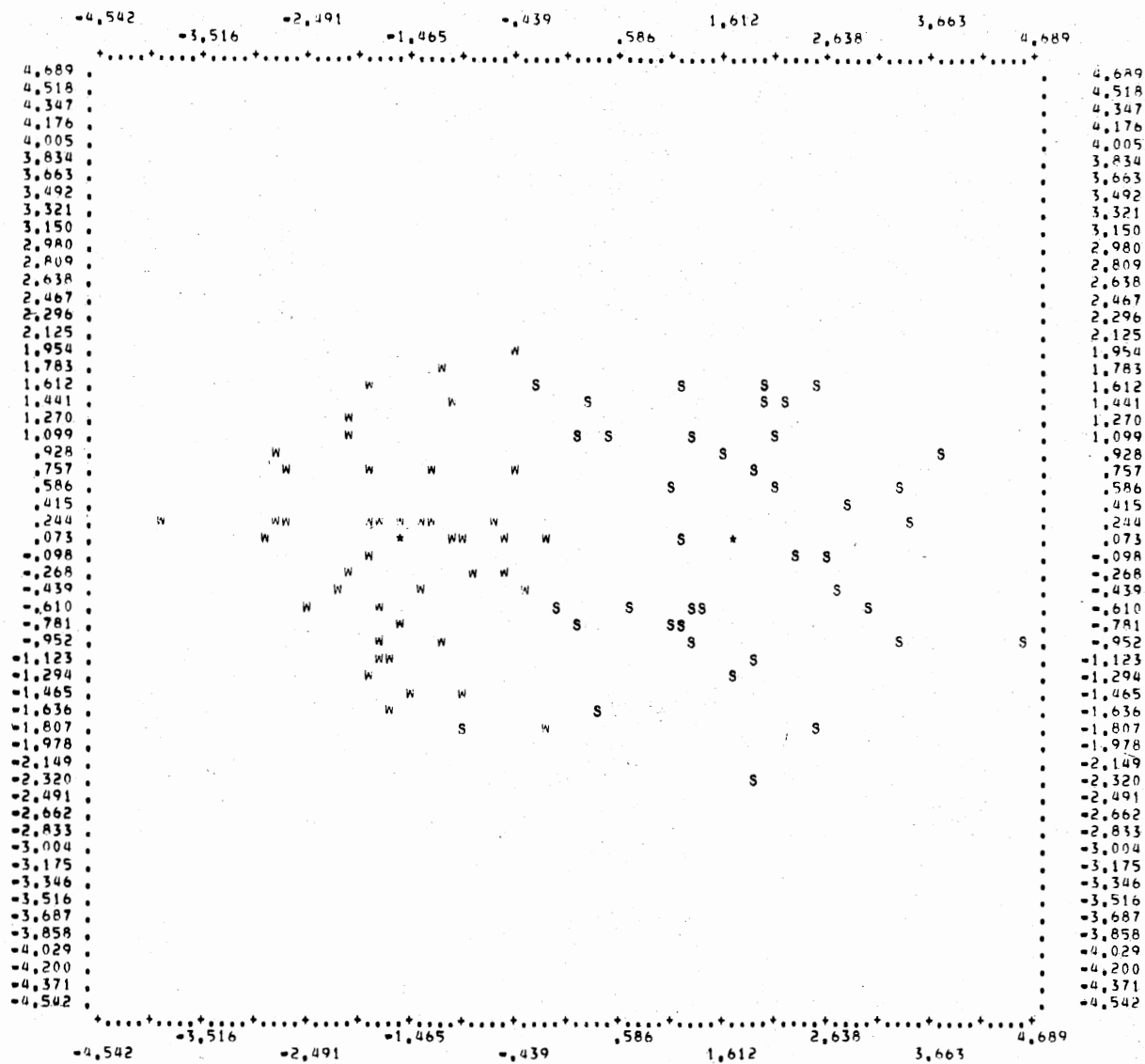
COEFFICIENTS FOR CANONICAL VARIABLE -

| ORIGINAL VARIABLE | 10 | 8 | 17 | 18 | 20 | 33 |
|-------------------|---------|--------|---------|--------|--------|---------|
| 1 | .00269 | .03100 | -.05341 | .09755 | .02147 | -.05808 |
| 2 | -.41218 | | | | | |
| 5 | -.01872 | | | | | |
| 6 | .22621 | | | | | |
| 7 | -.03250 | | | | | |

GROUP CANONICAL VARIABLES EVALUATED AT GROUP MEANS

| | |
|---|--------|
| 1 | .00000 |
| 2 | .00000 |

CHECK ON FINAL U-STATISTIC .27283



VITA ^a

Verna Lucille Barron

Candidate for the Degree of

Doctor of Philosophy

Thesis: AN EPIDEMIOLOGICAL APPROACH TO PSYCHOLOGICAL FACTORS
ASSOCIATED WITH SYMPTOM REPORT OF HEALTH AND DISEASE
IN COLLEGE STUDENTS

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