



The effect of an operant learning theory approach on compliance, through utilization of a multiple baseline design, with regard to medication taking, caloric intake, and exercise behaviors in an adult diabetic

by Barbara Pennington Pinkava

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF NURSING
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Abstract:

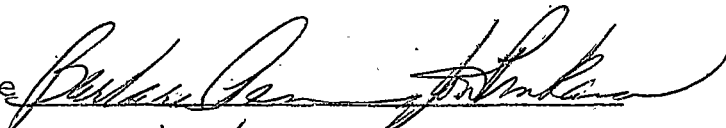
One subject with diabetes mellitus who demonstrated noncompliant behavior as determined via interview, was selected from Gallatin County, Montana to participate in a single subject multiple baseline experimental study which was designed to ascertain whether an operant learning theory approach is effective in attaining and maintaining compliance in the diabetic regimen with regard to medication taking, caloric intake, and exercise behaviors. Baseline data were collected, a clinical level of significance was determined, and then treatment (reinforcer) was applied successively across each behavior, and evaluated. The study relied heavily upon self reporting, but first order measures such as periodic fasting blood sugar rates, daily weights, and daily urine test results, served as corroborative data. This data could also serve to indicate increasing control of the disease. Results indicated that there was a change in the desired direction towards increased compliance for the target behaviors, as treatment was applied. Furthermore, the change was able to be attributed to the treatment, since change occurred only to the behavior being treated. However, except for the medication taking behavior, the clinical level of significance was not attained and maintained on a day to day basis. Corroborative data indicated an increasing control in the disease, however, this was confounded by the fact that the physician adjusted the subject's insulin four times during the course of the study.

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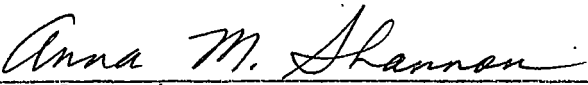
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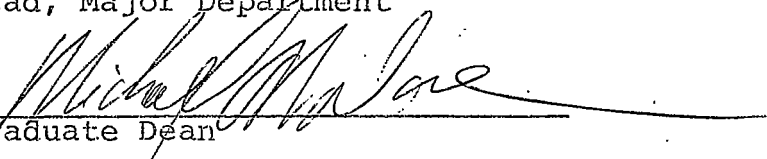
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ABSTRACT

One subject with diabetes mellitus who demonstrated noncompliant behavior as determined via interview, was selected from Gallatin County, Montana to participate in a single subject multiple baseline experimental study which was designed to ascertain whether an operant learning theory approach is effective in attaining and maintaining compliance in the diabetic regimen with regard to medication taking, caloric intake, and exercise behaviors. Baseline data were collected, a clinical level of significance was determined, and then treatment (reinforcer) was applied successively across each behavior, and evaluated. The study relied heavily upon self reporting, but first order measures such as periodic fasting blood sugar rates, daily weights, and daily urine test results, served as corroborative data. This data could also serve to indicate increasing control of the disease. Results indicated that there was a change in the desired direction towards increased compliance for the target behaviors, as treatment was applied. Furthermore, the change was able to be attributed to the treatment, since change occurred only to the behavior being treated. However, except for the medication taking behavior, the clinical level of significance was not attained and maintained on a day to day basis. Corroborative data indicated an increasing control in the disease, however, this was confounded by the fact that the physician adjusted the subject's insulin four times during the course of the study.

CHAPTER 1

INTRODUCTION

Diabetes mellitus, more simply known as diabetes, is a chronic and complex disease. It is possible to gain control of diabetes. "The well controlled person is free of diabetic symptoms, has no episodes of hypoglycemia, maintains optimum weight, has a blood glucose level between 80mg/100ml of blood and 130mg/100ml of blood before each meal, and has little or no glucosuria" (Brunner and Suddarth, 1975, p 818). However, the etiology of diabetes as yet remains unknown. Subsequently, in the interim of ascertaining the cause, there have been several studies devoted to discovering factors which relate or do not relate to the control of the disease. A particular problem under consideration in this study is compliant behavior, since deviance from such may be associated with lack of control of the disease. The importance of studying noncompliant behavior is realized when it is taken into consideration that diabetes mellitus has many ramifications. Lack of control may bring about premature complications, such as neuropathies, retinopathies, cardiovascular problems and

nephropathies (Knowles, Meinhert, and Prout, 1976).

Various behavior responses exhibited in the form of noncompliance in the diabetic regimen, have aroused interests and provoked studies. Indeed, Sackett, Haynes, Gibson, Taylor, Roberts, and Johnson (1978) state that suggestions for improving compliance range from studying psychosocial factors, and implementing patient education programs, through negotiated contracts, to calendar packs of pills. Furthermore, the investigators feel that almost none have undergone any rigorous investigation and evaluation to see if they really work.

The operant learning theory, a behavioral model, was the framework for this study. This theory studies the relationships between observable, definable behavior, and the environment. According to Skinner (1974), every response produces some consequence, and the behavior will be increased or decreased depending upon the nature of the consequences. Theoretically, change in behavior will occur by identifying the consequences, and systematically and consistently manipulating them through appropriate application of reinforcers, which will reward the desirable behaviors. Operant learning theory provides a means of increasing or decreasing specific behaviors in people.

Additionally, it may supersede the complexities and confounding that generally occurs when studies deal with specific underlying causes of behavior.

In conjunction with the operant learning theory approach, a multiple baseline design, which demonstrates the effects of treatment as it is applied across the target behaviors of the noncompliant adult diabetic subjects, was utilized.

Statement of the Problem

The problem of this study was to determine whether an operant learning theory approach is effective in attaining and maintaining compliance in an adult diabetic who has demonstrated noncompliant behavior.

Need for the Study

Diabetes mellitus effects approximately 10 million Americans, and the projected increase of the disease appears to be about 6 percent a year (Etzwiler, 1976). In view of this, diabetes mellitus will continue to be a major health concern. Also, on a broader basis, diabetes mellitus has caused 38.8 million days of restricted activity, and has caused 10 hospitalizations per 100 diabetics per year. In addition, it has also cost the

American economy two billion dollars every year (Knowles et al., 1976).

With regard to compliance, studies reveal that many discrepancies exist. Marston (1970) notes that wide variations exist in compliance behaviors which range from 4 percent to 100 percent in the extent to which people default. Also, keeping in mind that comparison of compliance from one study to another can be misleading, "the fact remains that the health behavior of most people falls short of what is known to be optimal" (Marston, 1970, p. 312).

Compliance, with regard to following a therapeutic regimen, has generally been studied in relation to underlying causes of behavior, so that predictions can be made. Findings of studies geared in this direction have usually found that health professionals have been frustrated not only in their attempts to identify noncompliers, but also in their attempt to improve compliance (Christensen, 1978).

Conversely, there is a growing awareness that the operant learning theory approach has been quite successful in increasing compliance behavior of those with chronic illnesses. Baile and Engel (1978), and Sacket et al. (1978) turned to behavioral techniques after utilizing more conventional patient education methods, and both met

with success in improving compliance, although both recommended further studies, since they noted that employment of this approach is limited in the health care field.

Operant learning theory was used by a public health nurse with an adult diabetic, and compliance improved as demonstrated by mean urine test results, however, it was not presented as a formal study (Soderberg, 1972).

Furthermore, a multiple baseline experimental design has not been utilized to ascertain whether compliance would be improved in a diabetic with regard to following their therapeutic regimen, specifically, medication taking, caloric intake (diet), and exercise.

This gave rise to several questions in relation to compliance in diabetics.

General Questions

Will there be a desirable change in diabetic compliance behavior in an adult after utilizing an operant learning theory approach, in conjunction with a multiple baseline design, in medication taking?

Will there be a desirable change in diabetic compliance behavior in an adult after utilizing an operant

learning theory approach, in conjunction with a multiple baseline design, in caloric intake (diet)?

Will there be a desirable change in diabetic compliance behavior in an adult after utilizing an operant learning theory approach, in conjunction with a multiple baseline design, in exercise?

General Procedures

This study was developed in the following manner. A review of literature was made to provide documentation for the foundation of the study. Utilizing the operant learning theory approach, a multiple baseline single subject experimental design was constructed. This particular design attempted to demonstrate the effects of treatment, as it was applied successively across noncompliant target behaviors. The behaviors which were studied were medication taking, caloric intake (diet), and exercise. Tools for data collection included a Reinforcement Survey Schedule, Interview Format Form, Multiple Baseline Graphs, Cumulative Graphs of each behavior as it is successively treated, Weight Charts, Exercise Plan Charts, and a Contingency Contract. Also, fasting blood sugar (FBS) measures, and daily urine tests for sugar and

acetone, were recorded.

The experiment was a single subject design, however, two subjects were selected via the interview process, who were noncompliant adult diabetics, between the ages of 18 and 60 years of age. Also, included in the criteria for subject selection was that the subjects have diabetes for five years duration since Watkins, Williams, Martin, Hogan, and Anderson (1967) state that noncompliance increases in diabetics with increased passage of time from date of onset. Two subjects were selected instead of one as a precautionary control measure, since extraneous variables, with respect to a particular subject, might prematurely end the experiment. Therefore, the experiment could then still be carried on with the remaining subject.

Self reporting was relied upon heavily. This technique requires a person to record his actions and then report them to the investigator for purposes of feedback and evaluation (Mahoney and Thoresen, 1974). Cordes (1978) states that literature regarding this kind of data indicates a strong correspondence between this and measures used by health professionals. Furthermore, the reliability and validity of self reporting may be improved if the proper precautions are taken. Therefore, fasting blood

sugars, weights, and urine tests served as corroborative data to the self reporting.

The analysis of data attempted to answer questions regarding diabetic compliant behavior after utilization of the operant learning theory approach. Finally, the investigator attempted to draw conclusions and make recommendations based on the findings, as to the ways in which to improve compliance behavior using the operant learning theory approach.

Delimitations

The experiment relied heavily on self reporting.

The sample chosen had several prerequisites to meet which subsequently excluded a considerable number of diabetics.

With this type of experiment, replication is necessary to bolster reliability and validity.

Limitations

There were no metabolic clinics in Gallatin County, Montana. Therefore, the sample was derived first, indirectly, through appeal to the diabetics themselves, and then directly, through their medical doctor's agreement.

Definitions of Terms

Compliance: The extent to which a person's behavior is consistent with a prescribed therapeutic regimen, as demonstrated by correct medication taking, caloric intake, and exercise, for the particular individual. Absence or trace of sugar, and absence of acetone in urine, fasting blood sugar of closer approximations to normal results, with decreased or completely without episodes of hypoglycemia or hyperglycemia, and closer approximations to correct body weight for height. The desired behaviors should be attained and maintained on a systematic and consistent (stable), not up and down (variable), basis.

Target Behaviors: These are the observable undesirable non-compliant behaviors of the individual regarding caloric intake (diet), medication taking, and exercise, which need to be changed in a desirable direction.

Treatment: This is the reinforcement, appropriate for the individual, which is applied successively

across target behaviors.

Adult

Diabetics: Individuals with diabetes mellitus, 18 to 60 years old, male or female, ideally with diabetes at least five years in duration, who have been given a prescribed regimen of medication taking, diet, and exercise to follow by their physician.

Summary

Diabetes mellitus is a complex disease involving many components. Furthermore, statistics indicate that it is a health problem of major proportions and will continue to be so in the future. The concept of compliance which varies from 4 percent to 100 percent in the extent of noncompliance has inspired many studies. However, the emphasis in research has been on underlying causes of behavior upon which predictions could be made. These studies have not been very successful, attributable perhaps to the confounding variables inherent in human nature. Recently, the operant learning theory approach, which is concerned not with underlying causes but with observable behavior and its relationship to the environment, has been applied to increase compliance in those who have a chronic illness and must change their life styles. This approach has been more successful. However, further studies are encouraged.

Finally, answers to questions in compliance in adult diabetics, as they relate to the application of the operant learning theory approach, in conjunction with a multiple baseline design, may lead to more effective treatment and subsequent control of the disease.

CHAPTER 2

REVIEW OF LITERATURE

The purpose of the review of literature was: 1) to develop an understanding of the magnitude of diabetes mellitus, 2) to clarify the difference between the medical model and behavioral model approaches, 3) to develop an understanding of compliance as it has been researched in relation to the medical model and behavioral model approaches, and 4) to identify studies of compliance specifically related to the behavioral model approach to ascertain whether or not this approach would be effective in attaining and maintaining compliance in an adult diabetic with regard to medication taking, caloric intake, and exercise.

Magnitude of Diabetes Mellitus

Approximately 10 million Americans in the United States are either known diabetics, unknown diabetics, or will develop diabetes. These groups consist respectively of approximately 1.6, 0.6, and 2.8 percent of the population. About 389,000 new cases are reported yearly for the total population for all ages (Knowles et al., 1976).

Additionally, 8 percent of the cases are diagnosed at age 24 or before, 22 percent from 25 through 44, 50 percent from 45 through 64, and 20 percent at age 65 or older. Only 4 percent reported their diagnosis to be made before age 15 (Knowles et al., 1976).

The mortality rate from diabetes has increased from 33,000 deaths in 1965 to 36,000 deaths in 1973, and in 1973 diabetes was ranked as the sixth leading cause of death in the United States (Knowles et al., 1976).

The findings of the National Health Interview Survey of the year 1965-66 indicated that 562,000 diabetics were disabled in some way from diabetes. There were 38.8 million days of restricted activity due to diabetes, 19.9 million of these days being spent in bed. There are each year, about ten hospitalizations for diabetics per 100 diabetics in the population. In general, disability days due to all illnesses were three times more frequent among diabetics than those estimated for the population of the United States generally (Knowles et al., 1976).

Diabetes mellitus costs the American economy approximately \$2 billion dollars every year (Knowles et al., 1976).

There are also long term health complications for the diabetic in addition to disabilities and costs.

Atherosclerosis stands out as the major health hazard in the natural history of the disease, with coronary artery disease the leading cause of death (Knowles et al., 1976).

Diabetes mellitus is one of the most complex medical states. The impact which diabetes and its ramifications has upon society is sufficiently great to warrant an increased effort in attempting to alleviate and control its public health problem (Knowles et al., 1976).

Two approaches, the medical model approach, and the behavioral model approach, are investigated in an effort to ascertain their differences and the effect each has in relation to compliance.

Medical Model Approach Versus Behavioral Model Approach

The medical model is the traditional approach to health care. It is a version of the intro psychic concept, whereby the personality is considered an assortment of psychic forces, which, if normal, are socially acceptable, and if abnormal, are considered dysfunctional and diseased, so to speak. This approach assumes that a socially undesirable behavior is a symptom of the diseased internal conditions. Subsequently, the medical model approach is concerned with the symptomatic overt behavior only to the

extent that it can explain what exists internally. It assumes further that by ascertaining what motives the behavior represents, a cure will follow. In essence, the diagnosis is aimed at the pathogen, and the treatment, which is based on the diagnosis, is aimed also at the pathogen for a cure (Kazdin, 1975).

Thomas Szasz (1960) states that this approach is oppressive, requires a need for labeling an individual, and the success rate of curing labels is low.

Finally, Kazdin (1975) states that there is a manpower shortage, since this method requires professionally trained therapists, and the approach tends to be time consuming.

Lastly, this approach assumes that by answering why a behavior occurs and then utilizing that answer in a therapeutic regimen, it will yield compliance.

On the other hand, the behavioral model approach, also known as reinforcement theory, operant conditioning, and operant learning theory, rejects inferred motives, hypothesized needs, impulses, and drives which supposedly explain behavior. The emphasis is not on internal, but external, as the behavioral model assumes the environmental determinants influence behavior. It also assumes that

behavior is learned. Subsequently, treatment is based on the learning theory (Kazdin, 1975).

Kazdin (1975) states that labeling is avoided since diagnosis is aimed at antecedents of a behavior, the behavior itself, and the consequences of the behavior. The treatment is aimed at either the antecedents or the consequences, or both. It is additionally advantageous in that nonprofessionals can be utilized, which would alleviate the manpower shortage, and it can be utilized within the individual's contextual situation. The evaluation process is constant and ongoing, and aimed at the behavior change itself. The final assumption with this approach is that upon changing a designated behavior, thus improving compliance, a change in attitudes, beliefs, and values will also evolve, which is just the opposite with the medical model approach.

Kelman (1959) studies compliance as a process of attitude change. Kelman (1959) states that compliance occurs "when an individual accepts influence because he hopes to achieve a favorable reaction from another person or group" (p. 53). The behavior is adopted because of the rewards which are expected upon performance of desired behavior. Kelman (1959) maintains that the satisfaction

derived from compliance is due to this "social effect" (p. 53).

Marston (1970) notes that wide variations in compliance behaviors are anywhere from 4 percent to 100 percent in the extent to which people do not comply. Furthermore, comparing compliance of one study to another can be misleading, but, "the fact remains that the health behavior of most people falls short of what is known to be optimal" (Marston, 1970, p. 312). With this in mind, compliance is investigated from the perspective of the medical model and behavioral model approaches.

Compliance in Relation to Medical Model and Behavioral Model Approaches

Research directed at understanding compliance behavior has yielded a multitude of findings that are often not predictive of compliance. For instance, demographic variables have been studied at great length in relation to compliance behavior and include such variables as age, sex, socioeconomic status, education, religion, marital status, and race. In Marston's (1970) review of literature on compliance of demographic variables, they have thus far not demonstrated that these variables are predictive of compliance with therapeutic regimens.

In addition, studies in compliance are often mutually contradictory. For example, Marston's (1970) review states that Johnson (1965), in a study of patients with coronary heart disease, found that patients who verbalized problems with their regimens were more likely to comply, while Neely and Patrick (1968) found the opposite to be true in their study of aged persons taking medications at home. Bergman and Werner (1963) found that 92 percent of the patients who were under treatment with oral penicillin for streptococcal infections defaulted in taking medications by the ninth (last day) of treatment. On the other hand, Gordis, Markowitz, and Lilienfeld (1969) in a study on children taking penicillin prophylaxis for rheumatic fever, found no significant change in compliance over time.

Becker and Maiman (1975) state that these problems appear to arise mainly from a past predilection for a medical model of compliance, which confined its search for determinants to such aspects as characteristics of the patient, which included demographic and social, the regimen, including such things as type, complexity, discomfort, duration, and finally, the type of illness. There are, he says, major deficiencies of the medical model. Since demographic, physiological and structural characteristics

of patients are not necessarily related to their motivations, findings in the former areas are not able to account for the large numbers of persons who, despite the presence of many adverse characteristics associated with high probability of defaulting, still follow the recommended therapy. In addition, the medical model of compliance relies on a "shotgun" method of selecting items for study rather than upon the prior development of a unified conceptual approach to compliance, as a starting point. Thus, Kasal and Cobb (1966) in their review of scientific literature concerning health behavior and the sick role behavior, note that studies deal mostly with demographic and background variables, which are advantageous for measurement criteria, but dodge the issue of compliant behavior.

Becker and Maiman (1975), while observing the limitations of the medical model approach, adapt Rosenstock's Health Beliefs Model which attempts to explain and predict compliance (p. 12). However, in keeping with the medical approach, this model tries to get at an understanding of compliance through analyzing underlying motivations. With the Health Belief Model, behavior is predicted from the value of an outcome to an individual, and from the

individual's expectation that a given action will result in the outcome (Becker and Maiman, 1975). In essence, Becker and Maiman (1975) are concerned with noncompliant behavior only to the extent of its predictive value, and in order to change that noncompliant behavior, motivations and values and beliefs would first have to be changed.

Borofsky (1976) states that the physician's management of the therapeutic regimen of a patient can be an example of operant behavior occurring in a social situation. Borofsky (1976) advocates the application of operant conditioning principles to management of therapeutic regimens to enhance compliance. He views the principles of learning and conditioning as central both to the development and to the alleviation of the noncompliant behaviors. In distinguishing the medical model from the behavior model, he contends that the medical model prohibits direct symptom treatment when treating illnesses lest the symptoms reappear in another form. By contrast, the behavioral approach considers undesirable behavior to be, not a symptom of some underlying process, but examples of maladaptive learning or poor environmental control. Borofsky (1976), unlike Becker and Maiman (1975), is concerned with treatment of the noncompliant behavior itself, not the underlying

motivations which attempt to explain and predict compliance or noncompliance.

Why there is noncompliance in following a prescribed therapeutic regimen, is an issue which has caused a considerable stir within the field of research. An impact which has turned researchers with increasing interest toward studying compliance, according to Marston (1970), is the development of highly effective drug therapies for certain types of illnesses. Also, there has been an evolution of the general hospital as more of an acute care center, with the home serving increasingly as a source of care, whereupon the individual is expected to become responsible for his well being.

Sackett et al., (1978) state that suggestions for improving compliance range from studying psychosocial factors and implementing patient education programs, through negotiated contracts to calendar packs of pills. The investigators add that all of these recommendations are plausible and some are even feasible, but almost none have undergone any rigorous evaluation to see if they work.

A study on control in diabetes in 1961 by Stone noted that "experts have suggested that good control helps

diabetics live longer, whereas poor control encourages degenerative disease" (p. 436). One objective of this study was to find out how well these patients regulated their diabetes. Ninety-eight diabetic women and 62 diabetic men, ranging from 18 to 68 years of age, composed the sample population. The duration of diabetes ranged from 6 months to 37 years. Of the 160 patients, 126 were "not well regulated" (p. 441) at the time the study began. However, Stone (1961) noted increased compliance in 51 of the 126, or 40.5 percent, upon appropriate instructions. Noting again the importance of control in diabetes to lengthen the life span of those so afflicted, he contended that the results revealed a need for further scrutiny of poorly regulated patients.

Segal (1976) presents findings from the Family Therapy Training Center Child Guidance Clinic of Philadelphia, that indicate an apparent causal relationship to exist between emotional stress in human relationships and psychosomatic attacks of diabetes in diabetic children. In addition, these attacks are remarkably resistant to various types of treatment. In light of this, a psychotherapy program to reorganize the family patterns is recommended. However, whether or not the treatment was beneficial to

improving control, was not discussed.

Becker, Drachman, and Kirscht (1972) utilized the Health Beliefs Model in a study to predict compliance of mothers of pediatric patients in administering penicillin, as prescribed, to the ill children. The investigators found that the motivations appeared useful in predicting compliance and suggest that the health motivations, in this case the mother's values, beliefs, and perceptions, should be increased for achieving compliance. In addition, Becker et al. (1972) state that by knowing which components are below the level presumed to be necessary for compliance, health professionals may be able to better meet individual needs of each client. Becker and Maiman's (1975) followup study supported this, however, they state that application in practice to enhance compliance, is yet to be investigated.

More recently, Foster and Kousch (1978) have developed an assessment based on the hypertensive patient's perceptions and behavior, which attempts to combine the medical model and behavioral model approaches into practice. The Hypertension Assessment Form is utilized to gather data on the first visit and is based on the Health Beliefs Model with counseling done accordingly. The Hypertension

Encounter Form records progress on a long term basis, and is based on the behavioral approach to some extent. For instance, tasks are listed and a contract is drawn up. However, the authors do not mention success or failure with this combination, and it is not a formalized study as presented.

Christensen, in his 1978 review of literature of drug taking compliance, speaks to the Health Beliefs Model with regard to its use in practice, and suggests that "Empirical verification of the validity of the Health Beliefs Model and its applicability to various patient groups is still needed" (p. 184).

The internal-external locus of control psychological concept, has evolved from the Social Learning Theory by Julian B. Rotter (1966), and has also been investigated as a possible factor associated with compliance. Results thus far seem to indicate that the kind and amount of information a patient acquires about his situation may be related to his generalized expectancy for control of reinforcement. Goldstein and Reznikoff (1971) utilized Rotter's (1966) Internal-External (I-E) Scale to test their hypothesis that with chronically ill patients, there is a defensive adoption of external locus of control and

subsequent difficulties with the patient's involvement in his treatment regimen, in this case, control of dietary intake. Twenty-two hemodialysis patients were compared with a control group of 24 convalescent patients of like age and sex. The significantly greater externality of hemodialysis patients over control patients support their hypothesis. The patient's refusal to participate in the treatment program, in an effort to cope with his anxieties, takes the form of noncompliance in his therapeutic regimen.

Lowery (1973) contradicts these findings in her dissertation study which attempted to determine whether diabetes related learning and control vary as a function of the patients' generalized expectancy for internal or external control of reinforcement. In addition, Lowery (1973) also attempted to examine the kind and amount of information diabetics learn about their illness, the number of control problems diabetics have with their disease and whether diabetes related learning and control vary as a function of the patient's length of illness. Lowery (1973) found that internal diabetics scored significantly higher at the .01 level of significance on the Diabetes and Health Information Test (Lowery, 1973) than did the external diabetics on control related data. However, a person with

diabetes for six years did not score significantly higher at the .01 level of significance than did newly diagnosed diabetics, on this test. In addition, there was no significant interaction between locus of control and length of illness. The internal diabetics didn't increase their knowledge with time any more than the external diabetics did, according to the test given. Lowery (1973) concludes that locus of control is a personality variable which tends to remain stable over time, contrasting with Goldstein and Reznikoff's (1971) findings that chronic disease fosters externality. Lowery (1973) also states further that the study tests knowledge of diabetes and contends that the amount of learning and control of disease is related to locus of control. However, those with internal locus of control have more knowledge about diabetes but do not necessarily use this knowledge.

De-Nour and Czaczkes (1962) studied such personality factors as inability to delay gratification, and primary and secondary gains from assuming the sick role, as being the most frequent causes for noncompliance. The former factor was found in 25 of the 43 hemodialysis patients studied and seemed to differentiate clearly between good and bad compliers at the .01 level of significance.

Twenty-one of the 43 patients involved the latter factor, and 14 of these 21 were also unable to delay their gratification. The investigators state that isolating these factors as possible causes of noncompliance is important because they could dictate what psychotherapeutic intervention could be utilized, and further research in this area is necessary.

Some studies took a multifaceted approach, studying several variables at one time. For example, Williams, Martin, Hogan, Watkins, and Ellis (1967) conducted an extensive study of compliance behavior of diabetics. Samples were selected from two hospital metabolic clinics, one health insurance program in an urban location, and a sample from a physician's private practice. The samples included patients with juvenile and adult onset diabetes. The independent variables which were studied in relation to compliance were, intelligence, socioeconomic resources, motivation to comply, and knowledge of how to carry out the recommendations. The investigators found a positive correlation between knowledge and performance of prescribed treatment, no correlation between performance and control of disease, and a negative correlation between patient's knowledge about illness and control factors. The

deteriorating nature of the disease itself, it was suggested, could have been the reason for this finding. Regarding the other variables, such as locus of control, Williams et al. (1967) state "those factors where we found no relationship to exist, will not be discussed" (p. 450).

A study done by Watkins et al. (1967) to ascertain the relationship among what diabetics know, what they do, and their state of diabetic control, supports some of Williams et al. (1967) findings. For instance, the investigator studied 60 adult diabetics via direct observation, in their homes. A positive correlation was found between knowledge and performance. Also, no significant correlation was found between performance and day to day control. In addition, knowledge about diabetes is inversely correlated with control. Those patients in poorer control knew more about diabetes than those in better control. Other interesting findings were that the length of time a person had diabetes was positively correlated at the 5 percent level with errors made in insulin dosage. Thirty-three percent with diabetes 10 years or less made errors and 64 percent with diabetes 10 years or more made errors.

The effects that the primary medical prescriber, namely the physician, has on compliance, have also been

studied. For example, Schmidt (1977) focused on the characteristics of intelligence of the patient, the patient's knowledge of his disease, the complexity of the medication regimen, the influence of the family, the health beliefs model, and the doctor-patient relationship. After reviewing the research data on these characteristics, Schmidt (1977) lists 12 suggestions, which he feels might enhance patient compliance, and enable the doctor to be more effective as a therapeutic agent. However, Schmidt (1977) also states that while helpful, they are no guarantee of improving compliance.

Hulka, Cassel, Kupper, and Burdette (1976) designed a study concerned with compliance in taking medications. The sample was 46 doctors and 357 patients with either diabetes mellitus or congestive heart failure. Good communication of instructions and information from the physician to the patient was significantly correlated with increased compliance in those with congestive heart failure. However, no such significant relationship existed with the diabetic patients.

Kaufman, Cotnoir and Holm (1978) devised a program which they hoped would increase compliance of those who have to self administer medication after hospital discharge.

It involved utilizing a calendar dated pill pack and attending a counseling program developed by pharmacists. Post counseling questionnaires tended to indicate that compliance generally improved as a result of greater understanding of the medical regimen. However, the authors state that there has been no formal verification of this data yet.

Christensen (1978) in his review of literature of drug taking compliance, states that, "it would appear to be a simple matter to study drug noncompliers for characteristics that would readily identify them as needing more compliance generating efforts, but identification of the potentially noncompliant person has proven to be unexpectedly difficult" (p. 172).

Small (1978) states that health professionals tend to blame failure in such things as testing urine or losing weight, on poor patient compliance. The lack of information about diabetes and the reasons for balance in diet, exercise and medication is the reason for these problems. Though not a formal study, Small (1978) states that a comprehensive patient education program for diabetics should decrease hospitalizations, help prevent complications, and alleviate many of the difficulties encountered in daily management of

patients with diabetes. However, Williams et al. (1967) found that the greater the knowledge of diabetes, the more control problems were noted. Watkins et al. (1967) follow up study on diabetics in the home, further reinforces Williams et al. (1967) with respect to this finding. One explanation given by Williams et al. (1967) for this finding was that "the major features of the diabetes disease process itself and its treatment, are still too poorly understood to permit adequate therapeutic recommendations for many patients" (p. 451).

Borofsky (1976) explores compliance as a learned behavior, stating that a patient learns about factors that determine compliance from his own experience with past therapies, from interaction with those in the health field and from his interaction with various social and cultural institutions. Sackett et al. (1978) performed a series of randomized clinical trials of compliance improving strategies among working men with newly treated primary hypertension, which is illustrative and supportive of the operant learning theory approach. The compliance criteria were measured by whether or not blood pressure was at the goal that was set for a particular individual. First, they investigated patient education as a means of improving

compliance.. Eighty-five percent of the experimental group were able to master knowledge after instruction and post test, while only 20 percent of the control knew the same information upon taking the test with no instructions. Nonetheless, this mastery learning had no effect on the mens' compliance. Fifty-six percent of the men were high compliers in the sixth month of treatment as compared to 59 percent of the controls. Another part of their investigation concerned itself with improving compliance by increasing the convenience of long term care and follow up. There was no difference in compliance between the experimental and control groups. The results indicate that answering why the sample was noncompliant and then supplying them with the answers in the form of education or convenience, would increase compliance. However, answering the question, as the study notes, does not necessarily lead to improved compliance. Subsequently, the investigators turned to a more behaviorally oriented set of strategies to improve compliance. The program consisted of using a control group and experimental group. The former received the usual routine care, while the latter were followed by a coordinator in addition to routine care. The experimental group were instructed in taking their own blood pressure

at home once daily and to record it on a chart. A record of medications taken and missed was also to be recorded. They were also instructed to link their pill taking to the execution of daily habits, and a contract was negotiated. Patients in this experimental group were to visit the coordinator every two weeks. They were reinforced socially and monetarily if goal blood pressure was met. The data which was analyzed at six months and a year, demonstrated that compliance in the control group steadily declined, while compliance in the experimental group continued to increase. Sackett et al. (1978) recommended further studies from these encouraging results. In addition, Baile and Engel's study (1978) utilized a behavioral strategy to promote compliance with patients who had a myocardial infarction. They found the program to be a highly effective way of dealing with this problem in their group. Furthermore, they recommended that future research be aimed at the applicability of their rehabilitation strategy to different patient groups, and at using health personnel such as nursing staff to implement the program. Likewise, Borofsky (1976) states that unfortunately behavioral principles have not been utilized fully enough in the health care field to confirm their usefulness, and

subsequently recommended continued research.

Indeed, nurses are aware of operant learning theory techniques and feel further investigation in this area is warranted. For instance, in 1966, Whitney states, "during the last decade, the fact that behavior is changeable has become axiomatic. From the natural science approach of careful observation and experimentation, it has become evident to the nurse that if the environment were modified, the individual pattern of behavior might also be modified" (p. 229). Similarly, Shipley (1977) states that nurses are confronted every day with problems that could best be handled through application of operant learning principles. In addition, Neimeier (1976) states that nurses have been modifying behavior for a long time, however, it has been on an unsystematic basis. Properly applied, in a systematic design, behavior modification can equip nurses with skills and techniques that can be more useful and effective than any others now available.

Diet, exercise, and medication, such as insulin and oral hypoglycemic agents, are used to keep the patient's metabolic disorders from diabetes, under control (Garber, 1977). Consistency in all three is considered important. However, compliance with a prescribed regimen, in most

cases, involves a change in behavior patterns.

Compliance Studies Specifically Related to the Behavioral Model Approach as an Effective Means of Controlling Diabetes

Diabetes, like most chronic diseases, requires participation on behalf of the patient in the treatment regimen. Bondy (1971) states that with a chronic disease, the patient controls the therapy, with the health team acting as consultants. Therefore, the patient must learn how to control his disease. Indeed, the patient must assume responsibility for changing his behavior economically, medically, recreationally, and nutritionally. To the extent to which the behavioral approach has been investigated and applied, it seems to support these aspects. Baile and Engel's (1978) study which used a behavioral technique program to increase compliance in myocardial infarction patients, found that the program was effective because it returned control of care to the patient, there was frequent positive reinforcement, and the regimen was individualized.

The aforementioned Sacket et al. (1978) study, with hypertensive patients, which utilized behavioral techniques, subsequent to the traditional approaches, also yielded a high rate of success.

Epstein and Masek (1978) designed a study using

behavioral techniques, to develop reliable, easily implemented procedures for measurement and modification of medicine compliance. Fifty-nine college students served as subjects in the experiment. Vitamin C was the medication used and this was selected by the investigators, since Vitamin C as a prophylaxis, is consistent with the use of medication in prevention. The Vitamin C was filled with a tracer. It was ordered QID, as this regimen is typical of medicine regimens. The investigators were thus hopeful that it might serve as a useful analogue model for study of medicine intake. The study was carried out in three, 3 week phases. The subjects were required initially to place a deposit of \$9, which they would get back as long as they followed the program. Phase 1 was the baseline, pretreatment phase. It served to identify the most noncompliant subjects. Phase 2 was the treatment 1 phase. Here the sample was randomly broken into four groups which were: 1) self monitoring, 2) taste, 3) taste plus self monitoring, and 4) a no treatment control. The third phase was treatment 2 whereupon a response-cost procedure was utilized on half the subjects of each of the treatment 1 groups. These subjects signed a contractual agreement indicating that \$1 of their deposited amount would be

forfeited for each week that instructions weren't followed. The results indicated that during treatment 1, phase 2, the self monitoring group and the taste plus self monitoring group had compliance rates of 49 percent and 67 percent, respectively. However, during treatment 2, phase 3, those provided with response-cost procedures had a compliance rate of 78 percent. Also, the compliance of the taste plus self monitoring group appeared to improve over time, while the subjects of the self monitoring group appeared to have a decrease in compliance over time. In any event, the study demonstrates the variable effectiveness in using behavioral techniques to yield compliance, depending upon the experimental design.

"Today in the western world, weight control is recognized as being one of the major health problems. It contributes to the increased incidence in coronary artery disease, hypertension, and diabetes" (Crow and Wright, 1974, p. 103). Traditional dietary therapies for weight control haven't been demonstrated to be successful in producing a sustained weight in those who undertake these therapies (Brightwell and Sloan, 1977). A multitude of research has been done on this aspect, utilizing behavioral techniques. One objective at the Nutrition Behavioral

Research Conference (1975) was to ascertain principles and methods for producing dietary behavior change. Barlow and Foreyt (1975), speakers at the Conference, stated that "almost anything you do with people who have weight control problems is probably going to work for awhile" (p. 67). However, the results on a long term basis demonstrate that the traditional treatment is not very effective. They point to the Stuart and Davis (1972) behavioral program, as most studies that involve behavior modification for revising eating patterns stem from the Stuart and Davis (1972) program. The Stuart and Davis (1972) weight control program assumes that eating patterns are a function of environmental controls and that eating is determined by presence or absence of food cues in our environment. Stunkard (1974), renowned for his studies in weight control, together with Levitz (1974), used the Stuart and Davis (1972) program as a framework for a study on weight control. Results indicated that the program was effective in weight losses and control which was maintained in a nine month follow up. In addition, Stunkard (1972) considers the Stuart and Davis (1972) program highly successful for weight control.

Brightwell and Sloan (1977) state that over 100 articles dealing with behavioral treatments of obesity

have been published, and therefore, reviewed the literature to ascertain long term effectiveness with this method. The investigators found that it has been clearly established that behavioral techniques can lead to short term weight control. Furthermore, weight control can be maintained for a sufficient length of time, however they still suggest further research and application of this approach to ascertain this.

Soderberg (1972), a professional nurse, prepared a program using operant conditioning and applied it to a diabetic patient because the patient had continued to be noncompliant in spite of the use of traditional approaches to promote compliance. The program employed in the home, by visiting nurses, combined positive social reinforcement to increase desirable behavior, with ignoring to extinguish undesirable behavior. When the color of the urine changed to 4 plus, there was no show of disapproval and no use of social interaction. When the color stayed blue, or even a light green, an exaggerated show of approval by words, looks, and gestures, with a prolonged period of social interaction, was to be used. The patient began to be interested in the test procedure and really became involved in the results. This was also verified by the patient's

daughter. A graphic record was kept for three months which "showed a definite reduction in sugar level in the urine. The mean sugar was 3.5 in June and 2.3 in September"

(Soderberg, 1972, p. 8). Soderberg (1972) found this an effective way of increasing compliance with a diabetic patient, however, more formalized research is necessary.

Biermann and Toohey (1977) note that the Director, Dr. Olson, of the Diabetes Education Center in Spokane, Washington, states that not nearly enough attention has been given to the benefits of exercise for the diabetic. Abandonment of the old concept of restricted activity has led to the realization that diabetics are capable of, and can benefit from, vigorous exercise, and participation in individual and team sports.

Baile and Engel (1978) used a behavioral strategy with a sample of recovering myocardial infarction patients, related to exercise. The patients were instructed to prepare a hierarchial list of activities, the tenth one being complete rehabilitation as defined by the patient. The doctor collaborated on this list with the patient. In addition, they were trained to take and record pulse rate and any ill effects, pre and post activity. The positive reinforcement received from evaluating their recovery in

terms understandable to them, together with weekly support from health care team, yielded a 97 percent compliance rate, however, further research is stressed.

Stuart and Davis's (1972) weight control program, via behavioral techniques, also emphasized the importance of exercise and required that an individual be able to manage exercise activities. Exercise is classified as light, moderate, or heavy, and each minute of exercise expends a specific amount of calories accordingly. Values were tallied and plotted daily for feedback purposes, in conjunction with daily weight and amount of foods, eaten (in caloric value). The graph served to reinforce the individual to continue the desired behavior.

Though there are no studies directly related to use of behavioral techniques with regard to exercise in diabetics, Biermann and Toohey (1977) report that Engerbretson, a professor of physical education and a researcher, conducted two separate studies in 1962 and 1970, which were designed to ascertain the use of regular exercise to control diabetes. Both studies indicated that regular physical exercise produced an improvement in diabetes control.

Finally, Biermann and Toohey's (1977) review of

literature uncovered a paucity of information on exercise in diabetes and stated that this third aspect of the treatment triad in diabetes is as equally important as diet and medication, in controlling diabetes.

Summary

Statistics on diabetes mellitus indicate that it is not only a chronic, complex disease involving many components, but that it is also a major health problem, and will continue to be so in the future.

Two approaches, the medical model and the behavioral model, are reviewed in an effort to ascertain their differences and the effect each has in relation to compliance. While the medical model approach is concerned with behavior, only as it relates to the underlying dynamics, the behavioral model approach views behavior as a function of its consequences. The former is concerned with why a behavior occurs, while the latter concentrates on the behavior itself. While both are attempting to change behavior, the medical model approach tries to change attitudes and internal values in hopes that desirable behavior will follow. On the other hand, the behavioral model approach attempts to change the behavior itself with a subsequent change in attitudes and internal values. Review of the literature highlights the issue that a chronic disease requires patient participation in management to maintain control. Research aimed at

understanding compliance, has yielded results which are not always predictive of compliance. In most cases, investigators have been frustrated in their attempts to improve compliance. Studies utilizing the medical model approach tend to attribute the varying compliance rates to the many factors which were not taken into consideration, but which should be in future studies. Literature indeed confirms that identification of the noncomplier becomes extremely difficult in view of the multitude of variables within the sample to be considered. On the other hand, the studies which use the behavioral model approach yield high rates of compliance, place the control of disease back in the hands of the patient, and eliminate labels and guesswork as to the cause of the behavior, since it focuses upon the interaction between behavior and environmental events. However, studies reviewed also indicate that the effectiveness of behavioral strategies to increase compliance, still need continued research and duplication of experimentation to serve as proof of validation.

Finally, review of the literature also sheds light on the fact that there is only a minimal amount of formalized research by health professionals being done in relation to use of behavioral techniques with diabetics and their

therapeutic regimen. However, what little information there is seems successful enough to warrant further investigation.

CHAPTER 3

PROCEDURES

The problem of this study was to determine whether an operant learning theory approach is effective in attaining and maintaining compliance of diabetes in an adult who has demonstrated noncompliant behavior. The operant learning theory approach was used in conjunction with a multiple baseline design. This design demonstrates the effect of treatment as it is applied successively across the target behaviors of medication taking, caloric intake, and exercise in the noncompliant adult diabetic.

Outline of the Study

In this chapter, the outline of the study is presented in the following manner:

- * The population is described.
- * The experimental design, including method of collection and organization of data, is detailed.
- * Target behaviors and their parameters are defined.
- * A statement regarding hypotheses is explained.
- * The data analysis is outlined.
- * The precautions taken for accuracy are described.
- * The chapter summary is presented.

Population Description

There are no metabolic clinics in Gallatin County, Montana. Therefore, as a means of obtaining subjects for this study, an advertisement was placed in the classified section of the local newspapers. The American Diabetic Association and the Montana State University Student Health Center were also approached directly as to whether or not they had any noncompliant adult diabetics. Also, the Great Falls Clinic indicated that they would be willing to cooperate. However, the advertisements were effective in producing a suitable sample. Also, through the act of contacting the investigator, the potential subjects demonstrated a willingness to participate in the study.

As the potential subjects called to make appointments, the investigator sought to ascertain preliminary appropriateness prior to arranging for an interview (Appendix A). The prerequisites, in order to be considered for an interview, included the following: The subject must be a diabetic between 18 and 60. This was in an effort to avoid such extraneous variables as growth and developmental changes below the former age, and complications of old age and deterioration beyond the latter age. Either sex was acceptable. Ideally, the subject should have had diabetes

for at least five years duration since studies indicate that noncompliance increases with length of illness (Watkins et al. 1967). The subjects must state that they want to control their diabetes. They must also be on a diabetic therapeutic regimen regarding diet, medication taking, and exercise, as prescribed by their physician, since these areas were focused on in this study. Upon meeting these prerequisites, the subjects were then scheduled to be interviewed. Gronlund (1971) states that the personal interview process is a good means with which to elicit information. Yet, he also mentions that it is time consuming and difficult to standardize. However, also speaking for the interview process is Walsh (1967) in his study on the validity of self report. He researched the accuracy of the personal interview, the questionnaire, and the personal data blank form, and he found that none of the three methods elicited more accurate data than any other. In light of this, the personal interview format was utilized. Furthermore, specific criteria for selecting subjects were set. Those meeting over 50 percent of the criteria were eligible to participate in the study (Appendix B). Although only one subject was needed for this type of study, two subjects who met the requirements were selected since this

would enable the investigator to continue the study, should extraneous variables be a factor. Only data from one subject was utilized since complications prevented subject number two from participating until it was too late. In addition, the cooperation of the subject's physician was sought since the doctor was needed to participate to the extent that the subject's prescribed regimen was verified, and also to the extent that he must authorize the necessary laboratory blood work. The physician was also given an explanation as to the investigator's purpose of the study. Only with the physician's consent was the subject allowed to participate.

Prior to baseline phase initiation, the subject was instructed to fill out a Reinforcement Survey Schedule (Cautela, 1978, p. 45) to ascertain the subject's interests, and this was later used in negotiating the contract (Appendix C).

Experimental Design, and Data Collection and Organization

Baier, Wolf, and Rosely (1968) point out that "In the multiple baseline technique, a number of responses are identified and measured over time to provide baselines against which changes can be evaluated. With the baselines

established, the investigator applies an experimental (treatment) variable to one of the behaviors, produces change in it, and perhaps notes little or no change in other baselines" (p. 94). This procedure is continued successively to each target behavior, after the clinically significant level is reached. Where the level is set depends upon data gathered during baseline. In addition to identifying functional relations, applied research is concerned with "meaningful clinical or socially relevant behavioral changes" (Herson and Barlow, 1977, p. 37). Just showing statistical significance does not necessarily mean that a treatment has been effective. For instance, Herson and Barlow (1977) give the example that if depression could be measured on a 0 to 100 scale, a treatment that improved each patient in the experimental group of depressives, a decrease from 80 to 75 would be statistically significant if all depressives in the control group remained at 80. However, to the clinician, it may be meaningless because a depressive might have to show a 40 to 50 point drop before he's out of suicidal range. Likewise, the primary concern in this study was attaining a change in the target behaviors that was significant at the clinical level of significance.

With the advent of reliable and valid methodological designs, such as the multiple baseline approach, measurements and significance can be determined. A multiple baseline design, as opposed to a reversal or withdrawal design, was utilized since it is not feasible or, in the case of a diabetic, not ethical to withdraw or reverse the treatment and allow the subject to demonstrate baseline levels again, just to demonstrate a functional relationship between treatment (reinforcement) and behavior. The investigator was still able to ascertain that treatment was effective with the multiple baseline design, when a change in the rate appeared after its application, while the rate of concurrent untreated behaviors remained relatively constant (Herson and Barlow, 1977). In addition, this design fostered the simultaneous measurement of several concurrent target behaviors, which is important, and significant, since it approximates naturalistic conditions where a variety of responses are occurring at the same time.

While a multiple baseline design can be used across subjects, settings, and behaviors, the latter was selected for the purposes of this study, since with a diabetic, literature indicates that consistency in the three key behaviors of medication, diet and exercise, may keep the

diabetic's metabolic disorders under control (Garber, 1977). In this multiple baseline design across behaviors, a treatment variable was applied to behaviors within the same subject. Using a single subject study afforded the investigator the chance to more accurately pinpoint the functional relationships between the treatment and the behavior. It was also a feasible approach, since gathering a large sample of diabetics meeting these prerequisites, in this rural area was unlikely.

Parameters of Target Behaviors

Medication taking - This includes not just the actual self administration of the medication, but also taking accurate dosages, timing, rotation of sites, and use of a sliding scale, and notification to the doctor if the dosage was changed. Included too is the care of equipment and use of aseptic technique with injection, and use of a standard needle size only. Also use of a syringe which matches the kind of strength of

insulin, rolling the vial between the hands to mix, rather than shaking, injecting air into the vial, checking the syringe for air bubbles, checking and double checking the syringe for the accurate dose, cleansing of the site with cotton and alcohol, pinching or stretching the skin, drawing back the plunger after inserting the needle, before injecting insulin to be sure the needle isn't in a blood vessel, and using the recommended areas for injection (Watkins, Moss, Lawrence, Williams and Coyle, 1969-71). These items are organized into a checklist format (Appendix D).

One point was assigned to each item for a total of 19 points. Total points were tallied and recorded daily.

Caloric intake -

This means the total amount of

calories taken in during the subject's entire day including meals, snacks, and fluids, other than water, and meal additives like a type of salad dressing, croutons, gravies, jams, jellies, sugar and/or milk in coffee or tea. This information was organized via a diet diary form (Appendix E). These calories were tallied and recorded daily.

Exercise -

Various types of exercise, such as walking, running, dancing, bicycling among others, were divided into three general categories - light, moderate, and heavy, and the caloric cost for each type was estimated. This information was organized into an exercise plan chart (Appendix F).

Baier, Wolf, and Risley (1968) thought that a minimum of two target behaviors would be needed to derive useful information. However, Barlow and Hersen (1973) state that

"controlling effects of the treatment over at least three behaviors would appear to be the minimum requirement" (p. 323) to yield almost complete conviction regarding relationships between change and treatment.

Therefore, in light of the recommendations, and also because consistency in medication, diet, and exercise helps control diabetes, three target behaviors were utilized.

The order of target behaviors was stated as such because according to compliance studies, it is considered less difficult to acquire a new habit such as medication taking, than it is to alter old behaviors such as dietary or exercise patterns (Sackett and Haynes, 1976).

Pre-Baseline Phase

Prior to the Baseline the investigator observed the subject while performing medication taking, for a period of three days. The investigator checked the steps, as previously defined, which the subject performed. It was then assumed that the results from the three day observation were a fair representation of the subject's usual performance. This phase was a necessary prerequisite since the subject could not be given the checklist prior to the treatment phase or it may have influenced the

baseline phase performance. These observations were separate, and while reported in the discussion of the study, were not entered in as baseline data points.

Baseline Phase

There was a minimum of five baseline points in order to eliminate the existence of a trend or pattern. During the baseline phase, the subject met with the investigator after at least five baseline points were accumulated. During this meeting, the investigator merely collected the subject's assembled data. At the conclusion of the baseline phase, the data was plotted on a graph and evaluated by the investigator so the clinically significant criterion level could be set.

Treatment Phase

During this phase, the treatment (reinforcer), was applied. The goal was to attain and maintain clinically significant results at the predetermined criterion level of effectiveness, across each target behavior, in succession.

Reinforcers - a contingency contract was negotiated between the subject and the investigator. The basis for this contract was that if the subject performed the agreed upon behaviors, then, and only then, was he rewarded (DeRisi

and Butz, 1977).

Items which were included on the contract, based on DeRisi and Butz (1977) were:

- 1) Data agreement begins, ends, or is renegotiated.
- 2) Behavior(s) targeted for change.
- 3) Amount and kind of reward or reinforcer to be used.
- 4) Schedule of reinforcer's delivery.
- 5) Signature of all those involved (Appendix G).

The exact nature of the reinforcer was dependent upon the individual subject's preferences, and the answers which the subject placed on the Reinforcement Survey Schedule.

The contract was renegotiated six times, at which time treatment on the next behavior was initiated. The subject met with the investigator once a week (DeRise and Butz, 1977) for the duration of the program to report on her status, hand in data, and realize the reward, as was stated in the contract. In addition to the contract, the subject was also instructed to fill out a cumulative graph daily, which provided immediate feedback to the subject as to whether or not she was complying.

In reiteration, once the goal of one behavior was reached, the next behavior, which was in baseline phase up to that point, was then treated.

Subject's Instructions - The subject was initially told that the study she was participating in would help the investigator ascertain in what ways diabetics can control their own disease. She was also told that it would be necessary for her to take an active part during the study. The subject was assured further that her anonymity would be preserved, and that she might read the final results if she so desired.

During the baseline phase, the subject was given a three divider notebook and was required to record exactly what procedures were followed for the medication taking target behavior. Also, foods eaten during breakfast, lunch, and dinner, any snacks, including fluids of any kind, and any additives, were also recorded. Additionally, the subject was required to keep a record of the kind and the amount of exercise. The subject was asked to record these three target behaviors, one in each section of the notebook, on a daily basis. Written instructions were also included in each section. During all baseline phases, the investigator converted data and plotted it to minimize the chances of subject reactivity.

During the treatment phases, the subject was required to collect and record the data on all three behaviors, but

only actually converted and plotted the data on the behavior being treated. Therefore, after the first baseline phase on the medication taking target behavior was assembled, a clinical criterion significance level was set, and a contract was negotiated as specifically stated previously, with the subject. Based on the parameters of medication taking, the subject was responsible for assigning points for what was performed and plotting them on a cumulative graph (Appendix H).

During the treatment phase for the caloric intake target behavior, a clinical criterion significance level was set, and a contract was negotiated, and the subject was shown how to convert food eaten into calories, and was required to plot the calories on a separate cumulative graph. The subject was given a chart (Appendix I) to refer to since she didn't have her own from her doctor.

During the treatment phase for the exercises, a clinical criterion significance level was set, and a contract was negotiated, and the subject was shown how to convert exercise into gross energy expenditure, and was required to plot this on a separate cumulative graph. A chart (Appendix J) also accompanied the explanation on exercise conversion to which the subject was able to refer.

The subject was also required to record urine sugar and acetone test results, and weight daily on standard 8½" x 11" graph paper. Additionally, the subject was instructed to weigh in at the same time every day, preferably in the morning prior to breakfast. She was also told that five fasting blood sugars would be necessary during the program, and that the times would be specified by the investigator. Table 1 (Outline of Responsibilities) outlines both the investigator's and the subject's responsibilities.

While it is evident at this point that the design relies to a great extent on self recording, there are studies which do support its accuracy. Self reporting techniques are typically used when information is desired that is inaccessible by other means. Mischel (1976) states that subjects "can report directly about their own behavior with as much or better accuracy than we can get from other more direct inferences and information about them" (p. 262). Cordes (1978) further reinforces this issue, indicating that information obtained from self reporting correlates strongly with measures used by health professionals, according to the literature. Furthermore, in Stuart's "highly successful weight control program" (1977, p. vii) a predominating factor is that the person is responsible

TABLE 1. OUTLINE OF RESPONSIBILITIES

Subject's Responsibilities

Makes and keeps appointment with investigator.

Pre-Baseline Phase -

Has blood sugar test done.
Performs medication taking for 2-3 days.

Baseline -

Record: Medication taking
Foods eaten
Exercise
In a 3 divider notebook
Record: Weight (same time daily)
Urine for sugar and acetone results
On 8½" x 11" lined paper with date and time next to data. This paper will be kept in a 3 hole notebook.
Meets with investigator on the fifth day.

Investigator's Responsibilities

Interviews subject, reviews subject for appropriateness. Notifies subject as to whether or not he would be participating in the study. Confers with subjects M.D.

Observe subject's medication taking behavior for 2-3 days and fill in checklist.
Administer Reinforcement Survey Schedule prior to baseline initiation.

Plot points on M-B* graph.
Plot calories on M-B graph.
Plot calorie expenditure on M-B graph.
Weigh weekly and plot.

Test urine weekly and plot results. Plots the subject's daily results also.

Depending on data, either extend baseline three more days or establish clinical significance level.

TABLE 1. OUTLINE OF RESPONSIBILITIES, (Continued)

Subject's Responsibilities

Post-Baseline -

Has blood sugar test done.
Negotiate contract with the investigator concerning medication taking behavior.

Treatment Phase for Medication

Taking Behavior -

Record: Daily totals in 3 divider notebook.
Tallies and plots points earned for medication taking behavior on a daily basis on a cumulative graph which is kept in a 3 hole notebook.
Instructions and parameters accompany graph.
Concurrently recording baseline data on foods eaten and exercise.

Record: Also still recording weights and urines daily, but now plotting on a graph which is kept in a 3 hole notebook.

Meets with investigator on a weekly basis.

Investigator's Responsibilities

Negotiate contract with subject concerning medication taking behavior.

Takes subject's data and plots on M-B graph.
Tests urine and weighs subject.
Plots these results and subject's daily results.

Instructs on parameters and graph plotting.
Tallies, converts and plots on M-B graph.

Tests urine and weighs subject.
Plots these results and subject's daily results.

Checks on fulfillment of contract agreement.

TABLE 1. OUTLINE OF RESPONSIBILITIES, (Continued).

Subject's Responsibilities

Investigator's Responsibilities

Post-Treatment Phase for Medication

Taking Behavior -

(The level of significance has been achieved at this point.)

Has blood sugar test done.

Contract renegotiation with the investigator concerning caloric intake behavior.

Contract renegotiation with subject concerning caloric intake behavior.

Treatment Phase for Caloric Intake Behavior -

Converts foods eaten into calories and plots on cumulative graph daily. This data is kept in 3 hole notebook. Instructions and exchange lists accompany graph.

Takes subject's data and plots on M-B graph.

Instructs in conversion and plotting.

Record: Total daily calories in 3 divider notebook.

Record: Concurrently still recording baseline data on exercise.

Converts, tallies, and plots on M-B graph.

Record: Also still recording medication taking behavior and plotting on cumulative graph.

Checks on maintenance of this behavior and fulfillment of contract agreement.

Record: Also still recording weights and urines daily on graph.

Tests urine and weighs subject. Plots these results and subject's daily results.

Meet with investigator on a weekly basis.

Checks on fulfillment of contract agreement for caloric intake behavior.

TABLE 1. OUTLINE OF RESPONSIBILITIES, (Continued).

Subject's Responsibilities

Investigator's Responsibilities

Treatment Phase for Exercise Behavior--

Converts exercise into gross caloric expenditure and plots on cumulative graph which is kept in 3 hole notebook. Instructions and conversion values accompany graph.

Instructs in conversion and graph plotting.

Record: Daily totals of expenditure in 3 divider notebook.

Takes subject's data and plots on M-B graph.

Record: Still concurrently recording and plotting on medication taking and caloric intake, and plotting on graph.

Checks on maintenance of these behaviors and fulfillment of contract agreement.

Record: Also recording weights and urines daily on graph.

Tests urine and weighs subject. Plots these results and subject's daily results.

Meets with investigator on a weekly basis.

Checks on fulfillment of contract agreement for exercise behavior.

Post-Treatment Phase for Exercise Behavior -

(The level of significance has been achieved at this point.)

Has blood test done.

Final meeting with investigator.

Final meeting with subject.

*M-B graph means Multiple Baseline Graph.

for himself and must self record, and report to an investigator at assigned intervals.

The self report technique does make the assumption that respondents are both willing and able to report accurately. Thus, special efforts must be made to meet these conditions (Gronlund, 1971). To enhance effectiveness, Gronlund (1971) suggests that a good rapport be developed and the subject must believe that honest responses are in their own best interests.

Furthermore, there are three conditions which must be taken into consideration which Mahoney and Thoresen (1974) identify as interfering with reliable recording and reporting: 1) drift, which occurs when the subject moves away from the originally defined criterion and redefines his own criterion, 2) reactivity, which occurs when the subject becomes more aware by monitoring his own behavior and changes in the desired direction are evident prior to treatment application, 3) bias, or expectancy, whereby the subject begins to move in the desired direction because he feels this is what the investigator wants him to do. Therefore, in addition to establishing rapport, to minimize these interferences, the subject's instructions were

reinforced with explanatory charts and the contract. Also, the baseline phase could have been extended if reactivity occurred which would remedy the situation, since this particular interference is considered to last only a short time (Kazdin, 1975). In addition, the investigator adhered exactly to the established design and conditions that existed in the contract. Kazdin (1974) suggests that when self reporting is used, independent corroborative data such as weight loss or gain, if the target behavior is caloric intake, is essential to validate the accuracy. Therefore, for purposes of this study, corroborative data which would back up the subject's self report, was: five fasting blood sugars, which were done on the first day just prior to baseline, on the last day of the experimental design, and three times in between when the treatments were applied successively across each target behavior. Daily weights were recorded by the subject and checked every week by the investigator. Urine tests for sugar and acetone were also recorded daily by the subject and tested by the investigator every week. This corroborative data might also illustrate increasing control of the disease. Arithmetical means of these were calibrated after each phase and

inter-phase when there was a change in some part of the experiment. The subject was aware of the fact that the investigator was checking weight and urine on a weekly basis, and that five fasting blood sugars were necessary. These provisions were stated in the contract. Therefore, with the uses of these added measurements, and the cumulative graph, a significant other was not considered as necessary to corroborate the subject's self reported data.

With the behavioral approach, Zifferblatt (1975) says "the focus of responsibility for change shifts to the subject with the stipulation that he acquires both the skills and beliefs that he can influence his behavior in positive ways" (p. 181). Subsequently, it is hoped that the natural positive results experienced during this program would become the reinforcers which would maintain the desired behavior. Indeed, this was reported as a resulting factor in a behavioral study done by Kau and Fischer (1974).

Statement Regarding Hypotheses

Hypotheses, especially the null, while appropriate to normative studies where the population means are used,

are inappropriate to single subject experimental designs where $N=1$. The primary concern in this study was to identify the target behaviors that needed to be changed, and do what was necessary to achieve the change at a clinically significant level. Therefore, the data being generated from this study has a different perspective and did not lend itself, with the utilization of this particular design, to accepting or rejecting a null hypothesis (Hersen and Barlow, 1977).

Data Analysis

The primary emphasis in the analysis of data was placed on reaching clinical significance at the predetermined criterion level of effectiveness.

Baseline/treatment phase graphs were used to depict clinical significance. Figures were used to state data graphically.

Precautions Taken for Accuracy

The tools in this study have been utilized extensively in research and are considered reliable and valid. For instance, the Reinforcement Survey Schedule (RSS), developed by Cautella and Kastenbaum (1967), has been used for over 10 years. A chi square analysis for frequency

of choice for each response showed no significant difference ($p > .05$, $N=165$). In essence, there was no tendency to pick any one category over any other (Cautela and Kastenbaum, 1967).

The multiple baseline design has also been in use for over 10 years, and can accurately demonstrate relationships between a treatment and change in behavior, which is its purpose (Hersen and Barlow, 1977).

The exercise plan tool elicits values that are considered gross values; however, they provide a guide for calculations of expenditure (Stuart, 1977).

The Food Record diary form was compiled by a nutritionist and based on a nutritional assessment guide by Nizel (Lilly, 1972). Additionally, the Nutritive Values for Foods chart and the Meat Exchange list which were utilized were based on established values as derived by the scientific method (Stuart, 1977).

Finally, the tool used for the interview was a combination of general health guides (Malasanos, Barkauskos, Moss, Stoltenberg and Allen, 1977), and a diabetic assessment guide (Watkins, et al. 1969-71).

The computational data which was compiled by the

subject and the investigator was checked and double checked to minimize error. A hand calculator was also used in this process as necessary.

Summary

The problem of this study was to determine whether an operant learning theory approach is effective in attaining and maintaining compliance of diabetes in an adult who has demonstrated noncompliant behavior, in conjunction with a multiple baseline design. The sample population was gathered directly via local advertisement in the newspapers. Subjects were screened and interviewed for prerequisites and two were selected, although this specific experimental design requires only one subject. This was a precautionary measure since it enabled the investigator to continue if a subject should have to terminate due to extraneous variables. In fact, only data from one subject was reported since subject number two could not begin until it was too late.

The multiple baseline design was utilized to demonstrate the relationships between treatment and behavior change in the three target behaviors of medication taking, caloric intake, and exercise, since consistency in these behaviors are considered the key factors in the control of diabetes.

While it was the investigator's responsibility to organize, convert, and plot data during baselines, after

the subject merely recorded the information in a 3 divider notebook, it became the subject's responsibility to do this during the treatment phase of each behavior.

The study relied heavily on self recording and reporting, however, first order measures such as urine tests, blood tests, and weights were used to corroborate the subject's behavior and illustrate possible increased control of the disease. In addition, literature indicates that subjects usually report behavior honestly and accurately.

The design of the study, using the operant learning theory approach, placed emphasis on the subject's responsibility for care and control. Furthermore, optimally, as the desired behaviors are strengthened by rewards, the subject will incorporate these behaviors into her repertoire to maintain compliance.

The data was compiled and analyzed. Tables and figures were utilized to more graphically present the data. Finally, the analysis of data would allow for drawing conclusions and making recommendations.

CHAPTER 4

ANALYSIS OF DATA

The problem of this study was to determine whether an operant learning theory approach is effective in attaining and maintaining compliance in an adult diabetic who has demonstrated noncompliant behavior with regard to medication taking, caloric intake and exercise, via a multiple baseline experimental design.

Subject Selection

Twelve individuals responded to the classified advertisements which were placed in the Gallatin County, Montana newspapers, via a telephone call to the investigator. Of those twelve, it was ascertained that eight met the initial prerequisites and were subsequently scheduled for an interview. Of those eight, four kept their interview appointments with the investigator. After each was interviewed individually, the two subjects with the highest number of total points, as evaluated by the criteria for subject selection checklist, were selected. For the purposes of this study, only data from subject #1 was analyzed. Subject #2 started the program too late due both to the

difficulty in contacting the physician for approval, and to the subject's own variable schedule. Except for the pre-baseline observation period which was done in the subject's home, the Nursing Services Center, at Montana State University was utilized as the meeting place.

Subject #1, to be referred to hereafter as the subject, scored 17 out of a possible 23 on the criteria for subject selection checklist. The data compiled indicated that the subject was a 58 year old female who was diagnosed with diabetes in July of 1978. It was ascertained through screening for illnesses that she had changes in visual fields prior to the diabetes diagnosis. However, this was corrected when her fasting blood sugar was lowered, and she also obtained corrective lenses. She also had a peptic ulcer and a history of epilepsy. Both were controlled with medications with no exacerbations or seizures for over two years. Subsequently, the investigator did not think that these factors would influence this study. In addition, it was determined that the subject was inconsistent in medication taking, diet, and exercise. The subject also did not test urine for sugar and acetone consistently and did not keep a record of this, nor of her daily weight or daily caloric intake. Furthermore, she had

no set patterns for visiting her physician. It was also ascertained, however, that the subject's therapeutic regimen as prescribed, remained the same since diagnosis. Her last fasting blood sugar was in September of 1978, and that was 250mg/100ml of blood. When asked why she wanted to participate in this study she responded that she wanted to be as healthy as possible. The subject's motivation was demonstrated by her follow through on all instructions, consistency in recording, and keeping all appointments with the investigator without the necessity of reminders.

Experiment Results

The entire experiment ran from June 30, 1979 to August 23, 1979. This 8 week period is inclusive of the initial interview and the final fasting blood sugar.

The pre-baseline phase ran for a period of three days. The arithmetical mean was used throughout this study, both to identify the subject's average status and to set a realistic clinical level of significance. The results from the investigator's observations of the medication taking parameters indicated that the subject attained a mean of 12.3 out of a possible 18 points. Number 19 was

not applicable since the subject never changed dosages.

The baseline phase for medication taking behavior ran for five days. The subject was given verbal and written instructions to keep a daily record of the exact steps taken during the act of medication taking. Results indicated that the subject attained a mean of 12.8 in medication taking. Figure 1 illustrates the level at which the subject performed during the baseline phase of medication taking behavior, with a drop from 13 to 12 on day 5.

The treatment phase for medication taking ran for 40 days. This particular treatment which was utilized required that the subject negotiate a contingency contract with the investigator. Providing that the subject was able to attain and then maintain the clinical level of significance of 18 points in medication taking on a daily basis, she was entitled to watch her favorite television shows. Results indicated that it took the subject three days to attain that level, with a subsequent lapse on the fourth day. From the fifth day on, however, the subject was able to maintain the clinical level of significance. The subject stated that deprivation of her reward on the day that she lapsed, was enough to encourage her to maintain

the level which had been set. Of the 40 day treatment phase, it took eight days to attain the clinical level of significance, with initiation of consistency occurring on day ten (Figure 1).

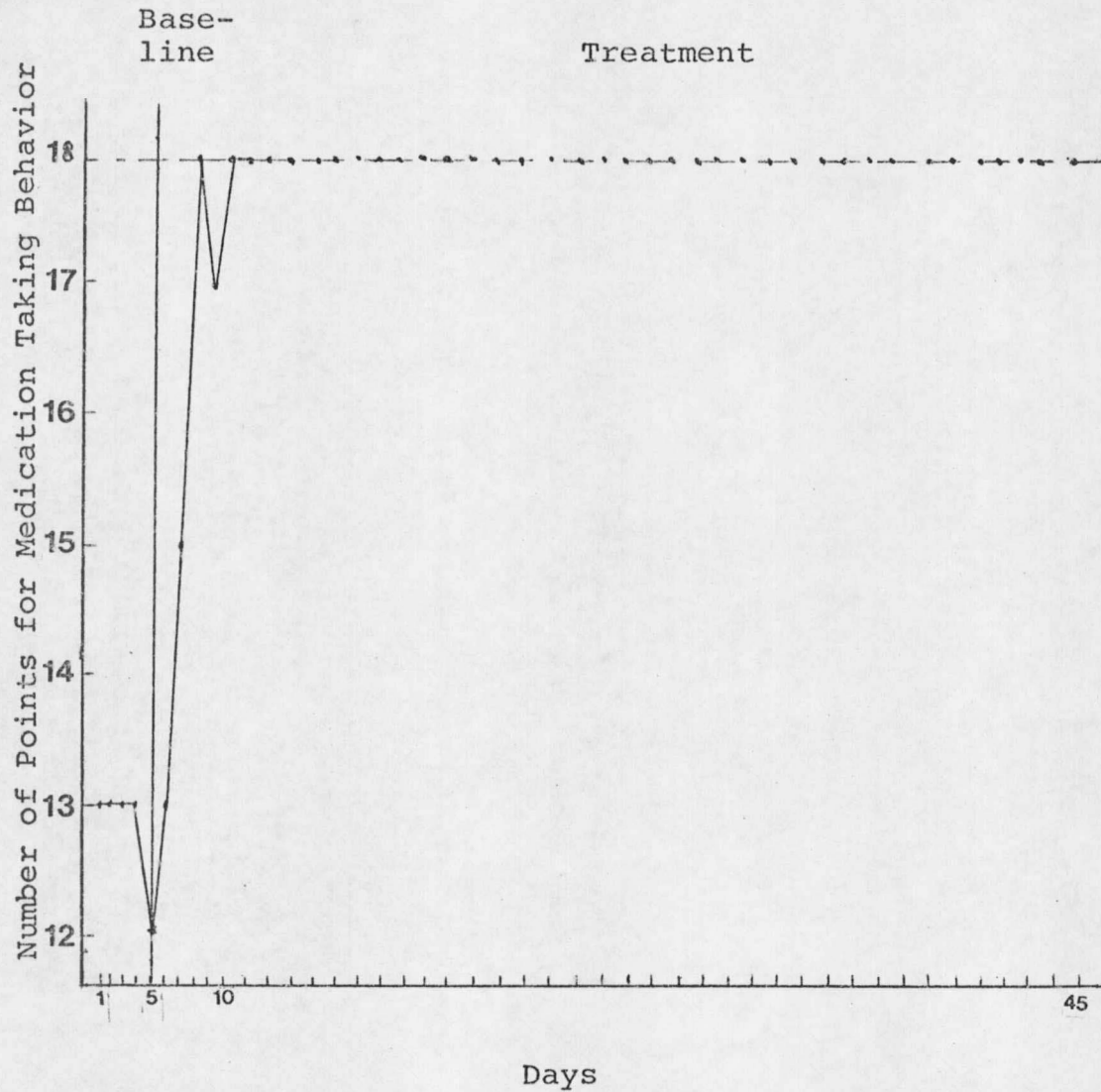
The baseline phase for caloric intake, which ran for 14 days, was being recorded concurrently with the medication taking baseline/treatment phases. The subject was again given verbal and written instructions to record, in detail, her food and fluid intake on a daily basis.

Figure 2 demonstrates the variability of caloric intake behavior during the baseline phase. The data points during the first five days indicated a temporary descending pattern of daily caloric intake, as the subject stated that she became aware, while recording, that she was probably eating too much. Subsequent data points demonstrated that caloric intake again increased and became variable as the experiment progressed.

The mean caloric intake during the baseline phase was 2200 calories per day. The desired daily caloric intake as prescribed by the subject's physician, was 1500 calories per day. Therefore, it was estimated that the subject had to decrease her daily caloric intake by 700 calories per day to maintain both the desired intake and

Figure 1

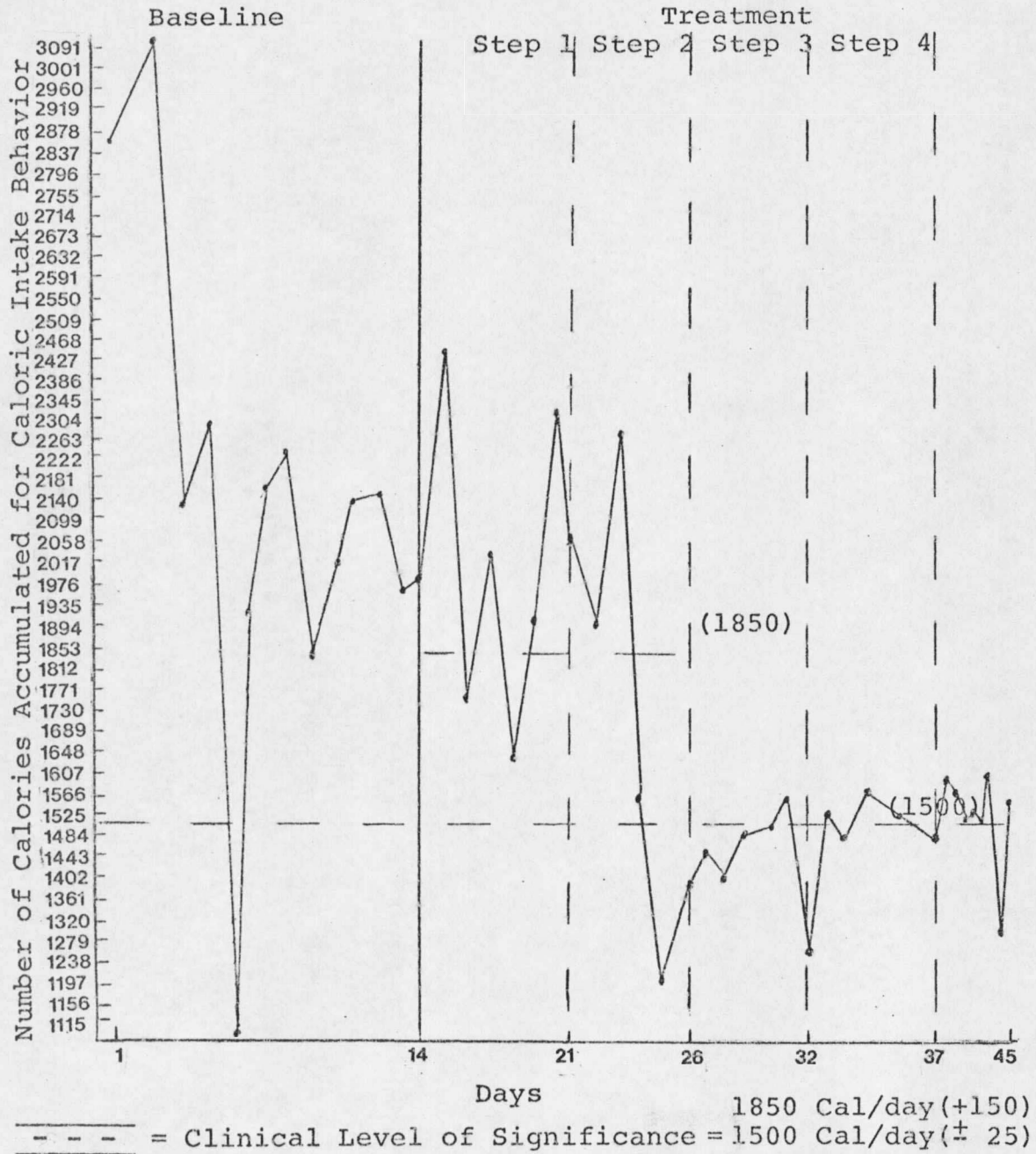
Total Points/Day Scored for Medication Taking Behavior During Baseline and Treatment Phases



--- = Clinical Level of Significance = 18 points/day

Figure 2

Total Calories Accumulated/Day for Caloric Intake Behavior During Baseline and Treatment Phases



consistency in diet.

The treatment phase for caloric intake, which ran 31 days, was initiated after it was ascertained that the clinical level of significance for medication taking was reached. Additionally, there was no consistent pattern or trend demonstrated during the baseline phase of the caloric intake behavior, with the data point on day 14 indicating an undesirable change in the opposite direction. A second contract was negotiated with the subject. Since an immediate decrease to the clinical level of significance of 1500 calories per day was considered unrealistic, the treatment phase was subdivided into four steps. The first step required that the subject reach 1850 calories per day. The contingency was again based on a reward of television privileges for meeting her daily level. The subject was also allowed an extra 150 calories above the level before she was deprived of her reward. This stipulation was included in the contract during the first two steps since the subject was unfamiliar with calorie counting. Results during step 1, which ran seven days, indicated that there was no consistency on a daily basis, however, the mean did decrease from 2200 calories per day during the baseline phase, to 2014 calories per day. The contingencies in

step 1 were repeated again in step 2 with the same level to reach. The results from step 2, which ran five days, indicated that the mean decreased again from 2014 calories per day during the first step, to 1654 calories per day during the second step. The mean for the first two steps was 1834 calories per day. This was encouraging for the subject since she was able to decrease her caloric intake in the desired direction and reached the level set, on a mean basis. However, there was still a lack of consistency. Subsequently, step 3 was initiated, and a third contract was negotiated. The contingencies were more difficult since the clinical level of significance was now 1500 calories per day, with an added emphasis on consistency. The subject had to reach 1500 calories per day, plus or minus 25 calories, in order to receive her reward. The reward was changed, at the subject's request, to newspaper reading privileges, as she felt this was more difficult for her to do without. The results in step 3, which ran six days, indicated that there was again a mean decrease to 1437 calories per day. There was also more consistency in day to day intake. However, since the level was not as yet reached with consistency, step 4 was initiated. The instructions were reviewed with the subject and the same

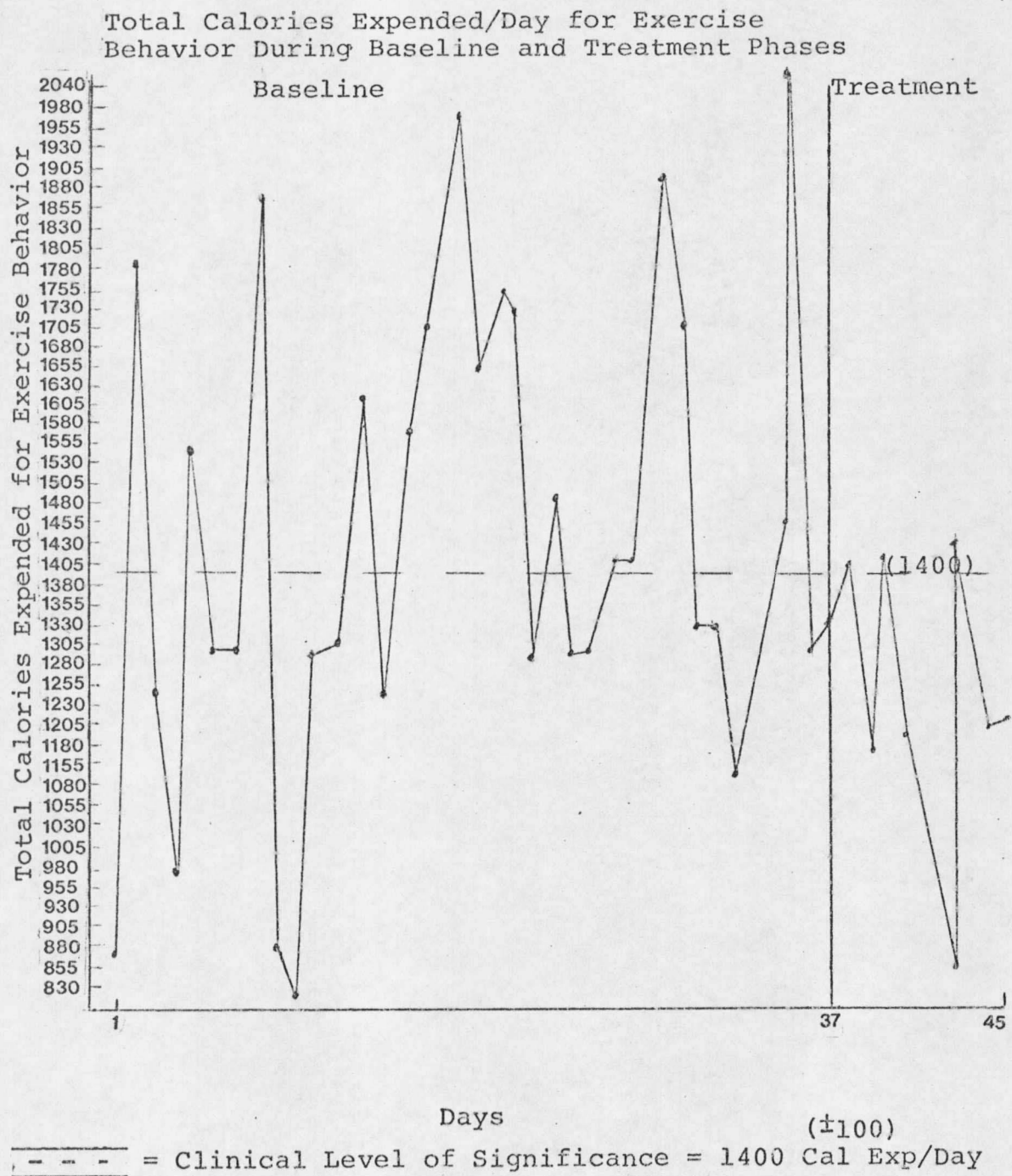
contract and stipulations which were negotiated in step 3 were repeated in step 4. Step 4 ran for five days. The results indicated that there was increased consistency and the mean was 1519 calories per day. The clinical level of significance which was set for this target behavior was reached on a mean basis. Of the 31 day treatment phase, it took 23 days to reach the level, and 23 days for initiation of consistency, both on a mean basis only. After initiation of the treatment phase for exercise behavior, data points continued to be collected for caloric intake. The mean increased to 1525 calories per day. While there was a change in the desired direction, the level of significance was still not attained and maintained. The caloric intake during the entire treatment phase ranged from 1475 to 2000. On this basis the subject was within this range 28.6 per cent of the time during baseline and 58.1 percent of the time during treatment (Figure 2).

The baseline phase for exercise, which ran for 37 days, was being recorded concurrently with the medication and caloric intake baseline/treatment phases. The subject was given verbal and written instructions to record on a daily basis, the kind of exercise and the amount of time spent in its performance. In addition, the identical list of

exercises was given to the subject that the investigator had. The only difference was that caloric expenditures were not demarcated on the subject's copy until the treatment phase. Results, as illustrated in Figure 3, indicated that while the mean of 1400 calories energy expenditure per day, was the approximate number of calories which the subject should be expending per day, there was no consistency on a day to day basis. Indeed, highly variable exercise behavior was performed on a day to day basis, during the baseline phase, and continued as such, even while treatments were being applied to the previous target behaviors.

The treatment phase for exercise was therefore initiated and ran for eight days. A fourth contingency contract was negotiated between the subject and the investigator. This contract required that if the subject consistently met the clinical level of significance of 1400 calories energy expenditure per day, plus or minus 100 calories, then she would be rewarded with a piece of angel food cake, a favorite desert, which was allowed in her diet. Results indicated that the subject was not able to reach consistency on a daily basis at the clinical level of significance after eight days of treatment. Figure 3 illustrates that

Figure 3



on day 41 there was a drop substantially below the clinical level of significance which the subject attributed to the fact that it was Sunday, and that she rested most of the day. However, there was a change in the desired direction since during baseline the subject was only in the desirable range of 1300 - 1500 calories expenditure per day 24.3 percent of the time, while during treatment, the subject was in the desirable range 37.5 percent of the time.

Figure 4 depicts a comparison of medication taking, caloric intake, and exercise behavior during baseline and treatment phases.

Figure 5 illustrates corroborative data of weight, urine tests, and fasting blood sugars, (FBS). This data was collected in an attempt to corroborate the subject's self reporting. Therefore, the subject was instructed both verbally and in writing, to record urine test results, and weights, daily. The investigator measured urine test results and weights at each meeting, also. In addition, the investigator informed the subject when it was necessary to have a FBS. Five FBS's were performed by the physician's lab for purposes of this study. There was also a sixth FBS which was ordered by the physician on day 26 of the experiment, for his use, but was not necessary

Figure 4

Comparison of Medication Taking, Caloric Intake, and Exercise Behaviors During Baseline and Treatment Phases

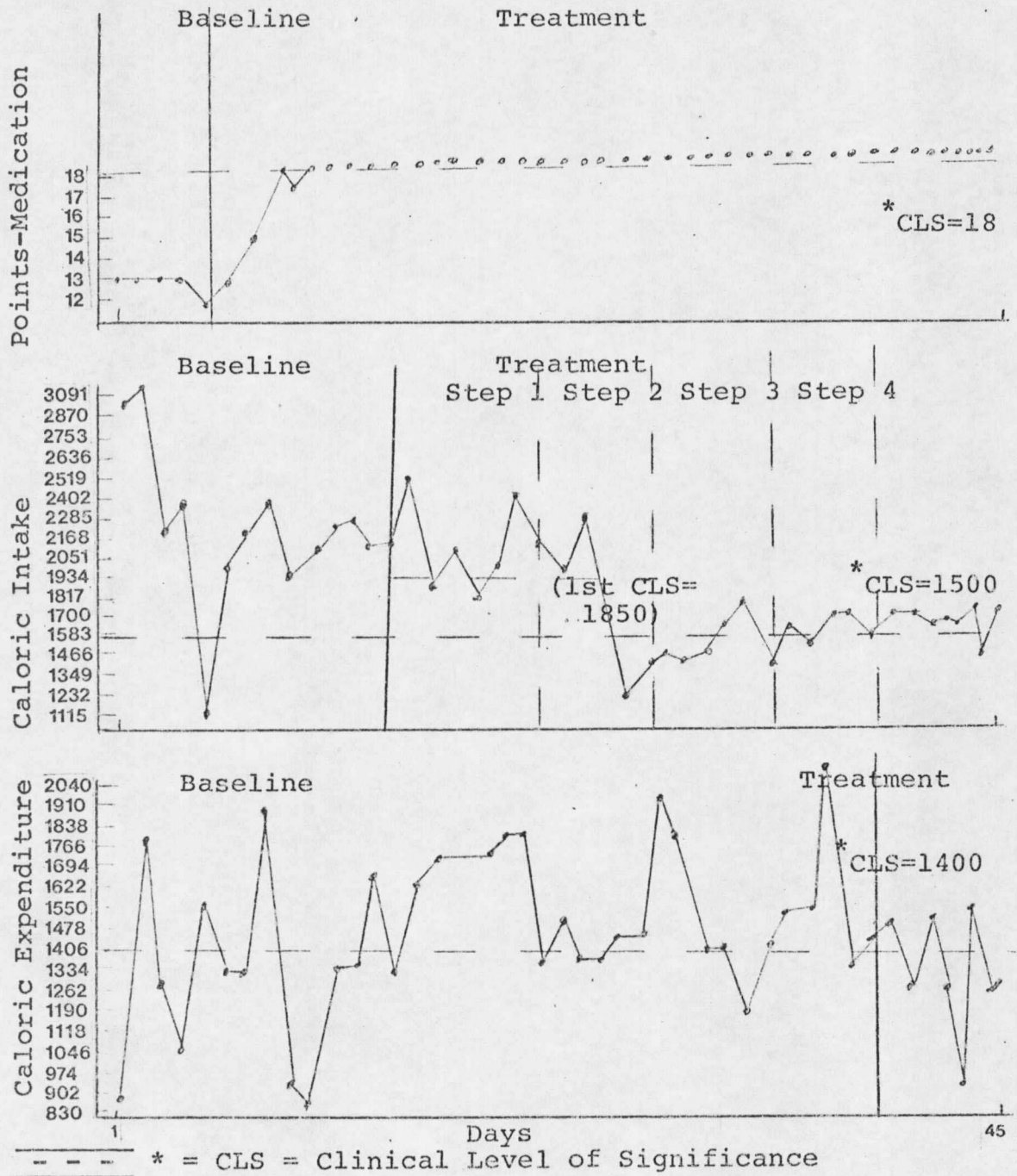
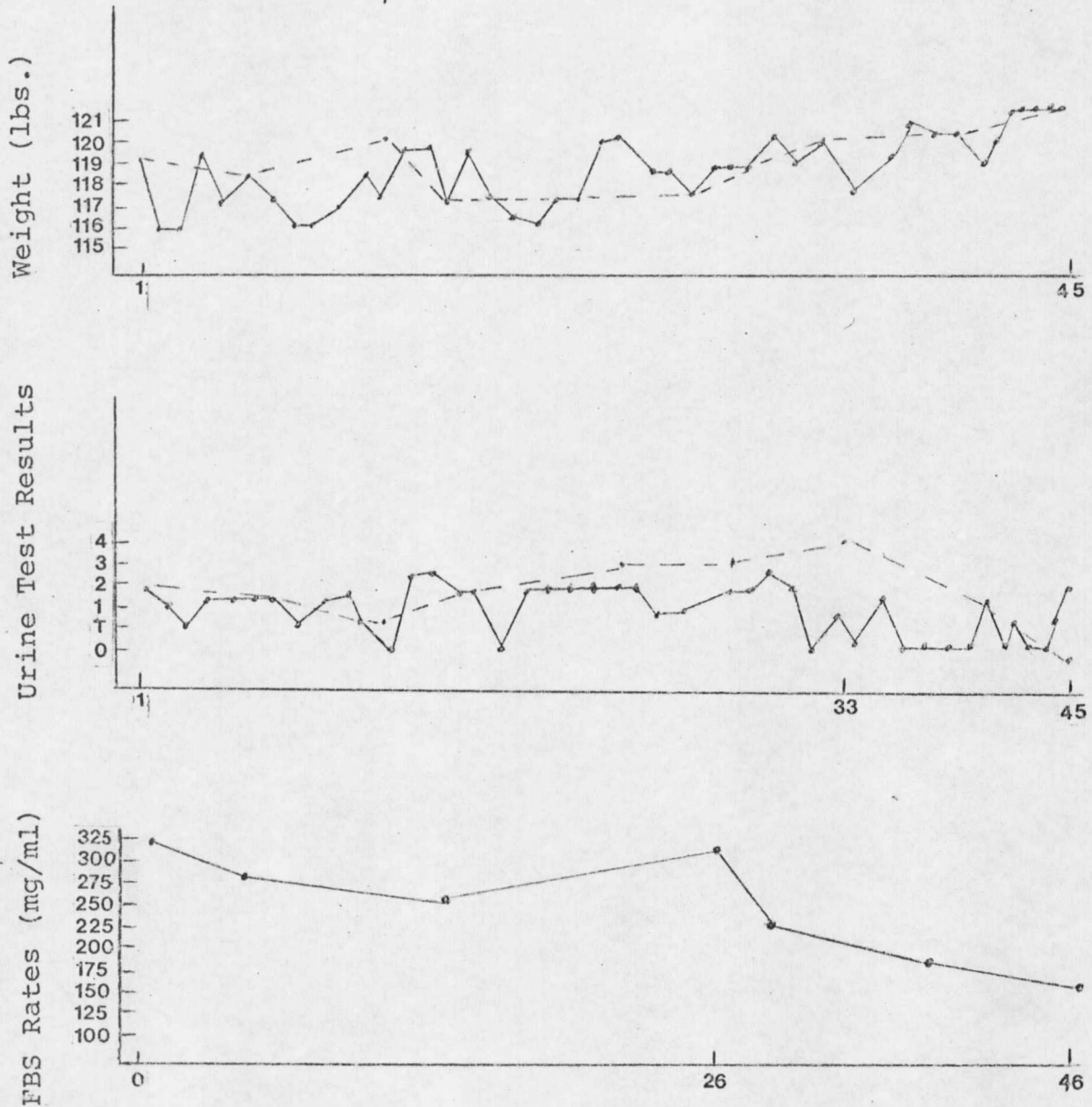


Figure 5

Corroborative Data of Weight, Urine Tests, and
Fasting Blood Sugar



————— = Subject Days
 - - - - - = Investigator

for this study. The first FBS was taken prior to the initiation of the experiment. The last FBS was taken at its termination, and the other three FBS's were taken prior to the initiation of each treatment phase. The FBS rates, as reported from the lab, demonstrated a gradual decrease in the amount of glucose from 320mg/100ml of blood on July 5, 1979, to 150mg/100ml of blood on August 23, 1979 (Figure 5).

Results from daily weight records demonstrated a slight but gradually increasing weight, which was sustained at 120 pounds during the last five days of the experiment. According to the physician, the desired weight for this subject should be between 120 to 125 pounds. Except for day 12, the subject's report of weight was in agreement with the investigator's (Figure 5).

Data from the subject's records indicated a still variable but downward trend regarding urine test results. According to the investigator's urine test results records, the data indicated an upward trend which only began to decrease in the desired direction after the 33rd day. There was a discrepancy between the subject's results and the investigator's results on days 12, 22, 27, 33, with the investigator's results being higher on each of those days.

The subject reported negative results for acetone throughout the experiment, which is in agreement with the investigator's results (Figure 5).

Finally, the physician began changing the subject's insulin dosage throughout the experiment, after he received the reports on the subject's FBS rates. Upon the initial interview, the subject had been taking 15 units of NPH insulin OD at 6:30 a.m. for 10 months. However, after the first FBS rate, but prior to the initiation of the experiment, the physician began the subject on 20 units of NPH insulin OD at 6:30 a.m. The subject remained on 20 units of NPH insulin up until the 20th day of the experiment whereupon the physician again increased her dosage to 25 units of NPH insulin OD at 6:30 a.m. The subject's insulin was again increased to 30 units of NPH insulin, OD at 6:30 a.m. on the 30th day of the experiment. The physician increased the subject's insulin still further on the 37th day of the experiment to 35 units of NPH insulin OD at 6:30 a.m. This last dosage was maintained by the subject until the end of this study.

Summary

The problem of this study was to determine whether an operant learning theory approach is effective in attaining and maintaining compliance in an adult diabetic who has demonstrated noncompliant behavior with regard to medication, caloric intake and exercise via a multiple baseline experimental design. After the appropriate screening for noncompliance, two subjects from Gallatin County, Montana, were selected to participate. For the purposes of this study, only data from one subject was reported, since complications prevented the second subject from beginning the program until it was too late. The experiment ran for an eight week period. During this time, the target behaviors of medication taking, caloric intake and exercise were evaluated during baseline and treatment phases. Data during the baseline phase of each behavior indicated a low or variable level of performance which changed in the desired direction during the treatment phase of each behavior. However, the attainment and maintenance at the clinical level of significance, on a day to day basis, except for medication taking behavior, was not clearly achieved. Corroborative data such as daily weights, and

urine tests for sugar and acetone indicated variability, but began changing in the desired direction toward the end of the experiment. The five FBS rates which were taken for this study indicate a steady decrease as the experiment progressed. Finally, the subject's physician was increasing the subject's insulin dosages during the experiment, a factor which must be considered when examining the corroborative data, and in making conclusions and recommendations.

CHAPTER 5

DISCUSSION

The problem of this study was to ascertain whether an operant learning theory approach is effective in attaining and maintaining compliance with regard to medication taking, caloric intake, and exercise behaviors in an adult who has diabetes. The operant learning approach supports the theory that there is a relationship which exists between observable behavior and the environment. Furthermore, since each response produces some consequence, a change in behavior will occur by identifying the consequences, and systematically manipulating them via reinforcers, which will reward the desirable behaviors. The implication in utilization of this framework is that education programs, predictive models, psychotherapy, among others, will not necessarily increase and maintain compliance, unless the relationship between the observable behavior and the environment itself is evaluated and manipulated accordingly. Subsequently, data was gathered on one subject from Gallatin County, Montana, for an eight week period, utilizing a multiple baseline design across the target behaviors,

and analyzed at the clinical level of significance in conjunction with the operant learning theory. Results obtained in this study indicated the effectiveness of the operant learning theory framework in initiating a change in the desired direction towards increased compliance, since the baseline phase of each behavior illustrated a low or variable performance which changed only as an appropriate treatment was applied. In addition, there was little or no change in other baselines which were not currently being treated. This supports Hersen and Barlow (1977) who maintain the reliability and validity of the multiple baseline design in that it demonstrates functional relationships between treatment and behavior when change occurs in a specific target behavior only when a treatment is applied.

Cordes (1978), Gronlund (1971), Kazdin (1974), Mahoney and Thoresen (1974), Mischel (1976) and Walsh (1967), state that self reporting is accurate provided the necessary precautions are taken. Results from this study seem to support this since this study relied to a great extent on self reporting, with positive results. The subject was required to record daily, and to report at the designated meetings, to the investigator. Corroborative data, such as

daily weights, daily urine tests, and periodic FBS rates at the physician's lab, were collected. These data were utilized to identify the accuracy of the subject's reporting and to identify if there was increased control in the disease. Furthermore, the investigator weighed the subject and tested her urine for sugar and acetone at each meeting. Results indicated that except for urine test results, the subject's data was in agreement with the investigator's data. The reason for the discrepancy in urine test results may have been due to the subject's failure to time the test, since a premature reading may indicate a false low result. However, with regard to identifying increasing control of the disease, the physician was periodically changing the insulin dosages, consequently the corroborative data was confounded. For instance, Bierman and Toohey (1978) and Garber (1977) state that consistency in medication taking, caloric intake, and exercise behaviors is a key factor in controlling diabetes. However, results from this study indicated that while there was increased compliance in the desired direction, across target behaviors which was initiated by the treatment, and corroborative data such as the FBS rates in particular, indicated increasing control in the disease, the changes in the insulin dosage which the

physician initiated, may be responsible for the increasing control. In any event, the subject seemed to derive reinforcement from the decreasing FBS rates. When the FBS on day 26 of the experiment showed an increase, she could hardly wait to have another one, and subsequently seemed to perform better in compliance in her caloric intake behavior, as the data points indicated.

Also, the investigator double checked the subject on assignment of calories to foods and calorie expenditure to exercise. The subject assigned calories accurately in both cases.

Subject reactivity occurred during the baseline of the caloric intake behavior, with a decrease in caloric intake, since the subject reported becoming aware that she was eating too much. However, the subsequent increase in caloric intake supports Kazdin's (1975) statement that subject reactivity is only temporary.

The clinical level of significance was clearly attained in medication taking behavior. However, the clinical level of significance was reached and maintained on a mean basis only for caloric intake. Day to day maintenance was not established. There was no consistency reached at the clinical level of significance for exercise behavior.

Since however, it was evident that the subject was changing in the desired direction in caloric intake and exercise behavior, lengthening the phases may have established attainment and maintenance at the clinical level of significance on a day to day basis. These findings seem to be in support of Sacket and Haynes (1976) findings that it is easier to incorporate new habits such as medication taking, than it is to change old ones such as diet and exercise.

Implications for Nursing

Nursing has a real role in utilization of the operant learning theory approach. Today's nurse is concerned with setting measurable objectives. This theory, when applied systematically, provides an effective means for changing undesirable behavior in a measurable way. In addition, since a great deal of health care is increasingly being done in the home, this approach is geared toward working with the individual in his natural environment. Furthermore, the multiple baseline design, in conjunction with the operant learning theory approach, has added value in that it approximates naturalistic conditions where a variety of responses are occurring at the same time. Also, using the single subject study enables the nurse to more accurately

pinpoint, in an ongoing evaluative process, functional relationships between the treatment and behavior. Additionally, this approach actively involves the subject, and in some cases significant others, and makes the subject ultimately responsible for his health care. Finally, significant others can be taught to utilize this approach, and indeed serve as corroborative data to the nurse, regarding the subject's progress.

Recommendations

This study could be replicated exactly, as a means of bolstering reliability and validity.

This study could be replicated with other chronic disease entities such as with cardiovascular diseases, in which life styles must be altered, whereupon the subject must become primarily responsible for health care.

This study could be replicated with different age groups, such as children or teenagers.

This study could be replicated, but with the addition of lengthening the treatment phases until the clinical level of significance is attained and maintained on a day to day basis, and utilization of a significant other for additional corroborative data.

REFERENCES

REFERENCES

- Baier, D. M., Wolf, M. M., and Risely, T. R. Some current dimensions of applied behavior analysis. Journal of Applied Behavioral Analysis, 1968, 1, 91-97.
- Baile, W. and Engel, B. A behavioral strategy for promoting treatment compliance following myocardial infarction. Psychosomatic Medicine, 1978, 40, No. 5, 413-419.
- Barlow, M. S. and Foreyt, L. S. Producing behavioral changes in dietary habits. Proceedings of the Nutrition-Behavioral Research Conference, 1975, Sponsored by National Heart and Lung Institute, National Institute of Health, Bethesda, Md. Jeanne Tillotson, (conf. coor.). Department of Health, Education and Welfare, No. (NIH) 76-978, 67.
- Barlow, D. and Hersen, M. Single case experimental designs: uses in applied clinical research. Archives of General Psychiatry, 1973, 29, 319-325.
- Borofsky, I. Chapter six. In D. Sackett and R. B. Haynes (Eds), Compliance with Therapeutic Regimens. Baltimore and London: Johns Hopkins University Press, 1976, 100-109.
- Becker, M., Drachman, R., and Kirscht. Motivations as predictors of health behavior. Health Services Reports, 1972, 87, No. 9, 852-862.
- Becker, M and Maiman, L. Sociobehavioral determinants of compliance with health and medical recommendations. Medical Care, 1975, 13, No. 1, 10-24.
- Bergman, A. B. and Werner, R. J. Failure of children to receive penicillin by mouth. New England Journal of Medicine, 1963, 268, 1334-1338.

- Biermann, J. and Toohey, B. The diabetic's sports and exercise book. New York: Jove Publications, Inc., 1977, 10-32.
- Bondy, P. Diabetes mellitus. In P. Beeson and W. McDermott (Eds.), Cecil-Loeb, Textbook of medicine, (13th ed.). Philadelphia: W. B. Saunders Publishing Co., 1976, 1649.
- Brightwell, D. and Sloan, C. Long term results of behavior therapy for obesity. Behavior Therapy, 1977, 8, 898-905.
- Brunner, L. S. and Suddarth, D. S. Textbook of medical surgical nursing, (3rd ed.). Philadelphia: J. B. Lippincott Co., 1975, 818.
- Cautela, J. Behavior analysis forms for clinical intervention. Champaign, Illinois: Research Press, 1978, 45-52.
- Cautela, J. and Kastenbaum, R. A reinforcement survey schedule for use in therapy, training, and research. Psychological Reports, 1967, 20, 1115-1130.
- Christensen, D. B. Drug taking compliance: a review and synthesis. Health Services Research, 1978, 171-185.
- Cordes, S. M. Assessing health care needs: elements and processes. Community Health Journal, 1978, 1, No. 2, 1-15.
- Crow, R. A. and Wright, P. Experimental studies of obesity. Nursing Times, 1974, 70, 103-105.
- De-Nour, A. K. and Czackes, J. W. Personality factors in chronic hemodialysis patients causing noncompliance with medical regimen. Psychosomatic Medicine, 1972, 34, No. 4, 333-344.
- DeRisi, W. and Butz, G. Writing behavioral contracts. Champaign, Illinois: Research Press, 1977, 42.

- Epstein, L. and Masek, B. Behavioral control of medicine compliance. Journal of Applied Behavioral Analysis, 1978, 11-19.
- Etzwiler, D. D. Patient participation: the key to successful diabetes control. Diabetes Forecast, 1976, 29, 1.
- Foster, W. and Kousch, D. Promoting patient adherence. American Journal of Nursing, 1978, 829-832.
- Garber, R. The use of a standardized teaching program in diabetes education. Nursing clinics of north america, 1977, 12, No. 3, 371-391.
- Goldstein, M. and Reznikoff, N. Suicide in chronic hemodialysis patients from an external locus of control framework. American Journal of Psychology, 1971, 1205.
- Gordis, L., Markowitz, M., and Lilienfeld, A. Studies in the epidemiology and preventability of rheumatic fever. Pediatrics, 1969, 43, 173-182.
- Gronlund, N. E. Measurement and evaluation in teaching, (2nd ed.). New York: MacMillan Company, 1971, 462-463.
- Hersen, M. and Barlow, D. Single case experimental designs: strategies for studying behavior change. New York: Pergamon Press, 1977, 226-253.
- Hulka, B., Cassel, J., Kupper, L., and Burdette, J. Communication, compliance, and concordance between physicians and patients with prescribed medications. American Journal of Public Health, 1976, 66, No. 9, 847-853.
- Johnson, W. L. Conformity to medical recommendations in coronary heart disease. Paper presented at the meeting of the American Sociologic Association, Chicago, Illinois, 1965.

- Kasl, S. V. and Cobb, S. Health behavior, illness behavior, and sick role behavior. Archives of Environmental Health, 1966, 12, 246-266.
- Kau, M. L. and Fischer, J. Self modification of exercise behavior. Journal of Behavior Therapy and Experimental Psychology, 1974, 5, 213-214.
- Kaufman, R., Cotnoir, G., and Holm, A. Medication discharge counseling program developed by pharmacists. Hospitals, 1978, 52, 89-92.
- Kazdin, A. Self monitoring and behavior change. In Self control: power to the person, Mahoney, M. and Thoresen, C. Monterey, California: Brooks/Cole Publishing Company, 1974, 218-246.
- Kazdin, A. Behavior modification in applied settings. Homewood, Illinois: The Dorsey Press, 1975, 2-24.
- Kelman, H. Compliance, identification and internalization: three processes of attitude change. Conflict Resolution, 1959, 11, No. 1, 52-60.
- Knowles, H., Meinhert, C., and Prout, T. Diabetes mellitus: the overall problem and its impact on the public. In Diabetes Mellitus, Department of Health, Education and Welfare, Public Health Services, 1976, 4, No. (NIH) 76-854, 10-27.
- Levitz, L. S. and Stunkard, A. J. A therapeutic coalition for obesity: behavior modification and patient self-help. American Journal of Psychiatry, 1974, 131, 423-427.
- Lilly, K. Food record. 1978. Based in part on Nizel, A. Preventive dentistry: science and practice. Philadelphia: Saunders Co., 1972,
- Lowery, B. Diabetes related learning and disease control of diabetes as a function of locus of control. Unpublished doctoral dissertation, Temple University, 1973.

Mahoney, M. and Thoresen, C. Self control: power to the person. Monterey, California: Brooks/Cole Publishing Co., 1974, 22 and 168.

Marston, M. Compliance with medical regimens: a review of the literature. Nursing Research, 1970, 19, No. 4, 312-322.

Malasanos, L., Barkauskas, V., Moss, M., and Stoltenberg-Allen, K. Health Assessment, St. Louis: C. V. Mosby Co., 1977, 19-41.

Mischel, W. Introduction to personality, (2nd ed.). New York: Holt, Rinehart, Winston, 1976, 262.

Neely, E. and Patrick, M. L. Problems of aged persons taking medication at home. Nursing Research, 1968, 17, 52-55.

Neimeier, D. and Allison, T. Nurses can be effective behavior modifiers. Journal of Psychiatric Nursing and Mental Health Services, 1976, 14, No. 1, 18-21.

. Proceedings of the Nutrition-Behavioral Research Conference. Sponsored by National Heart and Lung Institute, National Institute of Health, Bethesda, Md., Jeanne Tillotson, (conf. coord.). Department of Health, Education and Welfare, No. (NIH) 76-978, 1975, 67.

Rotter, J. Generalized expectancy for internal versus external control of reinforcement. Psychological Monographs, 1966, 609, No. 80, 1-9.

Sackett, D. and Haynes, R. B. Compliance with therapeutic regimens. Baltimore and London: Johns Hopkins University Press, 1976, 26-39.

Sackett, D., Haynes, R. B., Gibson, E., Taylor, D. W., Roberts, R., and Johnson, A. Patient compliance with antihypertensive regimens. Patient Counseling and Health Education, 1978, First quarter, 18-21.

- Schmidt, D. Patient compliance: the effect of the doctor as a therapeutic agent. Journal of Family Practice, 1977, 4, No. 5, 853-855.
- Segal, J. Psychosomatic diabetic children and their families. National Institute of Mental Health. Research Grant: MH 21336, Washington, D.C.: Superintendent of Documents, U. S. Government Printing Office, 1976, 1-10.
- Shipley, R. Applying learning theory to nursing practice. Nursing Forum, 1977, 16, No. 1, 83-94.
- Skinner, B. F. About behaviorism. New York: Vintage Books, 1974, 51-79.
- Small, D. Adult diabetes: a patient education program. American Journal of Nursing, 1978, May, 889-890.
- Soderberg, T. Operant conditioning as applied to a diabetic patient. Utah Nurse, 1972-73, Winter, 8.
- Stone, D. A study of the incidence and causes of poor control in patients with diabetes mellitus. American Journal of Medical Science, 1961, April, 436-441.
- Stuart, R. and Davis, B. Slim chance in a fat world. Champaign, Illinois: Research Press, 1972, 1-237.
- Stuart, R. Slim chance in a fat world, (revised ed.). Champaign, Illinois: Research Press, 1977, vii.
- Stunkard, A. J. New therapies for the eating disorders: behavior modification of obesity and anorexia nervosa. Archives of General Psychiatry, 1972, 76, 391.
- Szasz, T. The myth of mental illness. American Psychologist. 1960, 113-118.
- Walsh, B. W. Validity of self report. Journal of Counseling Psychology, 1967, 4, 18-23.

Watkins, J., Williams, F., Martin, D., Hogan, M., and Anderson, E. A study of diabetic patients at home. American Journal of Public Health, 1967, 57, 452-459.

Watkins, J., Moss, F., Lawrence, P., Williams, T. F. and Coyle, V. Diabetes Mellitus: Assessment Guides. American Diabetes Association, North Carolina Affiliate, Inc., 1969-71, 1-10.

Whitney, L. Operant learning theory: a framework deserving nursing investigation. Nursing Research, 1966, 15, No. 3, 229-235.

Williams, F., Martin, D., Hogan, M., Watkins, J., and Ellis, E. The clinical picture of diabetic control studied in four settings. American Journal of Public Health, 1967, 57, 441-451.

Zifferblatt, S. Increasing patient compliance through the applied analysis of behavior. Preventive Medicine, 1975, 4, 173-182.

APPENDIX

APPENDIX A

CLASSIFIED AD: SAMPLE

Adult diabetics, male or female, needed to participate in a study designed to help you control your diabetes. Must be between 18 and 60 and under medical supervision. Call 587-2562 to set up appointment.

When potential subjects called for appointment, I would explain that I am a Master's Degree candidate in Nursing at Montana State University. This study is actually my thesis, which is a necessary prerequisite for obtaining my Master's Degree. In addition, the study is designed to help maintain control of diabetes. Confidentiality will be maintained in the study. The study will last from one to three months and weekly meetings with the investigator would be scheduled. I would then ascertain that they were between 18 and 60, the duration of diabetes and whether or not they were under medical supervision, specifically with regard to medication taking, diet, and exercise. Finally, we would schedule an appointment for an interview and more detailed information would be obtained at this time. The potential subjects would also be asked to bring their urine equipment

and their medication and any equipment that goes with that,
to ascertain what they are using.

APPENDIX B

CRITERIA FOR SELECTING SUBJECT

The following items are raised during the interview. Any subject that meets over 50 percent (11 items) of the criteria, is eligible to participate in the study.

	YES	NO
1) Over 18 and under 60		
2) Minimal amount of major illnesses (1 to 2)		
3) Operations which interfere with the study (i.e. - amputations)		
4) Erratic and crisis oriented patterns of health care		
5) Old diabetic, 5 years duration		
6) Taking insulin		
7) Inconsistent in following doctor's orders regarding medicine taking		
8) Adjusts medication dosage on his own without consulting physician		
9) Erratic patterns of testing urine		
10) Inconsistent in keeping a record of urine test results		
11) Has a diabetic reaction from too much sugar more than twice a month (thirst, anorexia, nausea, vomiting, abdominal pain, headaches, listlessness, drowsiness, weakness, dyspnea, and coma)		

	YES	NO
12) Has a diabetic reaction from too little sugar more than twice a month (sweating, pallor, tremor, anxiety, tachycardia, and palpitation - if blood sugar falls slowly - headache, light-headedness, confusion, emotional changes, memory lapses, numbness of lips and tongue, slurred speech, incoordination, double vision, convulsions, and coma)		
13) Inconsistent in following the doctor's orders regarding diet.		
14) Meal patterns inconsistently spaced from day to day		
15) Inconsistent in keeping a record of caloric intake per day		
16) Inconsistent in recording weight on a daily basis		
17) Inconsistent in exercising on a daily basis		
18) Inconsistent in always keeping a record of exercise habits		
19) Hospitalized more than 10 times in a year for a diabetic reaction		
20) Has irregularly scheduled appointments with the doctor		
21) Needs adjustments in regimen every time he sees the physician		
22) Average blood sugar is above 150mg/100ml of blood		
23) Wants to participate because he is interested in controlling diabetes		

APPENDIX B

INTERVIEW FORMAT*

Initials _____ Phone _____ Date _____
 Age _____ Sex _____
 Height _____ Education _____
 Weight _____ Level _____
 Doctor _____ Occupational History _____

Diagnosis _____ Duration _____

Significant others (i.e. - mother, father, sibling, friend)

Initials _____ Relationship _____ Phone _____
 Initials _____ Relationship _____ Phone _____
 Initials _____ Relationship _____ Phone _____

Medical History (i.e. - major illnesses, other than diabetes which might interfere in study)

Were you ever
tested for this?

YES NO COMMENT

Hypothyroidism

Hyperthyroidism

Changes in visual
fields or vision

Cardiovascular
system disease

Hypertension

Respiratory system
disease

Asthma

Gastrointestinal
system disease

112

YES NO COMMENT

(If female)
Pregnancy status

OPERATIONS (WHEN, WHAT KIND) YES NO

COMMENT

How would you describe your health prior to onset of diabetes?

Your usual patterns of health care?

DIABETIC HISTORY (type, onset, duration, stable, or variable course)

What kind of diabetic medication has the doctor ordered you to take? (kind, strength, number of units or dosage, timing, equipment, techniques for cleaning equipment and giving injection)

Is it difficult for you to always do what the doctor orders?

YES _____ NO _____ (if yes, why)

Do you ever take a different dose for any reason? (i.e. illness, doctor's orders, inconvenient)

YES _____ NO _____ (if yes, why and how often)

What does the doctor want you to do about testing your urine? (names of tests and times)

Do you ever change the number of times you test your urine?

YES _____ NO _____ (If yes, why)

Do you keep a written record of urine tests?

YES _____ NO _____ (if no, why not)

How many times in a month do you spill sugar and acetone in your urine?

How many times in a month do you have a diabetic reaction from either too much sugar, or too little sugar in your blood?

What kind of diet has the doctor ordered you to take? (number of calories, allowance for snacks and additives)

Is it difficult for you to always do what the doctor orders?
YES _____ NO _____ (if yes, why)

Do you ever eat foods which are not on your diet?
YES _____ NO _____ (if yes, why and how often)

Do you ever skip meals?
YES _____ NO _____ (if yes, why and how often)

How do you decide how much food you eat?

Do you buy special foods because of your diabetes?
YES _____ NO _____ (if yes, why)

Do you keep a record of your daily diet?
YES _____ NO _____ (if yes, what kind. If no, why not?)

Do you keep a record of your weight?
YES _____ NO _____ (if yes, what kind, and is it stable or variable? If no, why not?)

What does the doctor want you to do regarding exercise?

Do you exercise daily?
YES _____ NO _____ (If yes, kind and amount. If no, why not?)

Do you keep a record of your exercise habits?
 YES _____ NO _____ (if yes, what kind. If no, why not?)

How many times in a month are you hospitalized for a diabetic reaction? _____

In a year? _____

Length of hospital stay, on the average? _____

How many times a month do you visit your doctor?

Does the doctor ever change his orders for you?

How many times has the doctor changed your diabetic regimen since the onset of your diabetes?

When was the last time your orders were changed?

Does the doctor take a blood sample (fasting blood sugar or 2 hour post prandial) when you visit him?

When was the last blood test done?

Do you know what your average blood sugar level is?
 (verify with the doctor)

Do you keep a record of your blood sugar tests?
 YES _____ NO _____ (If yes, what kind. If no, why not?)

Why do you want to participate in this study?

*Based on: Malasanos, Lois, Violet Barkauskas, Muriel Moss, Kathryn Stoltenberg-Allen. Health Assessment. St. Louis, C. V. Mosby Co., 1977. Watkins, Julia, Fay Moss, Patricia Lawrence, T. Franklin Williams, Virginia Coyle, Diabetes Mellitus Assessment Guides, ADA, No. Carolina Affiliate, Inc., 1969 & 1971.

APPENDIX C

REINFORCEMENT SURVEY SCHEDULE (RSS) *

Name _____ Date _____

The items in this questionnaire refer to things and experiences that may give joy or other pleasurable feelings. Check each item in the column that describes how much pleasure it gives you nowadays.

	Not at all	A little	A fair amount	Much	Very much
1. Eating					
a. ice cream					
b. candy					
c. fruit					
d. pastry					
e. nuts					
f. cookies					
2. Beverages					
a. water					
b. milk					
c. soft drink					
d. tea					
e. coffee					
3. Alcoholic beverages					
a. beer					
b. wine					
c. hard liquor					
4. Beautiful women					
5. Handsome men					
6. Solving problems					
a. crossword puzzles					
b. mathematical problems					
c. figuring out how something works					
7. Listening to music					
a. classical					
b. country western					
c. jazz					
d. show tunes					
e. rhythm & blues					
f. rock & roll					

	Not at all	A little	A fair amount	Much	Very much
g. folk					
h. popular					
8. Nude men					
9. Nude women					
10. Animals					
a. dogs					
b. cats					
c. horses					
d. birds					
11. Watching sports					
a. football					
b. baseball					
c. basketball					
d. track					
e. golf					
f. swimming					
g. running					
h. tennis					
i. pool					
j. other					
12. Reading					
a. adventure					
b. mystery					
c. famous people					
d. poetry					
e. travel					
f. true confessions					
g. politics and history					
h. how-to-do-it					
i. humor					
j. comic books					
k. love stories					
l. spiritual					
m. sexy					
n. sports					
o. medicine					

	Not at all	A little	A fair amount	Much	Very much
p. science					
q. newspapers					
13. Looking at interesting buildings					
14. Looking at beautiful scenery					
15. TV, movies, radio					
16. Like to sing					
a. alone					
b. with others					
17. Like to dance					
a. ballroom					
b. discotheque					
c. ballet or interpretive					
d. square dancing					
e. folk dancing					
18. Performing on a musical instrument					
19. Playing sports					
a. football					
b. baseball					
c. basketball					
d. track and field					
e. golf					
f. swimming					
g. running					
h. tennis					
i. pool					
j. boxing					
k. judo or karate					
l. fishing					
m. skin diving					
n. auto or cycle racing					
o. hunting					
p. skiing					
20. Shopping					
a. clothes					
b. furniture					
c. auto parts and supply					

	Not at all	A little	A fair amount	Much	Very much
d. appliances					
e. food					
f. new car					
g. new place to live					
h. sports equipment					
21. Gardening					
22. Playing cards					
23. Hiking or walking					
24. Completing a difficult job					
25. Camping					
26. Sleeping					
27. Taking a bath					
28. Taking a shower					
29. Being right					
a. guessing what someone is going to do					
b. in an argument					
c. about your work					
d. on a bet					
30. Being praised					
a. about your appearance					
b. about your work					
c. about your hobbies					
d. about your physical strength					
e. about your athletic ability					
f. about your mind					
g. about your personality					
h. about your moral strength					
i. about your understanding of others					
31. Having people seek you out for company					
32. Flirting					
33. Having somebody flirt with you					
34. Talking with people who like you					
35. Making somebody happy					
36. Babies					

	Not at all	A little	A fair amount	Much	Very much
37. Children					
38. Old men					
39. Old women					
40. Having people ask your advice					
41. Watching other people					
42. Somebody smiling at you					
43. Making love					
44. Happy people					
45. Being close to an attractive man					
46. Being close to an attractive woman					
47. Talking about the opposite sex					
48. Talking to friends					
49. Being perfect					
50. Winning a bet					
51. Being in church or temple					
52. Saying prayers					
53. Having somebody pray for you					
54. Peace and quiet					

Situations I Would Like to Be In

How much would you enjoy being in each of the following situations?

1. You have just completed a difficult job. Your superior comes by and praises you highly for a job well done. He also makes it clear that such good work is going to be rewarded very soon.

not at all () a little () a fair amount () much () very much ()

2. You are at a lovely party. Somebody walks across the room to you, smiles in a friendly way and says, "I'm glad to meet you. I've heard so many good things about you. Do you have a moment to talk?"

not at all () a little () a fair amount () much () very much ()

3. You have just led your team to victory. An old friend comes over and says, "You played a terrific game. Let me treat you to dinner and drinks."

not at all () a little () a fair amount () much () very much ()

4. You are walking along a mountain pathway with your dog by your side. You notice attractive lakes, streams, flowers, and trees. You think to yourself, "It's great to be alive on a day like this, and to have the opportunity to wander alone out in the countryside."

not at all () a little () a fair amount () much () very much ()

5. You are sitting by the fireplace with your loved one. Music is playing softly on the phonograph. Your loved one gives you a tender glance and you respond with a kiss. You think to yourself how wonderful it is to care for someone and have somebody care for you.

not at all () a little () a fair amount () much () very much ()

6. As you are leaving your place of worship, a woman turns to you and says, "I want you to know how much we appreciate all that you did for us in our time of trouble and misery. Everything is wonderful now. I'll always remember you in my prayers."

not at all () a little () a fair amount () much () very much ()

Now place a check next to the number of the situation that appeals to you most.

List things you do or think about more than

5 times a day	10 times a day	15 times a day	20 times a day

*Reproduced with permission of the Author and Journal from Psychological Reports, 1967, 20, 1115-1130.

APPENDIX D

MEDICATION TAKING PARAMETERS CHECKLIST*

	YES	NO
1) Actual administration of medication to self		
2) Accurate amount of dosage is known		
3) Timing (time of day is as ordered)		
4) Rotation of sites (uses systematic fashion, whereby a particular site is used only after the other possible sites are used)		
5) Uses recommended areas for injection (arms, thighs, buttocks, and abdomen)		
6) Care of equipment (avoids contaminating needle prior to injection by keeping cap on if laying down and doesn't touch needle at all - with anything)		
7) Uses standard needle size only (25 27G, 1/2 - 5/8" long)		
8) Uses syringe which matches the kind and strength of insulin taken		
9) Rolls vial between hands to mix rather than shaking		
10) Injects air into vial		
11) Checks syringe for air bubbles		
12) Checks syringe for accurate dose		
13) Cleanses site with cotton and alcohol		
14) Double checks syringe for accurate dose		
15) Pinches or stretches skin at site		

	YES	NO
16) Injects needle at the correct angle		
17) Draws back plunger after inserting needle, before injecting insulin to be sure needle isn't in a blood vessel		
18) Takes medication the required number of times a day, as ordered		
19) Notification to doctor if dosage is changed		

*Based on: Watkins, et al, 1969, 1971.

APPENDIX E

FOOD RECORD*INSTRUCTIONS

1. To promote accurate recording, keep a running account of your meals and between meal snacking. Putting off the recording until the end of the day or even a short time will not be reliable. If you do not have this diary form with you, use a piece of scratch paper to jot down what you ate and then copy it over when you get home.
2. Please write down in DETAIL everything you eat or drink in the order in which it was eaten. Record in detail the kinds, amounts and preparation of food and drink.
3. Record EACH TIME and WHEN you eat or drink something whether at mealtime or between meals. Include such items as candies, gum, "licking out the bowl", etc.
4. Consider:
 - a) Measurements: Use household measurements when possible such as 8 ounce, 1 cup, 1/2 cup, 1 teaspoon, 1 Tablespoon, etc. Occasionally helpful are words like small, large, average, especially when referring to fruit.
 - b) Preparation: Record how the food was prepared such as fried, baked, raw, plain, with mayonnaise, breaded.
 - c) Additions: If you added anything to the food such as butter on vegetables, sugar on cereal, honey in tea, milk on cereal, include them and the amounts in your food record.
5. Record your food and drink daily.

EXAMPLESNOT CORRECT

Juice

Juice

Sandwich

Dessert

Chicken

CORRECT

1/2 cup orange juice

1 cup orange drink

2 slices white bread

3 ounces roast beef

1-1/2 Tablespoons
mayonnaise3" x 3" chocolate
brownie2 batter-dipped, fried
chicken legs

*Lilly, Karen, Nutritionist, Home Economics Department,
Montana State University, Bozeman, Montana. "Food Record".
Based in part on Nizel, Abraham, Nutrition in Preventive
Dentistry: Science and Practice. Phila., Pa: Saunders,
1972.

APPENDIX F

Exercise Plan

LIGHT EXERCISE	
	Each box = 5 min. = 20 calories
	x20=
MODERATE EXERCISE	
	Each box = 5 min. = 35 calories
	x35=
HEAVY EXERCISE	
	Each box = 5 min. = 50 calories
	x50=
DAILY TOTAL	

FRUIT AND VEGETABLE EXCHANGE LIST (40 calories per exchange)			
Apple, guava, nectarine, orange, peach, pear	1 small	Strawberries, cantaloupe, honeydew melon, watermelon	1 cup
Banana, grapefruit, orange, peach	1/2	Cherries, grapes	12
Apricots, figs, plums, prunes	2	Raspberries	1 1/2 tablespoons
Apple sauce, pineapple, blackberries, blueberries, raspberries	1/2 cup	Juice: apple, grapefruit, orange, pineapple	1/2 cup
		Juice: grape, prune	1/4 cup
Bamboo shoots, broccoli, carrots, eggplant, greens (beet greens, chard, collards, dandelion, kale, mustard greens, spinach, turnip greens), kohlrabi, okra, turnip	1 cup	Artichokes, beets, Brussels sprouts, leeks, onion, okra, pot pods	3/4 cup
		Pot, pumpkin, rutabaga, winter squash, water chestnuts	1/2 cup
Tomato	1 large or 1 cup	Corn, parsnips	1/2 medium or 1 1/3 cup
Juice: tomato or mixed vegetable	1 cup	Tomato sauce or puree	1/2 cup
		Tomato paste	1/4 cup
		Saute: tomato, vegetable, vegetable meat (made with water)	1/2 cup
MISCELLANEOUS FOODS EXCHANGE LIST (40 calories per exchange)			
List 1 (Fats)			
Avocado	1/8 6-inch diameter	Nuts	6 small
Bacon, crisp	1 slice	Oil (safflower, sunflower, corn, soybean, cottonseed)	1 teaspoon
Butter, hard margarine, cooking fat	1 teaspoon	Olives	5 small
Soft margarine	1 tablespoon	Sour cream	2 tablespoons
Cream cheese	1 tablespoon	Whipped cream	1 rounded tablespoon
French dressing	1 tablespoon		
Mayonnaise	1 teaspoon		
List 2 (Sweeten & Starches)			
Cocoa (sweetened)	The following provide 40	Calories per exchange.	
Hard candy (small) or caramel	1 level tablespoon	Sugar, syrup, honey, jam, jelly	1 level tablespoon
	1	Flour, corn starch	1 rounded tablespoon
List 3 (Desserts and beverages)			
These foods, in the amounts specified, supply approximately 80 calories and must be counted as 2 miscellaneous food exchanges.			
Desserts			
Cake: sponge, angel food	1 piece, 2 x 2 x 1 inches	Any dessert, if 1 serving portion is no more than 80 calories	1 serving
Jello	1 serving (5 per package)	Beverages	
Shorbet, ice milk, ice cream	1/3 cup	Beer, carbonated beverages	6 ounces
		Wine (light, dry)	3 ounces
MILK EXCHANGE LIST (85 calories per exchange)			
Buttermilk (skimmed)	1 cup (8 ounces)	Evaporated milk	1/4 cup
Cheese: American pro- cessed, cheddar, edam, etc. (use skimmed or partially skimmed milk cheese more frequently)	1 ounce, 1 slice cube, or 1 slice	Evaporated milk (skimmed)	1/2 cup
		Nonfat dried milk powder	1/3 cup
		Partially skimmed milk	3/4 cup
		Skimmed milk	1 cup
		Yogurt, plain	1/2 cup
		Yogurt, plain (made from skimmed milk)	3/4 cup

*Based on Stuart, Richard and Barbara Davis, 1972 and 1977, p. 189-191.

APPENDIX G

SAMPLE CONTRACT*

Date(s) _____

I, the undersigned party, agree to perform the following behavior:

If _____	Then _____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

There will be weekly meetings between the investigator and _____ for reinforcement and to be weighed and have urine tested. (Test for presence of blood sugars will also be done, ideally, 5 times during the course of this study.)

This contract will be reviewed in _____ from date of agreement.

Signed _____

Signed _____

*Based on: DeRisi and Butz, Writing Behavioral Contracts, Champaign, Ill., 1977, p. 45.

APPENDIX H

Instructions for plotting points on the cumulative graph for medication taking behavior.

The purpose of a cumulative graph is to give you feedback on a day to day basis. The number of days are calibrated along the X-axis (horizontal), which is called the abscissa. The number of points are calibrated along the Y-axis (vertical) which is called the ordinate. A target performance line is drawn based on what is to be reached in a particular week. The cumulative amounts are obtained by adding points successively to the previous total. For example, the first day you may have a total of 8 points. So you plot 8 on the graph, corresponding to Day One. On Day 2 you may have a total of 9 points. So you add 9 to 8, (the previous total), to get 17, and plot 17 on the graph corresponding with Day 2. On Day 3, you may have a total of 10 points. So you add 10 to 17 (previous total) to get 27, and plot 27 on the graph corresponding with Day 3.

The criteria will be set for what you want to reach on a week by week basis. However, you will plot on a daily basis, the total number of points you gathered immediately after your performance. You will also record the daily totals in the 3 divider notebook along with the date and time. Check your list of parameters for medication taking to ascertain what is awarded points.

APPENDIX I

Instructions for plotting the number of calories on the cumulative graph for caloric intake behavior.

The purpose of a cumulative graph is to give you feedback on a day to day basis. The number of days are calibrated along the X-axis. The number of calories are calibrated along the Y-axis. A target performance line is drawn, based on what is to be reached in a particular week. The cumulative amounts are obtained by adding the number of calories successively to the previous total. For example, you may take in 1000 calories on Day 1. So you plot 1000 on the graph corresponding to Day 1. On Day 2, you may still take in 1000 calories. So you add 1000 (previous total) to 1000 and get 2000, and you plot 2000 on the graph corresponding to Day 2, and so on for consecutive days.

The criteria will be set for what you want to reach on a week by week basis. However, you will plot, on a daily basis, the total number of calories taken in at the end of the day, preferably the same time every day. You will also record the daily totals in the 3 divider notebook along with the date and time. Refer to your exchange lists and nutritive values charts for accuracy.

APPENDIX J

Instructions for plotting number of calories expended on the cumulative graph for exercise behavior.

The purpose of a cumulative graph is to give you feedback on a day to day basis. The number of days are calibrated along the X-axis. The number of calories expended are calibrated along the Y-axis. A target performance line is drawn based on what is to be reached in a particular week. The cumulative amounts are obtained by adding the number of calories expended successively to the previous total. For example, on Day 1 you calibrate that you expend 200 calories doing exercise. So you plot 200 on the graph corresponding to Day 1. On Day 2 you expend 250 calories doing exercise. Add 250 to 200 (previous total) to get 450 and plot 450 on the graph corresponding to Day 2 and so on for consecutive days.

The criteria will be set for what you want to reach on a week by week basis. However, you will time and plot the activities immediately after performance on the pocked sized card. Then you will plot on a daily basis, the total number of calories you expended doing the kind of exercise you specified, at the end of the day, preferably the same time every day. You will also record the daily totals in the 3 divider notebook along with the date and time. The general rule of thumb is that light exercise expends 4 calories per minute, moderate exercise expends 7 calories per minute, and heavy exercise expends 10 calories per minute. You multiply the number of minutes by the number of calories expended (by a particular exercise). And the number of calories per minute will vary according to the type of exercise (i.e. - light, moderate, or heavy). For example, with 5 minutes of gardening (light exercise) you will expend 20 calories. With 5 minutes of skipping rope (heavy exercise), you would expend 50 calories. Refer to your list for examples that are considered light, moderate, and heavy exercise.

Examples of Exercise Classification

Light Exercise

Dancing (slow step)
Gardening (light)
Golf
Table tennis
Volleyball
Walking (3 mph)

Moderate Exercise

Badminton (singles)
Cycling (9.5 mph)
Dancing (fast step)
Gardening (heavy)
Stationary cycling (moderately)
Swimming (30 yd/min)
Tennis (singles)
Walking (4.5 mph)

Heavy Exercise

Calisthenics (vigorous)
Climbing stairs (up and down)
Cycling (12 mph)
Handball, paddleball, squash
Jogging
Skipping rope
Stationary cycling (quickly)
Stationary jogging
Swimming (40 yd/min)

*Based on Stuart, 1972, 1977, p. 190.

MEAN ENERGY EXPENDITURE OF VARIOUS ACTIVITIES *

The values are expressed in calories/minute of gross body expenditure.

	Body weight, pounds	Calories*/ minute
1. Personal necessities		
Sitting, eating	143	1.5
Sleeping	150	1.2
Washing and dressing	150	2.6
2. Locomotion		
Cycling, 5.5 mph	156	4.5
Cycling, 9.4 mph	156	7.0
Cycling, 13.1 mph	156	11.1
Driving a car	141	2.8
Walking, 2 mph	160	3.2
Walking, 3 mph	160	4.4
Walking, 4 mph	160	5.8
Walking downstairs	161	7.1
Walking upstairs	161	18.6
3. Sedentary occupations		
Classwork, lecture	150	1.7
Sitting, reading	161	1.3
Standing, light activity	161	2.6
Typing, 40 words/min., mechanical typewriter	121	1.7
Typing, 40 words/min., electric typewriter	121	1.5
4. Domestic work		
Bed making	121	3.5
Dusting	121	2.5
Ironing	121	1.7
Preparing a meal	121	2.5
Scrubbing floors	121	4.0
Shopping with heavy load	121	4.0
Window cleaning	121	3.5
5. Light industry		
Assembly work in car factory	121	2.3
Carpentry	150	3.8
Farming chores	150	3.8
Farming, haying, plowing with horse	150	6.7
House painting	150	3.5
Metal working	150	3.5
Mixing cement	150	4.7
Stone, masonry	150	6.3
Truck and automobile repair	150	4.2

6. Heavy work		
Dragging logs	143	12.1
Drilling coal or rock	143	6.1
Felling trees	143	8.6
Gardening, digging	139	8.6
Pick and shovel work	143	8.6
7. Recreation		
Canoeing, 2.5 mph	150	3.0
Canoeing, 4 mph	150	7.0
Cross country running	143	10.6
Dancing, waltz	167	5.2
Dancing, rumba	152	5.7
Golfing	139	5.0
Gymnastics exercises:		
Balancing exercises	150	2.5
Trunk bending	150	3.5
Mountain climbing	150	10.0
Playing baseball (except pitcher)	150	4.7
Playing basketball	161	8.6
Playing football (American)	161	10.2
Playing pingpong	161	4.9
Playing tennis	154	7.1
Playing squash	147	10.2
Playing volleyball	150	3.5
Skiing, level hard snow, moderate speed	125	10.8
Skiing, up hill hard snow, maximum speed	150	18.6
Sprinting	150	23.3
Snowshoeing 2.27 mph	150	6.2

*The calorie used in human metabolism is the heat needed to raise the temperature of one kilogram (2.2 pounds) of water from 15 degrees to 16 degrees Centigrade.

Adapted from the following:

J. V. G. A. Durnin and R. Passmore, *Energy, work and leisure*. London: Heinemann Educational Books Ltd., 1967. Pp. 49, 57, 72, 76.

R. Passmore and J. V. G. A. Durnin, Human energy expenditure, *Physiological Reviews*, 1955, 35, 811-813.

C. F. Consolazio, R. E. Johnson, and L. J. Pecora, *Physiological measurements of metabolic functions in man*. New York. McGraw-Hill, 1963. Pp. 330-332.

*From Stuart, Richard and Barbara Davis (1972).

APPENDIX K

LETTERS

1212½ South Willson
Bozeman, Montana 59715
August 8, 1979

Dr. George Shroyer
Chairman, Human Subjects Committee
Montana State University
Department of Health, Physical
Education, and Recreation
Bozeman, Montana 59717

Dear Dr. Shroyer,

Enclosed please find copies of the release forms which
have been signed by the participants in this study, as
per your request.

Thank you for your best wishes for my research project.

Sincerely,

Barbara Pinkava, RN, BS
INVESTIGATOR

RELEASE FORM

I, the undersigned party, do hereby acknowledge that I am participating in this study of my own free will.

Signature _____

Date _____



COLLEGE OF EDUCATION

DEPARTMENT OF HEALTH, PHYSICAL EDUCATION & RECREATION

MONTANA STATE UNIVERSITY, BOZEMAN 59717

July 18, 1979

Ms. Barbara Pinkava
1212 1/2 South Willson
Bozeman, MT 59715

Dear Ms. Pinkava:

You have the approval of the Human Subjects Committee to do your research study on diabetes mellitus.

Please have the release forms filled out and send them to me.

Good luck with your research project.

Sincerely,

A handwritten signature in cursive script, appearing to read "George Shroyer".

George Shroyer,
Chairman, Human Subjects Committee

GS:bam

cc: Dr. John Jutila, Vice President for Research

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1212½ South Willson
Bozeman, Montana 59715

406-587-2562

July 3, 1979

Dr. George Shroyer
Chairman, Human Subjects Committee
Department of Health, Physical
Education and Recreation
Montana State University
Bozeman, Montana 59717

Dear Dr. Shroyer,

This letter is in response to your June 6, 1979 letter which requested more specific information on procedures for recruitment of individuals to be studied. An advertisement placed in the classified section of the local newspapers is expected to attract 2 adult diabetics who fit the criteria for appropriateness of the study. This will be determined via the interview process. Once the appropriate individuals are selected, the cooperation of their physicians will be sought. The physicians' cooperation will complete the sample selection process, for only with the physicians' cooperation will the individual be allowed to participate.

Regarding the investigative processes, the proposed study will utilize an operant learning theory framework in conjunction with a multiple baseline design, which will demonstrate the effects of reinforcement on the target behaviors of medication taking, diet, and exercise.

Finally, I have met with Dr. Cheever at the Student Health Center also, to clarify any questions he had, and he now feels comfortable with the specifics of my proposal.

Thank you for your interest. Should you need any further clarification, please contact me. In any event, I would

Page 2
Dr. George Shroyer
July 3, 1979

appreciate your acknowledgement, in writing, of this letter
for inclusion in my thesis. Thank you again.

Sincerely,

/s/ Barbara Pinkava

Barbara Pinkava, RN, BS



COLLEGE OF EDUCATION

DEPARTMENT OF HEALTH, PHYSICAL EDUCATION & RECREATION

MONTANA STATE UNIVERSITY, BOZEMAN 59717

June 6, 1979

Barbara Pinkava, RN
1212½ South Willson
Bozeman, MT 59715

Dear Ms. Pinkava:

Regarding your request for approval from the Human Subjects Committee for your research proposal, we have brought the proposal to the attention of Dr. Donald Cheever of the Student Health Center, MSU.

Dr. Cheever has commented that he would desire more information on procedures for recruitment of individuals to be studied and also, more details on investigative processes to be used.

I would appreciate hearing from you with further information on your research proposal.

Sincerely,

A handwritten signature in cursive script, appearing to read "George Shroyer".

George Shroyer
Chairman, Human Subjects Committee

GS:bam

1212½ South Willson
Bozeman, Montana 59715
406-587-2562

August 1, 1978

Dr. Shroyer
Chairman, Human Subjects Committee
Health and Physical Education Center
Montana State Univeristy
Bozeman, Montana 59715

Dear Dr. Shroyer,

Diabetes mellitus is both a major health concern of society and a concern to the investigator. Compliance in particular is the area under consideration, since studies indicate that as much as 50 percent of the individuals who are placed on therapeutic regimens to control their disease do not comply.

The investigator is researching compliance in diabetics, as partial fulfillment for a Master's Degree in Nursing at Montana State University. I will be staying on the Bozeman Campus to complete my work. Therefore, I am notifying you, the Chairman of the Human Subjects Committee, of my proposed course of action.

The research design will focus on the generally noncompliant behaviors which are usually demonstrated in diet, exercise, and medication. The investigator will be working with a sample of approximately 2 to 5 adult diabetic patients. I have gained the cooperation of the Great Falls Clinic, in obtaining my sample. The local G.C. area will also be explored. It is estimated that the program will probably take three month of working with the patients on a weekly basis, for completion. Precautions will be taken to assure the confidentiality of the individuals. The investigator will cooperate with the Clinic and the patients, in any way that is necessary, in an effort to secure this.

The investigator would appreciate your written response to this letter. If indeed you need more clarification regarding

Page 2
Dr. Shroyer
August 1, 1978

my proposal, please call or write, and I can plan to meet with you if this is necessary. May I also add at this time, that any suggestions which you could offer would be more than welcome. Thank you for your time and consideration in this matter.

Sincerely,

Barbara Pinkava
INVESTIGATOR

144

1212½ South Willson
Bozeman, Montana 59715

406-587-2562

June 5, 1979

Mrs. P. Bryan, RN
c/o Student Health Service
Montana State University
Bozeman, Montana 59717

Dear Mrs. Bryan,

I am a graduate nursing student at Montana State University. Currently, I am researching compliance in adult diabetics in partial fulfillment for my Master's Degree in Nursing. The proposed study will utilize an operant learning theory framework, in conjunction with a multiple baseline design. It will focus on the generally noncompliant behaviors which are usually demonstrated in diet, exercise, and medication taking.

I will be needing 2 diabetics to participate in the study, and thought perhaps, the student health service might be able to help me obtain these subjects.

Enclosed, please find a copy of my first chapter. This chapter will provide an overview of the study, its design, and the specific parameters. If there are any further questions, please feel free to contact me. I would greatly appreciate any assistance you, and the health service can give me.

Thank you for your time and consideration.

Sincerely,

Barbara Pinkava, RN, BS

ROBERT J. FLAHERTY
FAMILY PRACTICE

Phone 587-5123
Medical Associates, P.C.

7 East Beall
Bozeman, Montana 59715

6-1-79

Dear Ms. PINTAVA,

Per our conversation, you
have my permission to work
with L. S. for your
DIABETES study project.

Sincerely,

R. J. Flaherty

146

1212½ South Willson
Bozeman, Montana 59715

406-587-2562

June 29, 1979

Dr. Joseph R. Cautela
10 Phillips Road
Sudbury, MA 01776

Dear Dr. Cautela,

I am a graduate nursing student at Montana State University, in Bozeman, Montana. Currently, I am researching compliance in adult diabetics in partial fulfillment for my Master's Degree in Nursing. The proposed study will utilize an operant learning framework, in conjunction with a multiple baseline design. It will focus on the generally non-compliant behaviors which are usually demonstrated in diet, exercise, and medication taking.

I wrote to Southern University Press seeking permission to utilize the Reinforcement Survey Schedule as a tool with which to gather data for my study. They granted me permission to reproduce the copies, however, they also suggested that I notify you. In addition, they recommended that I send you a copy of the tool as it would be reproduced. Therefore, please find a copy which has been enclosed for your review. Finally, they also recommended that I send you a copy of my thesis. However, quite frankly, the cost to the student of doing a thesis is expensive, as you probably well know. Consequently, what I will do is prepare an abstract of the completed study which I will forward to you. Should you wish to read it in its entirety, I'm sure a library loan could be arranged.

Please contact me should you have any questions. Thank you.

Sincerely,

Barbara P. Pinkava, RN, BS

Enc.

TEL. 443-3959

BEHAVIOR THERAPY INSTITUTE
JOSEPH R. CAUTELA, PH. D.
CONSULTING PSYCHOLOGIST
10 PHILLIPS ROAD
SUDBURY, MASSACHUSETTS 01776

Ms. Barbara P. Pinkava
1212½ South Willson
Bozeman, Montana 59715

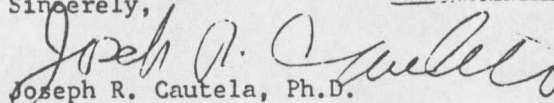
July 3, 1979

Dear Ms. Pinkava,

You have my permission to reproduce the Reinforcement Survey Schedule for your research work. I am looking forward to seeing a copy of your abstract.

Enclosed is some material you may find useful.

Sincerely,


Joseph R. Cautela, Ph.D.

JRC/k1
encl.

148

1212½ South Willson
Bozeman, Montana 59715

406-587-2562

June 1, 1979

Southern Universities Press
Box 1441
Missoula, Montana 59801

Dear Sir,

I am a graduate nursing student at Montana State University. Currently, I am researching compliance in adult diabetics in partial fulfillment for my Master's Degree in Nursing. The proposed study will utilize an operant learning theory framework, in conjunction with a multiple baseline design. It will focus on the generally noncompliant behaviors which are usually demonstrated in diet, exercise, and medication taking.

I would like to use the Reinforcement Survey Schedule, by Cautela and Kastenbaum, which was published in Psychological Reports, in the special issue, June, 1967, 1115-1130, Part II. Therefore, I am formally requesting permission to utilize this tool. Thank you for your consideration. I await your reply in writing.

Sincerely,

Barbara Pinkava, RN,BS

PSYCHOLOGICAL REPORTS PERCEPTUAL AND MOTOR SKILLS

June 20, 1979

Box 9229 Missoula, Montana 59807

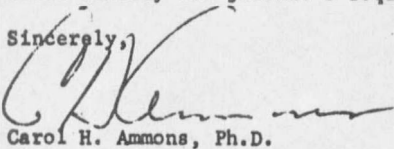
Ms. Barbara Pinkava
1212½ South Willson
Bozeman, MT 59715

Dear Ms. Pinkava:

We have your letter of June 1. Be advised that the journal will grant you permission to reproduce copies of the Reinforcement Survey Schedule by Dr. Joseph Cautela and his colleague, Dr. Kastenbaum from the manuscript which is published in PSYCHOLOGICAL REPORTS, 1967, 20, 1115-1130. On each copy there must appear, "Reproduced with permission of the author and journal from: PSYCHOLOGICAL REPORTS, 1967, 20, 1115-1130." It is our understanding that Dr. Cautela has been enthusiastic about the use of his materials by students, particularly in research for degrees. You will find his address is listed below so that you might write to him directly and obtain his permission for making this copy.

We suggest that you forward to him a copy of the material as reproduced for collecting data in your thesis and that you send to him a copy of your thesis in appreciation for his permission. Those arrangements would satisfy the journal's requirements.

Sincerely,



Carol H. Ammons, Ph.D.
Editor

CHA/jja

Dr. Joseph R. Cautela
10 Phillips Road
Sudbury, MA 01776

150

1212½ South Willson
Bozeman, Montana 59715

406 - 587-2562

May 21, 1979

Research Press Co.
2612 No. Mattis Avenue
Champaign, Illinois 61820

Dear Sir,

I am a graduate nursing student at Montana State University. Currently, I am research compliance in diabetics in partial fulfillment for my Master's Degree in Nursing. The research design will employ a behavior mod program via MBD and will focus on the generally noncompliant behaviors which are usually demonstrated in diet, exercise and medication taking.

I would like to use the Reinforcement Survey Schedule, published in Behavior Analysis Forms for Clinical Intervention by Joseph Cautela. Therefore, I am formally requesting permission to utilize your tool.

Thank you for your consideration. I await your reply, in writing.

Sincerely,

Barbara Pinkava, RN, BS

Research Press

2612 N Mattis Champaign, Illinois 61820 217-352-3273



May 29, 1979

Barbara Pinkava
1212½ South Willson
Bozeman, Montana 59715

Dear Ms. Pinkava:

We regret to say that we cannot grant you permission to duplicate the Reinforcement Survey Schedule from Behavior Analysis Forms for Clinical Intervention by Joseph Cautela because we do not hold the copyright on that form. Copyright is held by Psychological Reports, as indicated by the footnote on page 45, and you should contact them for permission.

Thank you for writing us, and good luck with your research.

Sincerely,

RESEARCH PRESS

Patricia Sammann
Patricia Sammann
Permissions Editor

1212½ South Willson
Bozeman, Montana 59715
March 29, 1979

O. Charles Olson, M.D., F.A.C.P.
Director, Diabetes Education Center
Director of Medical Education
Deaconess Hospital
Spokane, Washington

Dear Dr. Olson,

In reading Biermann's and Toohey's book on exercise and the Diabetic, I became aware of you and your position at the Deaconess Hospital in Spokane, Washington.

I am researching compliance in diabetes in partial fulfillment for a Master's Degree in Nursing at Montana State University. The research design focuses on the generally noncompliant behaviors which are usually demonstrated in diet, medicine, and exercise, utilizing the operant learning theory as my framework.

Consequently, I am wondering if you were conducting any similar research, on either a formal or informal basis, as I am experiencing difficulty thus far in finding studies which relate to operant conditioning and the diabetic.

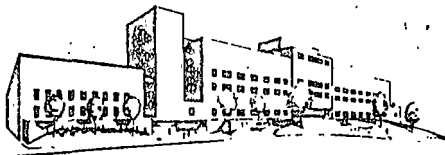
I would very much appreciate your response to this letter. Thank you for your time and consideration in this matter.

Sincerely,

Barbara Pinkava, RN, BS

DEACONESS HOSPITAL

WEST 800 FIFTH AVE. SPOKANE, WASHINGTON 99210
509 624-0171



O. CHARLES OLSON, M. D., F.A.C.P.

Director of Medical Education
Director of Diabetes Education Center

April 9, 1979

Ms. Barbara Pinkava, RN, BS
1212½ South Willson
Bozeman, Montana 59715

Dear Ms. Pinkava:

The only thing we have that might be of interest to you is a paper in preparation, summarizing the results of a questionnaire we have sent to our former diabetic students at our Diabetes Education Center. Similarly, I sent a questionnaire to the doctors attending these patients. We have not completed the paper, but hope to do so within the next few months. The essence of this is for us to find out how much trouble the diabetic has gotten into in the areas in which they have been educated. Then, of course, compliance can only be based on how the patient answers the questions. I think you will find that a lot of such studies have been done by Dr. Etzwiler and his group in Minneapolis, since they have been conducting a school for a long time.

You may contact Dr. Etzwiler as follows:

Dr. Donnell Etzwiler
Diabetes Education Center
4959 Excelsior Boulevard
St. Louis Park, Minnesota 55416

A second source of information might be the Joslin Clinic. You may write to:

Dr. Robert F. Bradley, Director
Joslin Clinic
15 Joslin Road
Boston, Mass. 02215

The third source of information might be the Diabetic Education Center in Portland. For information from them you could write to:

Dr. Otto C. Page
2232 N.W. Pettygrove
Portland, Oregon 97210

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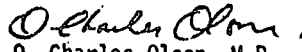
-2-

Another source of information might be the Virginia Mason Diabetic Information Center. You might write to:

Dr. Robert L. Nielsen
1118 9th Avenue
Seattle, WA 98101

I trust this will be helpful to you.

Sincerely,


O. Charles Olson, M.D.

OCO:sd

P.S. Also write the:

The Diabetic Educator
233 E. Erie St., Suite 712
Chicago, Illinois 60611

155

1212½ South Willson
Bozeman, Montana 59715

406-587-2562

July 20, 1978

Dr. William N. Miller
Chairman, Department of Medicine
1220 Central
Great Falls, Montana 59401

Dear Dr. Miller,

Diabetes mellitus is both a major health concern of society, and a concern to the investigator. Compliance, in particular, is the area under consideration, since studies indicate that as much as 50 percent of the individuals who are placed on therapeutic regimens to control their disease do not comply.

The investigator is researching compliance in diabetics, as partial fulfillment for a Master's Degree in Nursing at Montana State University. Your help is needed in order to reach the adult diabetic population with whom the investigator is concerned.

It is my understanding from the administrator at the Clinic, that proposals such as these go to a committee for review. Would it be possible, then, to be included on the agenda to personally present this proposal in more detail, if you feel that you do, indeed, desire more of the specifics? Perhaps an alternative might be to meet with each committee member separately. May I also add at this time that any suggestions which you could offer would be more than welcome. In any event, I am hopeful that we can work together in this matter.

The investigator will call you in two weeks to ascertain whether a decision has been reached. However, you may call me collect, or notify me by mail, if you reach a decision earlier. Thank you for your time and consideration.

Sincerely,

Barbara Pinkava, RN, BS
INVESTIGATOR

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1212½ South Willson
Bozeman, Montana 59715
406-587-2562

August 1, 1978

Dr. William N. Miller
Chairman, Department of Medicine
Great Falls Clinic
1220 Central Avenue
Great Falls, Montana 59403

Dear Dr. Miller,

I have received your letter, and I am most eager to work with you, and to supply you with as much information as possible.

The research design will focus on the generally noncompliant behaviors which are usually demonstrated in diet, meal spacing, and medication. The investigator will need a sample of approximately 2 to 5 patients with adult onset diabetes, who were placed on, but not following, a prescribed diet and a medication (either oral agent or insulin dependent). Since the program will involve an attempt at changing the noncompliant behaviors to compliant behaviors, it is estimated that it will probably take three months of working with the patients on a weekly basis, for completion. Precautions will be taken to assure the confidentiality of the individuals. The investigator will cooperate with the Clinic and the patients, in any way that is necessary, in an effort to secure this.

Currently, I do not know what my schedule will be, however, I think that morning interviews can hopefully be arranged. Though some visits may be longer, I expect that the average meeting with each patient would be a half an hour. Finally, I anticipate that the program will be ready for implementation in January or February. Although you did not state specifically, I have gleaned from your letter that I could probably gather a good sample from your clinic.

Page 2
Dr. William N. Miller
August 1, 1978

Thank you again for your time and consideration in this matter. I will await hearing further from your.

Sincerely,

Barbara Pinkava, RN, BS
INVESTIGATOR

GREAT FALLS CLINIC

P. O. BOX 5012
1220 CENTRAL AVENUE
GREAT FALLS, MONTANA 59403
PHONE (406) 454-2171
July 28, 1978

INTERNAL MEDICINE

F. J. ALLAIR, M.D.
D. S. ANDERSON, M.D.
A. H. ATKINSON, M.D.
D. W. BRENTON, M.D.
NEUROLOGY
S. A. BUFFINGTON, M.D.
NEPHROLOGY
J. D. EIDSON, M.D.
K. A. GUTER, M.D.
ONCOLOGY
L. W. KINZER, M.D.
CARDIOLOGY
J. A. LAYNE, M.D.
T. J. LENE, M.D.
W. N. MILLER, M.D.
GASTROENTEROLOGY
W. N. PERSON, M.D.
M. S. REID, M.D.
CARDIOLOGY
T. W. ROSENBAUM, M.D.
NEPHROLOGY

OBSTETRICS AND GYNECOLOGY

R. E. ASHUSSEN, M.D.
P. L. BURLINCH, M.D.
H. W. FULLER, M.D.
R. J. MCCLURE, M.D.
S. R. PHILLIPS, M.D.

PEDIATRICS

J. W. BRINKLEY, M.D.
J. A. CURTIS, M.D.
J. H. EICHNER, M.D.
J. L. HALING, M.D.
J. R. HALSETH, M.D.

SURGERY

L. L. HOWARD, M.D.
GENERAL AND UROLOGICAL
R. E. LAURITSEN, M.D.
GENERAL AND VASCULAR
J. E. MUNGAS, M.D.
VASCULAR AND GENERAL
L. H. TAYLOR, M.D.
GENERAL AND THORACIC
W. C. VASHAW, M.D.
GENERAL AND VASCULAR

ORTHOPAEDIC SURGERY

J. H. AVERY, M.D.
R. E. CHAMBERS, M.D.
J. C. WOLGANOT, M.D.

PSYCHIATRY

B. E. ENGSTROM, M.D.

PSYCHOLOGY

E. E. SHUBAT, PH.D.
H. SHUBAT, PH.D.

ADMINISTRATION

W. D. TAYLOR
M. D. MISSIMER

Ms. Barbara Pinkava
1212½ South Willson
Bozeman, Montana 59715

Dear Ms. Pinkava:

I received your request to perform research studies here at the Great Falls Clinic. This sounds very similar to the one that Donna performed concerning hypertension compliance. I would think that there should be no problem performing this, and approval by the Department of Medicine is a mere formality. What I need to know before presenting it to them are the following: How many patients do you plan to study? How many days will you be here in Great Falls? Are you interested in both insulin-dependent and oral agent and diet type diabetics, or exactly which ones would you want to talk with, and how long would you anticipate each interview would take? I do believe that perhaps a small concise statement of your research plan would be useful so I could present this to the department.

I don't anticipate any problems with approval for this. It's generally better if we can have the investigations done in the morning when the Clinic is less crowded, but I don't think Donna had any major problems getting her patients in several days. If you could provide me with more information concerning when you want to do this, etc., I think we should have no problems helping you with this study. I will await hearing further from you.

Sincerely yours,

William N. Miller, M.D.
William N. Miller, M.D. mb

WNM:mb

Diotated but not read

159

1212½ South Willson
Bozeman, Montana 59715
406-587-2562

August 9, 1978

North Carolina Diabetes Association
408 North Tryon Street
Charlotte, North Carolina 28202

Dear Sir,

I am a Master's student in Nursing at Montana State University. I am currently researching compliance in diabetes mellitus as a thesis study, and as such, may find the Diabetes Mellitus Assessment Guides very useful indeed. I would appreciate your sending me copies of these guides. I am more than willing to pay all of the necessary charges for these.

Thank you for your cooperation.

Sincerely,

Barbara Pinkava, RN, BS

522 W. Hayes St.
Bozeman, Mt. 59715

The Compliance Newsletter
c/o Department of Clinical Epidemiology
and Biostatistics
McMaster University Health Sciences Center
1200 Main St. West
Hamilton, Ontario, (L8S 4J9), Canada

Dear Sir,

I am presently reading Sackett and Haynes, Compliance with Therapeutic Regimens, and it is most interesting.

I am a Registered Nurse with a Bachelor's Degree, working towards my Masters. While employed as a community nurse for two years, I became very aware, of compliance vs. noncompliance with therapeutic regimens. Subsequently I would now like to formally research this in a thesis paper.

I worked daily with clients who had various diagnosis, but the bulk of my caseload was with diabetes and cardiacs. It seemed the pattern was always the same. For example, the clients, having just recuperated from the acute stage in the hospital, would return home, whereupon a visiting nurse like myself would initiate with the client, a regimen, which was long term to prevent reoccurrence. The client though wary, was anxious to learn and followed the regimen religiously up to the point of what they termed, "feeling much better". Then there were errors, forgetfulness, and/or denial of the entire regimen until disease symptomatology again emerged. Consequently I remain intrigued with this area and will attempt to answer some questions, hopefully, through study.

I would appreciate your sending me a subscription to this newsletter, and also submitting my name to any other mailing lists that would be helpful to me. Might I mention

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here, too, that the Sackett and Haynes book is informative and excellent for groundwork. Thank you.

Sincerely,

Barbara Pinkava, RN, BS



McMASTER UNIVERSITY
Department of Clinical Epidemiology & Biostatistics
1200 Main Street West, Hamilton, Ontario, L8S 4J9
Telephone: Area Code 416 525-9140

June 14th, 1977.

Ms. Barbara Pennington Pinkava,
522 W. Hayes Street,
Bozeman, Montana 59715.

Dear Ms. Pinkava:

As requested, I am enclosing the back issues of the Compliance Newsletter and have added your name to our mailing list to receive future copies and any other materials disseminated through this office in the area of compliance.

Many thanks for your kind words about the book. We would be interested in learning about your findings when you have completed your research.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "David L. Sackett".

David L. Sackett.

DLS:js
Encls.

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A large, dark, handwritten mark resembling a stylized 'X' or a checkmark, located to the left of the text.
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