A STUDY OF THE HEALTH-PROMOTING BEHAVIORAL EFFECTS OF AN EXERCISE EDUCATIONAL INTERVENTION IN ADULT DIABETICS

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BY

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I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Nursing.

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A STUDY OF THE HEALTH-PROMOTING BEHAVIORAL EFFECTS OF AN EXERCISE EDUCATIONAL INTERVENTION IN ADULT DIABETICS

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The purpose of this study was to investigate if using a health promotion approach when teaching adult diabetics the importance of exercise would have a positive effect on the healthy behaviors in which they engage and increase exercise participation. The framework of the study was guided by the Pender (1987) Health Promotion Model.

The design was a quasi-experimental, pre-test post-test design. Participants were volunteers from diabetic education support group classes at four hospitals (n=95). The majority were Caucasians and possessed at least a high school education. The independent variable was the exercise teaching intervention and dependent variables were health promotion and exercise behaviors. Health promotion behavior was measured by the Health Promoting Lifestyle Profile (Walker, Sechrist, and Pender, 1987); exercise behavior was measured by The Physical Functioning subscale of the MOS 36-Item Health Survey (Ware and Sherbourne, 1992) and a one-item question on exercise behavior change.

Pearson Product Moment Correlation was used to examine relationships. The findings indicate that there is a correlation between post-health promotion scores (PHPLP) and post-physical functioning (r=0.25, p<0.05) and PHPLP and post-exercise subscale scores (r=0.37, p<0.01) but that people with diabetes may not actually change their exercise behavior possibly due to their level of physical functioning. Health promotion scores significantly increased for both the experimental (t=-4.88, df=49, p<0.001) and the control groups (t=-8.15, df=44, p<0.001). T-test was used to examine if the health promotion exercise intervention made a difference in exercise behavior after one month. Both the experimental (t=-3.30, df=45, p<0.002) and control groups (t=-4.73, df=42, p<0.001) increased exercise subscale scores after the educational intervention despite one approach being based on health promotion and the other approach based on the traditional method of education. Exercise change scores were significantly higher in the experimental group (F=3.708, df=1, p<0.05). The results indicate that education increases exercise behavior in diabetics but further testing is needed to determine if a health promotion approach has more long-term effectiveness than the traditional method of exercise education.

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CHAPTER I

INTRODUCTION

Diabetes mellitus is a chronic disease which affects about 6.8 million Americans or three percent of the United States population. This number only includes self-reported cases and does not include undiagnosed diabetes or impaired glucose tolerance which is thought to be about 50 percent of all cases or another 6.8 million people (U.S. Department of Health and Human Services, 1990). About 90 to 95 percent of the known cases are probably non-insulin dependent diabetes while the other five to ten percent are insulin-dependent (American Diabetes Association, 1993a). The Texas Diabetes Council (1993) estimates there are 200,000 diagnosed and undiagnosed diabetics in the county in which this study was conducted.

Diabetes ranks as the seventh leading cause of death in the United States (U.S. Bureau of the Census, 1992). In 1991, there were 3,593 deaths reported in Texas; in the county under study, there were 491 deaths (Texas Department of Health, 1991). Death may result from severe metabolic and electrolyte disturbances but is primarily from cardiovascular and renal disease (Travis, Brouhard, and Schreiner, 1987). Actual mortality figures are not

accurate since many times diabetes is a contributing factor and not listed as the cause of death (Guthrie and Guthrie, 1982). The discovery of insulin changed diabetes from a disease causing certain death to a chronic, long-term condition. The introduction of insulin created a need for education related to the management of the diabetic condition. Diabetes has been identified as one of the first diseases having a formal education program and currently serves as a model disease for health education (Nemchik, 1982).

Traditionally, health care providers focused the educative process only on disease aspects of diabetes. Nationally, however, the focus of health education is changing from the traditional disease model to a holistic health oriented concept. The United States Department of Health Education and Welfare (1979) issued five broad national health promotion goals for the year 1990. These goals were designed to increase the level of well-being and actualize health potential. The 1980 public health report, Promoting Health/Preventing Disease: Objectives for the Nation, outlined 15 priority areas and 226 specific objectives to reach these goals. The evaluation of the progress the American people have made toward reaching these goals was described in 1986 (U.S.Department of Health and Human Services). Although progress was made on many of

the objectives, the goals were not accomplished. Again, the emphasis on health promotion as a national health policy has been reaffirmed by the issuance of health goals for the year 2000. Three goals were issued for people with diabetes: reducing diabetes-related deaths, reducing incidence of the disease, and reducing complications (U.S. Department of Health and Human Services-Public Health Service, 1990). These goals should ideally help guide the education process.

A review of the National Standards for Diabetes Education (National Diabetes Advisory Board, 1986) revealed that the education approach is disease-focused and other types of health teaching are not included with the exception of the use of the health care system, community resources and self-care responsibilities. Teaching diabetics how to give themselves insulin and adjusting insulin dosages is one of the main components of the education program (Flavin and White, 1989; Gorman and Berrien, 1987; Schiffrin, Mikic, Liebell, and Albisser, 1985). Nutrition education had been required even before the discovery of insulin (Nemchik, 1982) and is still a major focus (Hall, 1987; White, Carnahan, Nugent, Iwaoka, and Dodson, 1986). The importance of exercise has been included in diabetes education based on tight control of blood sugar (Horton, 1988; Kaplan, Hartwell, Wilson, and

Wallace, 1987). Skin and foot care are emphasized in education programs since infection is a major problem (Glasgow, McCaul, and Schafter, 1989). Control of complications such as hypoglycemia and hyperglycemia, retinopathy, and neuropathy are also included in comprehensive programs (Deeb, Pettijohn, Shirah, and Freeman, 1988; Teza, Davis, and Hiss, 1988). Psychosocial aspects of the disease have also been increasingly addressed in the last few years (Anderson, Nowacek, and Richards, 1988; Hess, Davis, and Harrison, 1986; Sprafka, Kurth, Crozier, Whipple, and Bishop, 1988).

A health promotion program for the diabetic would teach the individual not only the essential disease-related concepts but also would emphasize health-promoting behavior in all aspects of life and in the acute care setting (Flynn and Giffing, 1984). For diabetic educators, specifically nurses, to maintain leadership of the health education area, the concept of health-promoting behavior should be applied to diabetic education (Gorman and Berrien, 1987). A knowledge of factors that have been shown to be associated with health promotion (Pender, 1987) would be important for the nurse to understand when developing a comprehensive diabetic education program. Using these factors as a framework for the education sessions, strategies could then be developed to teach health

promotion and disease prevention to people with diabetes in order to emphasize not only disease management but a healthy lifestyle.

Problem of Study

The purpose of the study was to investigate if using a health promotion approach when teaching adult diabetics the importance of exercise would have a positive effect on the healthy behaviors in which they engage. The importance of exercise is included in many diabetic education programs but the approach is disease-focused and not health-promotion focused. Education programs for people with diabetes are taught both in groups and individually. Since this study focuses on healthy behaviors, the research was done in diabetic support groups which emphasize learning more about the self-management of the disease process.

Rationale

National emphasis on health promotion

The national focus on health promotion has lent impetus to research by nurses on quantifying exactly what factors are important in causing a person to engage in health-promoting behaviors. The concept of health-promoting behavior is in the process of being defined in the literature (Kulbok and Baldwin, 1992; Pender, 1987).

The criterion behaviors that differentiate health behavior, health-protecting behavior, and health-promoting behavior are in the process of conceptualization (Cox, 1987). The concept of health-promoting behavior has been studied in such diverse populations as the elderly (Allen, 1986; Kee, 1984; Speake, 1987); women (Brailey, 1986; Duffy, 1989) and people with cardiovascular disease (McDonald, Sawatzky, and Wilson, 1988; McMahon, Miller, Ringel, and Garrett, 1988). In the area of diabetes, studies have been focused on disease-preventative concepts (Becker, 1974) although Riffle, Yoho, and Sams (1989) studied health-promotion behavior in Appalachian elderly diabetics and hypertensives. However, the group was treated statistically as one sample so differences between diabetics and hypertensives could not be analyzed. Since health promotion has been identified as a national goal, it is imperative for nurses to evaluate the variables affecting health-promoting behavior in the person with diabetes and to utilize the concept of health promotion when designing a diabetes education program.

Health Care Costs

The current national focus on spiralling costs associated with health care is another reason for applying the health promotion concept to diabetes. The 1990 Healthy People report (U.S.Department of Health and Human Services)

states that "health promotion and disease prevention comprise perhaps our best opportunity to reduce the ever-increasing portion of our resources that we spend to treat preventable illness and functional impairment." The total cost of diabetes in the United States is estimated to be more than $90 billion dollars a year. Of this amount, $37 billion was spent for inpatient care. Hospitalizations related to the chronic complications of diabetes consumed $10 billion of the inpatient costs (American Diabetes Association, 1993a). One very frequent complication is that of diabetic foot ulcers which can lead to gangrene and amputation. Currently, diabetes-related amputations affect six percent of the diagnosed and undiagnosed population, and diabetes is the major cause of all amputations (American Diabetes Association, 1993a). In 1993, in a Southeastern tertiary care hospital of 650 beds, the average cost per patient (n=15) for 18 days of care for diabetic foot ulcers was $18,945 (Kaufman and Bowsher, 1994). In order to prevent diabetic foot ulcers, atherosclerosis needs to be prevented since this process is the implicating factor in the development of the ulcer. Eating a nutritious diet and adequate exercise are two health promotion practices which can deter the development of atherosclerosis (American Diabetes Association, 1993b).

Diabetes is the major cause of new cases of blindness. The incidence of blindness in elderly insulin-dependent diabetic individuals was found to be 3.2% (Moss, Klein, and Klein, 1988). Chronic complications of diabetes (cardiovascular, ophthalmic, neurologic, renal and other) as a group cause 162.7 hospitalizations per 1000 diabetics with similar conditions as compared to 72.5 hospitalizations per 1000 nondiabetics with similar conditions but not due to diabetes. About 25 percent of those with diabetes spent time in the hospital in 1992 as compared to 15 percent of nondiabetics. The average length of stay is about 1.7 days greater in people with a primary diagnosis of diabetes (American Diabetes Association, 1993a).

Not only does the person with diabetes incur high hospitalization costs but there are also many outpatient expenses. The person with diabetes incurs daily costs associated with the disease, e.g. the cost of syringes, blood and/or urine/glucose monitoring equipment and supplies, and insulin among other expenses (Taylor, 1987). The high rate of complications among diabetics not only increases hospitalization costs but causes loss of time at work. People with diabetes also are more likely to visit their physician than nondiabetics. Diabetes ranks seventh among all reasons for physician visits causing 6-11 visits

per year, three of which are directly related to diabetes (American Diabetes Association, 1993a).

Interrelationship of nursing and health promotion

The concept of health promotion serves as a holistic framework for the practice of nursing. It encourages nurses to look at the total person in the context of the environment rather than focusing on a disease-affected person. A person who has nursing care that is focused on the total self may be a more satisfied patient. Kernaghan, Salvinija, and Giloth (1988) cite the example of a 24 hour hospital telephone service conducted by nurses who answered health care related questions from the community. In the first six months of service, calls were twice the expected number, and the hospital experienced increased usage of inpatient and emergency room facilities. The hospital continued the telephone service after an evaluation demonstrated that the community was satisfied with the care they were receiving.

By examining factors that lead to health promotion behavior in persons with diabetes, educational programs can be developed to assist the individual in lifestyle behavior change which could prevent or delay the onset of diabetic-related complications. The Diabetes Control Program initiated in 20 states by the Centers for Disease Control developed a range of education intervention models. Many

of these programs demonstrated significant reductions in hospital rates, use of emergency services, use of sick days, and reductions in costs (Kernighan, Salvinija, and Giloth, 1988).

Health promotion education can also positively affect the ability to perform self-care skills. When nurses at the Cardiovascular Program at Methodist Hospital, Memphis, taught a cardiac teaching plan, they gave a post-test and a survey to assess patient learning of certain skills. Some 92% of the patients reported a better understanding of their condition; 90% reported they were continuing exercise (Kernaghan, Salvinija, and Giloth, 1988).

Health promotion intervention studies

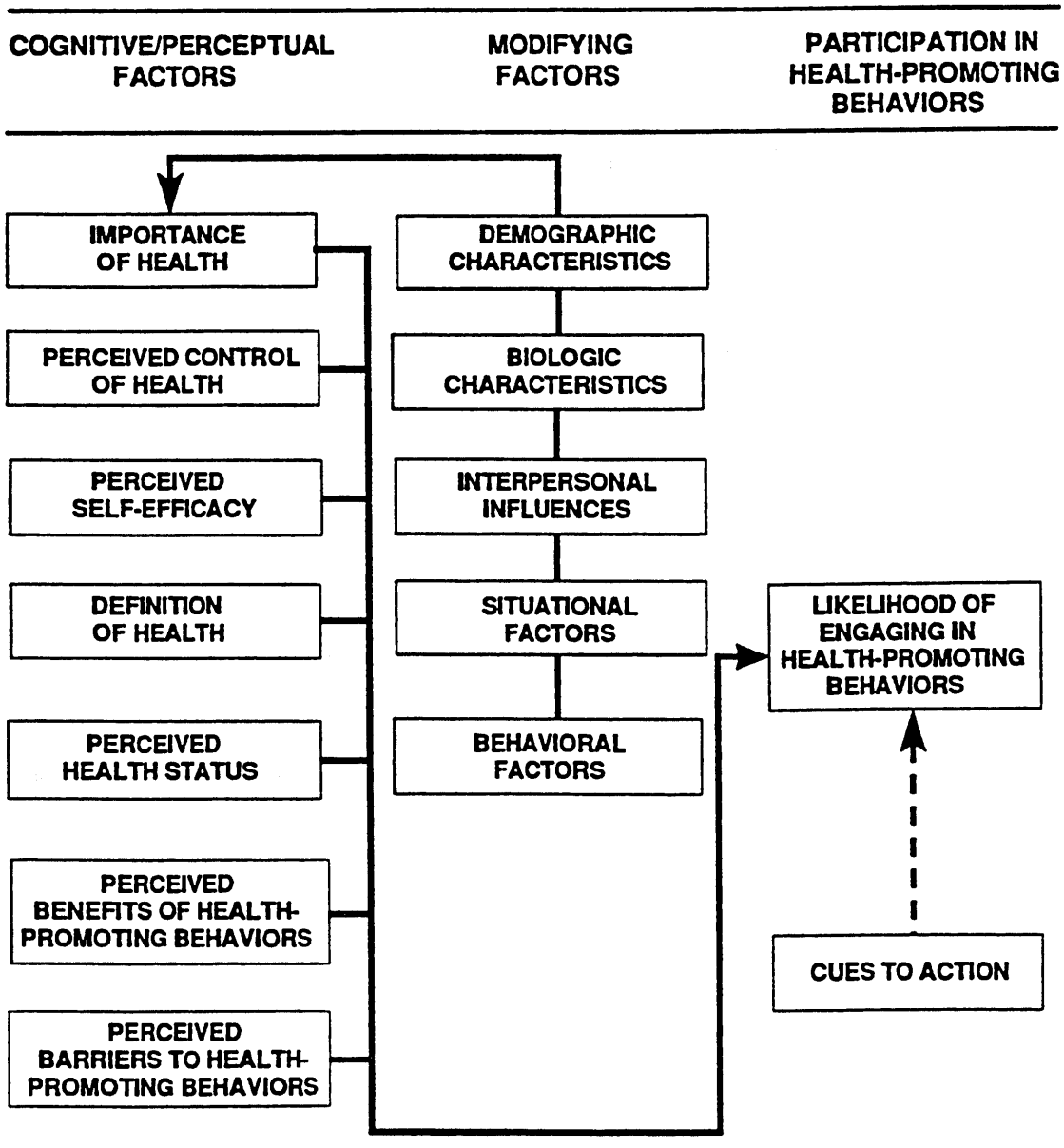
Nurses have been gathering data in regard to health promotion variables in numerous groups. However, few interventions have been reported as being developed using Pender's (1987) Health Promotion Model. Nurses need to assess the usefulness of the model in developing interventions that will make a difference in peoples' health promotion behaviors. This study tested the effectiveness of an exercise education intervention developed using Pender's Health Promotion Model in the adult person with diabetes mellitus.

Conceptual Framework

Health promotion models have been developed by nurses to guide research, advance theory, and to improve nursing practice. Pender's Health Promotion Model (HPM) has been widely researched by the nursing community (Ahijevych and Bernhard, 1994; Lusk, Ronis, Kerr, and Atwood, 1994; Pender, Walker, Sechrist, and Frank-Stromborg, 1990; Riffle, Yoho, and Sams, 1989; Walker, Kerr, Pender, and Sechrist, 1987; Walker, Kerr, Pender, and Sechrist, 1990; Walker, Volkan, Sechrist, and Pender, 1988; Whetstone and Reid, 1991. The Health Promotion Model (Pender, 1987) has been chosen as the guiding framework for the study since it specifically addresses exercise as a health promotion activity, and the cognitive-perceptual factors have been studied in chronically ill groups such as cardiovascular clients (Fleetwood and Packa, 1991; Pender, Walker, Sechrist, and Frank-Stromborg,1990) and cancer patients (Frank-Stromborg, Pender, Walker, and Sechrist, 1990).

Pender's model (Figure 1) identifies variables that are considered important in determining an individual's health promotion behavior. In the model, health promotion behaviors are considered to be those continuing activities that act as an expression of actualizing tendency and serve as a source of motivation for further health promotion

Figure 1. Pender's (1987) Health Promotion Model



activity (Pender, 1987). The HPM was developed from Becker's (1974) Health Belief Model which proposes factors that would lead to disease prevention behavior. The HPM identifies seven cognitive-perceptual factors which are the primary and direct motivational means for acquiring and maintaining health-promoting behavior. These factors are importance of health, perceived control of health, perceived self-efficacy, definition of health, perceived health status, perceived benefits of health-promoting behavior, and perceived barriers to health-promoting behavior.

Pender (1987) describes the health promoting variables as follows:

Importance of Health

The HPM defines importance of health as placing a value on health as compared to other ideals persons may cherish such as happiness, a comfortable life, freedom, and inner harmony.

Perceived Control of Health

Perceived control of health is the individuals' perception of ability to make a change in personal health state. There are three dimensions to perceived control: (a) internality, which implies that individuals believe they can effect changes in themselves; (b) externality (powerful others), stronger individuals or God are more

likely to cause changes than they themselves; (c) externality (chance), fate or chance are more likely to cause changes in their health than their own efforts.

Perceived Self-Efficacy

Perceived self-efficacy is the individual's belief that a particular action can be accomplished. People who do not really believe in their ability to accomplish a task will often decrease their efforts while people with a strong belief in their abilities will increase their efforts when facing a challenging situation.

Definition of Health

Individuals maintain different views or definitions of health varying from an absence of disease to a state of optimum wellness. Pender (1987) notes that there is a societal changing view of health from a negative construct (absence of disease) to a positive view of health as self-actualization. Pender (1987) does not define health itself but simply states there are a variety of definitions which need further study. The definition of health would influence the type of health behaviors in which individuals choose to participate.

Perceived Health Status

The HPM proposes that how well or how sick individuals feel at a given time would influence the health behaviors in which they choose to participate.

Perceived Benefits of Health-Promoting Behavior

The level of participation in health-promoting behavior may be influenced by individuals' perceived benefits when performing the activity. Repetition of the behavior seems to strengthen the beliefs about the benefits.

Perceived Barriers to Health-promoting Behavior

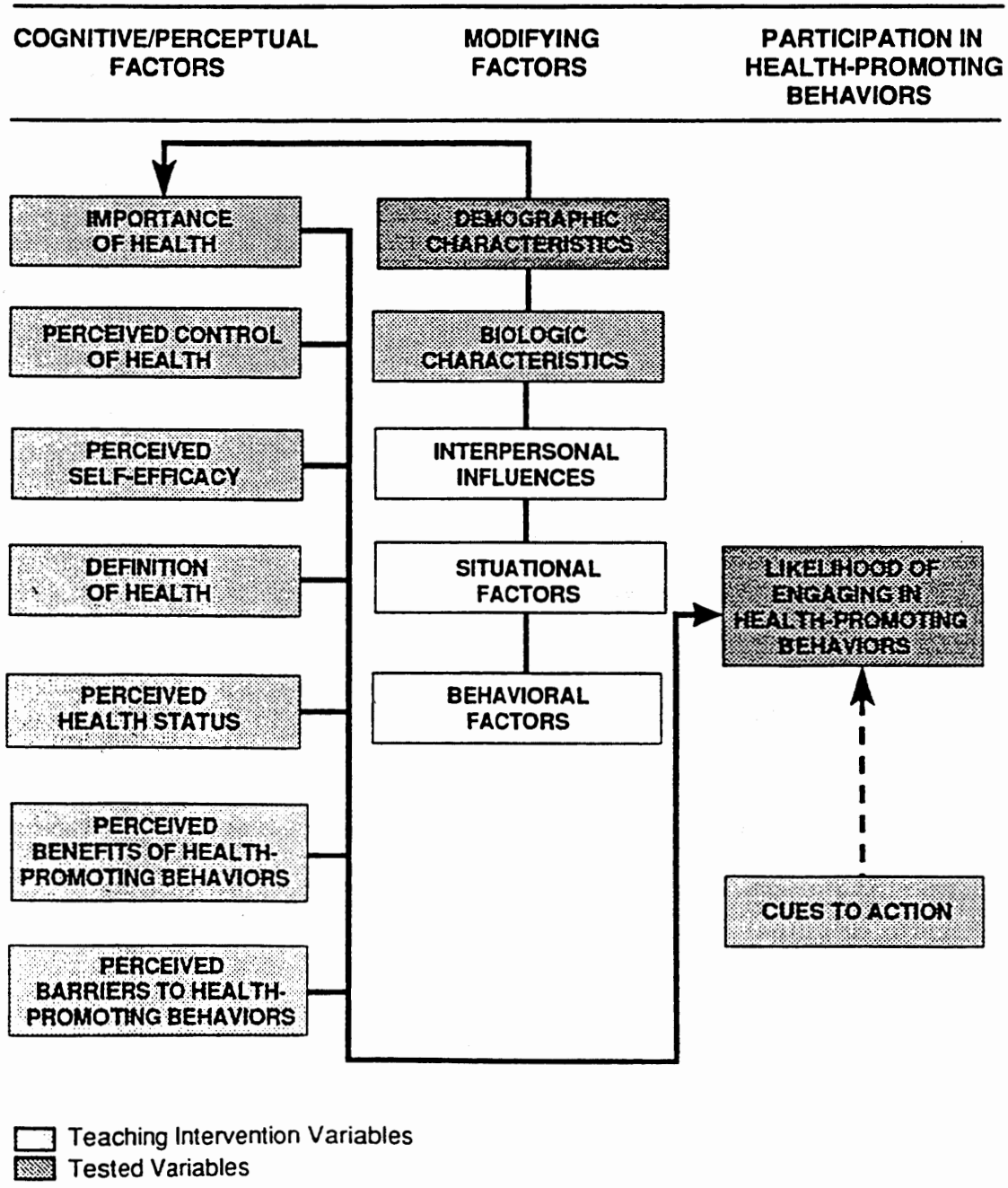
Barriers are the real or imagined difficulties inherent in pursuing a health-promoting behavior. These barriers may involve the unavailability, inconvenience, or difficulty of a particular health-promoting behavior. Another barrier may be poor health status.

Pender (1987) also proposed in the HPM five modifying factors which may affect health promoting behavior through an indirect impact on the cognitive-perceptual factors. These modifying factors are demographic factors, biological characteristics, interpersonal influences, situational factors, and behavioral factors. The likelihood of taking health-promotion action is hypothesized to depend on cues to action. These are activating mechanisms of either an internal or external nature which tend to remind persons to perform health-promoting behaviors. An internal cue would be "feeling good" after an activity; an external cue would be a television program about stress management.

The study concentrated on selected variables of the HPM due to the complexity of the model. Figure 2 shows the factors which were used in the teaching intervention (importance of health, perceived control of health, perceived self-efficacy, definition of health, perceived health status, perceived benefits of health-promoting behaviors, perceived barriers to health-promoting behaviors, biologic characteristics, and cues to action). The factors for which data were collected included demographic characteristics and the likelihood of engaging in health-promoting behaviors.

The cognitive-perceptual factors were used as the unifying framework to guide the development of an exercise health-promoting teaching intervention for adult diabetics who may be insulin-dependent, non-insulin dependent, or non-insulin dependent but taking insulin. Demographic factors represented in the HPM were assessed by questionnaire. Cues to action were stimulated with handouts on exercise and a computer-generated calendar for the participant to record exercise behavior on a daily basis. The handouts give the person specific guidelines and precautions that are pertinent to diabetics who engage in exercise. Finally, health promotion behavior in the HPM was assessed by pre and post-test using Walker, Pender, and Sechrist's (1987) Health Promoting Lifestyle Profile.

Figure 2. Health Promotion Model



Assumptions

Assumptions on which this study were based are:

1. Health has personal meaning for people and can be defined (Pender, 1987).
2. People can learn health-promoting behaviors (Pender, 1987).
3. There are benefits to be gained from health-promoting behavior (Pender, 1987).
4. There are both real and imagined barriers to engaging in health-promoting behavior (Pender, 1987).
5. People with diabetes can engage in health-promoting behavior (Gorman, 1987).

Research Questions

The following research questions were proposed for this study:

1. Is there a relationship between health-promoting lifestyle behavior scores, exercise subscale scores, and self-reported exercise behaviors in adult diabetics?
2. Does an exercise-focused health promotion education class make a difference in exercise behavior over time in adult diabetics?

Definition of Terms

The following terms are defined for this study:

1. Diabetes support group

Conceptual Definition: A group of people with diabetes and/or their families who meet together to support each other and to learn more about the effects of the disease and how to make changes in their lifestyle (Dawson, 1993).

Operational Definition: The group of people in attendance at a specified diabetes support meeting who state they have diabetes mellitus.

2. Exercise-focused health promotion education class

Conceptual Definition: A group of persons meeting together to learn a subject under a teacher's guidance (Webster's Encyclopedic Unabridged Dictionary of the English Language, 1989).

Operational Definition: A 30 minute presentation to persons with diabetes on the value of exercise using the variables in Pender's Model (1987) to assist the participants in making a decision to engage in exercise as a lifestyle habit. For example, the variable, Perceived Health Status, can affect whether a person engages in exercise. If health status is perceived as being so poor that performance of certain activities is not possible, then exercise may not even be attempted even though in actuality it is possible with modifications.

3. Health-promoting behaviors

Conceptual Definition: Those behaviors which are a continuing part of a person's lifestyle activity and are an expression of the actualizing tendency (Pender, 1987).

Operational Definition: Health-promoting behaviors were measured by the person's score on the Health Promoting Lifestyle Profile (HLPL) (Walker, Sechrist, and Pender, 1987).

4. Insulin-dependent diabetes (IDDM)

Conceptual Definition: Persons who have an inadequate or no production of insulin by the pancreas resulting in low blood glucose and ketosis, most commonly diagnosed before age 30, with the person requiring insulin injections. It is also classified as Type I diabetes (Rosenburg, 1992).

Operational Definition: IDDM was measured as self-reported on the Demographic Data Sheet.

5. Non-insulin dependent diabetes (NIDDM)

Conceptual definition: Diabetes which results from a decreased sensitivity to insulin and/or inadequate production; most commonly diagnosed after age 40 and may or may not require insulin injections. NIDDM is also called Type II diabetes (Rosenburg, 1992).

Operational Definition: NIDDM was measured as self-reported on the Demographic Data Sheet. For statistical purposes, NIDDM was split into two groups: those who are

currently taking insulin and those who are not taking insulin.

5. Exercise Behaviors

Conceptual Definition: A continuing activity that is an integral part of a person's lifestyle. It represents an expression of stabilizing and actualizing tendencies in human beings (Pender, 1987). Pender also notes that diabetics will need special considerations in exercise structuring and planning but that most diabetics can engage in some form of exercise.

Operational Definition: Exercise behavior was measured as self-reported on the MOS (Medical Outcomes Study) 10-Item Physical Functioning Form (Ware and Sherbourne, 1993)(Appendix C) and a one-item question regarding change in amount of exercise during the past month.

Limitations

The limitations for the study are those which are inherent to the sample. A diabetic support group is a self-selected group of people who choose to come to a meeting to learn more about diabetes. Attendance may mean that they are more health promotion motivated in outlook than those who do not come. Since the group is not truly representative of the overall diabetic population, the results are not generalizable to all diabetics. Another

limitation is the need for participants to attend two consecutive meetings. Some people may choose not to come a second time and others, though willing, may have prior commitments. The time series nature of the study may further limit the representativeness of the sample.

Summary

Health promotion is a concept that holds a national priority in the current concern with health care costs. Diabetes mellitus is a costly disease and interventions need to be found that will increase the health of people with diabetes and thereby decrease costs.

The purpose of this study was to determine if teaching an exercise intervention using a health promotion approach rather than a disease-focused approach would be effective in increasing overall health promotion behaviors. Pender's (1987) Health Promotion Model was chosen to be the guiding conceptual framework for both the teaching intervention and the measurement of the health promotion behaviors. The participants were selected from those attending diabetic support groups. Terms have been both conceptually and operationally defined within the context of the study. Assumptions and research questions were delineated from the conceptual framework. The limitations set the restrictions for the generalizability of the study.

CHAPTER II

REVIEW OF LITERATURE

Diabetes mellitus is a complex, chronic metabolic disease requiring extensive changes in self-care behaviors in order to promote a reasonably healthy lifestyle. The person with diabetes must consider exercise, diet, and medication as all part of the treatment of the disease. Exercise and nutrition practices are considered health promotion behaviors (HPB) by Pender (1987). This study focuses on teaching the concept of exercise as a health promotion behavior rather than as an illness prevention behavior in order to produce positive changes in the lifestyle of the person with diabetes. The literature regarding health promotion theory, research and exercise research in diabetes was reviewed.

The Meaning of Health Promotion

The concept of health promotion behavior has evolved from the shift in the public's perspective of the meaning of health. Once defined simply as the absence of disease (clinical model), health is now more holistically defined as self-actualization and a general feeling of well-being. This definition of health has been labelled the

"eudaimonistic" model. Eudaimonistic thinking is found in certain aspects of ancient Greek medicine and the writings of Plato and Aristotle. A third way of thinking about health focuses on the adaptive behavior of the person to the environment (adaptive model). Finally, Smith (1981) identified a fourth model of health from the literature as the ability of the person to perform societal roles. Laffrey (1985), using Smith's conceptualization of health, studied the relationship of a person's definition of health to health behavior choice in a descriptive non-experimental study of 95 white adults (58 women), ages 18 to 69, who lived in three midwestern suburbs in randomly selected households. The Health Behavior Choice Scale (HBCS) and Health Conception Measure (HCM), both developed by Laffrey, were significantly correlated ($r=0.44$, $p<0.001$), meaning that those persons with more complex health definitions selected more health promoting practices than people with less complex health definitions. The results indicate that self-actualization was associated with higher education and older age (statistics not cited). The findings of this study indicate that effective nurse-client communication is dependent in part on the meaning of health for the client which influences health behavior choices. Laffrey recommended further study of health behavior choice with other samples.

Kulbok and Baldwin (1992) in a concept analysis of health promotion and its historical development noted that nurse researchers are advancing the idea that health promotion behaviors can be considered as separate from a disease prevention model. However, despite the advancement of health promotion as self-actualization, there continues to be an emphasis placed on disease prevention which is a more limited concept.

Frauman and Nettles-Carlson (1991) studied health promotion behavior of well adult clients in a nurse practitioner outpatient clinic where health maintenance was emphasized. Out of the randomly chosen 347 subjects, 132 questionnaires were returned. Total Health Promotion Lifestyle Profile (HPLP) scores were significantly associated with higher education and income (adjusted $\underline{R}^2$=0.15, p=0.0005). Those who defined health eudaimonistically or as self-actualization had higher HPLP scores. Findings indicate that the person's concept of health meaning influences health behavior. Recommendations included testing interventions designed to help clients achieve a healthier lifestyle.

Pender's (1987) model of motivational factors that are important when choosing health behavior postulates there is a difference between illness-preventing health behavior and health promotion behavior (HPB). The latter

is defined as continuing patterns of behavior that are essential components of a person's lifestyle. HPB is directed toward enhancing health, promoting self-awareness, and increasing self-satisfaction and enjoyment. Some examples of HPB include physical exercise, healthy nutritional practices, social support, and stress management. When persons engage in HPB, they act on the environment rather than reacting to the environment. According to Pender's theory, the decision to engage in exercise is usually made in order to enhance health.

Health Promotion Behavior Research and Exercise

In recent years, a number of nursing studies have been produced in health promotion behavior with the majority using Pender's (1987) Health Promotion Model (HPM) as the conceptual framework. A small but growing body of literature is demonstrating that the decision to engage in exercise is a health promotion activity. Laffrey (1990) studied 85 adults (68 women) in a two-group comparative design. One group was considered healthy and one group had various chronic diseases. Sixty-four persons reported some type of exercise behavior. In the healthy group, 76% reported engaging in exercise; in the chronic illness group, 75% reported exercising. Pender's (1987) Model of Health Promotion was used to categorize reasons for

exercising into illness prevention (17%), health maintenance (36%), and health promotion (47%). It was also found that the rationale for participating in exercise did not vary significantly between the healthy and chronic illness groups. Men were more likely to participate in exercise for health promotion reasons than women(r_{pb}=-0.26, p=0.04).

In an exploratory study of 33 healthy subjects and 52 with chronic diseases (4% diabetes), a semi-structured interview format was used to find out, "What are the five most important things you do for your health?" and "What is the most important reason for these health behaviors?". Laffrey (1990) reported that exercise was one of the three most commonly reported behaviors by those with (75%) and without (76%) chronic disease. Content analysis yielded three major reasons for the behaviors: illness prevention, health maintenance, and health promotion. In the exercise behavior category, 17 subjects reported engaging in exercise for illness prevention, 36 for health maintenance, and 47 for health promotion.

Age-Related Studies:

Duffy (1988) surveyed 262 women in faculty and staff positions from a public university who responded to mail questionnaires regarding the health promotion practices of mid-life women. The mean age was 45.5 years (S.D.=8.3);

over 80% had completed college and greater than 50% had doctorates. The total Health Promoting Lifestyle Profile (HPLP) score variance (25%, $p<0.001$) was explained by chance health locus of control, self-esteem, current health status, health worry/control, post high school education, and internal health locus of control. Those persons scoring higher on the exercise subscale had high self-esteem ($r=0.79$, $p<0.01$), high internal health locus of control ($r=0.31$, $p<0.01$), low chance health locus of control ($r=0.33$, $p<0.01$), and high current health status ($r=0.34$, $p<0.34$). In this study, Duffy used the more recent Multidimensional Health Locus of Control Scale which divides external locus of control into "chance" and "powerful others". Duffy concluded that the HPM is partially supported by the findings that locus of control, self-esteem, and health status influence health promotion behavior.

Walker, Volkan, Sechrist, and Pender (1988) studied a convenience sample of 452 adults age 18-88. Significant age group differences were found for mean scores on total HPLP scores and three of the six subscales: health responsibility ($M=2.50$, $SD=0.56$, $p=<0.001$), nutrition ($M=3.04$, $SD=0.62$, $p=<0.001$), and stress management ($M=2.73$, $SD=0.50$, $p=<0.001$). Older adults reported the highest total frequency of health promotion behavior. Women had

higher HPLP scores than men (r=0.22, p<0.001) including higher scores on the subscales of exercise (r=0.100, p<0.006), health responsibility (r=0.176, p<.001), nutrition (r=0.105, p<.001), and interpersonal support (r=0.28, p<0.001) with gender contributing significantly to the variance of the model (R^2=0.114, F=<0.001). Higher education and income both contributed significantly to the explanation of variance in the scores; higher income was also associated with exercise and health responsibility (statistics not cited). The findings indicate that while many older adults follow a healthy lifestyle, many do not, and health promotion needs to be encouraged in the older population to enhance quality of life. Recommendations included studying various ages and health states.

Riffle, Yoho, and Sams (1989) studied HPB, perceived social support, and self-reported health status in an elderly Appalachian group of people in West Virginia. A convenience sample of 113 people, age 56-94, attending a nutrition center for either hypertension or diabetes was obtained. Women represented 78% of the sample and 93% were white. The average HPLP score was significantly related to increased social support(r=0.7528, p=0.0001), higher health status (r=0.2205, p=0.0103), and higher education (r=0.2166, p=0.0288). Exercise was found to be related to current health status (r=0.2808, p=0.0030). The findings

indicate that nurses need to increase the amount of time and attention spent on the most elderly clients, those who are less educated, and those who have the least income. The authors noted that some of the items on the HPLP instrument might not be relevant to older individuals. The use of a combination quantitative and qualitative design was found to be very effective in this older group, giving the researchers more information about the participants' health promotion behavior. This design was recommended for future studies. It was also recommended that future studies divide the older age range into young-old and old-old age groups.

Worksite Related Studies:

Weitzel (1989) tested the HPM (importance of health, perceived health locus of control, health status, and self-efficacy) in a sample of 179 blue collar workers. The subjects were 70% male, ages 20-60, 51% white, 27% Hispanic, 44% high school graduates, and no college graduates. Each of the variables were predictive of health promotion behavior using hierarchal multiple regression techniques but health status (R^2=0.34, p<0.001) and self-efficacy (R^2=0.13, p<0.001) were the most powerful predictors and the importance of health (R^2=0.22, p<0.019), the least powerful. However, only 28% of the variance (p< 0.001) in the total HPLP score was explained by the model.

Demographics (age, gender, education, and household income), taken as a whole, were positively correlated with HPLP (R^2=0.05, p<0.05), self-actualization (R^2=0.358, p<0.03), exercise (R^2=0.05, p<0.07), interpersonal support (R^2=0.05, p<0.071), and stress management (R^2=0.41, p<.02). Findings support the ability of the HPM to predict health promotion behaviors in blue collar workers and the effectiveness of health promotion programs at these worksites in influencing these variables.

Another worksite study used a sample of 589 employees of six unidentified companies who were already participating in onsite health promotion programs, although the level of participation varied greatly. Of the sample, 54% were male, 83% were white, ages ranged from 20-65, and 70% had completed college. The health promotion program consisted of physical fitness activities, nutrition classes, and stress management. Subjects, who had managerial, clerical, and operational roles, were tested initially and again at three months. Total HPLP scores increased significantly from initial testing (M=2.82, SD=0.39, p=0.016) to three months (M=2.86, SD=0.39, p=.016). Subscale scores on health responsibility (initial-M=2.23, SD=0.54, p=<0.001; 3 months-M= 2.86, SD= 0.39, p<0.016), nutrition (initial- M=2.66, SD=0.67, p=0.001; 3 months- M=2.42, SD=0.64, p=0.001), and stress

management (initial-*M*=2.42, *SD*=0.52, *p*<0.001; 3 months-*M*=2.48, *SD*=0.51, *p*<0.001) also increased significantly. The exercise subscale (initial-*M*=3.24, *SD*=0.59, *p*<0.001; 3 months- *M*=3.15, *SD*=0.65, *p*<0.001) showed a significant decrease which was also verified independently by program records of exercise frequency. The model explained 31% of the variance in HPLP scores initially and 25% at the three month testing period (*p*<0.05). Employees who had been participating in the program for greater than six months had higher HPLP scores. The findings indicate that since HPLP scores do improve over a three month time period, worksite health promotion programs have a positive impact. However, the decrease in exercise participation indicates a continuing need to integrate exercise into the daily activity planning. Recommendations include further model development and testing (Pender, Walker, Sechrist, and Frank-Stromborg, 1990).

In the first reported study of the HPM in one industrial setting and across all classifications of work, Lusk, Kerr, and Ronis (1995) analyzed the health promotion behavior of 638 blue collar, skilled, trade, and white collar workers in an automotive plant. Significant differences between the three worker groups were found in total HPLP scores and the self-actualization, exercise, and interpersonal support subscales (*F*=3.53 to 14.00[2,629],

$p<0.03$ to 0.001). White collar workers had the highest scores and blue collar workers the lowest scores in HPLP and nutrition. Differences between blacks and whites were only significant in the area of exercise with blacks exercising more ($t=2.05$, $p=0.04$). Women had significantly higher HPLP, exercise subscale, and interpersonal subscales scores than men ($t=1.96$ to 2.69, $p<0.05$ to 0.01). Those with college degrees had higher scores on HPLP and exercise than those with a high school education or less. Findings suggested that blue-collar workers have the greatest need for health promotion interventions. Ethnicity did not play a factor in this study. Women exercised more than men, contrary to other studies, but there was an aerobic exercise class available, which appeals predominantly to women. Recommendations include using the HPLP as a pre-test assessment in order to design work-site health promotion programs which meet individual's needs.

Lusk, Ronis, Kerr, and Atwood (1994) tested the HPM as a causal model of workers' use of hearing protection. Self-efficacy ($r=0.59$) and barriers to use ($r=-0.61$) had significant effects on the use of protective gear. Significance levels were not reported for these relationships. The findings support continuing research in the use of the HPM with health-protective behaviors.

Socio-cultural Studies:

Health promotion has been studied in several different cultural groups to determine its relevance as a concept and in most studies to specifically test the HPM. The Health Promoting Lifestyle Profile Instrument (HPLP) has been translated into Spanish and tested for its cultural relevance (Walker, Kerr, Pender, and Sechrist, 1990). The researchers used a convenience sample of 485 Mexican-Americans to test the translated instrument. The six subscale dimensions identified in Anglo groups were also identified by factor analysis in this group. The least well defined factor was stress management. The authors also recommended using a combined quantitative-qualitative approach to obtain more culture specific health promotion behaviors and testing in other Hispanic cultures.

Kuster and Fong (1993) evaluated the Spanish language HPLP in a Central American convenience sample of 106 in the San Francisco Bay Area. Age (r=0.27, p=0.02) correlated significantly with the total HPLP. Education, income, and perceived health status also correlated significantly with the total HPLP but actual scores were not reported. Exercise behavior was significantly more common in Hispanic males than females (t=-2.42, p=0.02). The reliability and validity findings support the use of this tool in studying the concept of health promotion in the Hispanic population.

Smith (1994) used a phenomenological approach with ten Southern rural African American families with incomes less than $15,000 per year. The basic question was "What thoughts or feelings do you have to cause you to describe your family as healthy?". Staying healthy for these families meant that the family believed health was a process and that the family learned new ways of dealing with experiences and interacted with the environment in a dynamic way that could not be measured linearly. The findings indicate that research needs to focus on ways and means of keeping the family empowered rather than focusing on the health values, beliefs, and practices. The author also believes the findings support Newman's (1986) theory that "health encompasses both disease and non-disease" and that "health is revealed by patterns of person-environment interaction".

Ahijevych and Bernhard (1994) studied the health-promoting behavior of 187 urban African American women, ages 18-69, who were recruited from a variety of sites. The majority (60%) had annual incomes less than $15,000. Since this study was part of a larger one on nicotine dependence, all were cigarette smokers. The HPLP subscales of self-actualization ($\underline{M}$= 2.89, $\underline{SD}$=0.53) and interpersonal support ($\underline{M}$= 2.90, $\underline{SD}$=0.59) had the highest means and the exercise subscale ($\underline{M}$=1.95, $\underline{SD}$=0.65) had the lowest means.

In a comparison of total HPLP scores with other reported groups, African-American women ranked next to the lowest (M=2.55, SD=0.45, n=187) with Hispanic women having the lowest HPLP scores (M=2.46, SD=.45, n=485). The African-American women ranked lowest on three subscales- exercise (M=1.95), self-actualization (M=2.89), and nutrition (M=2.37). They ranked highest in comparison to the other groups on health responsibility (M=2.34); the standard deviations were not reported. The researchers indicated that a number of participants asked questions about the meaning of such items as "enthusiastic and optimistic about life" and "like myself". Also, the researchers felt an item such as "attend educational programs on improving the environment" had a middle class bias for people who had little "time, desire, or energy" to attend such programs. Findings indicate the need for nurses to develop creative strategies to enhance exercise, nutrition, interpersonal support, stress management, and self-actualization among African American women.

Causal Model Testing:

Johnson, Ratner, Bottorff, and Hayduk (1993) tested the HPM using the LISREL approach, a structural equation model. The data were obtained from the National Survey of Personal Health Practices and Consequences (1979-80) which was a telephone survey of a national probability sample of

3,025 adults ages 20-64. Questions were taken from the data base which seemed to best correspond to subscale items and demographics on Pender's (1987) HPM. The LISREL model was only able to obtain a borderline fit to the HPM (chi square=65.61, df=.50, p=0.0680). This fit was accomplished by health responsibility having a direct effect on exercise- a relationship not proposed by the HPM as currently envisioned. Johnson et al. concluded that the HPM inadequately explained health promotion behavior and recommended reevaluation of the model. The authors also suggested better conceptual clarification of " What constitutes participation in a health promotion program?".

Lusk, Ronis, Kerr, and Atwood (1994) additionally tested the HPM as a causal model of workers' use of hearing protection. They found that the data fit the theoretical model well, explaining 49% of the variance and the proposed exploratory models explained 51-53% of the variance ($p<0.001$). They noted that Johnson's et al.(1993) study was limited due to using data collected for other purposes. Findings indicate that direct paths from modifying variables may be needed. Recommendations include future studies testing biologic characteristics, interpersonal influences, and behavioral factors which were not tested in this study.

Health Promotion Research in Chronic Diseases:

There have been limited studies in persons with chronic disease in understanding their health promotion activities. Laffrey (1986) found that health conception (definition of health) of overweight individuals did not differ from those who were normal weight. Laffrey and Crabtree (1988) again found that health conception did not vary between persons who were healthy and those with chronic cardiovascular disease.

Frank-Stromborg (1988) used a health diary for persons with cancer to record daily activity and responses to yes/no and open-ended format questions about their health. Subjects were 21-65 years of age with a diagnosis of cancer. Of the 108 patients, 32% were exercising both before and after diagnosis and another 6% had begun after diagnosis. Another 28% indicated they had exercised before diagnosis but not afterwards, and 33% did not engage in exercise before or after diagnosis. Most of the respondents indicated that exercise made them feel very good. Findings indicate that cancer patients are engaging in health promoting behaviors and have a strong desire to increase their health potential.

A review of the literature did not reveal any studies investigating the Health Promotion Model in diabetes except Riffle, Yoho, and Sams' (1989) previously discussed study.

However, the researchers used a combination of people with diabetes and hypertension and did not separately evaluate the data based on disease diagnosis.

In summary, the Health Promotion Model (Pender, 1987) has demonstrated its usefulness in explaining health behavior in a wide range of healthy adults who may or may not have concurrent chronic disease. Limited studies in people with chronic diseases, especially diabetes, lends support to this study. Pender (1987) suggests that the Health Promotion Model can be used as a basis for intervention to motivate a specified health promotion behavior. Since exercise is a health promotion behavior identified in the HPM and exercise is part of the medical treatment of diabetes, the literature was reviewed to gain a better understanding of the exercise treatment regimen and to determine support for the variables of the model in relation to exercise behavior in people with diabetes.

Diabetes Mellitus and Exercise

Regular exercise has been advocated as a means of health promotion for the United States general population and for the person with diabetes mellitus (U.S. Department of Health and Human Services-Public Health Service, 1990a). However, specific guidelines have been established for the person with diabetes through practice and research to avoid

complications which physical activity may cause or exacerbate. Research has demonstrated differences between Type I (insulin-dependent) and Type II (non-insulin dependent) diabetes in exercise effects, precautions, and benefits. Therefore, patient guidelines and instructions for engaging in exercise differ for the two groups. The literature on diabetes and exercise was reviewed for both types.

Type I Diabetes:

Type I Diabetes Mellitus is also called Insulin-dependent diabetes mellitus (IDDM). It most often develops in the person under age 30 and the classical symptoms of diabetes rapidly develop: frequent urination, severe weight loss, severe thirst, hunger, and ketones in the urine with progression to unconsciousness. If not treated with insulin, the condition leads to death. The pathophysiology of diabetes is complex but the mechanism of hyperglycemia causes a severe osmotic loss of fluid leading to dehydration. The body shifts to using fats for energy causing ketosis and acidosis. Hypokalemia occurs in conjunction with the acidosis and other factors. Once the fluid and electrolyte shifts are corrected and metabolic homeostasis is reestablished, the person should be taught how to live with the disease (Travis, Brouhard, and Schreiner, 1987).

Exercise, dietary management, and daily insulin injections are the foundation of the treatment regimen and have been advocated as such since the discovery of insulin in 1921 (Krall & Beaser, 1989). A specific exercise program should be a part of the treatment regimen for all Type I diabetes (American Diabetes Association, 1995). The amount of exercise can vary for each person depending on age, general health, and level of physical fitness. Activity can range from mild exercise with heart rate less than 60% of maximum capacity for age to a moderate level of exercise (less than 70%) to a strenuous level of exercise (70-90%) for those who are physically fit and wish to obtain a training effect. While walking is generally given as an example of mild to moderate exercise, other examples of appropriate activities include bicycling, swimming, gardening, aerobics, dancing, bowling, and other sports activities (Maynard, 1991). Krall and Beaser (1989) note that people with poor fitness should start the exercise program more slowly and work up to recommended levels.

The American Diabetes Association (1991, 1995) issued a position statement on exercise for Type I diabetics, noting that although exercise programs for this type of diabetes have not been shown to necessarily improve blood glucose levels, diabetics should nevertheless be encouraged to exercise for improvement of cardiovascular fitness,

increased psychological well-being, and for recreation, including competitive sports.

Guidelines for exercise have been written for a number of special populations of people with diabetes. Armstrong (1991) gave recommendations for the general Type I diabetic population. One recommendation is to increase the intake of quickly absorbed carbohydrate about 15-30 minutes before exercise if blood sugar is in the normal range or reducing short-acting insulin dosage before exercise by 30%, or a combination of these methods. One danger of exercise is the threat of hypoglycemia (Maynard, 1991), so the person is also cautioned to carry a quick-acting source of glucose while exercising. The Joslin Diabetic Clinic gives specific amounts of food to eat, based on the Diabetic Exchange List, and based on the length and intensity of the exercise (Krall and Beaser, 1989).

If the exercise session is prolonged, then planned snacks may be needed. Koivisto (1991) studied nine Type I diabetics who participated in long-term exercise (7.5 hours, average) by competing in a 75 kilometer cross-country ski race. They were instructed to eat 40 grams of carbohydrate before the race and 40 grams every hour. They also decreased their insulin dosage by 38%. During the race, their blood sugar fell to normal levels and remained there throughout the competition; the controls also

maintained a normal blood sugar. The findings from this study indicate that people with IDDM can participate safely in long-term exercise. In a study comparing the acute and long-term effects of exercise on glucose control, Zinman, Zuniga-Guajardo, and Kelly (1984) found that blood sugar fell each time exercise occurred throughout a 12-week training session. However, there were no long-term changes in blood glucose levels or glycoslyated hemoglobin levels. Total caloric intake increased significantly on exercise days and the findings indicate that the increased calories obliterated the glycemic effect of the exercise. The researchers believe that more precise exercise timing and nutrient intake is required to achieve a beneficial effect of exercise in Type I diabetes.

Cunningham (1988) in commenting on Zinman's (1984) study noted that exercise training sessions for research purposes are usually short-term and that longer studies are probably necessary to measure the beneficial effects that occur with exercise. For example, it takes about nine months to obtain a reduction in high-density lipoprotein levels from exercise training but studies seldom last that long.

Although the normal glycemic response to exercise is a fall in the blood sugar level, this does not occur if exercise occurs when a person has a high blood sugar. If

the person has a blood sugar level greater than 240 mg., then instructions should be given not to exercise because the level will further increase. This phenomenon is due to low insulin levels, combined with a rise in counter-regulatory hormone levels during exercise, causing a continued production of glucose and free fatty acids (Maynard, 1991).

Graham and Lasko-McCarthey (1990) have given guidelines for persons with diabetic complications whether they have Type I or Type II diabetes. These recommendations are based on research for the following problems: peripheral vascular disease, retinopathy, nephropathy, sensorimotor neuropathy, and autonomic neuropathy. These guidelines should be incorporated into the exercise prescription or discussed when giving group presentations.

The elderly person, whether Type I or Type II, may need to modify the type of exercise, based on physical functioning. Some recommended exercises for the older person with diabetes include walking, bicycling, chair exercises, lap swimming, and water exercise (Graham, 1991).

Another type of exercise that is sometimes recommended is resistance training. Soukup, Maynard, and Kovaleski (1994) wrote guidelines for utilizing this type of exercise for both types of diabetes. They state that the purpose of

resistance training is to enhance athletic abilities in the younger person and to improve strength and maintain activities of daily living in the older person.

Research on exercise in people with Type I Diabetes demonstrates benefits. One such benefit from exercise may be decreased mortality. Moy et al. (1993) used data collected from the Pittsburgh Insulin-Dependent Diabetes Morbidity and Mortality study to ascertain the risks of mortality from physical activity in 548 subjects. Activity levels varied inversely with the number of complications reported. Sedentary males were three times more likely to die than active males. Females had a similar effect but the results were not statistically significant. The results indicate that exercise in male IDDM patients does not increase the risk of death and may, in fact, increase longevity.

Another benefit of exercise is a change in body composition. McCargar, Taunton, and Pare (1991) studied 12 healthy men with IDDM who participated in a 12 week walking /jogging exercise program. The men exercised 3-5 days per week for one hour at 60-80% maximal heart rate. There was a significant reduction in waist-to-hip ratio (M=0.86, SD= 0.04) and improvement in exercise capacity as measured by time on the treadmill (M=9.8, SD= 3.8) and heart rate changes (M=128, SD=22). There were no changes in fasting

blood sugar levels or lipid levels over time. These volunteers had a normal weight at the beginning of the study but did not previously participate in a regular exercise program. Although weight loss is often mentioned as a benefit of exercise, this has been difficult to document and usually occurs in conjunction with dietary restrictions (Franz, 1992)).

Exercise not only lowers the blood glucose level but it also increases sensitivity to insulin. For Type I diabetes, this will mean a lower insulin dosage . Regular exercise also increases high-density lipoprotein levels thereby lowering the risk for cardiovascular disease. Regular exercise also improves mild to moderate hypertension, decreases the resting pulse rate, and decreases cardiac workload (Horton, 1988). Exercise is recommended to enhance psychological well-being (American Diabetes Association, 1991, 1995).

Type II Diabetes:

Type II diabetes usually develops in overweight persons over age 40. Typically, the person does not require insulin except during times of stress such as infection or surgery, but many individuals will require daily insulin for replacement purposes or oral medications which stimulate the pancreatic release of insulin. In Type

II diabetes, although insulin is produced, insulin resistance is frequently present and the body is unable to fully use the insulin for metabolic needs. While blood sugar levels are high, ketones do not form. The diabetes is typically very slow in development, and the person may have diabetes for some months or years before it is diagnosed. Frequently, long-term diabetic complications have already developed by the time of diagnosis (Ratner, 1992).

Exercise is also considered part of the treatment regimen for Type II Diabetes (American Diabetes Association, 1991,1995). The other components of treatment may include insulin or oral hypoglycemic medications, if needed, and dietary modifications. The American Diabetes Association (ADA) recommends a pre-exercise evaluation to uncover undiagnosed hypertension, neuropathy, retinopathy, nephropathy, and silent ischemic heart disease. The exercise evaluation should include an exercise stress EKG in subjects over 35 years.

The ADA also recommends that the exercise prescription include aerobic exercise at 50-70% oxygen uptake, duration of 20-45 minutes for a minimum of three times per week, a warm-up and cool-down time, and that the exercise be appropriate to the person's general physical condition and lifestyle. Hornsby (1991) notes that ADA guidelines

cannot be used as rules because understanding of physiological responses to exercise is incomplete. For the individual client, a great deal of flexibility is needed. Hornsby recommends lower levels of intensity than the stated guidelines for several months, working up to the recommended levels. Also, a shorter duration of exercise is needed for obese, sedentary patients. This group should be encouraged to have multiple periods of exercise throughout the day rather than one long session.

Benefits of exercise in the NIDDM patient are being studied. A single exercise session can result in the decrease of blood sugar levels and this improvement can last for hours to days; this transient improvement is probably related to an increase in insulin sensitivity (Devlin, Hirschman, Horton, and Horton, 1987). Exercise seems especially effective in mild to moderate diabetes, glucose less than 200 mg/dl. (Schneider and Ruderman, 1990).

Another benefit may be the ability of exercise to decrease the risk for atherosclerosis in NIDDM. Ruderman and Schneider (1992) reviewed numerous epidemiological studies and concluded that exercise may have the ability to decrease hyperinsulinemia and insulin resistance which is frequently found in individuals with a Western life-style no matter the country of origin. Japanese persons living

in Hawaii were found to be more obese, more hypertensive, and had higher cholesterol levels and triglyceride levels than their countrymen living in Japan.

Weight loss has been associated with exercise but long-term results have been disappointing. The difficulties are probably related to patient compliance. Combining exercise and diet restrictions has been found to be more helpful (Schneider and Ruderman, 1990).

Another potential benefit of exercise is prevention of diabetes. Eriksson and Lindgarde (1991) studied 41 Type II and 181 impaired glucose tolerance males in a six year Swedish program. The participants had 12 months of supervised physical activity with a six month follow-up for the next 5 years. Dietary instruction was also given. Dropout rates were two from the Type II group (one died) and 20 from the impaired glucose tolerance group. At six years, 82% and 71% respectively had a mean weight reduction of 5-6 kg. At six years, 54% of Type II diabetics no longer had elevated blood sugars. In 76% of cases, the glucose tolerances had improved. Other metabolic indicators also showed significant improvement from baseline: body mass index (M=-3.7, SD=4.8, p<0.001); diastolic blood pressure (M=-6.3, SD=11.3, p<0.01); and cholesterol levels (M=-3.8, SD=11.4, p<0.05). The authors concluded that metabolic deterioration was decreased in

Type II diabetes and progression to disease status was prevented in the impaired glucose tolerance group. The most important result was that such a large group successfully participated in a six year study with relatively few dropouts.

The psychological benefits of exercise are numerous. Quality of life is enhanced and well-being is promoted. If exercise is not made a part of the lifestyle, then physical functioning begins to deteriorate. A slow decline in physical functioning occurs between onset of the disease and diagnosis. Generally, after about 15 years, complications such as neuropathy, nephropathy, impaired vision begin further compromising physical functioning. It has been found that diabetics have twice as many disability days and restriction of activities of daily living than the general population (Revicki, 1990).

In a study of 577 ambulatory veterans, physical functioning and health status were explored. The sample consisted of 98% men, 79% white, ages 28-90 with 90% having NIDDM, 8% IDDM, and 2% secondary. The results demonstrated that 87% were in poor health in terms of physical functioning using the MOS SF-20 physical functioning subscale. There were 82% limited in vigorous activities and 44% in moderate activities. Health status was rated as fair or poor by 50% and only 14% rated it as excellent.

Subjects with NIDDM were also more impaired on all six measures of physical functioning than the IDDM subjects. (Ahroni, Boyko, Davignon, and Pecoraro, 1994).

Exercise Education and Adherence

Exercise is a habit that is frequently difficult to incorporate into the daily lifestyle. Anderson, Fitzgerald, and Oh (1993) surveyed 1055 patients with both types of diabetes. Of the self-reported high adherence group, 57% adhered to their exercise regimen. In the low adherence group, 43% reported performing their exercise program. The authors concluded that the low adherence rates for both groups demonstrate the difficulty in making exercise part of the daily routine.

Kravitz et al. (1993) in another study on adherence found that 91% of diabetics took prescribed medications, 69% followed dietary recommendations, and 19% engaged in regular exercise. Adherence to recommendations was significantly correlated with reduced glucose levels in persons with diabetes receiving insulin (r=-0.15, p<0.05, n=210) and not receiving insulin (r=-0.15, p<0.05, n=258).

Ford and Herman (1995), in an epidemiology study, examined the 1990 Health Promotion and Disease Prevention Supplement of the National Health Interview Survey. The data showed that adults with diabetes (n=1,632) were less

likely to exercise than adults without diabetes (n=38,933). However, after adjusting for physical limitations and age, both groups were equally likely to exercise. Walking was the number one form of exercise in both groups. However, neither group was meeting the national physical activity goals. The findings indicate that diabetes was not an important determinant of participation in leisure-time activities. People with diabetes are more likely to walk and less likely to engage in other activities. The other top choices of activities were gardening, calisthenics, bicycling, and swimming. The researchers suggested that health care providers need to encourage clients to exercise and help them develop appropriate exercise programs based on individual capabilities, physical limitations, and personal interests.

In order to ascertain the effectiveness of educational programs, Anderson, Nowacek, and Richards (1988) asked 54 patients with diabetes to participate in a 10-12 day inpatient education program. The participants were asked to fill out a questionnaire, The Semantic Differential Scale, before and after the program. A significant change occurred in patients' feeling after the program which indicated they could be successful at exercising; mean difference between admission and discharge was 0.23 ($p<0.05$). The findings illustrate that educational

programs can make an important contribution to helping clients adapt psychologically and socially to diabetes.

A meta-analysis of educational interventions showed that of 5 educational programs on exercise, effect size (0.31) was moderate (Padgett, Mumford, and Hynes, 1988). This finding is important in justifying the existence of diabetic educational programs. Ruby, Blainey, Haas, and Patrick (1993) surveyed a random sample of 400 registered nurses who were also certified diabetic educators. The purpose of the study was to learn specifically what these nurses were teaching elderly clients about exercise. A final sample of 197 questionnaires were returned (54%). It was found that knowledge level of the nurses was very high, as would be expected, but 46% indicated that a lack of resources prevented implementation of a comprehensive exercise teaching program specifically for elderly clients with NIDDM. Another 30% indicated that another barrier was that this activity required the expertise of an exercise physiologist. Surprisingly, 29% also identified that the elderly have too many complications to exercise safely and are non-compliant. Recommendations for future research were based on affirming that nursing practice in this area is scientifically grounded; therefore, more assessment of physiological and psychological responses to exercise needs to be done.

Health Promotion Model Variables and Diabetes Mellitus

While Pender's (1987) Health Promotion Model (HPM) has not been studied as a whole among people with diabetes, some of the variables have been studied. The literature was reviewed to gain support for the use of the cognitive-perceptual variables of the HPM in teaching people with diabetes about exercise. These specific factors were chosen since Pender (1987) proposes these factors are the directly modifying variables in making the decision to engage in a specific health promotion behavior.

Importance of Health:

Pender (1987) considered the client's perception of the importance of health to be an important factor in determining health promotion behavior. However, studies (Muhlenkamp, Brown, and Sands, 1985; Pender, Walker, Sechrist, and Frank-Stromborg, 1990; Whetstone and Reid, 1991) have shown that since most people seem to place a high value on health, it is not a significant factor. Schlenk and Hart (1984) studied the relationship of importance of health, health locus of control, and compliance in persons with diabetes. This non-experimental study used a convenience sample (n=30) from a diabetes outpatient clinic with ages ranging from 17-44, (M=29). All subjects had taken insulin for at least four months.

Health value was ranked by 80% of the sample as high (1-4 on a scale of 1-10). A point biserial correlation coefficient calculation between health value and compliance did not show a significant relationship. The findings indicate that subjects were most compliant in the area of hypoglycemia management (90%) and least compliant regarding exercise (75%) and foot care (74%). The authors felt that the high health value scores interfered with the ability of the variable to add significantly to overall compliance scores. Future studies with larger and more varied groups were recommended.

Perceived Control of Health:

In a non-experimental designed study, Alogna (1980) studied 50 overweight NIDDM adults in a diabetes clinic Patients were classified as compliant or noncompliant based on weight loss and glucose levels. The health locus of control scale was administered but no significant differences were found between the two groups although there was a trend toward internality. The compliant group rated their severity of disease as significantly greater than the noncompliant group even though the compliant group did not have more diabetic complications. The author noted that despite the lack of significance of the locus of control, other researchers have recommended matching individuals to programs according to their locus of control

possibly leading to improved outcomes. Another interesting recommendation was that diabetic educational professionals might need to increase their focus on making clients aware of the seriousness of the disease.

In Schlenk and Hart's (1984) study on health locus of control in 30 IDDM patients at a diabetic clinic, a significant relationship was found between powerful other health locus of control and total compliance scores ($r=0.54$, $p,0.01$), essential diabetic behaviors ($\underline{r}=0.57$, $\underline{p}<0.01$), diet ($\underline{r}=0.65$, $\underline{p}<.01$), foot care ($\underline{r}=0.40$, $\underline{p}< 0.01$), and insulin management($\underline{r}=0.30$, $\underline{p}<0.01$). A significant relationship was also found between internal health locus of control and total compliance ($\underline{r}=0.45$, $\underline{p}<0.01$), essential behaviors ($\underline{r}=0.42$, $\underline{p}<0.42$), foot care ($\underline{r}=0.40$, $\underline{p}<0.01$), and hypoglycemia management ($\underline{r}=0.53$, $\underline{p}<0.01$). The high compliance rate of these subjects limits the study. However, the findings suggest that a belief in powerful others makes the patient more likely to take prescription medications, listen to physician recommendations, and accept suggestions from other health care providers, friends, and family. Being internally controlled and having a belief in powerful others is not incompatible since patients can be encouraged to be responsible for their health while being able to recognize when to seek assistance.

Perceived Self-Efficacy:

McCaul, Glasgow, and Schafer (1987) studied the relationship of self-efficacy to adherence to diabetes behaviors in a sample of 84 IDDM patients (23 were adolescents). Self-efficacy was significantly related to all four diabetes behavioral areas: taking insulin (r=0.31, p<0.01), glucose testing (r=0.55, p<0.01), diet management (r=0.34, p<0.01), and exercise adherence (r=0.35, p<0.01).

Kavanagh, Gooley, and Wilson (1993) investigated the concept of self-efficacy in predicting adherence to the diabetes treatment program over time. The sample consisted of 63 adult IDDM and NIDDM outpatients who were seen initially and then two months later in Sidney, Australia. Self-efficacy was measured by an instrument developed for the study which examined three adherence areas: glucose testing, dieting, and exercise. The results showed that self-efficacy was a powerful predictor of adherence to diabetic treatment. Post-test levels of adherence were significantly correlated with glycosylated hemoglobin (r=0.44, p<0.001). Self-efficacy was the most powerful predictor of exercise behavior (r=0.54, p<0.001). The results show that adherence can be related to diabetic control which can prevent future complications. The authors recommend routinely assessing self-efficacy in diabetic management programs. Intervention studies are

needed to verify the benefits of using self-efficacy in diabetic management.

Skelly, Marshall, Haughey, Davis, and Dunford (1995), in a non-experimental design, studied the relationship of self-efficacy to self-care practices in inner city, African-American women with NIDDM. Data were collected from a convenience sample of 118 women at an initial visit to a diabetic outpatient clinic and again at four months. Self-efficacy was measured using the Self Efficacy Questionnaire. Self-efficacy did not significantly affect home glucose testing or taking medication initially (time 1) or four months later (time 2). Self-efficacy did affect diet at time 1 but not at time 2. Self-efficacy significantly predicted exercise behavior at both times ($r=0.731$, $p<0.05$; $r=0.593$, $p<0.05$). The findings of this study suggest that while self-efficacy can predict adherence to self-care diabetic behaviors, it cannot be relied upon to predict behavior at a later time. It was recommended that diabetic educators use methodologies to enhance clients' self-efficacy and their confidence in outcomes. The authors recommended further research in perception of severity of diabetes and barriers to adherence.

Definition of Health:

No studies were found testing this concept in people with diabetes but studies have been done in other chronic diseases. Laffrey and Crabtree (1988) used the Laffrey Health Conception Scale (LHCS) to study health conception (definition of health) and health behavior. This experimental study with 29 adults with cardiovascular disease and 29 healthy adults serving as controls showed that adults with cardiovascular disease perceived themselves as less healthy when defining health on the clinical dimension of the scale. They were equally healthy on the functional, adaptive, and eudaimonistic dimensions using matched paired t-tests. All four dimensions of health concepts were significantly correlated with age (correlations ranged from $r=0.33$, $p<0.01$ to $r=0.55$, $p<0.001$). Laffrey and Crabtree suggest that as age increases, the individual comes to embrace a broader view of health. How the individual defines health remains the same despite personal health status becoming less healthy. The researchers suggest further research in this area with longitudinal studies to examine the relationship between the two variables over time. Further research is also suggested with different samples.

Whetstone and Reid (1991) studied health definition using the LHCS in a convenience sample of 30 adults, ages

50-70, living in a rural township. All participants had hypertension. No relationship was found between health conception (definition of health) and the ability to perform self-care. This study was limited by the small sample size and lack of reliability studies for the self-care instrument in older adults. The study also incorporated a qualitative component using open-ended questions and this technique elicited useful information in what older adults deem important as far as health is concerned e.g. taking no pills.

Importance of health was measured using the LHCS in the previously cited study on the Health Promotion Model in clerical and managerial workers (Pender, Walker, Sechrist, and Frank-Stromborg, 1990). The findings indicate that healthy lifestyles were significantly more likely to be associated with the idea that health is wellness (a combination of role performance, adaptive, and eudaimonistic subscales) than with defining health in a clinical format (canonical correlation=0.508; alpha level not reported).

Perceived Health Status:

Linn, Linn, Skyler, and Harris (1980), in a quasi-experimental study of 150 diabetic and non-diabetic male outpatients matched for age and race, studied both patient and physician perceptions of health status. Data were

gathered at an initial meeting and then again two months later. People with diabetes who perceived their health status as being poor had significantly more clinic visits (M=12.42, p<0.01), greater symptomatology (M=29.79, p<0.05, multivariate F=2.28), and were less satisfied with the doctor-patient relationship (M=37.67, p<0.05, Multivariate F=2.95). Physicians also rating the group did not confirm that this group actually had poorer health and there was no difference in the number of diagnoses between the diabetic and non-diabetic groups. Findings indicate that a different treatment approach is needed in people with diabetes who perceive their health status as poor.

Riffle, Yoho, and Sams (1989) used Pender's (1987) HPM to study a convenience sample of 113 Appalachian elderly, ages 55 and older, who had diabetes and/or hypertension. Health status was measured by three health questions derived from the Older American Resources and Services Community questionnaire. Analysis showed a significant positive correlation between Health Promoting Lifestyle Profile (HPLP) and self-reported health status (r=0.2205, p=0.0103), HPLP and education (r=0.2166, p=0.0288), and HPLP and exercise (r=0.2808, p=0.003).

Nerenz, Repasky, Whitehouse, and Kahkonen (1992) in a longitudinal study of 235 patients with diabetes examined the perceived health status at baseline and six months

later. They used Ware and Sherbourne's (1992) Short-Form 36 instrument (SF-36) which has been previously discussed. Type I diabetics who managed multiple injections and had tight control of their diabetes had higher ratings of health status. In fact, those who managed three or more injections daily versus two or less had the highest ratings of health. Those patients also were younger and had more education and less complications than the two or less injection group. This finding was unexpected and the authors recommended further study with a larger, more representative sample. Over time, the physical functioning subscale of the SF-36 was relatively stable but the energy/fatigue and pain subscales were more likely to change. This change could have been due to factors other than diabetes and its treatment. The researchers recommend using the SF-36 as an assessment form in people with diabetes to establish a common vocabulary and enhance communication.

Perceived Benefits and Barriers of Health-Promoting Behavior:

Benefits and barriers represent two different components of the Health Promotion Model. However, since most studies investigate both of these behaviors, the concepts have been combined for purposes of reporting research results. A difficulty in reviewing the literature

on barriers is the wide range of definitions. Melnyk (1988) noted that there are a number of conceptualizations in the literature and that a given study needs to operationalize barriers according to the theoretical framework being utilized.

Glasgow, McCaul, and Schafer (1986) studied 65 IDDM adults and adolescents in a diabetic outpatient clinic. They studied the relationship of barriers to adherence to insulin injection, glucose testing, dietary adherence, and exercise regimen. Females reported the greater total frequency of barriers. There were no significant correlations between age or years diagnosed with diabetes to barriers. The highest frequency barriers were reported to incorporating diet and exercise into their lifestyle and the fewest barriers to integrating insulin and glucose testing into the daily pattern. The higher the barrier scores the lower the levels of adherence.

Pieper, Kushion, and Gaida (1990) examined the relationship of benefits and barriers to diet, exercise, and medication to a couple's marital adjustment. The study participants were 20 married couples who ranged in age from 40-77. Eight persons took insulin and 12 used oral hypoglycemic agents and/or diet. A diabetic diet was used by 85% and an exercise program was adhered to by 45% of the diabetics. The findings show that the greater the

perceived barriers to diet, the higher the marital satisfaction scores for the diabetic spouse but the non-diabetic spouse had lower marital satisfaction scores. Also, the greater the perceived barriers to taking medication, the greater the scores were on affection and sexual expression and the ability of the couple to work together. The nondiabetic spouse perceived fewer barriers to medication taking. This seeming discrepancy was explained by the authors as meaning that despite the perception of high barriers perceived by the diabetic spouse, the nondiabetic spouse felt a need to work harder and support the spouse in the difficulties encountered. Exercise barriers did not show a relationship to marital satisfaction scores. The findings indicate that diabetic behaviors have the potential to divide a couple and cause discord within the family. The authors point out that this is a beginning exploration and further research with larger samples and longitudinal designs are needed.

Summary

The literature has been reviewed on health promotion, exercise behavior, and diabetes. The Health Promotion Model proposes that exercise is a health promotion behavior. Since exercise is an integral part of the treatment regimen for people with diabetes, the use of the

Health Promotion Model as a educational intervention in teaching diabetics about exercise needs further exploration and is an appropriate framework for this study.

Chapter III

PROCEDURE FOR COLLECTION AND TREATMENT OF DATA

This chapter describes the design of the study and the method of collecting the data, a description of the setting, the sample and population, protection of human subjects, and the treatment of the data. The instruments are described in detail and the pilot study is discussed.

The design was a quasi-experimental, pre-test post-test two group design. The independent variable was the exercise teaching intervention, and the dependent variables were health promotion and exercise behaviors. The experimental group received the exercise education intervention presented by the researcher. The control group participated in the routine sessions of the diabetic support group. No deliberate manipulation or control over the setting was exerted (Polit and Hungler, 1991; Woods and Catanzaro, 1988). Extraneous variables were controlled by collection of demographic data and analyzing these variables as independent variables (Woods and Catanzaro, 1988). The subjects were given instruments to complete for each of the variables under study including a demographic data sheet to be completed at the beginning of the first

meeting. The teaching intervention on exercise was then presented to the experimental group. The control group received guidelines on exercise for diabetics as is routinely taught. Each participant, whether in the control or experimental group, received written guidelines for exercise behavior based on whether the person is an insulin-dependent diabetic or non-insulin dependent diabetic. Also, each participant in the experimental group received a computer-generated calendar on which to record daily exercise behavior. The subjects in the experimental group were asked to return the following month to report on their results. They again completed the questionnaires given at the beginning of the first meeting with the exception of the demographic data sheet. The subjects in the control group who wished to hear more about exercise were invited to come back a second time and the experimental presentation was given to this group at this time. One hospital group chose to come back a second time but the other group chose not to.

The subjects were asked to put their name and a seven-digit code corresponding to their telephone number on the demographic form so that forms could be matched afterwards for data analysis purposes with an easily remembered number. Also, the researcher explained that those who were unable to come to the second meeting could fill out a

mailed copy of the questionnaires or answer the questions over the telephone. Of the participants, 90 completed the post-test by telephone and five by returning the forms by mail.

Setting

The study was conducted with diabetic persons attending community-based diabetic support groups in a large city in the Southwestern United States. Diabetic support groups are usually found in conjunction with hospitals and are led by diabetic nurse educators. Approximately ten adult support groups are currently found within the city where the study was conducted (personal communication, American Diabetes Association). The groups are open to both diabetic persons and their families for assistance in dealing with the effects of diabetes. Groups vary in size, some only having 10-15 persons in attendance, while others are quite large, with about 80 in attendance. Group sessions typically have a speaker at each meeting and offer a time to socialize. Meetings are generally held in the evenings in a meeting room of the sponsoring facility. This study utilized both afternoon and evening groups. The participants have received information regarding diabetes from physicians, nurses (including diabetic nurse educators), dieticians, and various other sources.

Population and Sample

The accessible population were those adult diabetics who attend diabetic support groups in a large metropolitan city. Inclusion criteria for the sample will be attendance at a diabetic support group, age 18 years and older, diagnosed with diabetes mellitus for at least six months, and able to read and understand English.

The sample consisted of 95 subjects chosen by convenience sampling procedure from four diabetic support groups meeting in various parts of the city in order to gain increased heterogeneity of the sample (Woods and Catanzaro, 1987). The number of desired subjects (n=100) was determined by power analysis using Cohen's (1988) criteria and power tables for correlation coefficients and ANOVA. An alpha level of .05 and a conventional power of 0.80 was chosen (Polit and Hungler, 1991). A small effect size was assumed since previous studies have not been shown to cause a significant change in exercise behavior in chronically ill diabetic patients. Two support groups (n=50) were placed in the experimental group and two support groups were placed in the control group (n=50). Subjects meeting the inclusion criteria were invited to participate in the study by filling out the questionnaires. During the pilot study, small print size was problematic for many. Therefore, the type print on the questionnaires

was somewhat enlarged to facilitate reading for those with poor vision. Since many diabetics have vision difficulties due to the effects of the disease, enlarging the print seemed reasonable. Assistance was provided in reading an item when asked. Some participants had questions regarding some items on the questionnaires and these questions were answered. One person attending the session could not participate since he could only read Spanish.

Protection of Human Subjects

The guidelines of the Human Subjects Review Committee at Texas Woman's University were followed to assure protection of the study participants. Written approval was obtained from Texas Woman's Human Subjects Review Committee (Appendix A) and the agencies being used for the study (Appendix B). Written permission was also obtained from Texas Woman's University Graduate Department (Appendix C). The following elements were considered as part of the informed consent process.

1. Each subject was given a verbal and written explanation of the study. Each participant signed and dated a consent form (Appendix D) based on whether the subject was in the experimental or control group. An opportunity to ask questions was given both at the time of the study and later by providing the researcher's office telephone number.

2. The risks of the study were presented on the consent form. These were expected to be minimal but might include embarrassment due to not knowing the answer to a particular question. The questionnaires may cause mental distress if the person feels some of the described health behaviors are not being followed. Participants were told to check with their physician before beginning an exercise program since diabetics must plan exercise in relation to insulin intake and mealtime in order to prevent hypoglycemia (Smith and Casso, 1988).

3. The subjects were assured that confidentiality of the records will be maintained. The participants were asked to place a seven digit code corresponding to their telephone number for matching purposes with the subsequent post-test. However, this sheet was destroyed when the match was made. The records are maintained in a locked cabinet accessible only to the researcher and were destroyed once the data had been analyzed.

4. The subjects were told that withdrawal from the study can be done at any time, including during test administration, without repercussion. Withdrawal does not affect the subjects' status with the diabetic education support group.

Instruments

Three instruments were administered to each participant in the study: the Demographic Data Sheet (Appendix E), the Health Promoting Lifestyle Profile (Appendix F), and the MOS 10-Item Physical Functioning Form (Appendix G). The researcher devised the Demographic Data Sheet. The Health Promoting Lifestyle Profile was developed by Walker, Sechrist, and Pender (1987). The MOS 10-Item Physical Functioning Form was developed by Ware and Sherbourne (1992).

Demographic Data Sheet

The following demographic data were collected to provide a basis for describing the sample: age; gender, ethnicity; educational level; family income; type of diabetes; length of time diagnosed with diabetes; and length of insulin-dependency. The last two questions were not used for data collecting but enabled the researcher to determine the type of diabetes when the person does not know his type. It was found during the pilot study that many diabetics do not know the type of diabetes with which they have been diagnosed. This information was needed to put the subject in the correct group for statistical analysis purposes.

Health Promoting Lifestyle Profile (HPLP)

The HPLP was used to measure health-promoting behaviors which are an expression of the individual's level of well-being, self-actualization and personal fulfillment. The HPLP was developed from a 100 item clinical nursing tool, the Lifestyle and Health Habits Assessment. The HPLP has a 4-point response format to obtain an ordinal measure of frequency (never, sometimes, often, and routinely) of engaging in certain health-promoting behaviors. The responses of the items are summed to obtain a total score.

Pilot testing on 173 nursing students yielded an alpha coefficient of 0.92 indicating high internal consistency. Test-retest reliability was 0.854, indicating stability reliability over time (Walker, Sechrist, and Pender, 1987). After pilot testing, content validity was evaluated by four nursing faculty members who examined each item for similarity with the concept of health promotion. The instrument was then tested on a middle class sample, 516 men and 436 women (N=952). An internal reliability of 0.94 as measured by alpha coefficient was obtained on item analysis. Thirty-three items were eliminated which depressed reliability as measured by alpha coefficient. Other items were eliminated based on comments from participants that the items had been interpreted in various ways. Many items that were eliminated were practices to be

avoided, e.g. smoking. Factor analysis yielded 16 factors which were combined into six conceptually valid subscales which explain 47.1% of the variance. The six subscales are: self-actualization, health responsibility, exercise, nutrition, interpersonal support, and stress management. The final 48 item instrument has a total alpha reliability coefficient of 0.922. The six subscales have alpha reliability coefficients ranging from 0.702 to 0.904. Subscale scores are obtained by adding the scores for each item on the subscale and obtaining a mean score for that particular subscale. Written permission to use the instrument was obtained from Walker, Sechrist, and Pender (Appendix H).

MOS 10-item Physical Functioning Form

Exercise behavior was measured by this instrument. Ware and Sherbourne (1992) developed the Mos 36-Item Health Survey tool to measure the following subconcepts: limitations in physical, social, and role activities due to mental or physical health problems; bodily pain limiting physical activity; energy and fatigue levels; and general health perceptions. Only the physical functioning subscale was used in this study. The subject is asked to rank each statement on the physical functioning form by rating how much the person's health limits certain activities on a three point response scale. Scores are obtained by summing

the ten items and obtaining a mean score. The items were developed from instruments in use for 20-40 years and have been extensively studied in the Health Insurance Experiment since 1976 on 4717 subjects, age 14 and older at six different sites across the nation. The reliability estimate (Cronbach's alpha) for the summated ratings score was 0.89 (Davies and Ware, 1981). In well adults (N=638), reliability estimates for the six subconcepts ranged from 0.77 to 0.98. The Physical Functioning subscale has a reliability of 0.99. Written permission to use the Physical Functioning subscale was obtained from Ware and Sherbourne (Appendix I).

Chronically ill adults with Type II diabetes, hypertension, congestive heart failure, and recent myocardial infarction (N=969) were also studied to determine validity of the subconcepts. The authors used the method of known-groups validity to test each measure and evaluate relative precision in discriminating between the severity of medical and psychiatric conditions with the concepts being studied. The F-statistic was used to study the degree to which a concept separates the groups being compared and within-group variance. The three measures for physical functioning discriminated between patients with serious and minor medical problems (N=871, F-22.13). Sixty-one percent of the patients with serious medical

problems had Type II diabetes and all had two of the above listed conditions (McHorney, Ware, Rogers, Raczek, and Lu, 1992).

A one-item question was added to the post-test Physical Functioning Form, asking the subject if the amount of exercise changed during the past month. This question allowed the participant to directly state if exercise behavior changed during the study period. A one-item question about physical activity participation was used in a worksite health promotion program (n=1004). Validity of the instrument was evidenced by significant associations between body mass index and women ($p<0.0001$), body mass index and men ($p=0.001$), HDL cholesterol and women ($p<0.0001$), oxygen capacity and women ($p=0.0007$), and, finally, oxygen capacity and men ($p=0.002$). One-item questions are being used increasingly in studies with many questionnaires to save participant time (Schechtman, Barzilai, Rost, and Fisher, 1991).

Procedure

After obtaining written permission from the Human Subjects Review Committee at Texas Woman's University (Appendix A), the agencies (Appendix B) where the study was conducted, and the Graduate Department of Texas Woman's University (Appendix C), subjects who met the inclusion criteria were selected by convenience sampling. Once

informed consent was obtained, the three instruments were given to the participants. Each person received a folder containing the instruments, two copies of the consent form, and a pencil. The instruments took about 20 minutes to answer. Questions were answered as needed by the researcher who collected the data. Subjects were all seated at tables to answer the questionnaires and hear the presentation.

At the initial meeting for the experimental group, an education session on exercise (Appendix J), provided by the researcher, followed data collection. The focus of the exercise lecture was on exercise as a health promotion activity to improve general health and to make the person feel good. The exercise session utilized an interactive approach but no actual exercise was done. Persons with diabetes must plan exercise in relationship to insulin intake and mealtime in order to prevent hypoglycemia. Therefore, unplanned exercise could be potentially dangerous (Smith & Casso, 1988). Pender's (1987) Health Promotion Model was used as the framework of the teaching session. Subjects were also given written guidelines in regard to exercise based on whether the person was an insulin-dependent or non-insulin dependent diabetic. These guidelines are published by the National Exercise For Life Institute (Appendix K) and are provided at a nominal cost

to health professionals and the general public for education purposes. The subjects were also given a computer-generated calendar on which to record their daily exercise (Appendix L). The calendar was used as a visual cue in accordance to Pender's (1987) Health Promotion Model to remind participants to exercise. Subjects were instructed at the end of the meeting to return the following month to provide followup information.

At the second meeting for the experimental group, the session began with the completion of the HPLP and the Physical Functioning Form for the post-test. These forms were matched with the initial forms. If a person did not come to the second meeting, the researcher used the telephone number on the initial form, the name on the consent form, and called the person. The subject was asked to answer the questions over the telephone. All participants agreed to answer the questions and no forms were mailed. After completion of the post-test, the remainder of the session was devoted to review, open discussion by the participants about their experiences with exercise, and the answering of any questions that they had.

At the initial meeting for the control group, the study was explained to the participants. The participants then filled out the same questionnaires that the

experimental group had completed. At one hospital support group, the investigator then presented a program about guidelines for exercise for people with diabetes but did not use the Health Promotion Model Framework as a guide for the presentation. At the other hospital control group, the exercise guidelines had been previously discussed by the diabetic educator. Therefore, the questionnaires were completed but no formal presentation was made. Two persons completed the initial forms at home and mailed them to the researcher. At the second meeting, the questionnaires were again completed at the beginning of the meeting. The first control group received the experimental teaching after completing the forms but the other group chose not to come a second time and all persons in this group completed the second month forms by telephone.

Pilot Study

A pilot study using the HPLP and the Demographic Data sheet was completed in Spring 1991 with 29 subjects. The teaching intervention was not implemented. Several changes were made in the design based on the pilot study. First of all, a number of subjects had difficulty in actually seeing the questions well enough to read them due to vision difficulties. Since many diabetics have diminished visual acuity, the print on the questionnaires and handouts was slightly enlarged. Also, the pilot study was designed to

take a random sample. However, in the group situation, randomization was found to be difficult to manage and, in fact, a random sample could not be obtained. Therefore, convenience sampling was used in this study. In the pilot study, several other instruments were used to measure other variables of Pender's (1987) framework. It took an average of 40 minutes to complete the instruments. It was decided later to test an intervention and to delete testing three cognitive-perceptual factors.

Twenty-nine subjects participated in the pilot study at a Diabetes Support Group based at a hospital. The ages of the subjects varied from 31-81 (mean=61.7, S.D.=12.3) with a median age of 63. There were 17 (59%) female subjects. The majority ethnic composition was White (n=13, 45%). The other ethnic groups represented were Black (n=9, 31%) and Hispanic (n=7, 24%). The majority (n=19, 65%) had at least some college education. The mean income level was $10-20,000, probably due to the majority being of retirement age. The majority (n=23, 79%) took insulin to control their diabetes. Analysis of data did not yield any significant findings since the number of variables under study was large and the number of subjects minimal. However, the study did fulfill the purposes of a pilot which were to determine potential problems in data collection and data analysis. No problems were identified

during the analysis phase of the study. Problems with data collection have been discussed, and solutions to these problems were incorporated into the study.

Treatment of the Data

The data obtained from the study were examined for any statistically significant relationships between health promotion behavior, exercise behavior subscale and self-reported exercise behaviors. The data were also examined to determine if an exercise-focused class, based on the Pender (1987) Health Promotion model, would make a difference in exercise behavior over time. Demographic data were used to describe the sample.

Research Question 1

Is there a relationship between health promoting lifestyle behavior scores, exercise subscales scores, and self-reported exercise behaviors in adult diabetics?

Research Question 1 was statistically examined using the Pearson Product Moment Coefficient. Even though the HPLP instrument produces ordinal data, it was examined with interval level statistics, using the pre and post-test scores. Studies that have been published using this instrument have employed the data at the interval level (Pender, Walker, Sechrist, & Frank-Stromborg, 1990; Riffle, Yoho, & Sams, 1989; Weitzel, 1989).

Research Question 2

Does an exercise-focused health promotion education class make a difference in exercise behavior over time in adult diabetics?

Research question 2 was statistically examined using the ANOVA procedure: pre-test, post-test, 3 X 2 design. The diabetics were divided into three groups for analysis: insulin dependent, non-insulin dependent and taking insulin, and non-insulin dependent and not taking insulin. This division of diabetics into three groups has been recommended by Teza, Davis, and Hiss (1988) due to differences in characteristics of the three groups. Each group had a pre-test and a post-test score for each study variable.

Summary

The study had a quasi-experimental, two-group pre-test post-test design. The study was designed to study the effect of an experimental exercise-focused nursing intervention on health promotion behaviors of adult diabetics. The study also examined various demographic variables which may affect these behaviors. The conceptual framework for the study is the Health Promotion Model proposed by Pender (1987). Convenience sampling was used to choose 50 experimental and 45 control group adult diabetics who were attending diabetic support groups. They

were given three instruments which took approximately 20 minutes to complete. The experimental teaching intervention was then presented; the control group received the usual exercise guidelines given to people with diabetes. The participants were asked to return in one month to complete the post-test and discuss their experiences. Results were analyzed using statistical methods appropriate to the level of the data. Results of the study may be applied to future educational programs for diabetics to guide teaching methods and to improve their health promotion practices.

CHAPTER IV

ANALYSIS OF DATA

This chapter presents the results of a health promotion exercise intervention for adults with diabetes mellitus. Demographic variables and scores are presented in descriptive terms. The findings, related to the two research questions, are described. Analysis of data was accomplished using the Statistical Package for the Social Sciences (SPSS 4.1). Missing data were coded as "9" or "99" and not used in statistical analysis. Therefore, results do not always add up to the aggregrate number for the particular group under consideration.

Description of the Sample:

This study was a quasi-experimental, pre-test post-test design. The independent variable was the exercise teaching intervention, and the dependent variables were health promotion and exercise behaviors. The sample was comprised of 95 men and women, ages 18 or older, who attended diabetes educational support group classes in a large Southwestern city. Four hospitals with diabetes educational support group classes were utilized for the study. Two were located in the inner city and two were suburban. One suburban and one inner city hospital

comprised the experimental group and the other suburban and inner city hospital comprised the control group. The researcher approached each group at a regularly scheduled meeting and invited participation in the study. Each person who had diabetes and wanted to participate in the study was given a folder containing the consent form, Demographic Data Form, Health Promoting Lifestyle Profile (HPLP), Physical Functioning Form, and Exercise Guide published specifically for persons with diabetes. After explaining the study, the researcher asked the participants to sign the consent form and complete the questionnaires. When everyone had completed the forms, the researcher presented the Health Promotion Exercise Intervention lecture and exercise guidelines specifically for diabetes to the experimental group hospital subjects. Participants at the two hospitals selected as the control group received only the traditional exercise guidelines for persons with diabetes. At the second meeting, a month later, both the experimental and control groups completed the HPLP and Physical Functioning Form at the beginning of the meeting. The experimental group was given the opportunity to discuss exercise experiences and previous month's educational content on Health Promotion Exercise Intervention was reinforced. The control group at one hospital then received the experimental exercise intervention but the

other group did not due to meeting time constraints. Since the support groups met regularly on a monthly schedule, another meeting time could not be scheduled. All persons who did not come to the second meeting were contacted and the questions were answered over the telephone. The participation for the second contact was 100%. Not all attendees at the diabetic sessions participated in the study; most nonparticipants were family members learning about the disease. The researcher did not ask any of the nonparticipants to state the reason for refusal to participate in the study. It was, therefore, unknown to the researcher if a nonparticipant was a diabetic or a family member. However, the majority of persons participated at each session. The high participation rate was aided by the Diabetes Nurse Educators at each hospital who advertised the meeting by fliers, letters to usual group participants, and in one instance by newspaper advertisement. Many subjects knew in advance that the meeting was for the purpose of participating in a research study on exercise.

The overall sample consisted of 47 (49%) males and 48 (51%) females (Table 1). Ages ranged from 23 to 81 with a mean age of 58.8 years (SD=12.87) and a median age of 60 years. There were 57 (61%) Caucasians, 24 (26%) African-Americans, 9 (10%) Hispanics, 3 (3%) Asians, and one person

who did not identify ethnicity. The participants were highly educated with 88 (93%) having at least a high school education. The lowest grade completed was the 9th grade. Only 22 (23%) did not have any college or technical education past high school. Socio-economic information was gained by asking for family income. Six people (6%) did not answer the question. Median income level was $30,-40,000. The income level with the highest frequency was $40,000 with 35 (39%) of the sample at or above this level. Only 8 (9%) had a family income less than $10,000 per year.

Data analysis included examining demographic characteristics of each group (Table 1). The experimental group (n=50) ranged in age from 23-79, with a mean age of 58.2 years (SD=14.31). Females were the largest gender group (60%) and Caucasians (51%) the largest ethnic group. Post high school education was reported by 76% of the group. The median family income ranged from $30-40,000.

The sample consisted of 8 (8%) Type I and 86 (91%) Type II diabetics (Table 2); one person did not answer the question. This dichotomy is consistent with the estimate that 10% of the diabetic population is Type I and 90% is Type II (Ratner, 1992). For insulin-managed diabetics, the mean length of diagnosis was 7.88 years (SD=9.04) and the median was 4 years; the mode was one year. Those persons taking insulin comprised 45% of the overall sample.

Table 1
Distribution of Sample According to Age, Gender, Ethnicity, Education, and Yearly Income (N=95)

Variables	Overall Sample n=95		Experimental Group n=50		Control Group n=45	
	n	%	n	%	n	%
Age						
18-29	2	2	2	4	-	-
30-39	6	6	5	10	1	2
40-49	12	13	3	6	9	20
50-59	26	27	15	30	11	24
60-69	29	31	12	24	17	38
70-79	19	20	13	26	6	13
80-89	1	1	-	-	1	2
Mean	58.81		58.20		59.49	
Standard Deviation	12.87		14.31		11.17	
Gender						
Female	48	51	30	60	18	40
Male	47	49	20	40	27	60
Ethnicity						
White	57	61	25	51	32	71
Black	24	26	15	31	9	20
Hispanic	9	10	6	12	3	7
Asian	3	3	3	6	-	-
Other	5	1	-	-	1	2

Table 1 (cont.)- Distribution of Sample according to Age, Gender, Ethncity, Education, and Yearly Income (N=95)

Variables	Overall Sample n=95		Experimental Group n=50		Control Group n=45	
	n	%	n	%	n	%
Education (Highest level completed)						
<12th grade	7	7	3	6	1	2
12th grade	15	16	9	18	9	20
Some College	32	34	15	30	17	38
Technical Degree	11	12	6	12	5	11
Bachelor's Degree	18	19	10	20	8	18
Graduate Degree	12	13	7	14	5	11
Yearly Family Income						
<$10,000	8	9	5	16	3	7
$10-20,000	11	12	7	22	4	9
$20-30,000	15	17	8	25	7	16
$30-40,000	20	22	7	22	13	29
>$40,000	35	39	5	16	18	40

Table 2
Distribution of Sample According to Type of Diabetes, Time Since Diagnosis, and Insulin Usage (N=95)

Variables	Overall Sample n=95		Experimental Group n=50		Control Group n=45	
	n	%	n	%	n	%
Type of Diabetes						
Type I	8	8	6	12	2	4
Type II	87	92	44	88	43	96
Time since Diagnosis						
< 2 years	38	40	18	36	20	44
3-5 years	17	18	10	20	7	16
6-10 years	17	18	11	22	6	13
11-20 years	13	14	7	14	6	13
>20 years	10	11	4	8	6	13
Insulin Usage						
Not taking insulin	52	55	26	52	26	58
Taking insulin	43	45	24	48	19	42

% may not equal 100 due to rounding.

The majority (88%) of the respondents had Type II diabetes and 52 (52%) were not taking insulin.

The control group (n=45) ages' ranged from 37-81 years. In contrast to the experimental group, the control group had only 40% females and t-test for independent samples showed a significant difference between the groups for gender (t=-1.97, df=91.9, p=0.05). This gender difference between the groups could have influenced findings. In the control group, the majority ethnic classification was Caucasian (71%). At least some post high school education was reported by 78% of the group. Family income was high; 40% reported income at or above the $40,000 level (median=$30-40,000). Of the control group (Table 2), 43 (96%) were Type II diabetics, noninsulin-managed, with the mean length of time since diagnosis of 7.8 years (SD=8.85) and median time of 3.00 years; seven people had had diabetes for over 20 years. Demographics for the overall sample, control group, and experimental group are summarized in Table 1.

Reliability:

The reliability for the Health Promoting Lifestyle Profile (HPLP) and the Physical Functioning Form (PHYS) in other studies has been reported earlier in this paper. For this study, Cronbach alpha reliability scores were high. The Health Promoting Lifestyle Profile (HPLP) pretest had

an alpha level of 0.95 (n=65). Any form that had even one missing item was discarded when the computer analysis was done. The post-test HPLP had an alpha level of 0.90 (n=92). The Physical Functioning Form had an alpha level of 0.91 (n=93) for pretest administration and 0.92 (n=94) post-test. Thus, the high reliability findings increase confidence in the outcome of the findings.

Instrument Scores:

HPLP and PHYS scores for the overall sample, experimental group, and control group are summarized in Table 3. Scores are totaled for each instrument and a total mean for the group is presented. This summated total method was used by Duffy (1988) and Weitzel (1989) in reporting results from the HPLP. Scores were also totaled and divided by the the number of questions for the total instrument and subscales. This method is recommended by the authors of the HPLP (Walker, Kerr, Pender, and Sechrist, 1990) and the authors of the Physical Functioning Form (Ware and Sherbourne, 1992). Subscale scores are also reported by both of the above methods (Appendix M). Both methods of reporting are utilized for ease of use for future researchers.

The experimental group had a pre-test HPLP mean of 138.88 (SD= 24.22) and a post-test mean of 153.00 (SD=18.48). T-test for paired samples showed a significant

Table 3

Means and Standard Deviations of Health Promoting Lifestyle Profile, Physical Functioning Scale, and Exercise Change Level in Diabetic Clients (N=95)

	Overall n=95	Experimental n=50	Control n=45
Health Promoting Lifestyle Profile			
Pretest- HPLP			
Mean	2.83	2.89	2.75
S. D.	0.49	0.51	0.46
Total Mean	135.72	138.88	132.20
S. D.	23.43	24.22	22.26
Posttest-PHPLP			
Mean	3.19	3.19	3.19
S.D.	0.40	0.39	0.41
Total Mean	153.15	153.00	153.31
S.D.	18.96	18.48	19.68
Physical Functioning Form			
Pretest- PHYS			
Mean	2.39	2.35	2.43
S.D.	0.54	0.55	0.54
Total Mean	23.86	23.50	24.27
S.D.	5.41	5.47	5.37
Posttest- PPHYS			
Mean	2.52	2.47	2.58
S.D.	0.49	0.51	0.46
Total Mean	25.22	24.68	25.82
S.D.	4.91	5.14	4.62
Change in Exercise Level-Ex			
Mean	3.52	3.72	3.29
S.D.	1.04	0.95	1.1

Range in HPLP Scores-	Possible 48-192	Actual	70-182
Range in PHPLP Scores-	Possible 48-192	Actual	98-189
Range in PHYS Scores-	Possible 10- 30	Actual	10- 30
Range in PPHYS Scores	Possible 10- 30	Actual	10- 30
Range in Ex Scores-	Possible 1- 4	Actual	1- 4

increase in HPLP scores for the experimental group (t=-4.88, df=49, p<0.001). On the exercise subscale, the experimental group had a significant increase in scores from pre to post-test (t=-3.30, df=45, p<0.002). The control group, in addition, had a significant increase in HPLP scores (t=-8.15, df=44, p<0.001) and exercise subscale scores (t=-4.73, df=42, p<0.001). The exercise subscale had the lowest mean scores on both pre and post-test for all three groups: overall sample (M=2.13, SD=0.792; M=2.52, SD=0.838); experimental group (M=2.24, SD=0.822; M=2.568, SD=0.866); and the control group (M=2.01, SD=0.751; M=2.47, SD=0.812). The self-actualization subscale had the highest mean scores on both pre (M=3.19, SD=0.63) and post-test (M=3.45, SD=0.48).

Findings for Research Question 1:

The first research question this study endeavored to answer was: Is there a relationship between health-promoting lifestyle behavior scores, exercise subscale scores, and self-reported exercise behaviors in adult diabetics? Pearson Product Moment Correlations were used to examine the first research question. Post-test Health-Promoting Lifestyle Profile (PHPLP) scores were compared to post-test Physical Functioning Form (PPHYS) scores, post exercise subscale scores (PEXERTOT), and Exercise Change (EX) scores. Pender's (1987) Health Promotion Model

indicates that the decision to engage in health promotion behavior occurs after the health education intervention. Therefore, the post-test scores were considered the appropriate scores to use to answer the research question.

In the overall sample (Table 4), there was a significant correlation between PHPLP and PPHYS (r=0.25, p<0.05) and PHPLP and PEXERTOT (r=0.61, p<0.01). PPHYS and PEXERTOT were significantly correlated (r=0.37, p<0.01) indicating that physical functioning affects how much activity a person with diabetes can actually do. There were no significant correlations found between PHPLP, PPHYS, and Exercise Change (EX) scores. The findings indicate that in respect to research question one there is a relationship between health promotion, physical functioning, and decision to engage in exercise but that people with diabetes may not actually change their exercise behavior. The lack of ability to increase exercise activity could be related in part to their level of physical functioning. Poor health (Ahroni, Boyko, Davignon, and Pecoraro, 1994) and perception of impact of disease (Anderson, Nowacek, and Richards, 1988) have also been found to affect exercise participation.

Findings for Research Question 2:

The second research question asked: Does an exercise-focused health promotion education intervention make a

Table 4

Intercorrelations Among Pre and Post Health Promoting Lifestyle Profile, Pre and Post Physical Functioning, Pre and Post Exercise Subscale, and Exercise Change for the Overall Sample(N=95)

Variables	HPLP	PHPLP	PHYS	PPHYS	EXERTOT	PEXERTOT	EX
HPLP		0.60**	0.31**	0.26*	0.65	0.48**	-0.16
PHPLP			0.11	0.25*	0.45**	0.61**	0.20
PHYS				0.85**	0.85**	0.33**	0.07
PPHYS					0.38**	0.37**	0.11
EXERTOT						0.72**	-0.08
PEXERTOT							0.09

*p<0.05

**p<0.01- Two tail test

difference in exercise behavior over time in adult diabetics? This question was examined using a t-test to determine differences in exercise scores before and after the diabetic exercise educational intervention.

In the experimental group who received the health promotion exercise intervention, the exercise subscale scores increased significantly one month after the intervention (t=-3.30, df=45. p=0.002). However, the control group who received the traditional diabetic exercise education also showed significantly increased exercise subscale scores (t=-4.73, df=42, p<0.001). The answer to the research question is affirmative that a health promotion exercise intervention does seem to increase exercise behavior. However, the control group also increased their exercise behavior. There are several possible explanations for this finding. First, the Hawthorne effect may explain why both groups increased exercise subscale scores. Also, since the researcher presented both the health promotion and the traditional exercise diabetic intervention, there may be something inherent in the researcher that motivated both groups to increase their exercise behaviors.

In order to better understand education behavior changes in the person with diabetes, the groups were further delineated by their type of diabetes and need for

insulin. A two-way ANOVA was used to determine differences between the control and experimental groups in exercise behavior based on their type of diabetes and usage of insulin. Post HPLP scores were higher in the experimental group but not significantly. Post physical functioning scores were significantly higher in the Type II diabetic taking insulin (F=6.57, df=1, p=0.01). Post exercise subscale scores did not differ significantly based on either type of diabetes or usage of insulin. Finally, exercise change scores were significantly higher in the experimental group (F=3.708, df=1, p=0.05) but did not differ based on either type of diabetes or insulin usage.

Related Findings Based on Demographic Data:

Demographic variables were examined to determine relationships between the demographics and the dependent variables of health promotion behavior, physical functioning, and exercise change behavior.

Age:

There were no significant differences in age between the experimental and control groups. For the overall sample, older age was significantly associated with higher pre-test HPLP scores (r=0.21, p<0.05) but not with physical functioning, exercise subscale, and exercise change.

In the experimental group, older aged persons had poorer physical functioning both pre-test (r=-0.38, p<0.01)

and post-test (r=-0.40, p<0.01). In the control group, age showed a significant negative correlation with exercise change scores, meaning that younger individuals exercised more than older age groups at the end of the two sessions (r=0.30, p<0.05).

Gender:

There were more males than females in the control group which could have affected the results (t=-1.97, df=93, p=0.052). There were no differences in pre and post HPLP and exercise subscale scores based on gender for the overall sample. Men had significantly higher physical functioning levels both pre (t=-0.4.44, df=93, p<0.001) and post-test (t=-3.42, df=93, p<0.001). However, women significantly increased exercise change levels over men (t=2.27, df=93, p=0.026).

Education:

T-test for independent samples indicated there were no significant differences in education levels between the experimental and control groups. Pearson Product Moment Correlation Coefficients indicated that higher scores in HPLP (r=0.20, p<0.05), physical functioning (r=0.36, p<0.01), and post physical functioning (r=0.30, p=0.01) were correlated with higher levels of education. In the overall sample, the group with some college had significantly higher post exercise subscale scores (F=2.53,

df=3, p<0.05) than those with a technical education.

Finances:

There were no differences between the experimental and control groups based on family income. Pearson Product Moment Correlation coefficients indicated that significantly higher scores on HPLP (r=0.27, p<0.05), physical functioning (r=0.44, p<0.01), post physical functioning (r=0.42, p<0.01) were correlated with higher levels of income.

Ethnicity:

There were no differences in ethnicity between the experimental and control groups. In the overall group, there were no differences in HPLP, physical functioning, and exercise subscale scores based on ethnicity. There was a significant change in exercise change level for the overall group based on ethnicity (F=3.08, df=4, p=0.0199) The post hoc Tukey procedure did not show a significant difference in exercise level between any of the ethnic groups.

The experimental group showed a significant difference on post physical functioning (F=2.48, df=4, p=0.0731). Post hoc Tukey procedure showed that Hispanics had significantly higher post physical functioning scores than Caucasians. It should be noted that small sample size for Hispanics (n=9) and also for Asians (n=3) limits this

finding.

Type of Diabetes:

Type of diabetes was recoded to differentiate persons with diabetes based on their need for insulin since Type I diabetes only represented 8% (n=8) of the sample. There were no significant differences in pre and post HPLP, pre and post physical functioning, pre and post exercise subscale scores, and exercise change scores between insulin-managed and non-insulin managed diabetics in the overall sample and the experimental group. The only significant difference in the control group was that pre (F=13.80, df=2, p<0.05) and post (F=5.11, df=2, p< 0.011) physical functioning scores were higher in insulin managed diabetics versus non-insulin managed diabetics.

Summary

A presentation of the major findings of this study in relation to two research questions has been delineated. Findings partially support the two research questions. Specifically, using the t-test, HPLP scores increased significantly from pre-test to post-test for both the experimental and control groups. However, based on type of diabetes, a two way ANOVA did not show a signficant difference in scores. Exercise subscale scores also showed a significant increase from pre to post-test for both the

experimental and control groups. The one question item asking if exercise level had increased in the prior month showed that there was a significantly greater increase in the experimental group, although exercise levels increased for both groups. Of the six HPLP subscales, the exercise subscale had the lowest means for both pre-test and post-test administration, indicating the low levels of exercise behavior in people with diabetes. There were no differences in health promotion, exercise behavior, and physical functioning based on insulin usage for the overall group.

CHAPTER V

DISCUSSION AND RECOMMENDATIONS

Diabetes mellitus is a chronic disease eventually affecting most body systems. Therefore, the health implications of this relatively common disease are overwhelming. Interventions which can prolong a healthy state are needed to reduce costs and disability. This study examined the results of a health promoting exercise education intervention in persons with diabetes attending diabetes educational support group classes. In this chapter, the findings are discussed and the literature is examined relative to the findings. Recommendations for further study and implications are offered.

Summary of the Study

This study examined health promotion lifestyle in adults with diabetes and a nursing education intervention was executed to determine changes in health promotion, exercise behavior, and physical functioning a month after the intervention. The Health Promotion Model (Pender, 1987) was used as the conceptual framework for the study. The model proposes that persons who decide to engage in a health promotion behavior must go through the change process. The last step of the process is "maintaining new

behaviors over time" (Pender, 1987, p.255). After the groups were taught about exercise, the persons were retested in one month to determine if exercise behavioral change was accomplished. Long-term testing would be needed to determine permanent lifestyle behavior change.

The first research question proposed that there is a relationship between health promoting lifestyle behavior and exercise behavior. Interval level scores were obtained by the use of questionnaires both before and a month after the teaching intervention. This question was statistically examined using Pearson Product Moment Correlation. The correlation scores indicated relationships between the variables.

The second research question proposed that using a health promotion based teaching intervention rather than the traditional educational approach would make a difference in exercise behavior. For this analysis, the experimental and control groups were also divided into insulin (IDDM) and non-insulin dependent (NIDDM) subgroups. Analysis showed partial support for differences in exercise behavior.

It should be noted that since the participants were volunteers, the findings cannot be generalized to all people with diabetes. However, since two suburban and two

inner city groups were utilized, more confidence can be placed on the findings.

Discussion of Findings

Exercise is one of the most difficult behaviors to incorporate into a lifestyle. Spangler and Komen (1993) found that 27.8% (n=83) of patients with IDDM participated in exercise (defined as the energy equivalent of walking 3.2 km. three times per week) and 15.9%(n=322) of NIDDM patients participated in exercise.

While not part of the study design, anecdotal comments were noted by the researcher. Some persons stated that they could not walk extensively due to foot pain related to diabetes foot complications. A number of persons could not manage stairs related to foot and leg problems associated with diabetes, peripheral vascular disease, and/or arthritis. For those who were working, time was frequently mentioned as the reason for not engaging routinely in exercise. These comments and others were made at the time of the second meeting which was conducted by telephone interview in some instances. The eagerness of the participants to discuss their disease and its effects upon them added to the depth of the study for the researcher. Findings of the study, as described in the previous chapter, are discussed in relationship to the variables under study (health promoting lifestyle behavior and

exercise behavior) and in relationship to the two research questions. The findings indicate partial support for the two research questions.

Health Promoting Lifestyle Behavior:

A significant correlation between health promotion lifestyle as measured by Pender's (1987) HPLP and post health promotion lifestyle (PHPLP) (r=0.60, p<0.01) was found on the overall sample indicating stability of the measures between testing times. Those persons with higher pre-test health promotion scores (HPLP) continued to have higher total post HPLP scores; also, higher exercise subscale scores on the pre-test were correlated with the post-test. Persons who practice more health promotion behaviors also include exercise in their daily lifestyle practices. This finding lends impetus to nurses to assist people with diabetes in understanding that health promotion is important. Those individuals with diabetes who incorporate health promotion practices into their daily lives may also increase exercise participation.

These findings can only be indirectly compared to other studies using the HPLP instrument, since the other known studies did not utilize a nursing interventional approach in an effort to effect a change in the scores. Also, none of the studies except the two following retested participants. Pender, Walker, Sechrist, and

Frank-Stromborg (1990) found that test-retest reliability of the HPLP over a two week period of time in a subsample of employees (n=63) enrolled in a worksite health promotion program was 0.93. The exercise subscale was retested at 3 months and showed a significant decrease from the initial testing (n=588, t=4.14, p<0.001). However, no exercise intervention or specific education was given. Some employees participated in the various health promotion activities and others did not. There were no controls built into the study to separate participants as to amount of health promotion participation. In a study of the health promoting behavior in African-American women, Ahijevych and Bernhard (1994) retested 61 of the total 187 women participating in the study at a six weeks interval. Total HPLP test-retest reliability was 0.70. Exercise subscale retest scores were not reported but the authors did find that the exercise subscale mean scores (1.95) were the lowest of all the subscale scores. Again, no specific education or other interventions were utilized to effect changes in the scores.

Both the experimental and the control groups had a significant increase in HPLP scores from pre-test to post-test. Several factors could have been contributory. First, many of the participants were in their first year of diabetes and had been attending diabetes education classes.

The scope of the diabetes education regimen includes dietary changes, health management, exercise, and stress management techniques. These aspects constitute four of the six dimensions of the HPLP. Therefore, the instrument specifically measures much of the content of class work. Having only recently obtained this information, the participants could have been in the process of integrating these practices into their lifestyle. Since this study was the first known use of the HPLP with persons with diabetes, additional studies are needed to confirm these findings. Also, studies are needed in groups of diabetics not presently attending diabetes education classes or support groups. Anders (1993) evaluated the effectiveness of a diabetes education program and found that two years after completing the program, the participants followed their diets 79% of the time and only 13% had changes in physical health related to long-term diabetic complications (n=30). Exercise compliance was not evaluated. An important finding was that the clients had been hospitalized an average of six times in the year prior to their education program for diabetes related diagnoses and in the period of time following the education classes had only been hospitalized twice. The cost savings was estimated to be $6000 per hospital visit that was not made. Although Anders' study does not address health promotion directly,

the findings related to diet and health management indicate that some aspects of health promotion education can have lasting effects in persons with diabetes.

Another factor possibly contributing to the increase in HPLP scores in both groups could be the intensity of the educational experience. All the hospitals in the study had diabetes nurse educators who utilized both individual and group classes. Most of the participants had been potentially taught by a diabetes nurse educator, a dietician specializing in diabetes, and by their personal physician who in many cases was a diabetologist. Two of the hospitals utilized exercise physiologists and one a social worker on the teaching team. A repetition of the research study in hospital or agencies without a diabetic teaching team and/or support group should be helpful in evaluating health promotion in the person with diabetes.

The mean HPLP score for the overall group was 2.83 (S.D.= 0.49). This score compares with the means found for other groups: older adults, ages 66-89 (M=2.85, S.D.=0.40, n=97); middle-aged adults, ages 40-65 (M=2.71, S.D.=0.41, n=188); and young adults, ages 18-39 (M=2.63, S.D.=.40, n=167 (Walker, Volkan, Sechrist, and Pender, 1988). This diabetic sample which had a mean age of 58.8 basically represented an older population which has reported higher

numbers of health promoting behaviors (Walker et al, 1988; Pender, Walker, Sechrist, and Frank-Stromborg, 1990).

Exercise Behavior:

Physical functioning scores were correlated with exercise subscale scores indicating that physical functioning affects exercise behavior. This finding is expected since microvascular disease affecting the legs and feet is a frequent complication of diabetes resulting in the majority of morbidity in persons with diabetes (Vinicor, 1988). However, paradoxically, long-term exercise in diabetes is associated with improved functional capacity and reduction of cardiovascular risk factors (Cunningham, 1988). Stewart et al. (1989) found that diabetics had lower physical functioning scores than those with high blood pressure or those without chronic disease. The typical person in this study who had higher physical functioning scores was a younger, well-educated male. This finding also agrees with the findings of Ahroni, Boyko, Davignon, and Pecoraro (1994) who studied 577 veterans with diabetes, most of whom were male. The older male had poorer physical functioning than the younger male. This study eliminated non-ambulatory patients thus strengthening the results.

Research Question 1:

Is there a relationship between health-promoting lifestyle behavior scores, exercise subscale scores, and self-reported exercise behaviors in adult diabetics?

There was a positive correlation between HPLP scores and post exercise subscale scores (r= 0.41, p<0.01). This correlation indicates that persons who scored high on the pre-test HPLP also tended to score higher on the post-exercise subscale score. This finding lends support to the idea of teaching diabetics' health promotion as part of their education program in order to increase exercise activity. Pender (1987, p. 84) noted that some diabetic education programs were incorporating diet, exercise, and stress management aspects of health promotion into the diabetic teaching program. Cognitive-perceptual factors and modifying factors of the model could be used to assess the person with diabetes to individualize the teaching plan for the patient. Further research with the model would help nurses determine applicable factors for large groups of diabetics since group teaching is a common modality for diabetes education.

Research Question 2:

Does an exercise-focused health promotion education intervention make a difference in exercise behavior over time in adult diabetics?

Both the control and experimental groups demonstrated increased levels of exercise participation on post testing. The researcher's presentation on exercise to the experimental group was based on exercise as health promotion but the control group was also taught to exercise based on traditional guidelines. Health promotion as a concept was not discussed in the control group class. This finding demonstrates the efficacy of exercise education for people with diabetes despite the type of approach. A long range study to determine the level of adherence to exercise over a longer period of time would be helpful to determine outcome differences between the two approaches. Teaching the importance of exercise for both types of diabetes should remain a priority for diabetes educators but the best approach needs further study.

Implications of the Study

The following implications have been drawn to assist diabetes nurse educators in designing effective health promotion educational programs for persons with diabetes:

1. Health promotion behavior can be increased for persons with diabetes through intensive diabetes education classes or by teaching specific health promotion information in less intensive sessions such as diabetes support groups.
2. Persons with diabetes, a chronic disease, are interested in a healthy lifestyle. Educational interventions can be designed based on Pender's Health Promotion Model (1987) to promote healthy living.
3. Since most persons attending diabetes support groups have been diagnosed for less than one year, diabetic nurse educators need to emphasize that learning about diabetes should be a life-long concern especially since complications increase as the length of time with the disease increases. However, realistically, the educational programs need to be designed with the more newly diagnosed diabetic in mind.
4. The aim of the support group should be different than the educational program for the newly diagnosed person. The emphasis should be on life-long continuing education to maintain interest and attendance.
5. Since many of the people attending the support groups were older persons and the life expectancy is increasing, the educational needs of the elderly need to be considered when determining program topics.

6. Diabetes education and health promotion needs to be offered to every newly diagnosed diabetic whether insulin dependent or not since the majority of persons with diabetes may not avail themselves later of educational opportunities.

7. Diabetes nurse educators can incorporate exercise research findings into educational and support group programs to increase exercise behavior. The specific exercise prescription for the individual is usually made by the physician in charge of the patient's overall care. The American Diabetes Association (1988) recommends that clinicians who do not feel knowledgeable enough in exercise prescription and supervision refer clients to exercise programs in hospital cardiac rehabilitation programs or college-supervised programs.

Recommendations for Further Study

The following recommendations are made for further study in the area of health promotion for persons with diabetes.

1. Health promotion should be studied in other subgroups of diabetics, such as long-term diabetics and those not having access to educational classes.

2. During the telephone interview, a number of the elderly subjects had difficulty with the HPLP questionnaire stating

that some of the questions were being repeated. More studies need to be directed toward the use of the HPLP in the elderly population to determine its age-related usefulness.

3. The use of the telephone format should be incorporated in future studies to enhance data collection especially when the person needs to be contacted more than once.

4. The exercise intervention study needs to be replicated to determine the reliability of the findings.

5. Exercise and health promotion needs to be studied in groups of diabetics who have not recently attended any educational classes on diabetes.

6. The use of a more focused health promoting instrument for diabetics should be attempted for future studies.

7. A multi-dimensional exercise change instrument would be helpful for future studies to overcome the limitations of a one item questionnaire.

8. The control group should receive an education session in another area of diabetes such as nutrition in order to better differentiate the effects of the health promotion 1exercise intervention.

References

Ahijevych, K. & Bernhard, L. (1994). Health-promoting behaviors of African American Women. Nursing Research, 43(2), 86-89.

Ahroni, J.H., Boyko, E.J., Davignon, D.R., & Pecoraro, R.E. (1994). The health and functional status of Veterans with diabetes. Diabetes Care, 17(4), 318-21.

Allen J. (1986). New lives for old: Lifestyle change initiatives among older adults. Health Values, 10(6), 8-12.

Alogna, M. (1980). Perception of severity of disease and health locus of control in compliant and noncompliant diabetic patients. Diabetes Care, 3(4),533-34.

American Diabetes Association (1988). Physician's Guide to Non-insulin-Dependent (Type II) Diabetes: Diagnosis and Treatment. (2nd ed.). Alexandria, Va.: Author.

American Diabetes Association (1991). Position Statement-diabetes mellitus and exercise. Diabetes Care, 14(2), 36-7.

American Diabetes Association. (1993a). Diabetes 1993 Vital Statistics. (pp. 13-16;39-46). Alexandria, Va: Author.

American Diabetes Association (1993b). Position statement: implications of the diabetes control and complications trial. Alexandria, Va: Author.

American Diabetes Association (1995). Position statement- diabetes mellitus and exercise. Diabetes Care, 18(Suppl.1), 28.

Anderson, R.M., Nowacek, G., & Richards, F. (1988). Influencing the personal meaning of diabetes: research and Practice. The Diabetes Educator, 14(4), 297-302.

Anderson, R.M., Fizgerald, J.T., & Oh, M.S. (1993). The relationship between diabetes-related attitudes and patients' self-reported adherence. The Diabetes Educator, 19(4), 287-298.

Anders, C.L. (1993). Evaluating the effectiveness of a diabetes education program. Diabetes Spectrum, 6(5), 314-319.

Armstrong, J.J. (1991). A brief overview of diabetes mellitus and exercise. The Diabetes Educator, 17(3), 175-78.

Becker, M.H. (1974). The Health Belief Model and Personal Health Behavior. (pp.82-105). Thorofare, N.J.: Charles B. Slack.

Brailey, L.J. (1986). Effects of health teaching in the workplace on women's knowledge, beliefs, and practices regarding breast self-examination. Research in Nursing and Health, 9(3), 223-231.

Cohen, J. (1988). Statistical Power Analysis for the Behavioral Sciences.(2nd ed., pp. 75-107). New York: Academic Press.

Cox, C.L. (1987). Assumptions and challenges inherent in the conceptual dilemmas of health and health promotion. In M.Duffy and N.J. Pender (Eds.), Conceptual Issues in Health Promotion: A Report of Proceedings of a Wingspread Conference. Racine, Wisconsin: Sigma Theta Tau.

Cunningham, L.N. (1988). Commentary. Diabetes Spectrum 1(4), 224-25.

Davies, A.R. & Ware, J.E. (1981). Measuring Health Perceptions in the Health Insurance Experiment.(pp. 11-49;86-95) Santa Monica, Ca.: The Rand Corp.

Dawson, L.Y. (1993). Managing managed care- with mercy. Diabetes Spectrum, 6(5), 316, 322.

Deeb, L.C., Pettijohn, F.P., Shirah, J.K., & Freeman, G. (1988).Interventions among primary-care practitioners to improve care for preventable complications of diabetes. Diabetes Care, 11(3), 275-280.

Devlin, J.T., Hirschman, M., Horton, E.D., & Horton, E.S. (1987). Enhanced periperal and splanchic insulin sensitivity in NIDDM after single bout of exercise. Diabetes, 36(4), 434-39.

Duffy, M.E. (1988). Determinants of health promotion in midlife women. Nursing Research, 37(6), 358-62.

Duffy, M.E. (1989). Determinants of health status in employed women. Health Values, 13(2), 50-57.

Eriksson, K.F. & Lindgarde, L. (1991). Prevention of Type 2 (Non-insulin dependent diabetes mellitus) by diet and physical exercise. The 6-year Malmo feasibility study. Diabetologia 34(12), 891-98.

Flavin, K. & White, N.H. (1989). The intensive insulin team. The Diabetes Educator, 15(3), 249-252.

Fleetwood, J. & Packa, D.R. (1991). Determinants of health-promoting behaviors in adults. Journal of Cardiovascular Nursing, 5(2), 67-79.

Flynn, J.B. & Giffin, P.A. (1984). Health promotion in acute care settings. Nursing Clinics of North America, 19(9). 239-50.

Ford, E.S. and Herman, W.H. (1995). Leisure-time physical activity patterns in the U.S. diabetic population. Diabetes Care, 18(1), 27-33.

Frank-Stromborg, M. (1988). Health promotion in ambulatory cancer patients- focusing on wellness. Presented at the 5th International Conference and Exhibition on Cancer Nursing- A Revolution in Care. London, Sept 7, 1988.

Frank-Stromborg, M., Pender, N.J., Walker, S.N., & Sechrist, K.R. (1990). Determinants of health-promoting lifestyle in ambulatory cancer patients. Social Science in Medicine 31, 1159-68.

Franz, M.J. (1992). Exercise and diabetes. In D. Haire-Joshu (Ed.). Management of Diabetes Mellitus- Perspectives of Care Across the Lifespan. (pp. 80-117). St.Louis: C.V. Mosby.

Frauman, A.C. & Nettles-Carson, B. (1991). Predictors of a health-promoting lifestyle among well adult clients in a nursing practice. Journal of the American Academy of Nurse Practictioners, 3(4), 174-79.

Glasgow, R.E., McCaul, K.D., & Schafer, L.C. (1986). Barriers to regimen adherence among persons with insulin-dependent diabetes. Journal of Behavioral Medicine 9(1), 65-77.

Glasgow, R.E., McCaul, K.D. & Schafer, L.C. (1989). Self-care behaviors and glycemic control in type I diabetes. Journal of Chronic Disease, 40(5), 399-411.

Gorman, A.R. & Berrien, L.E. (1987). Diabetes: a wellness perspective. Nursing Administration Quarterly, 11 (3), 24-29.

Graham, C. (1991). Exercise and aging: implications for persons with diabetes. The Diabetes Educator, 17(3), 189-95.

Graham, C. & Lasko-McCarthey (1990). Exercise options for persons with diabetic complications. The Diabetes Educator, 16(3), 212-220.

Guthrie, D.W.& Guthrie, R.A.(1982). Nursing Management of Diabetes Mellitus (2nd ed., pp 7-8). St. Louis: C.V. Mosby.

Hall, T.A. (1987). Designing culturally relevant educational materials for Mexican American clients. The Diabetes Educator, 13(3), 281-85.

Hess, G.E., Davis, W.K., & Harrison, R.V. (1986). A diabetes psychosocial profile. The Diabetes Educator, 12 (2), 135-40.

Hornsby, W.G. (1991). Exercise and type II diabetes. In H. Rifkin, J.A. Colwell, & S.I. Taylor (Eds.), Diabetes 1991 (pp. 1248-1251). Amsterdam: Elsevier Science.

Horton, E.S. (1988). Role and management of exercise in diabetes mellitus. Diabetes Care, 11(2), 201-211.

Johnson, J.L., Ratner, P.A., Bottorff, J.L., & Hayduk, L.A. (1993). An exploration of Pender's health promotion model using LISREL. Nursing Research, 42(3), 132-38.

Kaplan, R.M., Hartwell, S.L., Wilson, D.K., & Wallace, J.P. (1987). Effects of diet and exercise interventions on control and quality of life in non-insulin-dependent diabetes mellitus. Journal of General Internal Medicine, 2(4), 220-27.

Kaufman, M.W. & Bowsher, J.E. (1994). Preventing diabetic foot ulcers. MedSurg Nursing, 3(3), 204-210.

Kavanagh, D.J., Gooley, S., & Wilson, P.H. (1993). Prediction of adherence and control in diabetes. Journal of Behavioral Medicine, 16(5), 509-22.

Kee, C.C. (1984). A case for health promotion with the elderly. Nursing Clinics of North America, 19(2), 251-261.

Kernaghan, S.G., Salvinija, G., & Gilgoth, B.E. (1988). Tracking the Impact of Health Promotion on Organizations.(pp. 89-109). Chicago: American Hospital Publishing.

Koivisto, V.A. (1991). Exercise in IDDM. In Diabetes 1991. H. Rifkin, J.A. Colwell, and S.I. Taylor (Eds.,1252-55). Amsterdam: Elsevier Science.

Krall, L.P. & Beaser, R.S. (1989). Joslin Diabetes Manual (12th ed., pp. 81-93). Philadelphia: Lea and Febiger.

Kravitz, R.L., Hays, R.D., Sherbourne, C.D., DiMatteo, M.R., Rogers, W.H., Ordway, L., & Greenfield, S. (1993). Recall of recommendations and adherence to advice among patients with chronic medical conditions. Archives of Internal Medicine, 153(16), 1869-78.

Kulbok, P.A. & Baldwin, J.H. (1992). From preventive health behavior to health promotion: advancing a positive construct of health. Advances in Nursing Science, 14(4), 50-64.

Kuster, A.E. & Fong, C.M. (1993). Further psychometric evaluation of the Spanish language health-promoting lifestye. Nursing Research, 42(5), 266-69.

Laffrey, S.C. (1985). Health behavior choice as related to self-actualization and health conception. Western Journal of Nursing Research, 7(3), 279-300.

Laffrey, S.C. (1986). Perceived weight and health, health conception, and health behavior in normal weight and overweight. Nursing Research, 35(3), 173-177.

Laffrey, S.C. (1990). Exploration of adult health behaviors. Western Journal of Nursing Research, 12(4), 434-47.

Laffrey, S.C. & Crabtree, M.K. (1988). Health and health behavior of persons with chronic cardiovascular disease. International Journal of Nursing Studies, 25(1), 41-52.

Linn, M.W., Linn, B.S., Skyler, J.S., & Harris, R. (1980). The importance of self-assessed health in patients with diabetes. Diabetes Care, 3(5), 599-605.

Lusk, S.L., Kerr, M., & Ronis, D.L. (1995). Health-promoting lifestyles of blue-collar, skilled trade, and white collar workers. Nursing Research, 44(1), 20-24.

Lusk, S.L., Ronis, D.L., Kerr, M.J., & Atwood, J.R. (1994). Test of the health promotion model as a causal model of workers' use of hearing protection. Nursing Research, 43(3), 151-157.

Maynard, T. (1991). Exercise: part I, physiological response to exercise in diabetes mellitus. The Diabetes Educator, 17(3), 196-204.

McCargar, L.J., Taunton, J., & Pare, S. (1991). Benefits of exercise training for men with insulin-dependent diabetes mellitus. The Diabetes Educator, 17(3), 179-84.

McCaul, K.D., Glasgow, R.E., & Schafer, L.C. (1987). Diabetes regimen behaviors-predicting adherence. Medical Care, 25(9), 868-81.

McDonald, M.B., Sawatzky, J.E., & Wilson, T.W. (1988). Lifestyle behaviors in treated hypertensives as prediction of blood pressure control. Rehabilitation Nursing, 13(2), 82-84.

McHorney, C.A., Ware, J.E., Rogers, W., Raczek, A.E., & Lu, J.F. (1992). The validity and relative precision of MOS short- and long-form health status scales and Dartmouth Coop charts: results from the Medical Outcomes study. Medical Care, 30(5)(Suppl.), MS253-265.

McMahon, M., Miller, P., Ringel, K. & Garrett, M.J. (1988). Factors facilitating health after myocardial infarction. Health Values, 12(4), 25-29.

Melnyk, K.A. (1988). Barriers: a critical review of the literature. Nursing Research, 37(4), 196-201.

Moss, S.E., Klein, R. & Klein, B.E. (1988). The incidence of vision loss in a diabetic population. Ophthamology, 95(10), 131-38.

Moy, C.S., Songer, T.J., LaPorte, R.E., Dorman, J.S., Krisha, A.M, Orchard, J.J., Becker, D.J., & Drash, A.L. (1993). Insulin-dependent diabetes mellitus, physical activity, and death. American Journal of Epidemiology, 137 (1), 74-81.

Muhlenkamp, A.F., Brown, N.J., & Sands, D. (1985). Determinants of health promotion activities in nursing clinic clients. Nursing Research, 34(6), 327-332.

National Diabetes Advisory Board. (1986). National standards and review criteria for diabetes patient education programs. The Diabetes Educator, 12(3). 286-291.

National Exercise for Life Institute. (1994). Exercise and Diabetes. Excelsior, Minn: Author.

Nemchik, R. (1982). Developing an education program. In D.W.Guthrie and R.A. Guthrie (Eds.). Nursing Management of Diabetes Mellitus (2nd ed, pp. 271-293). St. Louis: C.V. Mosby.

Nerenz, D.R., Repasky, D.P., Whitehouse, F.W., & Kahkonen, D.M. (1992). Ongoing assessment of health states in patients with diabetes mellitus. Medical Care, 30(5, Suppl.), MS 112-123.

Neuberger, G.B., Kesal, S., Smith, K.V., Hassaneiu, R. & DeViney, S. (1994). Determinants of exercise and aerobic fitness in outpatients with arthritis. Nursing Research 43(1), 11-17.

Newman, M. (1986). Health as Expanding Consciousness. St. Louis: C.V. Mosby.

Padgett, D., Mumford, E., & Hynes, M. (1988). Meta-analysis of the effects of educational and psychological interventions on management of diabetes mellitus. Journal of Clinical Epidemiology, 41(10), 1007-30.

Pender, N.J. (1987). Health Promotion in Nursing Practice (2nd ed., pp. 27; 57-69). Norwalk, Conn.: Appleton and Lange.

Pender, N.J., Walker, S.N., Sechrist, K.R., & Stromborg, M.F. (1988). Development and testing of the health promotion model. Cardiovascular Nursing, 24(6), 41-3.

Pender, N.J., Walker, S.N., Sechrist, K.R., & Frank-Stromborg, M.F. (1990). Predicting health-promoting lifestyles in the workplace. Nursing Research, 39(6), 326-332.

Pieper, B.A., Kushion, W., & Gaida, S. (1990). The relationship between a couple's marital adjustment and beliefs about diabetes mellitus. The Diabetes Educator, 16(2), 108-112.

Polit, D.R. & Hungler, B.P.(1991). Nursing Research-Principles and Methods (4th ed., pp. 482-88). Philadelphia: J.B. Lippincott.

Ratner, R.E. (1992). Overview of diabetes mellitus. In D. Haire-Joshu (Ed.). Management of Diabetes Mellitus. (p.3). St. Louis: Mosby-Year Book.

Revicki, D.A. (1990). Quality of life and non-insulin-dependent diabetes mellitus. Diabetes Spectrum, 3(4), 260-266.

Riffle, K.L., Yoho, J. & Sams, J. (1989). Health-promoting behaviors, perceived social support, and self-reported health of Appalachian elderly. Public Health Nursing, 6(4), 204-211.

Rosenburg, C.S. (1992). Assessment and management of patients with diabetes mellitus. In S.C. Smeltzer and B.G. Bare (Eds). Brunner and Suddarth's Textbook of Medical and Surgical Nursing (7th ed., pp. 1021-1072). Philadelphia: J.B. Lippincott.

Ruby, K.L., Blainey, C.A., Haas, L.B., & Patrick, M. (1993). The knowledge and practices of registered nurse certified diabetes educators: teaching elderly clients about exercise. The Diabetes Educator, 19(4), 299-306.

Ruderman, N.B. & Schneider, S.H. (1992). Diabetes, exercise, and atherosclerosis. Diabetes Care, 15(Suppl.4), 1787-1791.

Schafer, L.C., McCaul, K.D., & Glasgow, R.E.(1986). Supportive and non-supportive family behavior relationships to adherence and metabolic control in persons with Type I diabetes. Diabetes Care, 9(2), 179-85.

Schechtman, K.B., Barzilai, B., Rost, K., & Fisher, E.B.(1991). Measuring physical activity with a single question. American Journal of Public Health, 81(6). 771-773.

Schiffrin, A., Mikic, M., Leibel, B.S. & Albisser, A.M. (1985). Computer-assisted insulin dosage adjustment. Diabetes Care, 8(6). 545-52.

Schlenk, E.A.& Hart, L.K. (1984). Relationship between health locus of control, health value, social support and compliance of persons with diabetes mellitus. Diabetes Care, 7(6), 566-574.

Schneider, S.H. & Ruderman, N.B. (1990). Exercise and NIDDM. Diabetes Care, 13(7), 785-89.

Skelly, A.H., Marshall, J.R., Haughey, B.P., Davis P.J., & Dunford, R.G. (1995). Self-efficacy and confidence in outcomes as determinants of self-care practices in inner-city African American Women with non-insulin-dependent diabetes. The Diabetes Educator, 21(1), 38-46.

Smith, C. A. (1994). The lived experience of staying healthy in rural African American families. Nursing Science Quarterly, 8(1), 17-21.

Smith, J.A. (1981). The idea of health: a philosophical inquiry. ANS, 3(3), 43-50.

Smith, L. & Casso, M.B.(1988). Exercise and the intensively treated IDDM patient. The Diabetes Educator 14(6), 510-515.

Spangler, J.G. & Komen, J.C. (1993). Predicting exercise and smoking behaviors in diabetic and hypertensive patients. Archives of Family Medicine, 2(2), 149-155.

Speake, D.L. (1987). Health promotion activity in the well elderly. Health Values, 11(6), 25-30.

Sprafka, J.M., Kurth, D., Crozier, M., Whipple, D., & Bishop, D. (1988). Response of diabetic patients to a community-based education program. The Diabetes Educator, 14(2), 148-51.

Soukup, J.T., Maynard, T.S., & Kovaleski, J.E. (1994). Resistance training guidelines for individuals with diabetes mellitus. The Diabetes Educator, 20(2), 129-37.

Stewart, A., Greenfield, S., Hays, R., Wells, K.L., Rogers, W., Berry, S., McGlyn E., & Ware, J. (1989). Functional status and well-being of patients with chronic conditions: results for the Medical Outcomes Study. JAMA, 262(7), 907-23.

Taylor, A.K. (1987). Medical expenditures and insurance coverage for people with diabetes: estimates from the national medical care expenditure survey. Diabetes Care, 10(1). 87-94.

Texas Department of Health. (1991). Texas Vital Statistics,(pp. 144-146). Austin: Author.

Texas Diabetes Council. (1993). A Plan to Control Diabetes in Texas, (pp. 1-20). Austin: Author.

Teza, S.L., Davis, W.K., & Hiss, R.G. (1988). Patient knowledge compared with national guidelines for diabetes care. The Diabetes Educator, 14(3), 207-11.

Travis, L.B., Brouhard, B.H., & Schreiner, B.J. (1987). Diabetes in Children and Adolescents, (pp. 147, 205-218). Philadelphia: W.B. Saunders.

U.S. Bureau of the Census. (1992). Statistical Abstract of the United States: 1988 (108th ed., pp. 82-87). Washington D.C.: U.S. Government Printing Office.

U.S. Department of Health, Education,and Welfare-Public Health Service. (1979). Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention. DHEW Pub. No.(PHS) 79-55071A.

U.S. Department of Health and Human Services, Public Health Service (1980). Objectives for the Nation. Washington D.C.: U.S. Government Printing Office.

U.S. Department of Health and Human Services (1986). The 1990 Health Objectives for the Nation: A Midcourse Review. Washington D.C.: U.S. Government Printing Office.

U.S. Department of Health and Human Services-Public Health Service (1990a). Healthy People-2000, (pp.43-53). Washington D.C.: U.S. Government Printing Office.

U.S. Department of Health and Human Services- Public Health Service (1990b). Regional variation in diabetes mellitus prevalence- United States, 1988 and 1989. Morbidity and Mortality Weekly Report. Washington D.C.: U.S. Government Printing Office, 805-819.

Vinicor, F. (1988). Atherosclerosis and diabetes mellitus. Diabetes Spectrum, 1(5), 319-23.

Walker, S.N., Sechrist, K.R.,& Pender, N.J. (1987). The health-promoting lifestyle profile: development and psycho-metric characteristics. Nursing Research, 36(2), 76-81.

Walker, S.N., Kerr, M.J., Pender, N.J., & Sechrist, K.R. (1990). A Spanish language version of the health-promoting lifestyle profile. Nursing Research, 39(5), 268-273.

Walker, S.N., Volkan, K., Sechrist, K.R., & Pender, N.J.(1988). Health-promoting lifestyles of older adults: comparisons with young and middle-age adults, correlates and patterns. Advances in Nursing Science, 11(1), 76-90.

Wallston, K.A., Wallston, B.S., & DeVellis, R. (1978). Development of the multidimensional health locus of control (MHLC) scales. Health Education Monographs, 6(2), 160-70.

Ware, J.E. and Sherbourne, C.D. (1992). The MOS 36-item short-form health survey (SF-36). Medical Care, 30 (6), 473-48.

Webster's Encyclopedic Unabridged Dictionary of the English Language. (1989). New York: Portland House.

Weiss, T.W., Slater, C.H., Green, L.W., Kennedy, V.C., Albright, D.L., & Wun, C.C. (1990). The validity of single-item, self-assessment questions as measures of adult physical activity. Journal of Clinical Epidemiology, 43(11), 1123-29.

Weitzel, M.H. (1989). A test of the health promotion model with blue collar workers. Nursing Research, 38(2), 99- 104.

Whetstone, W. & Reid, J. (1991). Health promotion of older adults: perceived barriers. Journal of Advanced Nursing, 16(11), 1343-49.

White, N., Carnahan, J., Nugent, C.A., Iwaoka, T., & Dodson, M.A. (1986). Management of obese patients with diabetes mellitus: comparison of advice education with group management. Diabetes Care, 9(5), 490-96.

Woods, N.F. & Catanzaro M. (1988). Nursing Research-Theory and Practice.(pp.98,99-100, 169-70). St. Louis: C.V.Mosby Co.

Zinman, B., Zuniga-Guajardo, S., & Kelly, D. (1988). Comparison of the acute and long-term effects of exercise on glucose control in Type I diabetes. Diabetes Spectrum 1(4), 220-223. Reprinted from Diabetes Care (1984)7: 515-19.

APPENDICES

APPENDIX A

Human Subjects Review

TEXAS WOMAN'S UNIVERSITY
DENTON DALLAS HOUSTON

HUMAN SUBJECTS REVIEW COMMITTEE - HOUSTON CENTER

HSRC APPROVAL FORM

Name of Investigator(s): Charlotte A. Wisnewski

Social Security Number(s): 267-74-7171

Name of Research Advisor(s): Jeanette Kernicki RN, Ph.D.

Address: 310 South Shadowbend

Friendswood,Texas 77546

Dear: Mrs. Wisnewski

Your study entitled: A STUDY OF THE HEALTH PROMOTING BEHAVIORAL EFFECTS OF AN EXERCISE EDUCATIONAL INTERVENTION IN ADULT DIABETICS

(The applicant must complete the top portion of this form)

has been reviewed by the Human Subjects Review Committee - Houston Center and it appears to meet our requirements in regard to protection of the individual's rights.

Please be reminded that both the University and the Department of Health and Human Services regulations typically require that signatures indicating informed consent be obtained from all human subjects in your study. These are to be filed with the Human Subjects Review Committee Chairman. Any exception to this requirement is noted below. Furthermore, according to HHS regulations, another review by the HSRC is required if your project changes or if it extends beyond one year from this date of approval.

Any special provisions pertaining to your study are noted below:

_____ The filing of signatures of subjects with the Human Subjects Review Committee is not required.

_____ Other: see attached sheet.

_X_ No special provisions apply.

Sincerely,

Doris E. Wright

Doris E. Wright, Ph.D.
Chairperson, HSRC - Houston Center

Dec. 12, 1994
Date

HSRC 1994-95

APPENDIX B

Agency Approvals

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING
1130 M.D. ANDERSON BLVD.
HOUSTON, TEXAS 77030-2897

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE _____ Medical Center

GRANTS TO Charlotte A. Wisnewski M.S. R.N.
a student enrolled in a program of nursing leading to a Ph.D. in nursing at Texas Woman's University, the privilege of its facilities in order to study the following problem:

A STUDY OF THE HEALTH-PROMOTING BEHAVIORAL EFFECTS OF AN EXERCISE EDUCATIONAL INTERVENTION IN ADULT DIABETICS

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. The agency is (willing) (unwilling) to allow the completed report to be circulated through interlibrary loan.
5. Other _____

Date: March 22, 1995

P L Offenbarger MD
Signature of ~~Agency Personnel~~ IRB Chairs.

Charlotte A. Wisnewski MS, RN
Signature of Student

Signature of Faculty Advisor

*Fill out and sign three copies to be distributed as follows: Original-Student; First copy - agency; Second copy - TWU College of Nursing.

DR:lt
1/13/92

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING
1130 M.D. ANDERSON BLVD.
HOUSTON, TEXAS 77030-2897

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE Diabetes Treatment Center

GRANTS TO Charlotte A. Wisnewski M.S., R.N.
a student enrolled in a program of nursing leading to a Ph.D. in nursing at Texas Woman's University, the privilege of its facilities in order to study the following problem:

The Health-Promoting Behavioral Effects of an exercise Educational Intervention In Adult Diabetics

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. The agency is (willing) (unwilling) to allow the completed report to be circulated through interlibrary loan.
5. Other _____

Date: January 31, 1995

Charlotte A. Wisnewski
Signature of Student

Signature of Agency Personnel

Kenneth Yarnell RN. Ph.D
Signature of Faculty Advisor

*Fill out and sign three copies to be distributed as follows: Original-Student; First copy - agency; Second copy - TWU College of Nursing.

DR:lt
1/13/92

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING
1130 M.D. ANDERSON BLVD.
HOUSTON, TEXAS 77030-2897

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE Hospital

GRANTS TO Charlotte A. Wisnewski M.S., R.N.
a student enrolled in a program of nursing leading to a Ph.D. in nursing at Texas Woman's University, the privilege of its facilities in order to study the following problem:

A STUDY OF THE HEALTH-PROMOTING BEHAVIORAL EFFECTS OF AN EXERCISE EDUCATIONAL INTERVENTION IN ADULT DIABETICS

The conditions mutually agreed upon are as follows:

1. The agency (may) (~~may not~~) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (~~may not~~) be identified in the final report.
3. The agency (wants) (~~does not want~~) a conference with the student when the report is completed.
4. The agency is (willing) (~~unwilling~~) to allow the completed report to be circulated through interlibrary loan.
5. Other_____

Date: 3-27-95

B Mueller RN, CDE
Signature of Agency Personnel

Charlotte A. Wisnewski MS, RN
Signature of Student

Janette Kennedy RN Ph.D
Signature of Faculty Advisor

*Fill out and sign three copies to be distributed as follows: Original-Student; First copy - agency; Second copy - TWU College of Nursing.

DR:lt
1/13/92

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING
1130 M.D. ANDERSON BLVD.
HOUSTON, TEXAS 77030-2897

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE Hospital

GRANTS TO Charlotte A. Wisnewski M.S., R.N.
a student enrolled in a program of nursing leading to a Ph.D. in nursing at Texas Woman's University, the privilege of its facilities in order to study the following problem:

A STUDY OF THE HEALTH-PROMOTING BEHAVIORAL EFFECTS OF AN EXERCISE EDUCATIONAL INTERVENTION IN ADULT DIABETICS

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. The agency is (willing) (unwilling) to allow the completed report to be circulated through interlibrary loan.
5. Other_____

Date: _____

Signature of Agency Personnel

Charlotte A. Wisnewski MS, RN
Signature of Student

Jeanette Kennedy RN. Ph.D.
Signature of Faculty Advisor

*Fill out and sign three copies to be distributed as follows: Original-Student; First copy - agency; Second copy - TWU College of Nursing.

DR:lt
1/13/92

APPENDIX C

Permission to Conduct Study

TEXAS WOMAN'S
UNIVERSITY
DENTON/DALLAS/HOUSTON

THE GRADUATE SCHOOL
P.O. Box 22479
Denton, TX 76204-0479
Phone: 817/898-3400
Fax: 817/898-3412

January 4, 1995

Ms. Charlotte Wisnewski
310 South Shadowbend
Friendswood, TX 77546

Dear Ms. Wisnewski:

I have received and approved the Prospectus for your research project. Best wishes to you in the research and writing of your project.

Sincerely yours,

Leslie M Thompson

Leslie M. Thompson
Associate Vice President for Research
and Dean of the Graduate School

dl

cc Dr. Jeanette Kernicki
Dr. Carolyn Gunning

APPENDIX D

Consent Forms- Experimental and Control

TEXAS WOMAN'S
UNIVERSITY
DENTON/DALLAS/HOUSTON

COLLEGE OF NURSING
Houston Center
1130 M.D. Anderson Blvd.
Houston, TX 77030-2897
Phone: 713/794-2100

Consent Form

A STUDY OF THE HEALTH-PROMOTING BEHAVIORAL EFFECTS OF AN EXERCISE EDUCATIONAL INTERVENTION IN ADULT DIABETICS

1. I hereby authorize Charlotte A. Wisnewski M.S., R.N. to perform the following investigation:

This study will look at exercise in people with diabetes. At the first meeting of the diabetic group, the researcher will ask you to fill out three questionnaires. This should not take more than 20 minutes. The researcher will then present a program about the benefits of exercise for the person with diabetes which will last approximately 30 minutes. Guidelines for safe exercising for people with diabetes will be given. At the next monthly meeting, you will again fill out the questionnaires, except the one asking your age, sex, and other similar information. At this meeting, we will have an open session, allowing everyone time to talk about their experiences with exercise and how it affects their diabetes. This session will last about one hour.

2. The study listed in paragraph 1 has been explained to me by Charlotte A. Wisnewski, M.S.,R.N.

3. (a) I understand that the study may involve the following possible risks or discomfort: low blood sugar may occur as the result of exercise, mental distress if I do not know the answer to a question or feel I should be doing more healthy activities, mental distress if information is improperly released. (b) I understand that I will not lose my opportunity to attend the diabetic support group if I choose not to participate in the study. (c) I understand that there are no actual benefits to me from this study. (d) Efforts will be made to prevent any complication that could result from this research. I understand that medical services and money for injuries resulting from participation in the research are not available. The researcher is prepared to advise me in case of adverse effects, which I will report to her promptly. Phone numbers are listed on the top and bottom of this form.

4. An offer to answer all of my questions regarding the study has been made. The possible risks and discomforts have been discussed with me. I understand that I may

terminate my part in the study at any time without penalty.

5. The records are confidential and will be kept locked at all times. If you have any questions about the research or your rights as a subject, please call us. If you wish to report a research-related complication, you may call the Office of Research and Grants Administration during office hours (817) 898-3375 or the researcher at (409) 938-1211.

_____

Subject's Signature

_____

Date

TEXAS WOMAN'S
UNIVERSITY
DENTON/DALLAS/HOUSTON

COLLEGE OF NURSING
Houston Center
1130 M.D. Anderson Blvd.
Houston, TX 77030-2897
Phone: 713/794-2100

Consent Form

A STUDY OF THE HEALTH-PROMOTING BEHAVIORAL EFFECTS OF AN EXERCISE EDUCATIONAL INTERVENTION IN ADULT DIABETICS

1. I hereby authorize Charlotte A. Wisnewski M.S., R.N. to perform the following investigation:

This study will look at exercise habits in people with diabetes. At the first meeting of the diabetic group, the researcher will ask you to fill out three questionnaires. This should not take more than 20 minutes. The researcher will then present a program about exercise guidelines for the person with diabetes which will last approximately 30 minutes. At the next monthly meeting, you will again fill out the questionnaires, except the one asking your age, sex, and other similar information. At this meeting, the researcher will present a program about the benefits of exercise for the person with diabetes. This session will last about one hour.

2. The study listed in paragraph 1 has been explained to me by Charlotte A. Wisnewski, M.S.,R.N.

3. (a) I understand that the study may involve the following possible risks or discomfort: low blood sugar may occur as the result of exercise, mental distress if I do not know the answer to a question or feel I should be doing more healthy activities, mental distress if information is improperly released. (b) I understand that I will not lose my opportunity to attend the diabetic support group if I choose not to participate in the study. (c) I understand that there are no actual benefits to me from this study. (d) Efforts will be made to prevent any complication that could result from this research. I understand that medical services and money for injuries resulting from participation in the research are not available. The researcher is prepared to advise me in case of adverse effects, which I will report to her promptly. Phone numbers are listed on the top and bottom of this form.

4. An offer to answer all of my questions regarding the study has been made. The possible risks and discomforts have been discussed with me. I understand that I may

terminate my part in the study at any time without penalty.

5. The records are confidential and will be kept locked at all times. If you have any questions about the research or your rights as a subject, please call us. If you wish to report a research-related complication, you may call the Office of Research and Grants Administration during office hours (817) 898-3375 or the researcher at (409) 938-1211.

_____

Subject's Signature

_____

Date

APPENDIX E

DEMOGRAPHIC DATA SHEET

DEMOGRAPHIC DATA SHEET

Instructions: Please complete the following by checking the appropriate line or by writing in the information.

1. Age (in years) _____

2. Gender Female___ Male____

3. With what ethnic group do you identify?_____

4. Educational Level Highest grade completed_____
   Number of years of college or technical school _____
   College Graduate Yes___ No____
   Degree? Bachelor's _____
   Master's _____
   Doctorate _____
   Technical _____

5. Family income level Less than $10,000 _____ Yearly
   $10,000-$20,000 _____
   $20,000-$30,000 _____
   $30,000-$40,000 _____
   Greater than $40,000_____

6. What kind of Diabetes do you have? Type I_____
   Type II____
   Other -specify ____
   Don't Know___

7. How long have you known you had diabetes?_____

8. How long have you taken insulin?_____

APPENDIX F

HEALTH-PROMOTING LIFESTYLE PROFILE

LIFESTYLE PROFILE

DIRECTIONS: This questionnaire contains statements regarding your *present* way of life or personal habits. Please respond to each item as accurately as possible, and try not to skip any item. Indicate the regularity with which you engage in each behavior by circling:
N for never, S for sometimes, O for often, or R for routinely.

	NEVER	SOMETIMES	OFTEN	ROUTINELY
1. Eat breakfast.	N	S	O	R
2. Report any unusual signs or symptoms to a physician.	N	S	O	R
3. Like myself.	N	S	O	R
4. Perform stretching exercises at least 3 times per week.	N	S	O	R
5. Choose foods without preservatives or other additives.	N	S	O	R
6. Take some time for relaxation each day.	N	S	O	R
7. Have my cholesterol level checked and know the result.	N	S	O	R
8. Am enthusiastic and optimistic about life.	N	S	O	R
9. Feel I am growing and changing personally in positive directions.	N	S	O	R
10. Discuss personal problems and concerns with persons close to me.	N	S	O	R
11. Am aware of the sources of stress in my life.	N	S	O	R
12. Feel happy and content.	N	S	O	R
13. Exercise vigorously for 20-30 minutes at least 3 times per week.	N	S	O	R
14. Eat 3 regular meals a day.	N	S	O	R
15. Read articles or books about promoting health.	N	S	O	R
16. Am aware of my personal strengths and weaknesses.	N	S	O	R
17. Work toward long-term goals in my life.	N	S	O	R
18. Praise other people easily for their accomplishments.	N	S	O	R
19. Read labels to identify the nutrients in packaged food.	N	S	O	R
20. Question my physician or seek a second opinion when I do not agree with recommendations.	N	S	O	R
21. Look forward to the future.	N	S	O	R
22. Participate in supervised exercise programs or activities.	N	S	O	R
23 Am aware of what is important to me in life.	N	S	O	R

	NEVER	SOMETIMES	OFTEN	ROUTINELY
24. Enjoy touching and being touched by people close to me.	N	S	O	R
25. Maintain meaningful and fulfilling interpersonal relationships.	N	S	O	R
26. Include roughage/fiber (whole grains, raw fruits, raw vegetables) in my diet.	N	S	O	R
27. Practice relaxation or meditation for 15-20 minutes daily.	N	S	O	R
28. Discuss my health care concerns with qualified professionals.	N	S	O	R
29. Respect my own accomplishments.	N	S	O	R
30. Check my pulse rate when exercising.	N	S	O	R
31. Spend time with close friends.	N	S	O	R
32. Have my blood pressure checked and know what it is.	N	S	O	R
33. Attend educational programs on improving the environment in which we live.	N	S	O	R
34. Find each day interesting and challenging.	N	S	O	R
35. Plan or select meals to include the "basic four" food groups each day.	N	S	O	R
36. Consciously relax muscles before sleep.	N	S	O	R
37. Find my living environment pleasant and satisfying.	N	S	O	R
38. Engage in recreational physical activities (such as walking, swimming, soccer, bicycling).	N	S	O	R
39. Find it easy to express concern, love and warmth to others.	N	S	O	R
40. Concentrate on pleasant thoughts at bedtime.	N	S	O	R
41. Find constructive ways to express my feelings.	N	S	O	R
42. Seek information from health professionals about how to take good care of myself.	N	S	O	R
43. Observe my body at least monthly for physical changes/danger signs.	N	S	O	R
44. Am realistic about the goals that I set.	N	S	O	R
45. Use specific methods to control my stress.	N	S	O	R
46. Attend educational programs on personal health care.	N	S	O	R
47. Touch and am touched by people I care about.	N	S	O	R
48. Believe that my life has purpose.	N	S	O	R

APPENDIX G

MOS 10-Item Physical Functioning Form and Exercise Change Question

MOS 10-Item Physical Functioning Form

Instructions: Circle one number on each line.

The following items are about activities you might do during a typical day. Does your health now limit you in these activities. If so, how much?

ACTIVITIES	Yes, Limited A Lot	Yes, Limited A Little	No, Not Limited At All
a. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports	1	2	3
b. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	1	2	3
c. Lifting or carrying groceries	1	2	3
d. Climbing several flights of stairs	1	2	3
e. Climbing one flight of stairs	1	2	3
f. Bending, kneeling, or stooping	1	2	3
g. Walking more than a mile	1	2	3
h. Walking several blocks	1	2	3
i. Walking one block	1	2	3
j. Bathing or dressing yourself	1	2	3

2. How would you rate the amount of exercise you do now compared to one month ago?

a lot more	a little more	same	a little less	a lot less
5	4	3	2	1

Appendix H

Health-Promoting Lifestyle Profile Permission

Northern Illinois University
DeKalb, Illinois 60115-2854

Health Promotion Research Program
Social Science Research Institute
Ambulatory Cancer Clients Project
Cardiac Rehabilitation Project
Corporate Project
Older Adults Project
(815) 753-9670

July 26, 1989

Charlotte A. Wisnewski, MS, RN
310 South Shadowbend
Friendswood, TX 77546

Dear Ms. Wisnewski:

You have permission to use the 48-item Health-Promoting Lifestyle Profile in your study of the relationship between health values and disease knowledge in predicting health-promoting lifestyle behaviors in insulin-dependent diabetic adults. You may have copies made from the form which is enclosed. Content should not be altered in any way and the copyright/permission statement at the end must be reproduced.

Please send me an abstract of your study proposal when it is finalized. There is no charge for approved research use, but I would appreciate receiving a copy of your completed dissertation for our files. We are particularly interested in information about scores (range, mean and standard deviation) on the Lifestyle Profile, reliability coefficients, and correlations with other measured variables.

Please let me know if I can answer any further questions. Best wishes with your study.

Sincerely,

Susan N. Walker

Susan Noble Walker, Ed.D., R.N.
Associate Professor and
Co-Director, Health Promotion Research Program

Encl.

APPENDIX I

MOS 10-item Physical Functioning Permission

THE MOS 36-ITEM SHORT-FORM HEALTH SURVEY (SF-36): USER AGREEMENT FOR U.S. ENGLISH-LANGUAGE VERSION

This Agreement is between New England Medical Center Hospitals, Inc. ("NEMCH") and Christie A. Wisniewski ("User"). NEMCH hereby grants User a nonexclusive, royalty free, paid up, limited license to use: (1) the U.S. English-Language version of the MOS 36-Item Short-Form Health Survey (SF-36™) in an approved format and (2) the documentation for administering and scoring the SF-36 (Basic Scoring Algorithms) based upon the following conditions:

1. User shall not modify, abridge, condense, translate, adapt, recast, or transform the SF-36 or the Basic Scoring Algorithms in any manner or form, including but not limited to any minor or significant change in wording or organization of the SF-36;

2. User shall not reproduce the SF-36 or the Basic Scoring Algorithms except for the limited purpose of generating sufficient copies for its own uses and shall in no event distribute copies of the SF-36 or the Basic Scoring Algorithms to third parties by sale, rental, lease, lending, or any other means;

3. User shall not (i) use the name of NEMCH, any of its affiliates, employees, agents, medical or research staff; or (ii) state or imply that NEMCH, any of its affiliates, employees, agents or medical research staff has/have interpreted, approved, or endorsed the use of, or the results of, the SF-36, without the prior express, written approval of NEMCH;

4. The SF-36 and the Basic Scoring Algorithms may be revised from time to time. NEMCH shall provide User with any revised forms of the SF-36 or the Basic Scoring Algorithms. User shall have the right to continue to use a superseded version of the SF-36 and the Basic Scoring Algorithms in connection with any then on-going project or study in which such superseded versions have been utilized and user agrees to identify and label the form used according to guidelines provided by NEMCH;

5. User shall not (i) take any action which would destroy or diminish NEMCH's rights in the SF-36 trademark; (ii) use the SF-36 trademark, or any mark or names confusingly similar thereto, for any purpose not authorized in writing by NEMCH; and (iii) User otherwise agrees to cooperate with NEMCH in preserving the goodwill in the SF-36 trademark.

In consideration of the rights granted by NEMCH to User hereunder, User agrees to provide NEMCH with a brief annual update regarding whether and for what purpose the SF-36 is used. The term of this User Agreement shall be for a period of one year commencing on the date indicated below provided, however, NEMCH may terminate this User Agreement any time in the event: (i) User fails to submit the annual update to NEMCH regarding its use of the SF-36 and the Basic Scoring Algorithms, or (ii) user breaches any term of this User Agreement. Should NEMCH terminate this User Agreement, User shall immediately cease all use of the SF-36 and the Basic Scoring Algorithms and shall destroy or return all unused copies of the SF-36 to NEMCH. NEMCH retains all rights in the SF-36 and the Basic Scoring Algorithms, including but not limited to all rights under copyright and trademark, not expressly licensed hereunder.

This User Agreement shall be construed and enforced in accordance with the domestic substantive laws of the Commonwealth of Massachusetts without regard to any choice or conflict of laws, rule or principle that would result in the application of the domestic substantive law of any jurisdiction. The rights and obligations of the parties set forth above are subject to all applicable state and Federal law and regulation. Neither party shall be entitled to exercise rights granted to it hereunder if such exercise would violate any applicable state or Federal law or regulation. In addition, no party shall be liable to the other party or to any third person for its breach of this Agreement if such party's satisfaction of its obligation hereunder would put such party in violation of any such applicable state or Federal law or regulation.

FORMAT: ☒ Standard or ☐ Alternate Approved (copy attached)

NEMCH Inc.

BY: _____

John E. Ware, Jr., Ph.D.
Principal Investigator
Medical Outcomes Study

DATE: 9/2/93

USER:

BY: Charlotte A. Wiemuth MS, R

TITLE: Doctoral Candidate

ORGANIZATION: Texas Woman's Univ

ADDRESS: 310 So. Shadowbend
Friendswood, Tx. 77546

DATE: July 12, 1993

Physical Functioning Form Permission
MOS-36

September 15, 1994
Telephone Call to :

Medical Outcomes Trust
New England Medical Center
Boston, Massachusetts 02111

Question 3: a-j was reproduced with permission from the Medical Outcomes Trust.

APPENDIX J

DIABETIC EXERCISE TEACHING INTERVENTION

FACTORS AFFECTING EXERCISE BEHAVIOR IN DIABETICS

I. Introduction

A. Why Exercise?

B. Exercise is a national public health priority for people with diabetes mellitus (DM)

II. Factors affecting exercise behavior in DM(Pender's Model)

A. Importance of Health

1. The value placed on physical health versus other values

2. High value usually placed on health by most

B. Perceived Control of Health

1. Definition of Concept of Internal vs External Locus of Control

2. How a diabetic can take control of personal health

a. Control of blood sugar

b. Nutrition

c. Exercise

C. Perceived self-efficacy

1. Definition

2. Application to DM and exercise habits

D. Definition of Health

1. Discussion of the the meaning of health
2. Holistic concept of health lends impetus to the idea of exercise for DM

E. Perceived Health Status
   1. Definition of the concept
   2. Health status may increase or decrease level of exercise since it reflects how a person feels

F. Perceived Benefits of Health promotion behavior
   1. Discussion of benefits
      a. Feeling better
      b. Losing weight
      c. Lowering blood sugar
      d. Lowering cholesterol
      e. Reduction of insulin requirements
   2. Encouragement of commitment to exercise on a three times/ week basis

G. Perceived Barriers of Health Promotion Behaviors
   1. Discussion of barriers
      a. Lack of time
      b. Poor health status
      c. Lack of desire
      d. Possibility of hypoglycemia
      e. Trauma to feet
   2. Discussion of means to reduce barriers
      a. Set a regular time to exercise

b. Adapt exercise to state of health

c. Relook at benefits

d. Eat an appropriate sized snack first

e. Wear proper fitting shoes

H. Biologic Characteristics

1. Insulin Dependent Diabetes

a. Check with physician before beginning exercise

b. Avoid high intensity exercise if you have diabetic retinopathy

c. Wear well fitting shoes and check feet afterwards for blisters

d. Eat a snack before exercising according to intensity of planned exercise

(1) Light exercise- 1 fruit/ 1 bread

(2) Moderate- 1 bread and 1 milk or 1 bread, 1 meat

(3) Strenuous- 2 breads, 1 meat and 1 fruit

e. Monitor blood sugar after exercise

f. Carry identification and a source of readily available carbohydrate

g. Don't exercise at insulin peak times

h. Don't inject insulin into an extremity being exercised

i. Don't exercise if blood sugar above 300

2. Non-insulin dependent Diabetes

    a. Check with physician before beginning exercise

    b. If sedentary, begin with sessions of walking for 5-10 minutes , three times a week

    c. Use guidelines for IDDM except insulin injection doesn't have to be considered and glucose monitoring need not be done

Exercise Program Adapted from:

American Diabetes Association (1988). Physician's Guide to Insulin-dependent (Type I) Diabetes: Diagnosis and Treatment. (2nd ed.). Alexandria, Virginia: Author.

American Diabetes Association (1988). Physician's Guide to Non-Insulin Dependent (Type II) Diabetes: Diagnosis and Treatment. (2nd ed.). Alexandria, Virginia: Author.

APPENDIX K

EXERCISE GUIDELINES FOR DIABETICS

EXERCISE AND DIABETES

FIT FACTS

Classifications of diabetes:

Type I - Insulin-Dependent Diabetes Mellitus (IDDM) or juvenile onset. This type of diabetes is associated with a deficiency of insulin production.

Type II - Non-Insulin Dependent Diabetes Mellitus (NIDDM) or mature onset. This type of diabetes is associated with decreased insulin sensitivity or obesity. Ninety-three percent of all diabetics have NIDDM and 85% of these patients are obese at the time of diagnosis.

When the body's sugar level in the blood is too low, it is termed hypoglycemia. To correct this condition, quick-acting sugar must be consumed. When the sugar level is too high, it is termed hyperglycemia and insulin must be administered.

It is estimated that with proper diet and exercise, only 25% of diabetics would need any kind of medication. Ninety percent of NIDDM is preventable with proper diet/exercise programs. The treatment of diabetes centers around the control of blood glucose levels. This control can be achieved through insulin, diet and exercise.

Benefits of aerobic exercise

1. Improved Diabetic Control - regular aerobic exercise will decrease insulin requirements by 30 to 50% in well-controlled IDDMs and by 100% in NIDDM.
2. Correction or prevention of obesity.
3. Reduction in the risk of coronary heart disease.

EXERCISE CREATES A RESPONSE SIMILAR TO THAT OF INSULIN WHICH WILL LOWER BLOOD SUGAR LEVELS.

The best form of aerobic training is considered cross-country skiing because it works the major muscle groups of both the upper and lower body. Other excellent forms of aerobic exercise that utilize large muscle groups include rowing, biking and swimming.

Exercise guidelines

Frequency : 3 to 5 times/week
Intensity : 60 to 75% of maximum heart rate (MHR=220-age)
Duration : 20 to 60 minutes each session.

Precautions for exercise participation:

(Guidelines from ACSM)

1. Monitor blood glucose prior to exercise.
2. Type I diabetics may decrease insulin dose or increase carbohydrate intake prior to exercise as recommended by the physician.
3. Type I diabetics should avoid injecting insulin into muscle areas that will be active during exercise.
4. Type I diabetics should avoid exercise during times when insulin reaches peak effectiveness.
5. Short-acting carbohydrates should be available for hypoglycemia reactions.
6. Carbohydrates may be ingested during prolonged exercise sessions (5 to 20 grams every 20 minutes).
7. Exercise 1 hour after meals when blood glucose is at its peak.
8. Proper footwear must be used and any injuries that occur must be treated immediately (i.e. blisters, abrasions, infections).
9. Avoid isometric, static-held contractions, which may elevate blood glucose and/or blood pressure.
10. Exercise participation should only take place after approval by the individual's personal physician.

For more information on this topic or other health-related topics, please call or write to:
THE NATIONAL EXERCISE FOR LIFE INSTITUTE • P.O. Box 2000 • Excelsior, MN • 55331-9967 • 1-800-358-3636

Dedicated to collecting and disseminating information concerning the benefits of exercise, in order to convince more Americans to undertake and maintain a personal program of regular exercise

2

Strength training and diabetes.

There is strong evidence that NIDDM is genetically determined*, and that obesity and aging promote the development of the disease among those who are susceptible. Obesity is characterized by insulin resistance, and when weight is lost the resistance is reduced. Blood glucose levels usually return to normal levels with weight loss. Weight loss also improves hypertension or high blood pressure and lipid profiles (cholesterol, triglycerides). Weight reduction by obese NIDDM individuals is of the utmost importance.

Resistance or strength training combined with aerobic exercise and a proper diet are 3 powerful ways of reducing the possible onset of diabetes, and for controlling the disease. As we know, 85% of NIDDM individuals are obese at the time of diagnosis. Most people understand that a proper diet and aerobic exercise can help prevent or control obesity, but what is now gaining the recognition it deserves is *strength training*.

By increasing strength, you also increase muscle mass. Ninety percent of the calories your body burns are from the use of muscle. In fact, 30 to 50 kcal/day are required to sustain the activity of 1 pound of muscle. Therefore, by increasing muscle mass you increase your ability to burn additional fat and calories. Aside from the benefits of additional muscle, the act of strength training elicits a caloric expenditure of approximately 540 kcal in a 60-minute session.

1 pound of body weight = 3,500 calories.

* National Institutes of Health

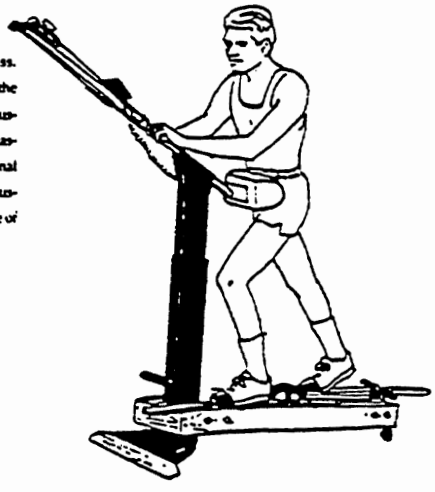
Guidelines for strength training:

1. Avoid exercising the muscle area underlying injections of short-acting insulin for at least 1 hour.

2. Make sure to always maintain a proper breathing pattern. Do not hold your breath during exercise.

3. Several long-term complications of diabetes may be worsened by exercise. Individuals who have complications with their retina should avoid exercise that requires straining or breath holding.

ALWAYS CONSULT YOUR PERSONAL PHYSICIAN BE STARTING ANY EXERCISE PROGRAM.



APPENDIX L

Calendar to Record Exercise

february

1995

SUN	MON	TUE	WED	THU	FRI	SAT
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

APPENDIX M

Subscale Scores for

Health Promoting Lifestyle Profile

Appendix M-Table 1

Means and Standard Deviations on Health Promoting Lifestyle Profile Subscales

N=95

		Overall	Experimental	Control
		n=95	n=50	n=45
Exercise Subscale				
(5 items)				
Pretest				
Mean		2.13	2.24	2.01
S. D.		0.79	0.82	0.75
Total Mean		10.63	11.17	10.05
S. D.		3.96	4.11	3.75
Posttest				
Mean		2.52	2.57	2.47
S.D.		0.84	0.87	0.81
Total Mean		12.60	12.85	12.33
S.D.		4.19	4.33	4.06
Interpersonal Subscale				
(7 items)				
Pretest	(n=91)			
Mean		3.02	3.04	2.99
S.D.		0.60	0.58	0.63
Total Mean		21.11	21.25	20.95
S.D.		4.20	4.06	4.39
Posttest	(n=95)			
Mean		3.39	3.33	3.45
S.D.		0.53	0.50	0.55
Total Mean		23.71	23.28	24.18
S.D.		3.68	3.47	3.87

Appendix M-Table 1 Means and Standard Deviations for the HPLP Subscales (cont.)

		Overall	Experimental	Control
Diet Subscale				
(6 items)	(n=90)			
Pretest				
Mean		3.15	3.28	3.02
S.D.		0.65	0.67	0.61
Total Mean		18.91	19.70	18.09
S.D.		3.93	4.03	3.68
Posttest				
Mean		3.31	3.38	3.24
S.D.		0.53	0.49	0.56
Total Mean		19.88	20.28	19.44
S.D.		3.16	2.95	3.35
Health Responsibility Subscale				
(10 items)	(n=88)			
Pretest				
Mean		2.70	2.82	2.56
S.D.		0.60	0.60	0.57
Total Mean		26.98	28.22	25.62
S.D.		5.96	5.98	5.70
Posttest	(n=95)			
Mean		3.10	3.09	3.12
S.D.		0.49	0.48	0.51
Total Mean		31.03	30.92	31.16
S. D.		4.91	4.76	5.13

Appendix M- Table 1 Means and Standard Deviations on HPLP Subscales (cont.)

		Overall	Experimental	Control
Self-actualization Subscale				
(13 items)	(n=92)			
Pretest				
Mean		3.19	3.19	3.47
S. D.		0.63	0.63	0.49
Total Mean		41.47	41.51	41.42
S.D.		7.77	8.23	7.33
Posttest	(n=92)			
Mean		3.45	3.44	3.47
S.D.		0.48	0.49	0.49
Total Mean		44.88	44.74	45.05
S.D.		6.30	6.30	6.37
Stress Management Subscale				
(7 items)				
Pretest	(n=85)			
Mean		2.62	2.68	2.56
S.D.		0.56	0.64	0.46
Total Mean		18.35	18.73	17.95
S.D.		3.90	4.46	3.20
Posttest	(n=94)			
Mean		3.06	3.00	3.14
S.D.		0.58	0.58	0.58
Total Mean		21.46	20.98	21.96
S.D.		4.04	4.03	4.03