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PERCEIVED QUALITY OF LIFE OF ADULTS AGED 30 TO 50 YEARS WITH TYPE I AND II DIABETES

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ABSTRACT

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The purpose of this study was to explore the difference between the perceived quality of life of adults with Type I and II diabetes mellitus. The conceptual framework of Imogene King (1981) was used. This secondary analysis of data utilized a non-probability convenience sample (N=117) of persons with diabetes 30 to 50 years of age. A majority of the sample perceived their quality of life in each of the five domains to be high. A significant difference between persons with Type I and II diabetes mellitus was identified in four of the quality of life domains: physical functioning, psychological functioning, occupational functioning, and somatic sensation. No significant difference was found within the social interaction domain. The results of this study provide useful information for the Clinical Nurse Specialist to utilize in the delivery of primary health care.

To Mike and Rhonda Linn

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Introduction

As the population of the United States grows older, the challenges posed by chronic and disabling conditions demand greater attention by the health care system. Diabetes mellitus, one of the most prevalent chronic conditions among Americans, imposes a major burden of preventable illness, premature mortality, and excessive financial cost.

Between thirteen and fourteen million people in the United States have diabetes mellitus (National Institutes of Health, 1992). Type I diabetes, which occurs most often before the age of thirty years, requires the use of exogenous insulin to avoid life threatening ketoacidosis (American Diabetes Association, 1993c). In contrast, persons with Type II diabetes are usually diagnosed at an older age, do not develop ketoacidosis, and may be managed with no medication, oral hypoglycemics or exogenous insulin injections (American Diabetes Association, 1993c).

Diabetes is widely recognized as one of the leading causes of death and disability in the United States. In 1992, 11.7 percent of deaths per 100,000 U.S. population were attributed to diabetes, ranking seventh of all causes of death (Centers for Disease Control and Prevention, 1993). Individuals with diabetes mellitus face not only a shortened life span but also the probability of developing acute and chronic complications. The Centers for Disease Control and Prevention (1991) estimate that over 2,900 persons living in Michigan suffer significant diabetes related complications each year, with over 2,020 lower extremity amputations, 365 new cases of end stage renal disease (ESRD) and 520 new cases of blindness.

Diabetes mellitus can present a wide variety of symptoms, ranging from none to being in coma (McCance & Huether, 1990). Due to insulin deficiency, the assimilation and storage of glucose in muscle, adipose tissue, and the liver is greatly diminished. The glucose accumulation in the blood and increase in osmolarity results in depletion of intracellular water and osmotic diuresis, creating intense thirst and increased urination. Fatigue and muscle weakness occur as the glucose needed for energy is not metabolized properly. Weight loss can occur in persons with Type I diabetes mellitus as a result of metabolism of protein and stored fat, as absence of sufficient insulin makes glucose unavailable. Both Type I and Type II diabetics can experience coma as a result of the lack of availability of glucose for metabolism, and excessive fat metabolism.

The long term consequences of diabetes can involve both large and small blood vessels throughout the body. Macrovascular disease is the most prominent, overall cause of morbidity and mortality among individuals with Type II diabetes. For reasons not understood, there is proliferation of subendothelial smooth muscle in artery walls, with formation of the fibrous plaques of atherosclerosis (McCance & Huether, 1990). In addition, deposition of lipids in arteries is facilitated, as the protective high density lipoproteins are present in low concentrations. As a result of these macrovascular changes, coronary artery disease, stroke, and peripheral vasacular disease result. Microvascular changes associated with diabetes mellitus result from thickening of the capillary basement membrane, eventually resulting in decreased tissue perfusion (McCance & Huether, 1990). Diabetic retinopathy, a common cause of vision loss in persons with diabetes, is believed to be a response to retinal ischemia caused by microangiopathy. Pathologic changes in the small blood vessels serving the kidney lead to nephrosclerosis, pyelonephritis, and other disorders that may lead to renal failure. Renal disease is a frequent cause of morbidity and mortality of persons with Type I diabetes mellitus.

Diabetic neuropathy, another chronic complication of diabetes mellitus, is not well understood. There is degeneration of the axons of unmyelinated nerve fibers of both peripheral nerves and those of the central nervous system (American Diabetes Association, 1989). Schwann cell abnormalities result, with a pattern of demyelination and remyelination. In addition, there is thickening of the basement membrane of the blood vessels of the neurons (McCance & Huether, 1990). Changes in both motor nerve conduction and sensory perception result in peripheral neuropathies that can be painful and limit mobility of the upper and lower extremities. Autonomic neuropathies can effect the cranial nerves, genitourinary, gastrointestinal and cardiovascular systems, and vasomotor stability (American Diabetes Association, 1989).

Careful control of diabetes is critical to prevention and management of its complications. Diet and physical activity are important to the management of both types of diabetes, and Type II diabetes can often be prevented through these measures (United States Department of Health and Human Services, 1991). Health care of the person with diabetes presents a significant challenge to both the person with diabetes and the health care provider. The Clinical Nurse

Specialist functioning in the primary health care setting is challenged with providing affordable, comprehensive, quality care to persons with diabetes. The nurse is in a position to influence both the delivery of health care services to the person with diabetes and the adoption of positive health care behaviors.

Measurement of morbidity and survival rates have traditionally been the focus of evaluation of health interventions. At present, health care research and delivery place emphasis on measurement of physical and disease related patient outcomes; that is, what happens to the patient in terms of management of health and illness, palliative care, or rehabilitation. The concept of outcome directs attention specifically to the client's physical well being.

Primary health care includes holistic care, which takes into account the needs and strengths of the whole person. Quality of life measurement is one outcome measurement influenced by nursing, that is reflective of broader health needs than physical ones. Quality of life measurement has been used to assess the individual's perception of the impact of care and the satisfaction with the level of well being (Rodin, 1990). Quality of life has been measured by exploring the effect of illness or care on one's physical, occupational, psychological, social, spiritual, and cognitive function, as well as by evaluation of the physical sensations experienced (Spilker, 1990). Thus, quality of life measurement can provide insights into the effect diabetes has on an individual's life, and may help identify therapeutic approaches with the greatest overall benefit (Jones, Quirk & Baveystock, 1991). Croog, Levine, Testa, Brown, Bulpitt, Jenkins, Klerman, and Williams (1986) suggest that by attending to quality of life measures, health care professionals can address the needs and concerns of their patients, and can expect that fewer patients may fail to adhere adequately to their prescribed regimen.

The Clinical Nurse Specialist in primary care provides preventive health services to persons with chronic illness, and routinely screens for conditions for which no prevention methods exist. By remaining aware of perceptions being held about the effect of diabetes mellitus on life and satisfaction, the Clinical Nurse Specialist (CNS) may implement interventions that positively affect perceived quality of life and diabetes. Aware of the similarities and differences between Type I and Type II diabetes, the CNS might expect perceptions regarding quality of life to be varied on some topics, and similar on others. Therefore, the purpose of this study is to describe how adults with each type of diabetes perceive the quality of their lives.

The aim of this study is to determine what perceptions exist related to quality of life in a sample of persons ages thirty to fifty years of age with diabetes. The major study question explores if there is a significant relationship between perceived quality of life and type of diabetes. The relationship will be analyzed by an assessment of five domains of perceived quality of life:

1. Is physical functioning perceived differently by persons with Type I and Type II diabetes?
2. Is occupational functioning perceived differently by persons with Type I and Type II diabetes?
3. Is psychological functioning perceived differently by persons with Type I and Type II diabetes?

4. Is social functioning perceived differently by persons with Type I and Type II diabetes?
5. Are the somatic sensations experienced by persons with Type I and Type II diabetes perceived as different?

The results of the investigation have the potential to contribute to the nursing profession in several ways. First, it may provide information that will assist the Clinical Nurse Specialist in developing interventions that may positively impact the emotional, social, and role functions of a person with diabetes. With information that guides practice, such as how persons with Type I and II diabetes experience their illness, the CNS can plan interventions that have greater opportunity to result in improved health care. Second, the theoretical knowledge base on client perceptions will be expanded.

Conceptual Definitions

This section summarizes the literature related to both perceived quality of life and diabetes mellitus. Following the overview of each of these two concepts, the conceptual definitions are found.

Perceived Quality of Life

Burckhardt, Woods, Schultz, and Ziebarth (1990) define quality of life as the client's subjective feelings about the quality of the lives they live while coping with a chronic illness or disabling condition. Jones (1991) describes quality of life as a comprehensive measure of general health designed to summarize a broad spectrum of the effects of disease on the patient's lives and perceived well being.

Bombardier, Ware, Russell, Larson, Chalmers and Read (1986) and Drossman, Leserman, Li, Mitchell, Zagami and Patrick (1991) emphasize quality of life as a global sense of well being and health, requiring a comprehensive assessment of overall health. Estwing-Ferrans and Powers (1992) believe global measures of quality of life have produced limited information, and encourage exploration about specific life domains.

Quality of life is most frequently described in the literature through exploration of one or more life domains. Hanestad, Hornquist, and Albrektsen (1991), for instance, define quality of life as "perceived need and functional satisfaction within six fundamental life domains" (p.58). The life domains are physical, psychological, social, activity, material and religious needs. One domain frequently assessed is that of sense of well being and satisfaction with life (Croog et al., 1986; Drossman et al., 1991; Ganz, Schag, & Cheng, 1990; Jenkins, Jono, Stanton, & Stroup-Benham, 1990; Meeberg, 1993; Rodin, 1990; Stewart, Greenfield, Hays, Wells, Rogers, Berry, McGlynn & Ware, 1990.)

Both physical state and psychological functioning are included as domains of quality of life by many authors (Barnett, 1991; Bombardier et al., 1986; Burckhardt et al., 1989; Croog et al., 1986; Drossman et al., 1991; Estwing- Ferrans & Powers, 1992; Fergusson & Cull, 1991; Ferrell, Grant, Schmidt, Rhiner, Whitehead, Fonbuena, & Forman, 1992; Ganz et al., 1990; Geddes, 1991; Hanestad et al., 1991; Hunskaar & Vinsnes, 1991; Jenkins et al., 1990; Jones, 1991; Rodin, 1990; Selman, 1989; Spilker, 1990; Stewart et al., 1989; Zhan, 1992). Physical state includes physical symptoms, functional status, and objective measures, such as range of joint motion. Psychological functioning includes concepts such as emotional state, attitude toward illness, self esteem and self concept.

The quality of life domain of social and role functioning often includes assessment of family, marital, occupational, and sexual relationships (Burkchardt et al., 1989; Croog et al., 1986; Drossman et al., 1991; Ferrell et al., 1992; Ganz et al., 1990; Geddes, 1991; Hanestad et al., 1991; Hicks, Larson, & Estwing-Ferrans, 1992; Jenkins et al., 1990; Jones, 1991; McHorney, Ware, Rogers, Raczek & Lu, 1992; Rodin, 1990; Selman, 1989; Spilker, 1990; Stewart et al., 1989). Fewer authors include intellectual functioning or cognitive ability as a quality of life domain (Croog et al., 1986; Jenkins et al., 1990). Spirituality has been identified as a distinct domain by several researchers (Estwing-Ferrans & Powers, 1992; Ferrell et al., 1992; Hanestad et al., 1991; Hicks et al., 1992).

Sense of dependence on others has also been described as a quality of life domain (Burckhardt et al., 1989; Selman, 1989). Economic status or socioeconomic status has been included by several authors (Estwing-Ferrans & Powers, 1992; Hanestad et al., 1991; Hicks et al., 1992; Jenkins et al., 1990; Zhan, 1992). Health care use and the relationship of the client with the health care system is a domain explored by other researchers (Drossman et al., 1991; Ganz et al., 1991).

The terms "quality of life" and "health status" are frequently used interchangeably, as if they have identical meaning (Fries & Spitz, 1990; Rodin, 1990). Spilker (1990) suggests that the term health status should be used for assessments which discriminate along a continuum which includes perfect health, while the term quality of life (QOL) be used to quantify attributes among persons with definite disease. The present investigation, consistent with Spilker's (1990) recommendation, utilized the term quality of life, rather than health status, as the target population had definite disease, diabetes mellitus.

Spilker's (1990) definition of quality of life and description of five quality of life domains provided the structure for the exploration in this study of the diabetic client's perceptions. Spilker (1990) adopted Shumaker's (1990) definition of overall quality of life as the "individual's overall satisfaction with life and their sense of personal well being" (p. 96). Five broad domains are considered by Spilker (1990) to contribute to one's quality of life: physical function, occupational function, psychologic state, social interaction, and somatic sensation.

Physical function refers to the ability to perform a variety of physical activities. It is the quality of life factor approximating the physical outcome measures traditionally used in medicine. Questions of strength, energy and the ability to walk and climb stairs are explored in this domain.

Occupational function, as described by Spilker (1990), explores the extent to which health interferes with usual daily activities, such as work, housework or school. Stewart et al. (1989) describe this domain as role function.

Psychologic function is a third quality of life domain described by Spilker (1990). Many psychological parameters are believed to have an impact on quality of life. Mood, anxiety, depression, anger, and fear are issues described by Spilker (1990) as important psychological parameters of this domain. This domain is also described as perceived mental health, as defined by general mood or affect, including depression and anxiety (Stewart et al., 1989).

Spilker's (1990) fourth quality of life domain is social interaction. This factor refers to a client's ability to carry on the person to person interactions with family, friends, work and community. This domain explores the extent to which health interferes with normal social activities such as visiting with friends or participating in groups.

Somatic sensation is the fifth domain in Spilker's (1990) model. This domain encompasses unpleasant feelings which may detract from quality of life. Somatic sensations include symptoms such as pain, nausea, vomiting, and shortness of breath. Stewart et al. (1989) describe a similar domain which explores solely bodily pain, while Hanestad et al. (1991) include disease specific symptoms in this domain.

Spilker (1990) emphasizes the multifactorial nature of quality of life - that measurement of one domain of quality of life will reveal information on only a single aspect of a person's overall function. Spilker (1990) emphasizes the subjective nature of quality of life measurement, stating "the ultimate observer of the experiment is not a dispassionate third party, but a most intimately involved patient" (p.22). How the client experiences an illness, the perception of symptoms, the way in which the client labels them and communicates distress, the experience of being unable to function normally and the methods used to cope, is essential knowledge.

Type I and Type II Diabetes

Type I diabetes mellitus, also called Insulin Dependent Diabetes Mellitus (IDDM), commonly develops in persons under the age of thirty. Exogenous insulin administration is required in all persons with Type I diabetes, as the production of insulin by the Beta cell of the pancreas is lost. Omission of insulin injections can result in life threatening diabetic ketoacidosis (American Diabetes Association, 1993c).

Type II diabetes, non-insulin dependent diabetes mellitus (NIDDM), is the most common form of diabetes. Type II diabetes usually begins in middle age, but can occur earlier or later in life. It is called NIDDM to indicate resistance to the development of diabetic ketoacidosis. Persons may be treated with no medication, oral hypoglycemic agents, or insulin (American Diabetes Association, 1993c).

Management of either type of diabetes mellitus requires modification of dietary intake, lifestyle changes, family and patient education, and on going support and follow up. Routine screening evaluations for microvascular, macrovascular, and neurologic complications of diabetes, as well as identification of the symptoms of hyperglycemia and hypoglycemia are also part of the self care of a person with either type of diabetes. The use of self blood glucose monitoring is recommended for insulin-treated patients by the American Diabetes Association (1989).

One common test used to measure the level of metabolic control of diabetes is the glycosylated hemoglobin. The blood test provides an accurate long term index of the diabetic's average blood glucose level by reflecting the average blood sugar level for the 100-120 day period before the test (Pagana & Pagana, 1992). The more glucose the red blood cell is exposed to, the greater the glycosylated hemoglobin, and the poorer the level of metabolic control of diabetes.

Research indicates that intensive insulin therapy delays the onset and slows the progression of diabetic retinopathy, nephropathy, and neuropathy in persons with IDDM (Diabetes Control and Complications Trial Research Group, 1993a). Intensive therapy aims to normalize blood sugar by the use of three or more daily insulin injections or use of an insulin pump, and five to seven capillary blood sugar readings each day. It is uncertain if the findings of the research involving Type I diabetics can be generalized to persons with Type II diabetes (American Diabetes Association, 1993a; Diabetes Control and Complications Trial Research Group, 1993).

It is apparent that diabetes self care places considerable demands on the person with diabetes. Thus, it is appropriate for the Clinical Nurse Specialist in primary care to determine what the person with diabetes perceives his/her quality of life to be.

For the purpose of this study, Type I diabetes mellitus was conceptually defined as an autoimmune disorder, requiring use of exogenous insulin to sustain life and to avoid ketoacidosis. Type II diabetes was conceptually defined as diabetes in which the individual is ketosis resistant, in whom insulin use to avoid ketoacidosisis is not essential to sustain life, but for whom diet, exercise, oral hypoglycemic agents or insulin may be used for control of hyperglycemia.

Conceptual Framework

The variables used to study the perceived quality of life of adults with diabetes mellitus can be conceptualized through use of the framework for nursing of Imogene King (1981). King's (1981) framework describes the health concerns which are the focus of nursing as those of the personal, interpersonal, and social systems. The client within the health care system is the personal system. King (1981) emphasizes that understanding the individual as a whole (the personal system) is critical for nursing. Two concepts of King's (1981) personal system, perception and self, are relevent to the variables of this study. Perception, according to this framework, is each person's representation of reality. It is through the perceptual process that a person assigns significance to the surrounding environment (Ittleson & Cantril, 1954 as cited in King, 1981). Perceptions considered in this study are those related to perceived quality of life of an adult with diabetes. These perceptions include those of physical functioning, such as perceived ability to perform vigorous and moderate activity, climb stairs, bend, walk one block, bathe and dress. The adult with diabetes also has perceptions related to occupational functioning - how work or other daily activities are affected. Psychological perceptions of the diabetic client include satisfaction with general moods including amount of worry, and feelings of peace, calm and nervousness. The diabetic client will also have perceptions related to diabetes' effects on him/her socially. Perceptions related to the extent to which health interferes with normal social activities is an important aspect of quality of life. The health care profession has traditionally focused on the patient's somatic sensations such as pain, thirst, fatigue, low blood sugar reactions, and bodily pain.

King (1981) states that "individual's differ in what they select to enter their perceptual milieu" (p.20). Since perception is subjective, personal, and selective (King, 1981) it cannot be assumed that persons with Type I diabetes have the same quality of life perceptions as those with Type II diabetes. Similarly, all persons with one type of diabetes cannot be expected to have similar perceptions.

It is through perception, according to King (1981), that an individual comes to know self.

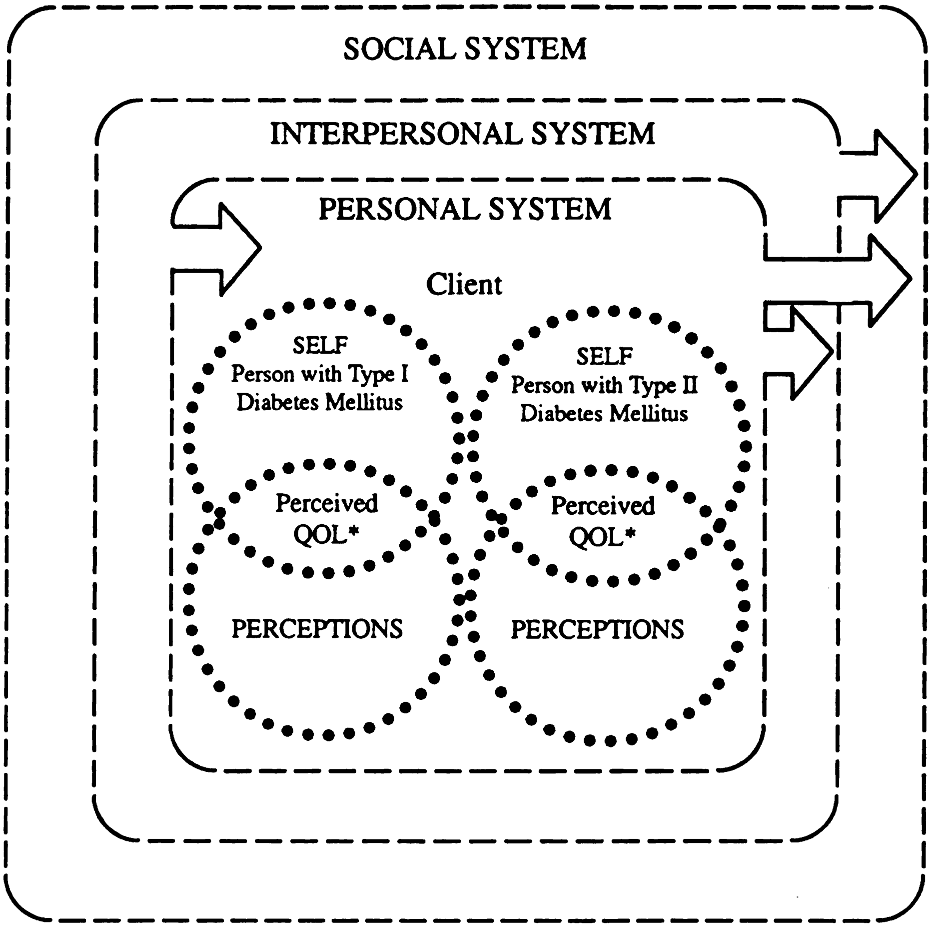
> "The self is a composite of thoughts and feelings which constitute a person's awareness of his individual

> existence...A person's self is the sum total of all he can call his...a person's total subjective environment." (p.27)

Within the personal system of the client, having diabetes is one component of self. Since each person functions in various roles within the family, community, and society, being a person with diabetes constitutes part of, but not the totality of self.

King (1981) does not describe self or perception as subsystems of the personal system, but rather as interacting concepts. It is expected that the perceptions of the person with diabetes will influence the concept of self. A highly independent, physically active person with diabetes' sense of self, for instance, might be influenced by an increase in the amount of bodily pain perceived or a decrease in functioning within the physical domain. Similarly, a person with diabetes' sense of self might influence what is perceived. If a person with diabetes' sense of self has been negatively influenced by interactions with others, or inadequate fulfillment of growth and developmental needs, functioning within the social and occupational domains of quality of life might be adversely perceived.

The model in Figure 1 illustrates the varibles of perceived quality of life of persons with Type I and Type II diabetes within King's (1981) conceptual framework. The boundaries of social, interpersonal, and personal systems are drawn with interrupted lines to represent each as open systems, exchanging information with each other and the environment. The boundaries of self and perceptions, also interrupted lines, are illustrated differently to highlight them as concepts within the personal system rather than subsystems. Since King (1981) states that the perceptions of the person influences the concept of self and



*Perceived QOL: Physical, Occupational, and Psychological Functioning, Somatic Sensation, and Social Interaction

Figure 1. The concepts of perceived quality of life and self in the client with diabetes within the personal system. Adapted from A Theory for Nursing: Systems, Concepts, Process (King, 1981).

the self is a person's subjective environment, perceptions are illustrated as interacting with the self. Persons with Type I and II diabetes, having different subjective experiences, are expected to have a different sense of self. Therefore, each type of diabetes is illustrated within its own self. The perceptions of quality of life are illustrated in the area of overlap of perception and self. It is expected that perceptions related to quality of life are only a few of the many perceptions of a persons with diabetes mellitus. Therefore, this area of overlap is not large. The overlapping area is consistent with King's (1981) statement that perceptions influence the concept of self. The arrows in this model illustrate the interactions possible within the framework, and emphasize the interconnectedness of each of the systems with each other.

Review of Literature

This review of literature explores research related to the five domains of perceived quality of life under study- physical, occupational and psychological function, social interaction and somatic sensation - as experienced by persons with Type I and Type II diabetes. After each domain is reviewed and summarized, an overall critique of the literature concludes the section.

Perception of Functioning Within Physical Domain of QOL

Perceived physical impact of diabetes on persons with either Type I or Type II diabetes has consistently been reported as impaired (Connell 1991; Ingersoll & Marrero, 1991; Jacobson, Barofsky, Cleary, & Rand, 1988; Mitchell, Stern, Haffner, Hazuda, & Patterson, 1990; Nerenz, Repasky, Whitehouse, & Kahkonen, 1992; Stewart et al., 1989). Stewart et al. (1989) compared physical functioning among Type I and II diabetic patients and patients with no chronic conditions. Persons with diabetes reported a significantly lower score in the domain, as measured by the Medical Outcome Study (MOS) Short Form Health Survey. The physical functioning measure assessed the capacity to perform a variety of physical activities, such as participating in sports, carrying groceries, climbing stairs, and walking. Nerenz et al. (1992) modified the MOS Short Form for use with Type I and II diabetics ages 18-60 years. Significantly poorer physical functioning scores were found for the intensively and loosely controlled subgroups, than for the moderately controlled subgroup. Control was measured by glycosylated hemoglobin testing. Persons with Type I diabetes who were controlled using two or fewer insulin injections daily had lower physical functioning scores than those using three or more injections daily. The former group is described as being on average three years older, less educated, and rated by a physician as more disabled. The lowest mean score of any of the measures of functioning evaluated by Nerenz et al. (1992), that of energy level, was found in the physical domain.

Two studies used the Sickness Impact Profile (SIP) to evaluate perceived physical functioning (Mitchell et al., 1990; Rodin, 1990). The SIP provides a multidimensional assessment of illness-related functional impairment. The ambulation, mobility, bodily care, and movement categories are grouped to provide a physical dimension score. Rodin (1990) reports subjects with Type I diabetes mellitus experienced mild functional impairment in the physical dimension. Those persons with Type I diabetes mellitus with end stage renal disease had scores within the severe physical functional impairment range. Mitchell et al. (1990) found that Mexican Americans reported greater impairment in the physical dimension of the SIP than did Non-Hispanic Whites. Twenty-nine percent of the total sample reported impairment in ambulation.

Youth and/or adolescents with Type I diabetes have been the focus of research in two studies, using the Diabetes Quality of Life Measure (Ingersoll & Marrero, 1991; Jacobson et al., 1988). The impact scale of the instrument includes questions about physical functioning, including exercise, sleep and sexual relations. In addition, this scale explores occupational, social, and psychological functioning. Jacobson et al. (1988) report that adult males reported less of an impact of diabetes than adult females, while adolescent males and females showed no difference. Ingersol et al. (1991) did not find any relationship between perceived impact by gender for their sample of 10 to 22 year olds, although longer disease duration was inversely related to perceived impact. Both studies that utilized the Diabetes Quality of Life Measure report scores for scale totals only. Conclusions cannot be made about physical functioning, as the impact scale includes several domains.

Connell (1991) reports results from a sample of adults with Type II diabetes over age 60. Eighty-one percent of the older adults perceived diabetes as preventing them from being as active as they want. Hanestad and Albreksten (1992) examined the stability of self reported quality of life over time. The behavioral/activity domain included capacity for self care and mobility. There was no significant difference in this domain over time, even in persons experiencing the major life events of hospitalization, divorce, and death of a family member. Similarly, Nerenz et al. (1992) indicate stability of physical functioning over a six month interval, with a reported baseline and six month correlation of .902.

This review of literature related to the perceived physical functioning domain of quality of life indicates that persons with diabetes had lower scores in this domain than persons without chronic disease (Stewart et al., 1989). Type I diabetics taking two or fewer insulin injections have lower physical functioning scores than Type I diabetics using three or more injections (Nerenz et al., 1992). Type I diabetics are reported to have mild impairment by Rodin (1990), while those Type I diabetics with ESRD had severe impairment in physical functioning. Mexican Americans report greater impairment than Non Hispanic Whites (Mitchell et al. 1990), and a large percentage of older adults with Type II diabetes report negative changes in this QOL domain. None of these studies provides information comparing persons with Type I and Type II diabetes, although all suggest that some level of physical impairment will be present.

Perception of Functioning Within Occupational Domain of QOL

As with physical functioning, the research related to perceived occupational function indicates that many persons with diabetes feel that adverse effects in occupational function are experienced (Connell, 1991; Hanestad and Albreksten, 1992; Ingersoll & Marrero, 1991; Jacobson et al., 1988; Lundman, Asplund & Norberg, 1990; Mitchell et al., 1990; Nerenz et al., 1992; Stewart et al., 1989). Stewart et al. (1989) report that persons with diabetes had significantly lower scores in the role functioning measure than did patients with no chronic conditions. This measure is described by Stewart et al. (1989) as measuring the extent to which health interferes with daily activities such as work, housework, or school. Nerenz et al. (1992) report role functioning scores similar to that of Stewart et al. (1989). The mean scores were in the 60th to 80th percentile of functioning. Nerenz et al. (1992) found no difference in reported role functioning between loosely, moderately, or tightly controlled persons with diabetes.

Mitchell et al. (1990) describe the home management and work categories of the SIP for Mexican Americans and Non-Hispanic Whites. Twenty-seven percent of Mexican Americans and 22% of Non-Hispanic Whites were impaired in the home management category. The work category is reported as one of the categories in which impairment was least likely to be present, and differed by two percent between Mexican Americans and Non-Hispanic Whites. Lundman et al. (1990) state that 62% of the Type I diabetics sampled reported absence from work due to causes related to or not related to diabetes during the previous two years, a percentage similar to that of the rest of the population of the region during the same time period for the same absences.

Connell (1991) reports 19% of a sample of older adults as having difficulty "meeting responsibilities" (p.368), which might be considered a component of occupational function, as it relates to ability to perform daily activities. Both Jacobson et al. (1988) and Ingersoll and Marrero (1991) measured how often work, school, and household activities are perceived as missed due to diabetes, but fail to describe the results of the questions as separate categories of the Disease Impact Scale. Similarly, Hanestad and Albreksten (1992) included working capacity as an item under a broader category of behavioral/activity life domain.

Two studies, using differing operational definitions of occupational function, disagree as to whether persons with diabetes have decreased functioning in the occupational domain (Lundman et al., 1990; Stewart et al., 1989). Others indicate mild impairment (Mitchell et al., 1990; Nerenz et al., 1992). This review of literature identified no research which compared occupational function between persons with Type I and Type II diabetes.

Perception of Functioning Within Psychological Domain of QOL

Both Stewart et al. (1989) and Nerenz et al. (1992), using similar instruments, use the term mental health for what was conceptualized as psychological functioning in the present research. Stewart et al. (1989) compared scores on mental health measurement between the general population, patients with no chronic conditions and persons with Type I and II diabetes and found no significant differences. The mental health measure assessed general mood or affect, including depression, anxiety and positive well being during the past month. Nerenz et al. (1992) report scores similar to those of the diabetic patients studied by Stewart et al. (1989). The scores indicate the sample of Type I diabetics scored within the 65th to 75th percentile on this measure. No significant difference in mean mental health scores between level of diabetic metabolic control, as measured by the hemoglobin Alc, was found by Nerenz et al. (1992).

Diabetes related worries in persons with Type I diabetes are explored by both Jacobson et al. (1988) and Ingersoll and Marrero (1991). In Ingersoll and Marrero's (1991) sample of 10 to 22 year olds, females were more likely than males to report disease related worries. The more participants reported worries, the lower they rated their overall health. Similarly, Jacobson et al. (1988) report that adult and adolescent males experienced fewer diabetes related worries than adult and adolescent females. Mean scores on the diabetes worry scales were lower for adolescents than for adults. However, all groups reported being worried only seldom, or some of the time.

The SIP includes a category, called emotional behavior, as part of the psychosocial dimension of the instrument. Questions include items about irritability, impatience, blaming oneself, and talking about the future in a hopeless way. Mexican American and Non-Hispanic Whites scored as functionally impaired in the emotional behavior category 20.6% and 23.5% of the time, respectively (Mitchell et al., 1990). No statistical significance is reported, and emotional behavior scores are not reported for the nondiabetic subsample.

The rate of mild, moderate, and severe depression measured in a sample of older adults with Type II diabetes are reported as 27%, 15%, and 5% (Connell, 1991). Older women with diabetes were found to be significantly more depressed at the moderate and severe levels than older men with diabetes (Connell, 1991). Approximately 53% of a sample of 191 adults over 60 years of age scored within the normal range of depression scores. Less than one-third of the sample felt that having diabetes made life very difficult, and 18% reported feeling unhappy because of diabetes mellitus. The majority of the older adults (65%) reported not being afraid of their diabetes. Gilden, Casia, Hendryx and Singh (1990) report that older adults who performed home blood glucose monitoring reported no statistically significant greater sense of embarassment than did peers who performed urine testing.

Tebbi, Bromberg, and Sills (1990) report more depressive symptoms in their sample of adults with Type I diabetes than in healthy controls. In contrast, Rodin (1990) reports that Type I diabetics had mean scores on the Beck Depression Inventory that were distributed in a range to be expected in the general population. Depressive symptoms did correlate with the severity of functional impairment, as measured by the SIP. A community population sample, part of a National Institute of Health general population survey of psychological disorders, found an increase prevalence of lifetime anxiety in individuals with Type I diabetes mellitus (Wells, Golding, & Burnam, 1989).

One study which compared persons with diabetes mellitus with patients without chronic illness has indicated that both groups combined had similar psychological functioning levels (Stewart et al., 1989). Scores for this domain of quality of life are within the 70th percentile of functioning suggesting mild to moderate impairment (Nerenz et al., 1992). When specific areas of psychological functioning, such as worry, anxiety and depression are explored, conflicting results are reported (Jacobson et al., 1988; Rodin, 1990; Wells et al., 1989). As with the domains of physical and occupational functioning, no literature was identified which contrasted psychological functioning between persons with Type I and Type II diabetes mellitus.

Perception of Functioning within Social Domain of QOL

Persons with diabetes often perceive their social functioning to be adversely affected (Connell, 1991; Lundman et al., 1990; Mitchell et al., 1990; Nerenz et al., 1989; Stewart et al., 1989). Stewart et al. (1989) found significantly lower scores in social functioning among 844 diabetics than among 2,595 patients with no chronic conditions. The instrument used, the MOS Short Form, defines social functioning as the extent to which health interferes with normal social activities, such as visiting friends or participating in group activities. Nerenz et al. (1992), using a modification of the MOS Short Form, report scores similar to Stewart et al. (1989), and found significantly lower social functioning scores among intensively and loosely controlled diabetics, when compared to those moderately controlled. The mean social functioning scores for the groups reported by Nerenz et al. (1992) ranged in the 75th to 85th percentile, indicating little to mild impairment in this domain. As in the discussion of physical functioning, lower social functioning scores were found in the tightly controlled subgroup who used two or fewer insulin injections daily.

Lundman et al. (1990), Ingersoll and Marrero (1991) and Jacobson et al. (1988) included social functioning in their evaluation of the perceptions of Type I diabetics. Questions related to social functioning are part of the impact scales used by the latter two investigations. Results for social functioning are not reported as separate from those of other areas of function on that scale. Twenty percent of Type I diabetics, ages 20 to 71 (mean age 38 years) reported the need for strict planning of every day activities to be a major problem with their relations with other people (Lundman et al., 1990). Significant associations have been found between a younger age and more problems explaining health needs to other persons, and the belief that planning affecting people around the individual with diabetes (Lundman et al., 1990). Persons who had Type I diabetes for a shorter duration had a greater impression that having to plan activities around diabetes self care schedules adversely affected others.

Thirty-one percent of older adults reported that diabetes had affected the ability to go out or travel as much with friends, and 21% felt their ability to have good relationships with people was negatively affected (Connell, 1991). The same sample of older adults reported that they perceived their family and friends as accepting of them and their diabetes (92%). Gilden et al. (1990) report that older adults with diabetes felt that home blood glucose monitoring caused no greater interference with social interactions than did urine testing for glucose. Thus, it appears that most older adults do not feel diabetes mellitus has negatively impacted their quality of life in the social interaction domain.

Mitchell et al. (1990) compare perceived social interaction among Mexican Americans and Non-Hispanic Whites. The social interaction measure includes questions about going out for entertainment, participation in community activities, and visits with friends. Twenty nine percent of Mexican Americans and 26.5% of Non-Hispanic Whites report impairment on this level. No description of significance, or comparison to nondiabetic population is made.

This review of literature has identified that the majority of persons with either Type I or Type II diabetes reported mild changes in social function (Connell, 1991; Lundman et al., 1990; Mitchell et al., 1990; Nerenz et al., 1989). It is expected, therefore that there will not be a large difference in the scores of the social interaction domain of quality of life in this research.

Perception of Function Within Somatic Sensation Domain of QOL

Fewer researchers have published literature related to the reporting of unpleasant physical feelings, symptoms, or pain that may detract from quality of life. Stewart et al. (1989) found no significant difference between the amount of bodily pain experienced in the past month by persons with diabetes, and those with no chronic health conditions. Nerenz et al. (1992) report bodily pain scores in Type I diabetics similar to those of Stewart et al. (1989). These mean scores indicate functioning at the 70th to 82nd percentile, indicating most are not impaired in this domain.

Other researchers have explored somatic sensations other than bodily pain. Connell's (1991) sample of older adults experienced no symptoms of low or high blood sugar in the past months, 58.9% and 56.3% of the time, respectively. Twenty-three percent reported experiencing symptoms of high blood sugar (thirst, decreased appetite, fatigue) more than three times in the past month. Fewer participants (12%) reported having experienced symptoms of low blood sugar (sweating, anxiety, trembling) during the same time period.

Men with Type I diabetes described themselves as somewhat less healthy more often than women in Lundman et al.'s (1990) research. Ingersol et al. (1991) and Jacobson et al. (1988) included questions about pain and feeling physically ill as components of the Diabetes Impact Scale. Neither researcher reported question results for the somatic sensation domain separately from other quality of life domains of the scale.

The research reviewed suggests that persons with Type I and Type II diabetes have no greater amount of bodily pain than persons with no chronic illness (Stewart et al., 1989), and the majority of Type I diabetics do not report impairment in this QOL domain (Nerenz et al., 1992). Similarly when the operational definition of somatic sensation includes symptoms of high and low blood sugar, most older adults deny experiencing adverse symptoms. Research which explored the difference between perceived somatic sensations of Type I and Type II diabetics was not identified.

Critique of Review of Literature

Literature relevant to the perceived quality of life of persons with diabetes has been reviewed. Studies specifically examining the relationship between type of diabetes and diabetes related perceptions were not found. Nerenz et al. (1992) indicate that persons with Type II diabetes generally perceive their health as good. However, no detail is provided on specific health status measures of persons with Type II diabetes. Gilden et al. (1990) do not identify type of diabetes, while Stewart et al. (1989) include both types in the data reported. Several studies included only Type I diabetics (Hanestad & Albreksten, 1992; Ingersoll & Marrero, 1991; Jacobson et al., 1988; Rodin, 1990; Wikblad et al., 1990) or only Type II diabetics (Connell, 1991; Mitchell et al., 1990). It is not clear why previous research has not compared perceived QOL between persons with Type I and II diabetes. It is possible that in the clinical setting, health care professionals do not differentiate between type of diabetes when providing health care. This researcher has observed that the terminology of classification is confusing to health care professionals, who inaccurately categorize all adults who take insulin as Type I, or insulin dependent diabetics.

Samples occasionally contain a wide age range of persons with diabetes. For example, Hanestad and Albreksten's (1992) research included persons ages 16 to 76, Lundman et al.'s (1990) ages 3 to 48 years, and Nerenz et al. (1992) ages 18 to 60 years. When results are not reported with respect to age, it is less clear if perceived function could be related to factors other than diabetes, such as developmental stage, aging or other chronic health conditions.

Sample sizes for these studies varied. The majority of the samples were large, with the number of persons with diabetes reported as 844 (Stewart et al., 1989), 393 (Mitchell et al., 1990), 215 (Lundman et al., 1990), 155 (Rodin, 1990), and 106 (Hanestad et al., 1991). Smaller samples are reported by Gilden et al. (1990) and Wikblad et al. (1990), with 20 and 55 persons respectively.

Several studies used similar instruments. However, numerical reporting of results varied, even when similar instruments were used. For instance, Stewart et al. (1989) and Nerenz et al. (1992) used similar formats of the MOS-SF. Stewart (1989) reports mean scores for each domain of health status, while Nerenz et al. (1992) states only that scores are similar to those of Stewart. However, wording of the MOS-SF (Stewart et al., 1989) differs from that used by Nerenz et al. (1992), making comparisons between studies difficult. Mitchell et al. (1990) do not report mean scores of the SIP, discussing proportions and percentages instead. Using the same instrument, Rodin reports mean scores, making comparisons difficult.

Operational definitions of the QOL domains also vary among studies. Stewart et al. (1989) and Nerenz et al. (1992) use definitions similar to the present research. Others (Gilden et al., 1990; Jacobson et al., 1988) do not conceptually define quality of life. However, their operational definitions include components of the domains of interest in this researach. Some data is not useful for comparison, as several QOL domains are incorporated in a single scale (Ingersoll & Marrero, 1991;

Jacobson et al., 1988). No literature was identified which discussed the role or effect of family support on the QOL domains.

Two studies included non-diabetic controls (Mitchell et al., 1990; Stewart et al., 1989), but only one of these reported scores for the control sample (Stewart et al., 1989). The lack of controls makes it difficult to differentiate if the perceptions about QOL of persons with diabetes differ from those of the general population.

This study was designed to explore if there was a difference between perceived quality of life scores in persons with Type I and Type II diabetes, a major deficit in the literature. To provide further clarity to findings, a sample of diabetic persons within a clearly limited age range was utilized.

Methods

Design

This study was a secondary analysis of data collected as part of the Medical Outcome database at Henry Ford Health System. The data base contains information collected from 235 adult patients 18 to 60 years of age receiving care for either Type I or Type II diabetes. Subjects were not experiencing serious medical complications at the time of data collection that would have made participation difficult. Data were collected from May, 1991 through December, 1993. The diabetic health care for these adult patients was provided at the Endocrinology and Metabolism Clinic at Henry Ford Hospital, Detroit, Michigan. Although the original data collection included baseline assessment and follow up collection of data at six months, eighteen months and yearly intervals, this study explored only the baseline data.

Sample

The study sample included 117 subjects, 44 males and 73 females, aged thirty to fifty years, diagnosed with Type I or Type II diabetes. The sample consisted of 94 persons with Type I diabetes, and 23 persons with Type II diabetes.

Operational Definition of Variables

The quality of life variables for this study were operationalized from the "Health Status Questionnaire -SF 36D" (Nerenz et al., 1992), found in Appendix A. The instrument contained questions measuring perceived physical functioning, perceived occupational functioning, social interaction, psychological functioning, and somatic sensation.

Fixed alternative scales were used to measure the variables. Items had between two to six possible responses. Each possible response was assigned a numerical value. Scoring on each question was arranged so that responses reflective of a greater perceived quality of life had higher numerical values. The variables were operationalized by the self report of each person completing the questionnaires. They were measured as follows:

Perceived physical function (Ten items, Questions 3a-j). This variable measured the extent to which health interfered with a variety of activities. Included are questions that assessed perceived ability to perform vigorous and moderate activity, climb stairs, bend, walk one block, bathe and dress. These items were scored yes, limited a lot (1) to no, not limited at all (3). The highest possible score for the scale was a total of thirty points with a range of 10 to 30 points. High scores reflected that respondents were not limited in their performance of physical activities.

Perceived occupational function (Four items, Questions 4a-d). This variable measured the extent that physical health had affected work or other daily activities. Questions inquired if amount of time spent, amount of accomplishment, kind of work or performance at work or daily activities were affected by physical health. These items were scored yes (1) or no (2). The highest possible score was eight points with a range of 4 to 8 points. High scores on the scale reflected that respondents did not experience problems with work or regular daily activities as a result of their physical health.

Perceived psychologic function (Nine items, Questions 9a- 9i). This variable measured general mood or affect, including feelings of nervousness, feeling down in the dumps, calm, peaceful, downhearted and blue, and happy during the past month. Items were scored as all of the time (1) to none of the time (6). The highest possible score for the scale was a total of 54 points with a range of 9 to 54 points. Items 9a, 9d, 9e, and 9h were reversed scored, so that feeling full of pep, calm, peaceful, happy and full of energy scored 6 points, while an absence of those feelings scored 1 point. High scores on the scale reflected a more positive mood or affect with little depression or anxiety.

Perceived social interaction (One item, Question 6). This variable measured the extent to which health interfered with normal social activities such as visiting with friends during the past month. The item was scored as not at all (1) to extremely (5). The highest score for the question was five points with a range of 1 to 5 points. This question was reversed scored. High scores reflected that the respondent did not feel that physical health or emotional problems interfered with social activities during the past four weeks.

Somatic sensation (One item, Question 7). This variable inquired into the amount of bodily pain experienced in the past four weeks and was scored as none (1) to very severe (6). The highest score for the question was six points with a range of 1 to 6 points. This question was reverse scored, so that high scores reflected that the respondent did not experience bodily pain during the past four weeks.

Type of diabetes. This variable was operationalized by report of the physician or Diabetes Clinical Nurse Specialist providers caring for the diabetic clients at the Endocrinology Clinic. Type of diabetes was indicated on the problem list of the chart by the providers, who were given no criteria for classifying persons as having either Type I or Type II diabetes.

Instrumentation

The instrument for this study, the "Health Status Questionnaire - SF 36D" (Nerenz et al., 1992) was derived from the work of the RAND Health Insurance Experiment and Medical Outcomes Study (Stewart, Hays, & Ware, 1988). Nerenz et al. (1992) describe no statistical evaluation of the Health Status Questionnaire.

The "Short-Form Health Survey: Medical Outcomes Study" described by Stewart et al. (1988) is similar to that used in this investigation. Minor changes were made by Nerenz et al. (1992). The number of items used to describe functioning varies in number and the phrasing was changed on several questions. For example, the fixed alternative scale for the physical activity questions was changed by Nerenz et al. (1992) from "Limited for 3 months, less than 3 months, not limited at all" to

"Limited a lot, limited a little, and not limited at all." Stewart et al. (1988) do report reliability statistics for the health measure. Multitrait scaling tests were performed for 8,294 participants with completed questionnaires. Item scale correlations ranged from 0.45 to 0.79 with a median of 0.68. Each item in the scale was substantially related ($\underline{r} \geq .40$) to the total scale computed from other items in that group. All items in each hypothesized scale also exceeded the discriminant validity criterion of greater than 0.40. Thus, each test item correlated higher with its hypothesized scale than with other scales. Internal consistency reliability coefficients were reported as: physical functioning (.86), role functioning (.81), mental health (.88), and health perceptions (.87). The values reflect a high degree of internal consistency, suggesting that items of each domain are measuring the same characteristic. Estimate of reliability based on the correlation between alternate forms were reported as: social (.67), and bodily pain (.76). Although the lowest of the five domains, Polit and Hungler (1991) indicate these values are adequate for making group level comparisons. All correlations among the health measures were statistically significant ($\underline{p}<.01$). All scales were correlated at the .39 or above level except that of mental health. Mental health correlated at 0.24 and 0.33 level with physical functioning and role functioning respectively. The statistics reported by Stewart et al. (1988) indicate the instrument to be valid and reliable.

Reliability estimates of the scales of the quality of life domains which contained multiple items were performed for this study. The reliability of the psychological, physical, and occupational domain scales was tested using the Cronbach's alpha correlational analysis of internal consistency. Internal consistency determines the extent to which all items on a particular scale consistently contribute to the overall measurement of a concept, by correlating the individual items on a scale with each other and the overall score (Polit & Hungler, 1991). Table 1 reports the alpha coefficients.

Table 1

Reliability of Three Quality of Life Variables of the Health Status Questionnaire-SF 369.

Variable	Alpha
Physical Functioning	.94
Occupational Functioning	.87
Psychological Functioning	.72

As illustrated in Table 1, the three variables had correlations of .72 or higher. This is considered an acceptable correlation for this type of analysis (Polit & Hungler, 1991), and indicates that the items consistently measure the same concepts. Correlations were not made of the single item variables, social interaction and somatic sensation. These variables were identical to those used by Stewart et al. (1988).

Data Collection Procedure

The data used in the study were initially collected at the Endocrinology and Metabolism Clinic at Henry Ford Hospital from May, 1991 through December, 1993. Data were collected on the day of a regularly scheduled clinic appointment. Clients were approached by clinic personnel when they arrived for a clinic visit, given a brief explanation of the purpose of the Outcomes Management data base, and asked to fill out the SF-36D. Verbal and written material describing the Outcomes Management Program described it as part of the clinical care process, and not a research project. The data set was made available for the present study on computer disk.

Data Analysis

Data analysis was done with the SPSS/PC computer program. Demographic and health history characteristics were summarized using descriptive statistics: percents, frequency distributions, and measures of central tendency. Descriptive statistics were also used to summarize the perceived quality of life in each domain. The five research questions related to differences in group means between persons with Type I and Type II diabetes on each QOL domain were tested by the t-test, with alpha level of significance set at .05.

Study Limitations and Assumptions

There were several limitations to this proposed study. Nerenz et al. (1992) made minor alterations to the Short Form Health Survey: Medical Outcomes Study of Stewart et al. (1988), and did not establish reliability of the modified form, leaving future researchers unsure of how consistently it measured the attributes it was supposed to be measuring. Individuals were not randomly selected for study participation. The sample for this research consisted solely of persons who attended the endocrinology clinic of a large metropolitan hospital where care was provided by a multidisciplinary team. Therefore, results can be discussed only in terms of this study sample and may not be applicable to other samples. In addition, sample sizes were unequal, with 94 persons with Type I diabetes, and 23 with Type II diabetes. No control group of persons without diabetes mellitus was used. As a result, the basis for evaluating responses of persons with Type I and II diabetes are limited.

It is not clear how persons who were experiencing medical complications were selected for exclusion from the study. This exclusion was made by the original data collectors at Henry Ford Health Care System at the time that the questionnaire was given to participants. Information on criteria used for exclusion, the number of data collectors, and the demographic and health characteristics of persons excluded was not available. This selection bias affects the generalizability of the findings.

There was no control over factors not under direct observation. A person who recently experienced a broken leg, for instance, might respond to the QOL questions with more negative responses because of the resulting disability. No mechanism was in place for identifying situations that would effect the internal validity of the results.

Use of the t-test assumes that the sample is random, and responses are normally distributed. The sample was a convenience sample. Scores for the QOL domains were not normally distributed, with responses in most domains skewed toward higher values. The t-test, however, is not as sensitive to violations of its assumptions as other statistical analyses.

Secondary data analysis prohibits exploration of domains of quality of life (intellectual functioning, spirituality, sense of dependence on others) that were not addressed in the data set being used. Use of secondary analysis also limited the ability to use larger, more equal sample sizes.

Several assumptions were made during this research. It is assumed individuals completed the QOL instrument honestly, and perceived the QOL items as they indicated they did. It is also assumed that the providers correctly diagnosed individuals as having either Type I or Type II diabetes mellitus.

Protection of Human Subjects

The rights of the individuals who provided data for this study were protected according to the guidelines developed by the University Committee on Research Involving Human Subjects (UCRIHS) at Michigan State University. Approval to conduct this study was received from UCRIHS prior to analysis of data (see Appendix B).

The data were released for this study by Henry Ford Health System without identifying names. The identity of all study participants, therefore, was not accessible to the researcher. No list of participant names or addresses was available. All study results were reported in aggregate form.

Results

Characteristics of Sample

The 117 subjects in the sample were between the ages of 30 and 50 years, with a mean age of 40 years (SD = 5.5). As illustrated in Table 2, the majority were white (83.8%), female (62.4%), and married (64.1&). Over 70% of the sample reported they had attended college for one year or more.

The 94 persons with Type I diabetes were younger than the 23 persons with Type II diabetes. Persons with Type I diabetes ranged from 30 to 45 years of age, with a mean age of 39 years (SD = 5.4), while those with Type II diabetes were 31 to 50 years of age, with a mean age

Table 2

Characteristics of Sample

Characteristic	Total		TypeI		Type II	
	n	%	n	%	n	%
Age						
30-34 years	21	18	18	19.1	3	13
35-39 years	24	20.5	24	25.5	-	-
40-44 years	30	25.6	24	25.5	6	26.1
45-50 years	42	36.0	28	29.8	14	60.8
Gender						
Male	44	37.6	34	36.2	10	43.5
Female	73	62.4	60	63.8	13	56.5
Marital Status						
Married	75	64.1	59	62.8	16	69.6
Never Married	27	23.1	23	24.5	4	17.4
Divorced	11	9.4	10	10.6	1	4.3
Separated	2	1.7	1	1.1	1	4.3
Widowed	2	1.7	1	1.1	1	4.3
Race						
Caucasian	98	83.8	85	90.4	13	56.5
African American	17	14.5	7	7.4	10	43.5
Native American	2	1.7	2	2.1	-	-
Schooling Completed						
Some High School	3	2.6	2	2.1	1	4.3
High School Diploma	20	17.1	16	17.0	4	17.4
Technical	6	5.1	4	4.3	2	8.7
1-3 Years College	37	31.6	29	30.9	8	34.8
4 Year College Degree	31	26.5	26	27.7	5	21.7
Post Graduate	16	13.7	14	14.9	2	8.7
Missing Data	4	3.4	3	3.2	1	4.3
Duration of Diabetes						
1 - 10 yrs.	37	31.6	18	19.1	19	82.6
11 - 20 yrs.	32	27.6	28	29.8	4	17.4
23 - 30 yrs.	38	32.5	38	40.4	0	0
31 - 40 yrs.	9	7.7	9	9.6	0	0
41 - 50 yrs.	1	.9	1	1.1	0	0
Type of Diabetes	117	100.0	94	80.3	23	19.7
Age at Diagnosis						
1- 4 years	1	.9	1	1.1	-	-
5- 9 years	1	.9	1	1.1	-	-

Table 2 (cont.)

Characteristic	Total		TypeI		Type II	
	n	%	n	%	n	%
10-14 years	1	.9	1	1.1	-	-
15-19 years	11	9.4	11	11.6	-	-
20-24 years	24	20.6	24	25.5	-	-
25-29 years	18	15.4	20	19.1	-	-
30-34 years	10	8.6	7	7.5	3	12.9
35-39 years	25	21.4	21	22.4	4	16.7
40-44 years	19	16.3	5	5.4	14	60.8
45-50 years	7	6.0	5	5.3	2	8.7

Table 3

Chi Square Analysis: Differences in Age Between Persons with Type I and Type II Diabetes Mellitus

Age		30-40 yrs.	40-50 yrs.	Row Total
Type I	Observed	59	35	94
	Expected Number	52.2	41.8	(80.3%)
Type II	Observed	6	17	23
	Expected Number	12.8	10.2	(19.7%)
	Column Total	65 (55.6%)	53 (44.4%)	

of 42.8 years (SD = 5.1). To determine if the difference in age between persons with Type I and Type II diabetes was significant, a chi square analysis was performed (Table 3). The sample was divided into two age groups, 30-40 years and 41-50 years. None of the four cells had expected values less than 5. There was a significant difference between the age distribution of the persons with Type I and Type II diabetes [X^2(1, N = 117) = 10.07, p =.01), with Type I diabetics being younger.

Forty three percent of the Type II diabetics were African American, compared to 7.4% of the Type I diabetics. The sample also differed significantly by race. Fisher's exact test was performed after the sample was divided into two groups, Caucasian and other races. The other category included African Americans and Native Americans. The result was significant at the p=.01 level, indicating that the Type I and II diabetics did differ significantly by race with more Caucasians having Type I diabetes (Table 4).

The persons with Type I diabetes reported having the disease for 3 to 47 years, with a mean of 20.5 years duration (SD = 9.3). In contrast, the Type II diabetics had diabetes for 4-18 years, with a mean of 8.7 years (SD = 4.1). Eighty-seven percent of the Type II diabetics had the disease less than fourteen years, compared to 33% of those persons with Type I diabetes. Chi square analysis was performed, dividing the duration of diabetes into two groups - one month to 15 years, and 16 years and longer (Table 5). This classification was selected because almost half of the sample had diabetes for less than 15 years. There was a significant difference between Type I and II

Table 4

Chi Square Analysis: Difference in Race Between Persons with Type I and Type II Diabetes Mellitus

Race		Caucasian	African American Native American	Row Total
Type I	Observed	83	11	94
	Expected Number	77.1	16.9	(80.3%)
Type II	Observed	13	10	23
	Expected Number	18.9	4.1	(19.7%)
	Column Total	96	21	
		(82.1%)	(17.9%)	

Table 5.

Chi Square Analysis: Difference in Duration of Disease Between Persons with Type I and Type II Diabetes

Duration of Disease		1 month- 15 years	16 years & longer	Row Total
Type I	Observed	32	62	94
	Expected Number	42.6	51.4	(80.3%)
Type II	Observed	21	2	23
	Expected Number	10.4	12.6	(19.7%)
	Column Total	53	64	
		(45.3%)	(54.7%)	

subsamples in the length of time persons had diabetes mellitus [$X^2(1, N = 117) = 24.5, p=.001$], with Type II diabetics having a shorter duration of the disease.

There was no significant difference between the two types of diabetes by marital status, gender, and education level. Marital status was computed by comparing two groups--married and all other marital categories. Similarly, comparison of education level was made by grouping persons into two categories--high school completion or less, and all others reporting education beyond high school.

One hundred three subjects (88.3%) reported being diagnosed as having diabetes at the age of twenty or older. Sixty percent of the Type I diabetics were diagnosed before the age of thirty, while all of the persons with Type II diabetes were diagnosed after the age of thirty years.

Description of the Quality of Life Variables

Several characteristics of the sample are evident from the statistics reported in Table 6. Overall, in all quality of life domains, subjects were minimally to moderately affected by their diabetes mellitus.

On average, both groups of diabetics reported functioning well within the physical functioning domain, although both groups included persons scoring at the minimum level. As a whole, both groups scored in the higher range in the occupational functioning domain, with persons with each type of diabetes at the lowest and highest levels. Persons with Type II diabetes had a narrower range of responses within the psychological functioning domain of quality of life. Both groups of persons had moderately high psychological functioning mean scores.

Table 6

Ranges, Means and Standard Deviations of the QOL Variables

Variable	Possible Range	Observed Range	Mean	SD	n
Physical Functioning					
Total	10-30	10-30	26.8	4.8	117
Type I	10-30	10-30	27.5	4.2	94
Type II	10-30	13-30	24.0	5.9	23
Occupational Functioning					
Total	4- 8	4- 8	6.9	1.5	117
Type I	4- 8	4- 8	7.2	1.4	94
Type II	4- 8	4- 8	6.3	1.6	23
Psychological Functioning					
Total	9-54	12-54	37.2	7.9	117
Type I	9-54	12-54	37.9	7.6	94
Type II	9-54	19-48	34.0	8.4	23
Social Interaction					
Total	1- 5	1- 5	4.2	1.1	117
Type I	1- 5	1- 5	4.3	1.1	94
Type II	1- 5	1- 5	3.7	1.3	23
Somatic Sensation					
Total	1- 6	1- 6	4.5	1.3	117
Type I	1- 6	1- 6	4.7	1.2	94
Type II	1- 6	1- 6	3.6	1.3	23

Social functioning scores indicated most of the sample felt that their physical health or emotional problems interfered with normal social activities only slightly. Once again individuals with both types of diabetes scored at both the lowest and highest scoring levels. On average, persons with Type I diabetes reported experiencing mild to very mild bodily pain over the previous four weeks, while those with Type II diabetes reported moderate to mild bodily pain.

Table 7 further explores the range of responses of persons with Type I and Type II diabetes for each of the quality of life domains.

Analysis of Research Questions

The five research questions described earlier were analyzed using the students t-test for independent samples. As shown in Table 8, the persons with Type I diabetes scored significantly higher than those with Type II diabetes in the quality of life domains of physical, occupational, and psychological functioning, and somatic sensation at the preset probablily level of .05. At the same level of probability, the social interaction scores of those with Type I and II diabetes were not significantly different.

The previously discussed analysis indicated that the sample of Type I and Type II diabetics differed significantly by age, race, and duration of diabetes. It addition, it was found that perceived QOL differed significantly within the physical, occupational, and psychological functioning and somatic sensation domains. To explore if the differences in age, race, and duration of diabetes by type of diabetes had an effect on the differences in perceived QOL, two way analysis of variance were performed.

Table 7

Frequency and Percent of QOL Domain Scores for Persons with Type I and Type II Diabetes

Variable	Equivalent Item response	Type I		Type II	
		n	%	n	%
Physical Functioning Score					
10-15	Very limited	4	4.3	3	13.0
16-20		3	3.2	4	17.4
21-25		8	8.5	2	8.7
26-30	Not limited	79	84.0	14	60.9
Occupational Functioning Score					
4	Yes, problems	11	11.7	6	26.1
5		5	3.2	1	3.3
6		6	7.4	3	13.0
7		7	10.6	7	30.4
8	No problems	8	67.0	6	26.1
Psychological Functioning Score					
9-13	All the time	1	1.06	0	0
14-24		3	3.19	3	13.0
25-34		28	29.8	10	43.5
35-44		43	45.7	6	26.1
45-54	None of the time	19	20.2	4	17.4
Social Interaction Score					
1	Extremely	3	3.2	1	4.3
2	Quite a bit	5	5.3	4	17.4
3	Moderately	8	8.5	4	17.4
4	Slightly	25	26.5	5	21.7
5	Not at all	53	56.4	9	39.1
Somatic Sensation Score					
1	Very severe pain	6	1.1	1	4.3
2	Severe	5	1.1	3	13.0
3	Moderate	18	19.1	7	30.4
4	Mild	16	17.0	5	21.7
5	Very mild	30	31.9	6	26.1
6	No pain	28	29.8	1	4.3

Table 8

Differences Between Responses on QOL Variables for Persons with Type I and II Diabetes

Variable	t value	degrees of freedom	2-tail probability
Physical Functioning	2.67	27.67	.012
Occupational Functioning	2.54	30.92	.016
Psychological Functioning	2.04	31.33	.050
Social Functioning	1.77	30.13	.086
Somatic Sensation	3.50	32.12	.001

Table 9

Two way ANOVA: The Effects of Race and Type of Diabetes on Perceived Physical Functioning Scores

Source of Variation	S.S.	D.F.	M.S.	F.	Sign. F.
Race	134.83	1	134.83	6.56	.01
Type of Diabetes	80.92	1	80.92	3.94	.05
Race X Type	1.53	1	1.53	.07	.79
Explained	360.36	3	120.12	5.85	.01
Residual	2280.62	111	20.55	-	-
Total	2640.99	114	23.17	-	-

The Effects of Race and Type of Diabetes on Perceived Quality of Life Domain Scores

Table 9 illustrates the effect of race (Caucasian or African American) and type of diabetes on the physical functioning domain. Caucasians with Type I and Type II diabetes had significantly higher scores in the perceived physical functioning domain than did African Americans (Caucasian cell means: 27.44; African American cell means: 23.06). There was no significant interaction between variables when race and type of diabetes were examined simultaneously. Therefore, the overall variation in physical functioning scores for the sample could not be accounted for when the combined effects of race and type of diabetes were examined. The differences in physical functioning scores could be explained by race or type of diabetes independently, however.

Race did not have a significant main effect on the scores of occupational functioning [F(2, *N* = 117) = 1.25, *p* =.29], psychological functioning [F(1, *N* = 117) =.48, *p* =.62)], and somatic sensation [F(1, *N* = 117) =.18, *p* =.67]. There were no significant two way interactions between race and type of diabetes in these three domains: occupational functioning [F(1, *N* = 117) =.08, *p* = .78], psychological functioning [F(1, *N* = 117) =.06, *p* = .81], and somatic sensation [F(1, *N* = 117) = 2.61, *p* =.11].

The Effects of Age at Diagnosis and Type of Diabetes on Perceived Quality of Life Scores

A two way analysis of variance (ANOVA) was performed in order to examine the effects of age at diagnosis on quality of life scores. This variable was chosen because in this sample, 60% of the Type I diabetics were diagnosed before the age of 30, while 100% of the Type II diabetics were diagnosed after age 30. Literature also suggests that age at diagnosis effects perceived quality of life (Jacobson et al., 1988; Lundman et al., 1990; Wikblad et al., 1990).

The sample was first divided into two groups, Group 1 (age under 35 years) and Group 2 (age 35-50 years). The groups were unequal in the number of years contained, as no Type II diabetics had been diagnosed before the age of 30.

As Table 10 indicates, age at diagnosis did significantly effect the scores of the physical functioning domain of quality of life. That is, being diagnosed with diabetes after the age of 35 resulted in significantly higher scores (Before age 35 cell means: 26.73; Age 35 or older cell means: 27.21). There was no significant interaction between variables when age at diagnosis and type of diabetes were examined simultaneously. The overall variation in physical functioning scores for the sample could not be accounted for when the combined effects of age at diagnosis and type of diabetes were examined. The differences in physical functioning scores could be explained by age at diagnosis and type of diabetes independently, however.

Age at diagnosis did not have a significant main effect on the scores of occupational functioning [F(1, $\underline{N}$ = 117) = 2.9, $\underline{p}$ = .09], psychological functioning [F(1, $\underline{N}$ = 117) = .14, $\underline{p}$ = .71] or somatic sensation [F(1, $\underline{N}$ = 117) = .63, $\underline{p}$ = .43]. In addition, there were no significant interactions between age at diagnosis and type of diabetes mellitus in the three domains: occupational functioning [F(1, $\underline{N}$ = 117) = .84, $\underline{p}$ = .36], psychological functioning [F(1, $\underline{N}$ = 117) = .3, $\underline{p}$ = .59], somatic sensation [F(1, $\underline{N}$ = 117) = .36, $\underline{p}$ = .55].

Table 10

Two way ANOVA: The Effects of Age at Diagnosis and Type of Diabetes on Perceived Physical Functioning Scores

Source of Variation	S.S.	D.F.	M.S.	F.	Sign. F.
Age at DX	83.39	1	83.39	4.09	.05
Type of Diabetes	306.16	1	306.16	15.04	.01
Age DX X Type	34.25	1	34.25	1.68	.20
Explained	344.01	3	114.67	5.63	.01
Residual	2301.85	113	20.37	-	-
Total	2645.86	116	22.81	-	-

Table 11

Two way ANOVA: The Effects of Duration of Diabetes and Type of Diabetes on Perceived Physical Functioning Scores

Source of Variation	S.S.	D.F.	M.S.	F.	Sign. F.
Duration of DM	96.33	1	96.33	7.85	.03
Type of DM	319.26	1	319.26	15.54	.01
Duration X Type	1.81	1	1.81	.09	.77
Explained	324.5	3	108.17	5.27	.01
Residual	2321.27	113	20.54	-	-
Total	2645.86	116	20.81	-	-

The Effects of Duration of Diabetes and Type of Diabetes on Perceived Quality of Life Scores

A two way analysis of variance was performed to examine the effects of duration of diabetes on QOL scores. The sample was first divided into two groups, those having diabetes 15 years or less, and those having diabetes 16 years or longer. This classification was selected since 44% of the sample had diabetes for less than 15 years, and this division afforded an adequate number of persons within the four cells for analysis.

Table 11 summarizes the results of the effect of duration and type of diabetes on physical functioning scores. Persons with Type I diabetes did have significantly higher scores in the perceived physical functioning domain, and duration of diabetes did have an effect on the scores (Duration 15 years or less cell means: 27.00; Duration 16 years or longer cell means: 26.66). There was no significant interaction between variables when duration and type of diabetes were examined simultaneously. Therefore, the overall variation in physical functioning scores could not be accounted for when the combined effects of duration and type of diabetes were examined. The difference in physical functioning scores could be explained by duration or type independently, however.

Duration of diabetes did not have a significant main effect on the scores of occupational functioning [F(1, $\underline{N}$ = 117) = 2.5, $\underline{p}$ = .12], psychological functioning [F(1, $\underline{N}$ = 117) = 1.14, $\underline{p}$ = .29], and somatic sensation [F(1, $\underline{N}$ = 117) = 3.36, $\underline{p}$ = .06]. In addition there were no significant interactions between duration and type of diabetes in the three domains: occupational functioning [F(1, $\underline{N}$ = 117) = .03, $\underline{p}$ = .86], psychological functioning [F(1, N = 117) = 2.82, p = .1], and somatic sensation [F(1, N = 117) = 1.03, p = .31].

Discussion

The majority (89%) of the sample of persons with Type I diabetes in this study were diagnosed before the age of 40 years. Rifkin and Porte (1992) indicate the characteristic pattern of age at diagnosis of Type I diabetes peaks at 10- 14 years, at the time of puberty. In contrast, the peak age at diagnosis for this sample was 20 to 24 years. Type II diabetes usually appears after age 40 years [United States Department of Health and Human Services (U.S. DHHS), 1991]. In this sample, 70% of the Type II diabetics were diagnosed after age 40, and all were diagnosed after age 30.

Diabetes is 33 percent more common among African Americans than Caucasians (U.S. DHHS, 1991). However, in the total sample population, 82% were Caucasian, compared to 16% African American. The prevalence of Type II diabetes is higher in non-white Americans, predominantly African Americans, than in Caucasians (Rifkin & Porte, 1992). In this sample, the percentage of Caucasians with Type II diabetes (56.5%) was higher than that of African Americans (43.5%). In the U.S., the prevalence of Type I diabetes among Caucasians living in a Pennsylvania county was about 1.6 times greater than for nonwhites (LaPorte, Tajima, & Dorman 1986). In this sample, the number of Caucasians with Type I diabetes (n=83) was greater than the number of African Americans with Type I diabetes (n=9).

It is not clear why this sample included so few African Americans, when the sample was drawn from an urban metropolitan medical center within a predominantly minority community. It is possible that more

African Americans were excluded from the study sample due to severe medical complications, as this population does experience a greater number of complications (U.S. DHHS, 1991). Information on utilization of the endocrine clinic, not available for this study, might indicate that the population utilizing the clinic is not representative of the surrounding residential area.

Rifkin and Porte (1992) indicate there is no difference in the frequency of Type I diabetes mellitus by gender. This study sample consisted of a larger percentage of females with Type I diabetes (63.8%) then males (36.2%). The frequency of females with Type II diabetes slightly exceeds that of men (Rifkin & Porte, 1992). In this sample, there were a greater percentage of females with Type II diabetes (56.5%) than males (43.5%).

As with the general population of persons with diabetes mellitus, the Type I diabetics were diagnosed at an earlier age, and there were more females with Type II diabetes than males. This sample of Type I diabetics were older at diagnosis than is the usual pattern. African Americans were under-represented in the Type II subsample, and females were overrepresented in the Type I subsample. Females may have been overrepresented, as they utilize health care services more frequently than men (U.S. DHHS, 1991).

Research Questions

Question #1. Is physical functioning perceived differently by persons with Type I and Type II diabetes? This study did find a statistically significant difference in perceived physical functioning between Type I and Type II diabetes. Persons with Type I diabetes perceived their ability to carry out physical activities more favorably than did those with Type II diabetes.

The total possible score of the physical functioning domain was 30 points. Approximately 30% of those persons with Type II diabetes scored in the 10-20 point range, indicating poorer perceived physical functioning, compared to approximately 7.5% of the Type I diabetics. Eighty-four percent of the Type I diabetics scored 26 to 30 points, compared to 61% of the persons with Type II diabetes. Thus, although most persons in the sample reported positive physical functioning, the greater percentage of persons with Type II diabetes with lower scores contributed to a larger standard deviation, resulting in a significanat difference between the two types of diabetes. This data suggest that in the clinical setting, the majority of these persons with Type I and Type II diabetes could be expected to be able to carry groceries, climb several flights of stairs, walk several blocks and perform moderate activities. The high level of functioning identified in this sample may have been affected by the exclusion of persons with serious medical complications from the original sample. Persons with severe peripheral artery disease, for example, might have reported lower scores in this physical functioning domain, as their ability to ambulate is often impaired. However, 13% of this sample reported that their health limited their participation in these activities to a considerable degree. One of every 3 persons with Type II diabetes experienced difficulty in this domain of quality of life.

In order to compare the study findings with that of others who have used a similar or identical QOL instrument, it was necessary to convert the mean scores obtained to a percentage. Both Stewart et al. (1989)

and Nerenz et al. (1992) did not report mean scores, using instead a value called predicted functioning score. The highest level of functioning of each health status domain as reported by Stewart et al. (1989) and Nerenz et al. (1992) was 100%, equal to the highest possible score of each domain.

For the physical functioning domain, the highest score possible (30) was converted to a predicted physical functioning score of 100%. Similarly the mean scores of the sample, 26.8 (total sample), 27.5 (Type I), and 24.0 (Type II) were converted to predicted physical functioning scores of 89%, 91.6%, and 80%, respectively. The mean scores for the total sample are higher than Stewart et al.'s (1989) sample of 844 Type I and II diabetics, who had a predicted health score in this domain of 78.4%, using a similar, but not identical instrument. Type I diabetics had mean scores of approximately 80% to 93%, according to Nerenz et al. (1992), similar, to the 91.6% identified for this research. Despite the more restricted age range for this research (30 to 50 year olds), the findings are similar to those of the wider age range (18 to 60 years) of Nerenz et al. (1992), from whom this data set was abstracted.

Race significantly affected physical functioning scores. African Americans with Type I or Type II diabetes had significantly lower perceived physical functioning. The Department of Health and Human Service (DHSS) reports in Healthy People 2000 (1991) that while life expectancy is rising for the overall U.S. population, it is falling slightly for African Americans. In addition, the complications of diabetes - heart disease, stroke, kidney failure, and blindness - are more prevalent amoung blacks with diabetes than whites with diabetes (U.S. DHHS, 1991). The findings of this research, therefore, are consistent with the national findings of poorer physical health in this population. This data set did not permit exploration of the presence or number of diabetic complications, co- morbidities, or economic status which might have provided useful information in the interpretation of the difference in physical functioning scores by race. Other researchers (Mitchell et al., 1990) have identified poorer mobility and ambulation scores among a different ethnic group, Mexican Americans, as compared to Non-Hispanic Whites.

Age at diagnosis was also found to have an effect on physical functioning for both Type I and Type II diabetics. The younger the age at diagnosis, the higher the perceived physical functioning scores for both Type I and Type II diabetes. Nerenz et al. (1992) reports higher physical functioning scores for persons with Type I diabetes using three or more injections of insulin. Unfortunately, information related to medication use was not available in this data set.

This data set did not permit further exploration of why age at diagnosis had an effect on physical function. Since persons with Type I diabetes are usually diagnosed before the age of 30, it is possible they have learned to adjust to, and compensate for, physical limitations to a greater extent than the persons with Type II diabetes. Structured educational interventions may be a more integral part of the management of persons with Type I diabetes, as they are at risk for life threatening diabetic ketoacidosis. Standards set by the American Diabetes Association (1993) include exercise, and benefits and responsibilities of care as topic areas to be included in diabetes patient education programs. Exploration of these topics might influence participation in activities which might improve physical functioning.

Type II diabetics are less ill at diagnosis, and can have the disease for months before it is diagnosed. In the past ten years the American Diabetes Association has launched an aggressive physician education campaign related to detection and management of Type II diabetes, with emphasis on education related to lifestyle change (Rifkin & Porte, 1992).

Duration of diabetes also had a significant main effect on perceived physical functioning, although a significant interaction with type of diabetes was not found. Mitchell et al. (1990) previously reported that poorer physical functioning in Type II diabetics, as measured by SIP scores, is related to a longer duration of diabetes. The present research is consistent with that of Mitchell et al. (1990), as both Type I and Type II diabetics in this sample had lower physical functioning scores, if duration of diabetes was over sixteen years.

Another variable, body mass index, might have been helpful in explaining the difference in scores between the groups. Obesity is a major risk factor for Type II diabetes, and the higher the body mass index in adults, the greater the incidence of Type II diabetes mellitus (Rifkin & Porte, 1992). Increased body weight might be expected to affect an individual's ability to walk several blocks or a mile, climb several flights of stairs, and participate in moderate vigorous activities. If this sample of persons with Type II diabetes had a large percentage of obese individuals, physical functioning scores might have been affected.

The small sample size may have contributed to the lack of significant interaction between type of diabetes, race, age at diagnosis, and duration of diabetes and physical functioning scores.

Using the mean scores obtained for the physical fuctioning domain, a power of .8, and calculated effect size of .77, the sample size needed was 33 persons with each type of diabetes. This sample contained only 23 Type II diabetics. A larger sample of Type II diabetics would have increased the number of individuals in each cell, and might have resulted in different interaction effect scores.

Question #2. Is occupational functioning perceived differently by persons with Type I and Type II diabetes? This study did find that persons with Type I and Type II diabetes perceived a difference in the performance of work or other regular activities. Persons with Type I diabetes had significantly higher scores, indicating they did not cut down on time spent on work or other activities, felt they did not accomplish less, and were not limited in the kind of work or activities performed.

There is considerable variability in the results within the occupational function domain. With a range of only 4 to 8 points, the standard deviations are 1.4 and 1.6 for Type I and Type II respectively. Twenty six percent of persons with Type II diabetes felt their physical health caused problems with all four items in the domain, compared to 11.7% of the Type I subsample. In contrast, 67% and 26% of those with Type I and II diabetes, respectively, reported no problems with work or other regular activities.

Most of the Type I (77%) and Type II (56%) diabetics reported scores at the highest two levels, indicating that most did not perceive their functioning within this domain of QOL as impaired. However, as with the physical functioning domain, a greater percentage of Type II diabetics reported poorer fuctioning than did those persons with Type I diabetes. This variability contributed to the finding of significance.

This data on occupational function suggest that the majority of the sample did not perceive themselves as impaired in the work environment and performing daily activities. However, 26% of the Type II diabetics and 11.7% of the Type I diabetics reported low scores in every item of the domain. They reported cutting down on the amount of time spent at work and daily activities, accomplishing less, being limited in the type of work and activities performed, and having difficulty performing work and other activities.

The general lack of impairment in the occupational functioning scores may have been influenced by the exclusion from this sample of persons with serious medical complications. Persons with severe diabetic retinopathy or nephropathy might be expected to report poorer functioning in the QOL domain, but may have been excluded from the original data set.

For this domain, the highest score (8) was converted to a predicted occupational functioning score of 100%. Similarly, the mean scores of 6.9 (total sample), 7.2 (Type I) and 6.3 (Type II) were converted to 86.3%, 90%, and 78.8%, respectively. Stewart et al. (1989) report predicted scores in this domain as 77.8% for a sample of Type I and II diabetics, a result similar to the total sample of this research. Nerenz et al. (1992) report predicted scores of approximately 68% to 82% for groups of Type I diabetics. The Type I diabetics of this research had scores slightly higher than that of Nerenz et al. (1992). Findings of this research are consistent with these two studies, suggesting persons with diabetes generally report good occupational functioning.

The perceived occupational functioning scores were not significantly affected by age at diagnosis, race, or duration of diabetes. Although utilizing a different measure of occupational function, Mitchell et al. (1990) report occupational impairment of 22% and 27% in Type II Non-Hispanic Whites and Mexican Americans, respectively. Similarly, 26% of those persons with Type II diabetes, in the present research, report impairment in all four questions of the domain. Nerenz et al. (1992) found age to have no significant association with role function scores in the sample of 235 persons with diabetes ages 18 to 60 years, from which this research data were obtained.

Small sample size may have contributed to the lack of significant findings related to an interaction effect of age and diagnosis, race, and duration of diabetes and type of diabetes with occupational functioning scores. Using the mean scores obtained for the occupational functioning domain, a power of .8, and calculated effect size of .63, the sample size needed for the occupational functioning domain was 45 persons with each type of diabetes. This sample contained only 23 Type II diabetics. A larger sample would have increased the number of individuals in each cell, and might have resulted in different interaction effect scores.

Data on the existence of complications of diabetes and co-morbidities, not available for this study, are variables which might have influenced the difference in occupational function scores. Information on type of employment and socioeconomic status, also not available, might be used to explore the difference as well. Persons with more physically demanding work might have poorer functioning scores than white collar workers with more sedentary work duties.

Question #3. Is psychological functioning perceived differently by persons with Type I and Type II diabetes? There is a statistically significant difference between how the Type I and Type II diabetics viewed their emotional health. The persons with Type I diabetes had significantly higher mean scores in this quality of life domain. Duration of diabetes, race, and age at diagnosis had no significant effect on perceived psychological functioning in this sample.

The total possible score on this scale was 54 points ($\underline{X}$ = 37.2, $\underline{SD}$ = 7.9). Fifty-six percent of the persons with Type II diabetes scored below 35 points, while 34% of Type I diabetics scored below 35 points. Sixty-five percent of the Type I diabetics had psychological functioning scores of 35 or greater, compared to 43% of Type II diabetics. This variability, in addition to the more restricted scores of the Type II diabetics, contributed to findings of significance.

The majority of this sample had moderately high scores in this domain of QOL. These results may have been affected by the exclusion of persons with severe medical complications of diabetes mellitus. Persons experiencing neuropathic pain and ESRD might be expected to report feeling less for of pep, less energetic, more worn out and tired than persons without such complications, for example.

Six percent of this sample of persons responded to the psychological functioning items with responses indicative of poor emotional health. They indicated that their feelings during the past month have been less healthy ones most of the time. A greater percentage of the Type II diabetics (13.04%) than Type I diabetics (4.25%) had scores in this low range.

For this domain, the highest score (54) was converted to a predicted psychological functioning score of 100%. Similarly, the mean scores of 37.2 (total sample), 37.9 (Type I), and 34 (Type II) were converted to 68.95%, 70.2%, and 62.9% respectively. Stewart et al. (1989) report predicted scores in this domain in a similar, but not identical instrument, as 77.7% for a sample of type I and II diabetics, results somewhat higher than those obtained for this research. Nerenz et al. (1992) report mean predicted values for groups of Type I diabetics as approximately 65% to 75% in this QOL domain. This present research sample, although more restricted in age than Nerenz et al. (1992) had scores within the psychological function domain for Type I diabetics that are similar.

It is difficult to compare the results of this scale to that of other researches using other instruments. Literature indicates worries are more frequent in females (Ingersoll & Marrero, 1991; Jacobson et al., 1988), depression is more common in diabetic women over age 60 (Connell, 1991), and anxiety is increased in persons with Type I diabetes (Wells et al., 1989). Each of these studies focuses on a particular component of psychological function, while the nine questions that compose this domain include several emotional states (nervousness, downhearted, happy, energetic), and conceptually embrace a broader view of psychological functioning. In addition, the previous research did not compare samples of Type I and Type II diabetics.

The Sickness Impact Profile (SIP) does include several dimensions of emotional behavior. Mitchell et al. (1990) reported 20.6% and 23.5%

impairment among Type II Mexican Americans and Non-Hispanic Whites respectively. In contrast, in the present research sample of Type I and II diabetics, 6% of the total sample had low psychological functioning scores in the 9 to 24 range, 74% had scores in the 25-44 point range, and 20% had scores in the 45-54 point range. The percentage of persons with severe psychological impairment is not as large as that reported by Mitchell et al. (1990).

Other variables, not available in this data set might be explored to explain the possible causes for the difference in the scores. These include existence of complications and co-morbidities, as previously discussed. In addition, the intensity of the self care regimen might have an influence. Gilden et al. (1990) reported that older adults with diabetes who tested urine for sugar reported a desire for using home blood glucose monitoring. Perhaps the persons with Type I diabetes experienced fewer worries and anxieties because they were confident in their self care regimen. Although not identified in the literature reviewed, it is possible that persons with Type I diabetes received more intensive therapeutic interventions from the health care team than did Type II diabetics. If these interventions included discussion of individual and family coping, better psychological functioning might be a result.

Question #4. Is social functioning perceived differently by persons with Type I and Type II diabetes? Social functioning scores were not significantly different between persons with Type I and Type II diabetes.

This scale consisted of a single question, with a range of responses from 1 to 5. The mean scores were 4.3 and 3.7 for Type I and

Type II diabetics, respectively, indicating slight to moderate impairment in social functioning for both groups, with little variability in responses. Eighty-three percent and 60.8% of the Type I and II diabetics, respectively, reported physical health or emotional problems interfered with normal social activities with family, friends, neighbors or groups either slightly or not at all. These statistics suggest that this sample of persons perceived this domain of QOL to be minimally affected. However, 8% and 21% of the Type I and II diabetics, respectively, felt their health had interfered with social activities quite a bit or extremely.

The generally positive social functioning scores might have varied if the sample had not excluded persons with severe medical complications. The time demands placed on a person with ESRD receiving dialysis, for instance, might adversely affect social activities with family and friends and lower the scores in this domain.

For this domain, the highest score (5) was converted to a predicted social functioning score of 100%. Similarly, the mean scores of 4.2 (total sample), 4.3 (Type I), and 3.7 (Type II) were converted to 84%, 86%, and 74% respectively. Stewart et al. (1989) report similar predicted scores (87%) in this domain for a sample of Type I and II diabetics, on a similar but not identical instrument. Nerenz et al. (1992) report mean predicted values for groups of Type I diabetics as approximately 75% to 90%. The present research sample of Type I diabetics, although more restricted in age than that of Nerenz et al. (1992), has similar scores in the social interaction domain of QOL.

The operational definitions of social functioning varies with that used in other research. This research inquired into interference with normal social activities. Lundman et al. (1990) explored how planning affected the individual with diabetes and others, while Connell (1991) more specifically explored ability to go out with others and ability to travel with others. Connell (1991), Lundman et al. (1990), and Nerenz et al. (1992), do not compare persons with Type I and Type II diabetes.

The two groups of persons with diabetes had similar mean scores and standard deviations. Using the mean scores obtained for the social functioning domain, a power of .8, and calculated effect size of .53, the sample size needed to detect significance in this domain was 128 persons, 64 persons with each type of diabetes. This sample included 117 persons, with only 23 Type II diabetics.

This variable is the only one of the Health Status Questionnaire SF-36D that asks if interference with a quality of life domain was due to physical health or emotional problems. It is possible that the change in the question format affected results. Additionally, it might be beneficial to include more specific questions in this domain. Specifically exploring areas of interference with social functioning such as avoiding activities where foods might be tempting to eat, cancelling planned activities, or leaving gatherings earlier than planned might provide additional information on this domain. Making such changes in questions might have an favorable impact on the reliability of this domain. There would be benefit in exploring if the individual perceived the family and close friends as having an effect on their social functioning. Questions could explore how often a person with diabetes mellitus participated in gatherings with family and friends and if the frequency of gatherings had changed due to diabetes. Similarly, it would be useful to explore if the nature of social interactions had changed. Inquiring if gatherings had occurred at a different place, e.g. the diabetic individual's home rather than the community would provide information on this domain. It would be of value to explore if the person with diabetes perceived their family and close friends as willing to alter activities to better meet needs.

Family has the potential to positively or negatively influence QOL within the social domain. Willingness to accommodate needs, keep health care needs in mind while planning, and alter traditional patterns may have a positive effect on QOL. Resistance to change in established patterns, however, could result in avoidance of interactions by the person with diabetes, and detract from QOL.

Stewart et al. (1989) report this item to have an estimate of reliability based on the correlation between alternate forms of .67. This value is the lowest for all the domains of this scale.

Question #5. Are the somatic sensations experienced by persons with Type I and Type II diabetes perceived as different? This study did find a significant difference in the somatic sensations reported by persons with Type I and II diabetes. Persons with Type I diabetes reported experiencing less bodily pain during the previous four weeks than did persons with Type II diabetes.

The total score on the somatic sensation scale was 6 points (X = 4.5, SD = 1.3). Sixty two percent of persons with Type I diabetes reported experiencing very mild or no bodily pain in the past four weeks, compared to 30% of those persons with Type II diabetes. Forty-eight percent of the persons with Type II diabetes indicated having moderate to severe pain, while only 21% of those with Type I diabetes had similar responses. Such variability in the data make the detection of significant differences more likely.

For this domain, the highest score (6) was converted to a predicted somatic sensation score of 100%. Similarly, the mean scores of 4.5 (total sample), 4.7 (Type I diabetes), and 3.6 (Type II diabetes) were converted to 75%, 78.3%, and 60% respictively. Stewart et al. (1989) report predicted scores in this domain as 73.6%, using an identical question. Nerenz et al. (1992) report mean predicted values of approximately 72% to 82% for groups of Type I diabetics. Thus the present research is consistent with previous findings in a sample of Type I and II diabetics, and Type I diabetics alone.

Age at diagnosis, race, and duration of diabetes did not have a significant main effect on the somatic sensation domain of QOL, although duration of diabetes did approach significance ($\underline{p} = .059$). The overall prevalence of diabetic neuropathy parallels the duration of diabetes in both Type I and Type II diabetics (Rifkin & Porte, 1992). Since the Type I diabetics had the disease for significantly longer, it might be expected that they would have more bodily pain as a result of neuropathic changes. In this sample, the Type I diabetics experienced significantly less pain. It is possible that these findings resulted from the selection bias of this sample. Persons who were experiencing medical complications of their diabetes were not included in this sample. Persons with painful or disabling diabetic neuropathy might have been excluded.

The sample size of persons with Type II diabetes was slightly lower than that needed. Using the mean scores obtained for the somatic sensation domain, a power of .8, and calculated effect size of .89, 26 persons of each type of diabetes were needed.

As in previous discussions, other variables might explain the differences found in this study. Painful neuropathy can be associated with poor metabolic control of diabetes (American Diabetes Association, 1992). Therefore, evaluation of glycosylated hemoglobin, as a measure of diabetic metabolic control, might be useful in exploring the reported differences in somatic sensation. The prevalence of coronary artery disease and peripheral vascular disease are increased in diabetic individuals (American Diabetes Association, 1989). Therefore, determining the existence of these complications which can cause chest pain and lower extremity pain, would be helpful in exploring responses within the somatic sensation domain of quality of life.

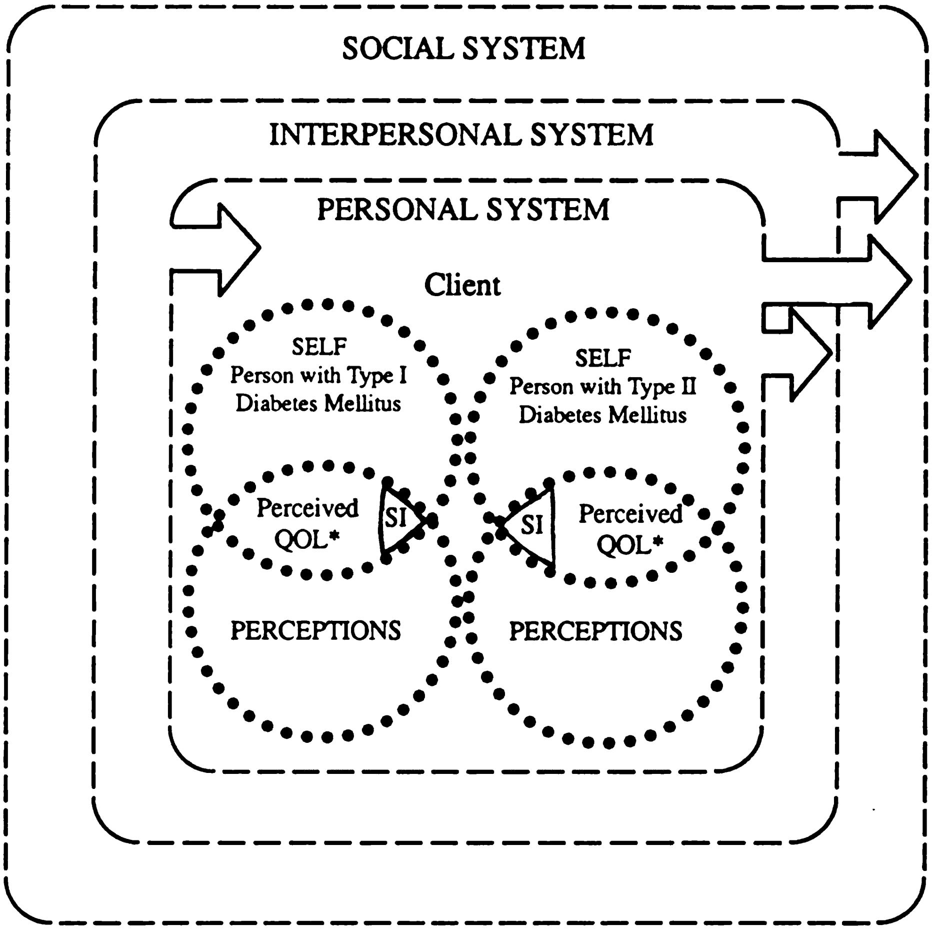
The operational definition of somatic sensation asked only about the amount of bodily pain experienced during the previous four weeks. Other somatic sensations, including the symptoms of high or low blood sugar of urinary frequency, dry mouth, blurred vision, sweating, shaking, and headache might also detract from perceived quality of life within the somatic sensation domain. Questions related to gastrointestinal function, (nausea, bloating, diarrhea, constipation, fecal incontinence) and genitourinary tract function (sexual function, bladder emptying) would also be appropriate, as these body systems can be affected by autonomic neuropathy in diabetes (American Diabetes Association, 1992).

Implications for Advanced Nursing Practice

The conceptual framework of King (1981) provided an appropriate model for the study of perceived QOL of persons with diabetes. King

(1981) views each person's perceptions as different from those of others. This research suggests that persons with Type I and Type II diabetes have both similar and dissimilar perceptions about QOL. Most persons with diabetes in this study described their function in the five areas of perceived QOL as good, regardless of type of diabetes. There were individuals within each type, however, who reported only fair to poor functioning within the domains. The results of this study suggest a revision in the model previously proposed in Figure 1 (Figure 2).

The QOL of persons with Type I and Type II diabetes mellitus was perceived as similar within only one of the five domains measured - perceived social interaction. This domain is illustrated as the darkened area within the overlap of the circles depicting self and perception. Perceptions within the other four QOL domains (physical functioning, psychological functioning, occupational functioning, and somatic sensation) differed in this sample of Type I and Type II diabetics. These four domains are not illustrated as darkened areas, to identify them as distinct from the social functioning domain. Consistent with King's (1981) discussion of the self as unified, complex, and individualized, persons with Type I and II diabetes mellitus are illustrated as separate circles, despite the finding of similarity in the social functioning domain. The perceived QOL of this sample was similar, although statistically significant differences were identified. These perceptions are integrated into the formation of the self as a distinctive center of experience (King, 1981). The demographic and significant differences found between Type I and II subsamples supports the choice of illustrating the self as distinct circles. This research explored only a few of the perceptions a person



*Perceived QOL: Physical, Occupational, and Psychological Functioning, Somatic Sensation and Social Interaction

SI: Similar perceptions of QOL within Social Interaction Domain

Figure 2. The concepts of perceived quality of life and self in the client with diabetes within the personal system (Revised). Adapted from A Theory For Nursing. Systems, Concepts, Process. (King, 1981).

with diabetes might have, specifically those related to the quality of life in five domains. Illustrating the quality of life perceptions as part of the perceptions that are unique for each type of diabetes is consistent with King's (1981) framework.

King (1981) states that perception is related to education, experience, goals, needs, physiology, socioeconomic status, and values. This research did not identify a difference in perceived QOL by education. However, differences were apparent by race, age at diagnosis and duration of diabetes. These can be thought of as experiences of the person with diabetes. The differences found in the scores between persons with Type I and II diabetes are consistent with King's (1981) discussion of influences on perceptions.

The assessment of the perceived QOL of a person with diabetes cannot occur without consideration of the interpersonal and social systems of King's (1981) framework. Exploring the perceptions of QOL will occur at the level of the provider (CNS) and client interaction - the interpersonal system. The CNS functions within the third of the systems described by King (1981) - the social system. The health care setting, in which the CNS and person with diabetes interact, is one social system. These systems are illustrated in Figure 2.

Most of the persons in this sample had scores on the five domains of QOL consistent with healthy functioning. However, Type I diabetics generally reported higher scores than Type II diabetics. This disparity in scores suggests the importance of assessment of QOL. The CNS must keep in mind the individual's experience, regardless of the type of diabetes mellitus. The CNS can use the QOL instrument to facilitate communication and identify aspects of life that are of greatest concern to the client. It could further be used to plan and evaluate interventions based on the instrument. In this way, assessing QOL could facilitatethe provision of client - centered care, based on the individual's subjective assessment.

The focus of this study was at the level of the individual client with diabetes, the personal system. It is expected within King's framework (1981), however, that the individual functions within a family, an interpersonal system. The CNS might include the family or significant other in assessment of QOL, seeking family clarification of what life with diabetes can be like, and how it is being experienced. This data could result in the planning and implementation of interventions at the interpersonal systems level that have potential to positively affect QOL. Mobilizing the social support of the family could positively influence QOL within all of the domains measured. Family members who ask the person with diabetes mellitus to join them for a walk may positively influence physical functioning by improving physical conditioning, improve psychological functioning by distracting from negative emotions, and provide valuable social interaction. Working with the family system, therefore, has the potential for positively influencing perceived QOL.

Persons with Type I and II diabetes did experience a statistically significant difference in physical functioning scores, with Type I diabetics reporting better physical functioning. Aware that most persons, with either type of diabetes report positive functioning, the CNS can promote maintenance of physical function by providing positive reinforcement for self care behaviors and participation in physical activities. Such reinforcement might include discussion of specific motivators for activity identified as important by the individual. Acknowledging the effort needed to remain physically active, and the potential benefit on control of blood sugar can also be emphasized.

Persons with Type I diabetes generally reported positive physical functioning scores. The CNS might recognize persons with positive functioning by inviting them to discuss with others how they have worked to maintain physical functioning. These discussions might occur in a formal educational program setting, support group, or by matching persons newly diagnosed with diabetes with peers.

The nurse should be alert for the greater potential for lower physical functioning scores among Type II diabetics. Assessment of physiologic, treatment related, personal and environmental factors contributing to poor physical functioning would be of value. Type II diabetics, for example, are frequently overweight (Rifkin & Porte, 1992), and therefore might experience more physical deconditioning. The CNS might collaborate with other health professionals in developing physical exercise programs for overweight persons, who might be hesitant to begin exercise without strong support and encouragement.

The CNS should also assure that the diabetes education received by all persons with diabetes is comprehensive, and includes discussion of both how to adopt a more active lifestyle and the value of physical conditioning in diabetes control.

At the level of the personal system, the CNS might negotiate with the client with poor physical functioning on the implementation of a management plan which might positively affect function. Interventions might include physical conditioning programs, altering activity and rest patterns, or referral to an occupational therapist for complex modification of activities. As the primary care nurse, the CNS would communicate with referral agencies and advocate within the heath care system for insurance coverage for referrals.

Race was found to have a significant effect on perceived physical functioning scores, but not on the other four quality of life domains. African Americans with either type of diabetes had lower physical functioning scores than Caucasians. The CNS working within African American communities might explore ways to promote positive attitudes toward an active lifestyle. Existing African American social structures, such as churches, might be appropriate sites for implementation of wellness programming. The difference in physical functioning by race suggests a population at greater risk, for whom a more focused assessment of physical functioning might be appropriate. As a clinician delivering primary care, the CNS should be aware of the decease in utilization of preventive health services by African Americans (U.S. DHHS, 1991). This decreased utilization might cause medical problems to be more severe at diagnosis, leading to poorer perceived quality of life. Discussion about preventive health care behaviors, and scheduling preventive visits should be a part of the health encounter by the CNS with at risk populations. Additional visits can place time, financial, transportation, and child care demands upon the person with diabetes. Within the social system, the CNS as client advocate and member of the health care team, can work with agencies to minimize the barriers to care that can impact on preventive health care visits.

Although scores generally indicated a high level of occupational functioning, scores were significantly different between persons with

Type I and Type II diabetes. Persons with Type I diabetes reported significantly higher scores in this domain, indicating they did not cut down on time spent on work or other activities, felt they did not accomplish less, and were not limited in the kind of work or activities performed. The CNS, by being attentive to the lived experience of the person with diabetes is capable of intervening within the occupational domain. Exploring with persons with Type I diabetes how they maintain their occupational activities, and acknowledging the value of that effort validates the importance of those efforts. Active listening may facilitate discussion of potential problems being experienced by an individual in their efforts to maintain positive functioning.

The CNS can collaborate with other professionals in an effort to maintain positive occupational functioning. Human resource personnel often have experience with adapting work settings to help employees continue functioning productively. Occupational therapists might provide insight into more energy conserving methods of performing tasks that become challenging to an individual with diabetes. Persons with Type I diabetes in certain work and household settings might also agree to share their experiences and "can do" attitudes with other diabetic individuals or groups.

One quarter of this sample of Type II diabetics reported low scores in every item of the occupational functioning domain of QOL. The CNS should be alert for the possibility of impairment within this domain, particularly among persons with Type II diabetes, and assess perceived occupational functioning on a regular basis. Discussions about specific difficulties being experienced will provide information essential to planning interventions. Interventions might include referrals to other diabetic persons, occupational therapists, human resource personnel, or mental health counselors.

Development of assertive communication skills might enhance a person's ability to improve functioning within this domain. Inclusion of household members in discussion of the individual's difficulties, and development of strategies each could employ might result in improvement in quality of life within the occupational functioning domain.

There were individuals with both types of diabetes reporting poor functioning in this domain. If left unexplored, persistent low responses in this domain, could have a negative impact on the client's financial resources. An employed person with diabetes reporting difficulty in performing work faces the possibility of job reassignment or loss of position. After clarifying the perceived difficulties, within the interpersonal system, the CNS might educate persons about the American with Disabilities Act, and the employer's responsibility to make reasonable accommodations. By empowering the person with diabetes to obtain needed assistance in altering the work environment, improvement in functioning within that social system might result.

As with the physical and occupational domains of QOL, most of this sample reported scores on the psychological functioning domain in the healthier range of functioning. The Type I diabetics, however, did report significantly higher mean scores within this domain. The CNS can support positive psychological functioning by encouraging the person with Type I diabetes to discuss how they maintain their emotional well being. Acknowledging the importance of healthy coping methods, and the time and energy taken to employ them, can provide support of the client's efforts. Exploring emotional status at visits affirms the importance of this QOL domain, thereby providing validation that persons are welcome to initiate discussion on issues of concern. Acknowledging the family's role in positive emotional adjustment, and being available for discussion with families when the diabetic is functioning positively may also help maintain healthy emotional status.

Awareness that a greater percentage of Type II diabetics reported lower psychological functioning scores is essential for nurses. As with the person with healthy functioning, assessment of this domain should be a priority. The CNS, with well developed communication skills, can provide focused assessment of areas within this domain, identifying aspects detracting from the individual's QOL. Depending on the complexity of the emotional issue and depth of intervention anticipated, the CNS can provide counseling, or act as a referral agent to another professional. It is essential for the CNS to have helped others within the health care setting to understand the more wholistic approach to health care required of the advanced practice nurse. Without this understanding, establishing blocks of time adequate for attention to the psychological domain will be difficult.

Referral to comprehensive diabetes education programs is important for all persons with diabetes. Discussion of coping, the potential emotional impact of diabetes, and community resources for assistance would be beneficial components of diabetes education. In addition, the CNS should refer clients to diabetes education programs that encourage active verbal discussion between participants, so that emotional needs can be identified. Referral to diabetes support groups might also be of benefit in achieving and maintaining positive psychological functioning. Acknowledging the effect diabetes can have on the household, and facilitating family discussions may also be appropriate interventions for persons experiencing impaired psychological functioning.

Within the social interaction domain, most of this sample reported little impairment. Exploring with individuals what social interactions they seek out and enjoy demonstrates the nurse's perception that social interaction is an important aspect of health. Encouraging discussion of hobbies and activities performed with others offers similar validation. Acknowledging that any individual can experience feelings of aloneness and/or desire for more social contact provides opportunities for reflection on the part of the person with diabetes on ways existing social interactions might be enhanced or improved. Assessing on a regular basis if the diabetic client is experiencing any changes in social interaction patterns alerts the CNS to needs that may exist. Through anticipatory guidance and problem solving, the nurse can help the client facing changes adapt, preventing a decline in functioning within the social interaction domain.

A small percentage of both type of diabetics felt quite impaired in this domain. Further assessment by the CNS might focus on areas of social interaction considered important to 30 to 50 year olds, from an individual and family development perspective. Exploring exactly how the individual is negatively impacted would be essential for planning interventions.

Persons in this sample with Type I diabetes mellitus reported experiencing less bodily pain than persons with Type II diabetes. The CNS, aware of pathophysiologic causes of pain in the person with diabetes, can encourage persons reporting little or no pain to continue self care behaviors that may be helpful in avoidance of pain.

Acknowledging an individual's foot care regimen encourages continuing attention to prevention of diabetic foot ulcers, a potential cause of pain. Similarly, recognizing a client's efforts at good blood sugar control may promote continuing efforts that may be beneficial in delaying the development of neuropathic pain. The CNS can also encourage persons with little or no pain to report any worsening in the amount of pain experienced promptly. Prompt reporting of changes in symptoms might result in earlier diagnosis of a health problem. Education about symptom reporting should be part of education at both the group and individual level.

Almost one half of this sample of persons with Type II diabetes reported having moderate to very severe bodily pain in the past four weeks. This data suggests the importance of thorough assessment of the existence of pain within this group of persons with diabetes mellitus. Persons experiencing recurrent or severe pain may require intensive interventions by the health care team to relieve the burden on the individual and family. Attention to alternating activity and rest, the use of distraction, relaxation, cutaneous stimulation, and medication might be taught to both patient and family. Thorough assessment of the effects of pain on role functioning, social interaction, finances, activities of daily living, psychological functioning, and the family unit is essential.

Aware of the large number of persons who might be in pain, the CNS can work within the health care system to decrease the waiting time in clinics, provide comfortable seating, and facilitate scheduling so clients could be seen at the time of day when they are most comfortable.

Assessment of QOL, and planning of interventions based on that assessment are important applications for the CNS. QOL evaluation could be utilized as a measure of patient outcome. Measurement of an outcome of direct importance to the individual with diabetes mellitus, such as decrease in bodily pain, increased ability to climb stairs, increased time spent with family or friends, improved sense of emotional health, and ability to perform occupational demands are of particular importance in a chronic disease such as diabetes mellitus for which there is not a cure. Nurses working with clients with diabetes mellitus who document their ability to help individuals maintain or increase their QOL will be demonstrating the uniqueness and value of care delivered by advanced practice nurses.

Recommendations for Future Research

The results of this study suggest several areas for future research. The research sample was not representative of Type I and II diabetics in the United States. A sample which included more African Americans with both types of diabetes mellitus, and more males with Type I diabetes might be targeted. Strategies to locate more African Americans with Type I diabetes include utilizing additional urban primary care sites, targeting persons through publications for diabetic persons, using churches as data collection sites, and identifying rural populations with a large percentage of African Americans by census data.

This data compared quality of life scores of persons with Type I and Type II diabetes ages 30 to 50 years old. No control group of similarly aged persons without chronic health conditions was utilized. Data from such a control group would provide valuable information on the expected range of responses from a sample of healthy persons against which to compare the perceived quality of life of persons with diabetes.

Criteria for exclusion from future studies should be clearly defined. A replication study might specifically state the criteria for exclusion due to severe medical complications. For instance, persons with ESRD and dyspnea secondary to advanced coronary disease might be among the excluded population. What accommodations are made to enable persons with poor reading skills or decreased visual acuity to answer the questions should also be clearly stated. Interrater reliability would also need to be evaluated, with training and scoring guides used to decrease variability among researchers choosing persons for inclusion or exclusion from the study. In addition, future research should explore the characteristics of those persons excluded to allow comparison with the study sample.

Limited sample size, due to the nature of secondary data analysis, prevented identification of variables which might have effected QOL scores. Mean scores obtained in this research could be used in determining sample sizes needed in the future.

Future research might include more sophisticated data analysis, using a multivariate regression technique. Such an analysis, requiring a large sample, would simultaneously examine the effects of independent variables on the QOL scores. This would allow one to assess the relative importance of the independent variables.

Other independent variables, not measured for this research might have affected QOL scores. As discussed previously, these variables include - presence or number of diabetic complications, co-morbidities, economic status, insulin or oral hypoglycemic agent use, previous diabetes education, body mass index, type of employment and intensity of the self care regimen.

The quality of life questionnaire used did not include questions relevant to the developmental tasks of persons ages 30 to 50 years old. It might be useful to include physical functioning questions related to ability to play with children, occupational functioning questions related to increased dependence on significant others to carry out home management responsibilities, or questions related to the perceived effect of health on career or job advancement. Interventions planned to address these developmental tasks has the potential to improve perceived quality of life. Revisions of the social functioning scale to include additional questions, as previously discussed, and increasing this scale's reliability coefficient would also be appropriate. Construct validity of the somatic sensation and social interaction scales might be improved by revisions of these single item scales.

This sample included only persons seeking care at the endocrinology clinic of a large urban health center. It is possible that there is a difference in health care delivery, patient education, and diabetes management between this sample and that of other groups of diabetics receiving care in different settings. Future research should obtain data from a broader sample, including rural health care delivery sites.

Literature was not identified which explored clinical application of the information obtained in assessing perceived quality of life. As the CNS provides interventions, such as counseling, pain management skills, education and advocacy, it is essential to measure the effect on patient outcome. Exploring what nursing interventions improve perceived quality of life is an essential component of nursing research.

Exploration of the relationship between perceived quality of life and metabolic control or ability to follow the self care regimen is also an important area for future research. Another outcome measure relevant to perceived quality of life might include communication patterns and satisfaction with care. It would be useful to know if diabetic clients feel greater sense of satisfaction with health care providers who address issues of quality of life, and if clients experience greater willingness to bring up health concerns that are not solely symptomatic in nature.

Literature was not identified which assessed how frequently QOL should be measured. The open systems of King's (1981) model suggests that persons are constantly changing, and perceptions and sense of self may change over time. Future research on QOL would help identify how often assessments should be made, while avoiding repetitive questioning at clinic visits that can become a nuisance to clients.

There would be value as well in carrying out qualitative research related to QOL of persons with diabetes. Such research might explore the lived experiences of persons who score on each extreme of the QOL domain ranges. Such research might also identify personal belief systems or attitudes that affect one's perceived quality of life. Information could also be obtained for the development of scales for quality of life issues not assessed in this research, such as spirituality, sense of dependence on others, and the relationship of the client with the health care system.

Summary

This research study found that persons with Type I diabetes had significantly higher scores in four quality of life domains: perceived physical, occupational, psychological functioning, and somatic sensation, although persons with both types of diabetes generally reported positive functioning in all domains. Findings also indicate that race and age at diagnosis affect perceived physical functioning. These findings have several implications for the clinical practice of the CNS working with the diabetic client. First, assessment of perceived quality of life provides valuable information for wholistic nursing and health care of the person with diabetes. Such an assessment can improve the nursing data base about the client's lived experience with diabetes, resulting in effective selection of nursing interventions. In addition, aware that some persons with each type of diabetes experienced lower quality of life in the four domains, the CNS can be more deliberate in educational and therapeutic interventions with those individuals.

The generalizability of the findings was limited for several reasons. The study used a sample of persons who all received care in the same urban health care setting. The majority of subjects were Caucasian and had at least a high school diploma. In addition, subjects who were experiencing serious medical complications at the time of data collection that would have made participating difficult were not asked to participate.

This study has increased the knowledge base available to the CNS about the differences in perceived quality of life between persons with Type I and II diabetes. However, it was not able to address why these differences were found. The conceptual framework for nursing of Imogene King (1981) provided an appropriate model for both assessing perceived quality of life and planning interventions that may influence those perceptions.

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APPENDICES

HEALTH STATUS QUESTIONNAIRE
SF-36D

INSTRUCTIONS:
This survey asks for your views about your health. This information will be summarized in your medical record and will help doctors keep track of how you feel and how well you are able to do your usual activities.

Answer every question by circling the appropriate number, 1, 2, 3, ... If you are unsure about how to answer a question, please give the best answer you can and make a comment in the right margin.

1. In general would you say your health is: *(circle one number)*

Excellent	1
Very Good	2
Good	3
Fair	4
Poor	5

2. Compared to one year ago, how would you rate your general health now? (circle one number)

Much better now than one year ago	1
Somewhat better now than a year ago	2
About the same	3
Somewhat worse now than one year ago	4
Much worse now than one year ago	5

TyPE℠ Specification

HEALTH AND DAILY ACTIVITIES

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

(circle one number in each row)	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 and dressing yourself	1	2	3

4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

(circle one number for each row)	Yes	No
a. Cut down on the amount of time you spent on work or other activities	1	2
b. Accomplished less than you would like	1	2
c. Were limited in the kind of work or other activities	1	2
d. Had difficulty performing the work or other activities (for example, it took extra effort)	1	2

5. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious) ?

(circle one number for each row)	Yes	No
a. Cut down on the amount of time you spent on work or other activities	1	2
b. Accomplished less than you would like	1	2
c. Didn't do work or other activities as carefully as usual	1	2

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups? *(circle one number)*

Not at all	1
Slightly	2
Moderately	3
Quite a bit	4
Extremely	5

PAIN

7. How much bodily pain have you had during the past 4 weeks? *(circle one number)*

None	1
Very Mild	2
Mild	3
Moderate	4
Severe	5
Very severe	6

8. During the past 4 weeks, how much did pain interfere with your normal work (including work both outside the home and housework)?

Not at all	1
A little bit	2
Moderately	3
Quite a bit	4
Extremely	5

YOUR FEELINGS

9. These questions are about how you feel and how things have been with you **during the past month**. For each question, please indicate the one answer that comes closest to the way you have been feeling.

How much of the time in the **past month** ...

(circle one number in each row)	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
a. did you feel full of pep?	1	2	3	4	5	6
b. have you been a very nervous person?	1	2	3	4	5	6
c. have you felt so down in the dumps nothing could cheer you up?	1	2	3	4	5	6
d. have you felt calm and peaceful?	1	2	3	4	5	6
e. did you have a lot of energy?	1	2	3	4	5	6
f. have you felt downhearted and blue?	1	2	3	4	5	6
g. did you feel worn out?	1	2	3	4	5	6
h. have you been a happy person?	1	2	3	4	5	6
i. did you feel tired?	1	2	3	4	5	6
j. has your <u>health</u> <u>limited</u> <u>your</u> <u>social</u> <u>activities</u> (like visiting with friends or close relatives)?	1	2	3	4	5	6

HEALTH IN GENERAL

10. Please choose the answer that best describes how <u>true</u> or <u>false</u> each of the following statements is for you.

(circle one number in each row)	Definitely true	Mostly true	Not sure	Mostly false	Definitely false
a. I seem to get sick a little easier than other people.	1	2	3	4	5
b. I am as healthy as anybody I know.	1	2	3	4	5
c. I expect my health to get worse.	1	2	3	4	5
d. My health is excellent.	1	2	3	4	5

11. Please answer <u>yes</u> or <u>no</u> for each question.

(circle one number for each row)	Yes	No
a. In the past year, have you had 2 weeks or more during which you felt sad, blue or depressed; or when you lost all interest or pleasure in things that you usually cared about or enjoyed?	1	2
b. Have you had 2 years or more in your life when you felt depressed or sad most days, even if you felt okay sometimes?	1	2
c. Have you felt depressed or sad much of the time in the past year?	1	2

MICHIGAN STATE
UNIVERSITY

April 25, 1994

TO: Ginny White-Linn
5675 Golfridge Drive
Alma, MI 48801

RE: IRB #: 94-148
TITLE: PERCEIVED QUALITY OF LIFE OF ADULTS WITH DIABETES MELLITUS
REVISION REQUESTED: N/A
CATEGORY: 1-E
APPROVAL DATE: 04/24/1994

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete. I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the UCRIHS approved this project including the revision listed above.

Renewal: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Investigators planning to continue a project beyond one year must use the green renewal form (enclosed with the original approval letter or when a project is renewed) to seek updated certification. There is a maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for complete review.

Revisions: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB # and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

Problems/ Changes: Should either of the following arise during the course of the work, investigators must notify UCRIHS promptly: (1) problems (unexpected side effects, complaints, etc.) involving human subjects or (2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

OFFICE OF
RESEARCH
AND
GRADUATE
STUDIES

University Committee on
Research Involving
Human Subjects
(UCRIHS)

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48824-1046
517/355-2180
FAX: 517/336-1171

If we can be of any future help, please do not hesitate to contact us at (517) 355-2180 or FAX (517) 336-1171.

Sincerely,

David E. Wright, Ph.D.
UCRIHS Chair

DEW:pjm

cc: Dr. Rachel Schiffman