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Physiological and Psychological Variables Contributing to Sexual Dysfunction in Female Insulin Dependent Diabetic Patients

Linda D. Rice
Loyola University Chicago

PHYSIOLOGICAL AND PSYCHOLOGICAL VARIABLES CONTRIBUTING TO SEXUAL DYSFUNCTION IN FEMALE INSULIN DEPENDENT DIABETIC PATIENTS

by

Linda D. Rice

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Vita

The author, Linda D. Rice, was born in Baltimore, Maryland on July 29, 1952.

Her elementary education was obtained in the parochial school system of Baltimore, Maryland. Her secondary education was completed in 1970 at Towson Catholic High School, Towson, Maryland.

In June, 1974, Ms. Rice received the degree of Bachelor of Arts in Psychology from Loyola College, Baltimore, Maryland. She received the degree of Master of Arts in Clinical Psychology from the same institution in August, 1980.

Ms. Rice completed an internship in Medical Psychology at the Johns Hopkins School of Medicine in June, 1985. She is currently a Post Doctoral Fellow in Psychology at the Sheppard and Enoch Pratt Hospital in Towson, Maryland.

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CHAPTER I

INTRODUCTION

Overview

Advances in medical technology in the 20th century have improved diagnoses and treatment of most infectious illnesses to the point of their elimination as major health problems (Stone, 1982). Incapacitation and death from such illnesses as cholera, typhus, and tuberculosis and from surgical complications such as infection and delirium have generally been eradicated (Stone, 1982). In their wake remains an increasing incidence of chronic medical problems that threaten patients' very lives and physical well being as well as present major adjustment challenges in all areas of life. The resolution of such challenges often directly affects the course of the illness by either reducing or increasing stress, which in turn leads to either a diminution or exacerbation of symptoms. One important aspect of life adjustment is sexual functioning, which has been a previously neglected area of research concerning adjustment to chronic illness. It is the purpose of the

present study to examine the impact of one chronic illness, insulin dependent diabetes, on sexual functioning in women.

The chronic illnesses that threaten modern life are many and include coronary artery disease, cancer, Parkinson's disease, multiple sclerosis, chronic obstructive pulmonary disease, and renal disease. Diabetes is considered the most prevalent chronic illness; this disease affects nearly 60 million individuals worldwide (Brownlee, 1985) and 10 million Americans (Surwit et al., 1985). Insulin dependent diabetes, the more chronic type and the subject of the current study, affects three to four million individuals across the world (Brownlee, 1985). Diabetes is responsible for over 300,000 deaths per year (Surwit et al., 1985). The illness poses a daily threat to life as well as a harbinger of possible future physical decompensation and premature death. The course of the diabetes frequently results in such serious medical complications as blindness, renal failure, increased risk of coronary artery disease, increased risk of limb infection with resultant gangrene and amputation, neurological disorder, and a generally lowered life span (2/3 that of nondiabetics). On a daily basis diabetics are ". . . precariously poised between hypoglycemia (too little blood glucose) and hyperglycemia (too much blood glucose)", either of which can propel the patient into feeling ill and if untreated can result in coma, hospitalization, or death

(Surwit et al., 1983). The diagnosis of diabetes, usually made during adolescence, often represents a serious challenge to self esteem and offers limited opportunity to cope as the individual must immediately acquire behaviors that are tedious, uncomfortable, not immediately rewarding, and often quite aversive. Diabetics must daily test their urine or blood for glucose levels, must carefully monitor diet, particularily carbohydrates, must get regular exercise but be sure to consume 10-15 grams of carbohydrates for each 30 minutes of additional exercise, and must give themselves daily insulin injections. The balance of prior relationships within the family, among friends, and in academic and occupational settings is disrupted as other individuals must interact with a previously healthy individual who is now seriously ill but able to continue daily functions (Hauser & Pollets, 1979).

Behavioral scientists have become increasingly interested in the psychological lives and problems of patients with chronic illness. Populations of interest have included cardiac patients, renal dialysis patients, patients with chronic pain, cancer patients, CNS impaired patients, and patients with neurological disorders like multiple sclerosis. Topics of concern have included uses of behavioral techniques to replace and/or augment medication in the treatment of pain (Steger & Fordyce,

1982), the relationship between stress and the development of illness or exacerbation of symptoms (Coyne & Holroyd, 1982), risks and recovery from coronary artery disease (Kaplan & Kimball, 1982), adjustment to disfiguring surgeries (Olbrisch, 1983), and chronic illness and the development of anxiety and depressive syndromes (Surridge et al.,1984).

Surwit et al., (1983) note that compared to these medical problems there has been little interest in diabetes by behavioral scientists. The first observations of psychological contributions to diabetes were in the 17th century (Willis, 1679; Maudsley, 1899). At that time general physicians noted the high incidence of depression among diabetics. These observations led to the opinion that emotional disturbance was causally related to the onset of diabetes and to flucuations in metabolic control, a point of view fueled by the concurrent popularity of the psychosomatic medicine movement (Jacobson & Leibovich,1984). With the demise of this philosophy and the discovery of the physiological deficit of the pancreatic beta cells of the diabetic, the psychogenic etiology of diabetes was abandoned, although current research does support the possibility that stress upsets daily metabolic control (Surwit et al., 1982; Simmonds et al., 1981).

Other areas of research have included studies to assess anxiety and depression in diabetics (Surridge et al., 1984), compliance with treatment regimens (Jacobson & Leibovich, 1984; Hauser & Polletts, 1979), personality and blood glucose control (Hauser & Pollets, 1979), and the impact of diabetes in the family (Hauser & Polletts, 1979).

As with other chronic illnesses most research to date on the psychological aspects of diabetes have focused on issues related to the development of the illness and its complications, management of treatment, and the development of major psychiatric problems. Little attention has been paid to the sexual lives and concerns of such individuals. One obvious reason for this neglect is the newness of research efforts resulting in initial attention being directed to the most life threatening aspects of the illness. In a recent review of research on sexuality in medical illness, Anderson and Wolf (1986) suggest additional reasons for negligence in this area. They first hypothesize a societal attitude that chronic illness is usually confined to the geriatric population and that sexual interest and behavior is reserved for the young and healthy. A related notion is that chronic illness causes a loss of sexual functioning rather than the viewpoint that chronic illness represents a threat to such functioning that is coped with in an adaptive or maladaptive manner. Also they suggest that sexual functioning is a difficult

topic for medical staff. Physicians and other health care providers often do not view sexual feelings or behaviors as having any impact on recovery and wellness, are often uncomfortable discussing sexual issues with their patients, and frequently view sexual difficulties as resulting from the organic processes of the disease independent of the psychological lives of patients and their families. The medical model of diagnosis based on systemic problems related to the disease does not ordinarily incorporate psychological issues such as interest in sexual behaviors and the abilities to act on such interests in a satisfactory manner.

The interest in and ability to engage satisfactorially in sexual behavior are, however, important aspects of an individual's biological, social, and psychological experience, and are frequently compromised in chronic medical illness (Wise, 1980). The immediate psychological reaction to diagnosis of illness, subsequent adjustment to an altered life style, the organic components of the illness, and related interpersonal stresses may individually or in various combinations result in sexual difficulty. A few studies have examined the relationship among these variables. One large body of such research has been devoted to cancer patients, primarily investigating the study of sexual dysfunction in patients who have had various types of cancer and treatment (Derogatis &

Kourlesis, 1981; Chapman, 1982). Research findings indicate rates of sexual dysfunction between 25% and 75% in this population compared to cited rates in the general population between 2% and 50% (Kinsey, 1948; Kaplan, 1974; Myer et al., 1983). Factors affecting sexual interest and behavior in cancer patients include organic problems, the toxicity of chemotherapy, structural impairments from surgery, anxiety and depression, negative body image, and the reactions of loved ones to the patient's illness. Other medical illnesses studied with regard to sexual functioning have been cardiovascular disease, renal dialysis, chronic obstructive pulmonary disease, and spinal cord lesions (Wise, 1980, 1983).

Diabetes is somewhat an anomaly in the dearth of research on sexual functioning in chronic illness, particularily with respect to the male population. It is a well investigated and widely reported finding that male diabetics suffer sexual dysfunction in the form of erectile problems and premature ejaculation as a result of their disease. Impotence has been estimated to occur in 27% to 59% of diabetic men (Schiavi & Schreiner-Engel, 1980). The causes of diabetic impotence are believed to be both organic and psychogenic in nature, involving duration of illness, poor metabolic control, vascular complications,

peripheral and autonomic neuropathies,[1] and anxiety and depressive reactions. Little research has explored the impact of problems with body image and self esteem, personality, or interpersonal issues and sexual difficulties in male diabetics.

There has been comparably scant research in sexual functioning for female diabetics. The first study was conducted in 1971 (Kolodny, 1971). Prior research in this area concerned reproductive issues for female diabetics; contraception, pregnancy and birth present major challenges for insulin dependent diabetic women and their physicians (Oakley et al., 1971). Other reasons for this apparent lack of interest in sexual functioning might include the conservative social climate prior to the 1960's, and also the fact that impotence is an obvious problem that would readily come to the physician's attention compared to the more subtle sexual difficulties likely experienced by female diabetics. Inadequate vaginal lubrication (the female analogue to erection), for example, does not necessarily prevent sexual intercourse and does not pose threats to self esteem to the degree impotence does for men (Masters & Johnson, 1966; Kaplan, 1974; LoPiccolo &

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[1]Neuropathy is the degeneration of nerve cells resulting from illness or injury. Both the autonomic and peripheral nevous systems may be damaged in this manner (Clements & Bell, 1982; Green & Pfeifer, 1985). A more detailed explanation of neuropathy and its role in diabetic sexual dysfunction in presented in Chapter II.

LoPiccolo, 1978). Additionally, considering the frequent onset of diabetes in adolescence, it is logical that diabetic women may not notice a change in sexual functioning because they may have always operated at a lower baseline compared to their nondiabetic peers. This last hypothesis is difficult to test at present due to the lack of prior research on adolescent sexual functioning and diabetes.

Given the physiology of sexual functioning and diabetes, it seems likely that female diabetics also experience sexual problems as a result of both organic and psychogenic factors. It is the purpose of the present study to explore these issues by first determining if sexuality is impaired for female diabetics compared to nondiabetic women.

The contention of the current research is that such an impairment exists as a function of physiological and psychological factors. Research addressing this issue is important for several reasons. The study of sexual problems in diabetic women represents a neglected area in the literature. Previously reported studies contain numerous experimental design problems and have yielded contradictory results. Thus one important contribution of the present study is to clarify the current conflicts in the existing research and hopefully provide a more definitive understanding of the nature of sexual

dysfunction in insulin dependent diabetic women. An additional purpose of the study is to provide practitioners with information concerning the existence of such problems. With such information family practice physicians, endocrinologists, internists and family counselors could provide valuable interventions to patients and their spouses, thus improving the qualtiy of their lives.

Statement of the Problem

It is the general purpose of the present study to demonstrate the existence of sexual dysfunction in insulin dependent diabetic women compared to non-diabetic women and to examine the effect of physiological and psychological variables on such dysfunction. Additionally, the study will attempt to isolate physiological and psychological variables that will predict sexual dysfunction in diabetic women.

A group of insulin dependent diabetic women will be compared with a demographically equivalent group of nondiabetic women on sexual functioning as measured by the Derogatis Sexual Functioning Inventory (DSFI) (Derogatis, 1980), the Derogatis Inventory of Sexual Functioning-Female Form (DISF-F) (unpublished test); on marital quality as measured by the Spanier Dyadic Adjustment Scale (DAS) (Spanier, 1979), and personality styles as measured by the Eysenck Personality Inventory (Eysenck & Eysenck, 1968).

Specifically the following questions will be addressed:

1. Do insulin dependent diabetic women exhibit greater sexual dysfunction compared to non-diabetic women?

2. Which physiological and psychological variables best discriminate diabetic and non-diabetic women?

3. Among diabetic women which physiological and psychological variables contribute to sexual dysfunction?

Data will be analyzed by discriminant analyses and multiple regression techniques. The use of multivariate statistics will clarify the relationship of several possible contributing physical and psychological factors to sexual dysfunction in diabetic women. Such a clarification has not been provided in the literature to date. This information will additionally provide the basis for screening diabetic women for the presence of sexual dysfunction and for suggesting appropriate treatment interventions.

CHAPTER II

REVIEW OF THE LITERATURE

Overview

In this chapter a discussion of the relevant literature concerning sexual functioning in insulin-dependent diabetic women will be presented, as well as an outline of the current study. In order to support this endeavor, information concerning the pathology and treatment of diabetes, the neurophysiology of sexual functioning, general sexual dysfunction, and the physiological complications of diabetes that may contribute to sexual dysfunction in diabetics will be presented. Finally, a review of the literature specifically addressing sexual dysfunction in insulin dependent diabetic women will be discussed. Appendix A presents a glossary of medical terminology referred to in this chapter.

Diabetes Mellitus

Diabetes mellitus is a disorder involving the endocrine system, the network of glands and structures that secrete hormones into the bloodstream. These hormones are responsible for the body's metabolism and growth. In

diabetes, the affected hormone involved is insulin, ordinarily secreted by the beta cells in the Island of Langerhans in the pancreas. The function of insulin is the storage and utilization of body fuel, particularily glucose, from ingested foods. As with most body systems, this one is truly remarkable in its ability to regulate the body's energy store across many variables such as consumption of varying quantities and types of foods, energy expenditure, and the effects of illness. The pancreas and its accompanying insulin function as a sophisticated computer, able to accurately regulate the uptake, release, and storage of glucose in muscles, the liver, and adipose tissue in response to numerous combinations of carbohydrates, fats, and proteins ingested by an individual throughout the day. Following consumption of a meal in a non-diabetic individual, blood glucose rises in response to direct ingestion of sugars and the breakdown of carbohydrates into sugar, and the pancreas releases insulin which signals the liver and muscles to store the excess glucose in the form of glycogen (normal levels are 400 g. in muscle and 200 g. in liver). This process maintains the blood glucose level between 126 mg./100 ml. and 63 mg./100 ml. This is a critical function because many of the body's systems, particularily the brain, depend on this level for adequate functioning. As will be shortly

explained, blood glucose levels beyond this range cause serious chemical imbalance and often death.

At the most simplistic level, diabetes represents the failure of the pancreas to release insulin in appropriate amounts to facilitate the events just described. The implications of such a failure, however, are very complex and range from the immediate problems in functioning resulting from extreme levels of either insulin or glucose in the blood to more long range problems resulting from the chronic irregulation of these substances throughout the body.

In the case of immediate functioning, the concentration of insulin in the blood at any given moment controls the mobilization and utilization of fuels, particularily glucose. When the level of insulin is too high the liver is signaled not to release glucose into the blood. Muscles and adipose tissue then are signalled to remove glucose, causing the glucose level to rapidly fall until there is not enough glucose to fuel the brain. Hunger, anxiety, restlessness, sweating, tachycardia, and heart palpitations result. In a counter measure, adrenalin is released; if the glucose level continues to drop, unconsciousness and death may result. In the opposite case, when insulin fails to increase in response to rising blood glucose, the resultant quantity of glucose becomes more than the kidneys can retain (over 180 mg./dl.) and

glucose spills into the urine. The liver in turn produces more and more glucose at the expense of body protein until the body enters a state of dehydration, hypoglycemia, and shock. Additionally, organic acids are overproduced by the liver and lost in the urine resulting in a condition called acidosis. The combination of acidosis, dehydration, collapse of circulation and shock results in a condition called diabetic ketoacidosis or coma.

To date the use of injected insulin in diabetic patients has not been able to accurately replicate the complex and subtle operation of naturally produced insulin. As a result, these immediate complications are ever present for diabetics, necessitating a complicated treatment regimen that involves strict observation of and adherence to diet, exercise, regular insulin injections, and daily glucose monitoring through blood or urine tests.

Even with strict adherence to this regimen, the artificial regulation of glucose is less than adequate and usually results in serious long range complications of disrupted metabolism. Included in such complications are retinopathy, arterclerosis, neuropathy, nephropathy, gangrene, vulnerability to infection, and premature death. The interaction between irregulation of blood glucose and these disorders is poorly understood at present, although ample evidence exists that control of diabetes prevents and/or minimizes the development of these complications

(Sherwin & Tamborlane, 1985). Particularily relevant to this study is the complication of neuropathy, the degeneration of sensory and motor axons in the autonomic and peripheral nervous systems. Neuropathy has been implicated in male diabetic sexual dysfunction, and is a likely contributor to sexual dysfunction in female diabetic patients.

Types of Diabetes:

There are two types of diabetic patients, although many writers would argue that such a delineation is arbitrary and that diabetes represents a spectrum of disorder in which insulin is absent or deficient in its functioning (Cahill, 1985). In spite of this valid position, the delineation has relevance for the present study as well as for a general understanding of diabetes.

The first type of diabetes, Type I, is also called insulin dependent diabetes mellitus (IDDM) and juvenile onset diabetes. Both terms mean exactly what their names might imply. In individuals with Type I diabetes, the beta cells of the Islands of Langerhans significantly reduce or cease their production of insulin, which necessitates the regular injection of insulin or death will result from ketoacidosis within a few days. These individuals are thus called insulin dependent diabetics. Additionally, the average age on onset in this group is 12-13 years, thus representing "juvenile onset".

In contrast, Type II, or non-insulin dependent diabetes mellitus (NIDDM) begins on average in the 5th or 6th decade and results in only a very limited deficiency in insulin. As such many diabetic patients in this group can control the disorder by diet alone. Additionally, many diabetics in this group are obese so that weight management is another variable that can be manipulated to avoid the use of supplemental insulin therapy. When they do require insulin, it is purely a supplement and does not result in a life threatening situation if withdrawn.

These two types of diabetes also vary in terms of hypothesized etiology and course, particularily in relation to complications. There seems to be some inheritability involved in Type I diabetes as well as an implication of viral infection prior to onset whereas these factors play no role in Type II diabetes.

While the complications of arteriosclerosis, neuropathy, retinopathy, and the like are possibilities for both groups, they are more likely to pose difficulties for Type I diabetics due to the longer duration of the illness in that group. Additionally, there seems to be more profound threats to self esteem, body integrity, and the general quality of life in the first group (Jacobson and Leibovich, 1985). This aspect is probably related to issues of adolescent acquisition of chronic illness. Juvenile onset diabetes requires a dramatic change in life

style at a time when the body is changing rapidly from puberty and issues of separation and autonomy are re-emerging for final resolution (Johnson, 1980). Normal developmental concerns such as acceptance of body changes, struggles for control with parents, and acceptance by peers are rendered more difficult by the presence of chronic illness such as diabetes.

Diabetic Control

Before discussing diabetic complications in general and those more specific to the current study, it is important to understand the concept of diabetic control. Control refers to the maintainence of blood glucose levels within the normal range of 70-100mg./dl. and is essential for normal bodily functioning and avoidance of the dangerous reactions previously described. In non-diabetic individuals the level does not rise above 6-7 mmols. (100-120 mg./dl). A blood glucose level that exceeds 9mmols. (162 mg./dl.) ensures a diabetic diagnosis. Control is a different concept from compliance, which refers to the degree of adherence to diabetic treatment regimens. Unfortunately for many diabetics control is difficult to consistently achieve even with the most careful attention to compliance issues due to the difficulty replicating normal body functioning with insulin injections. In recent years the development of the insulin pump has significantly improved this problem although even the pump does not

provide consistent adequate control for some "brittle" diabetics (Cahill, 1985).

Diabetic patients must carefully monitor glucose control either through daily blood or urine tests done in the home. Specific urine tests include Clinistix and Testtape. Both measure glucose metabolism by chemical reactions that are known to the patient by a color reading. More specifically, these tests measure the percentage of glucose in blood or urine. Additionally there are a number of tests for the presence of ketones in the urine: Acetest, Ketostix, Rothera's test, and Ferric Chloride Test are examples of such tests.

Blood tests measure the blood sugar concentration, a value that varies little throughout the day in normals, even after meals. If these tests produce borderline results, more elaborate tests like the Glucose Tolerance Test (GTT) are utilized. In this test glucose is administered after fasting and blood glucose concentrations are measured.

The most utilized labratory test for both clinical and research purposes is the measure of glycosylated hemoglobin (HGBA level). This measure assesses the average blood glucose control over the preceeding several months and thus is particularily suited for research purposes in which control is a relevant variable, such as the present study. This test utilizes the complex chemical reactions

that involve the breakdown of sugar in the blood and the related life of the hemoglobin molecule which lasts approximately 4-8 weeks.

Diabetic Complications

Diabetic complications as suggested earlier are numerous, particularily for Type I diabetics. Although the immediate and short range medical problems associated with irregulation of blood glucose and insulin have been greatly reduced, Sherwin and Tamborlane (1985) note that the development of long range complications, including an expected shortened life span, have not changed in recent years compared to the general population. In fact, a controversy still exists as to whether problems with control are responsible for these difficulties, although most animal and human studies would suggest this to be the case (Sherwin & Tamborlane, 1985). Through a variety of different pathways, the general relationship between lack of control and diabetic complications is such that cell damage from various chemical changes that go awry cause the complications. Thus control and duration of illness seem to interact in the development and progression of diabetic complications.

Complications are many and affect different body systems. Retinopathy, the destruction of cells in the retina of the eye is the most common diabetic complication often leading to blindness. Other visual changes due to

diabetes can occur in the conjuntiva, lens, iris, and vitreous. Oakley and colleagues (1978) note that a diabetic's risk of becoming blind is about ten times that of a non-diabetic. Lesions occurring in the kidneys result in a condition called diabetic nephropathy which can progress to chronic renal disease. In advanced renal disease death may result from cerebral hemmhorage or other cardiovascular events as the body's inability to process wastes drives up the blood pressure. Coronary artery disease and related death due to myocardial infarct or stroke is much more prevalent among diabetics compared to non-diabetics (Cahill, 1985). The incidence of cardiovascular problems is even greater for women diabetics compared to non-diabetic men (Cahill, 1985). As with the other complications, the precise etiology is not well understood but is most probably related to vascular cell changes, lipid abnormalities, or increased platelet adhesiveness and aggregation. Each of these factors would contribute to potential blockage in the cardiovascular system, the direct cause of cardiovascular problems. Oakley et al. (1978) note that diabetic patients occasionally suffer myocardial infarcts without the usual warning pains due to the lack of sensory responsiveness from neuropathy, an aspect of particularily dangerous implications. Related to the general category of vascular problems is the

increased incidence of vascular disease which often leads to foot lesions, gangrene, and amputation.

Finally, diabetic individuals are vulnerable to the development of peripheral and autonomic neuropathies, difficulties of the nervous system in which abnormalitites occur in the peripheral nerves that effect nerve conduction and stimulation. In diabetes the development of neuropathies seem to be related to both control of diabetes and duration. As with other complications, the exact etiology has yet to be delineated, although vascular disease, compression injuries and resultant lesions, lipid abnormalities, protein metabolism, and glucose metabolism have been suggested (Green and Pfeifer, 1985) as causes.

The pathology of diabetic neuropathy seems to involve the segmental demyelination of neuron axons, suggesting a disorder of the Schwann cells (Oakley et al., 1978). Greene and Pfeifer (1985) report more recent research that suggests the disorder may also be due to damage of the axon itself. Locke and Tarsy (1985) report studies confirming a dual explanation of etiology.

Neuropathies are generally divided into two types: peripheral and autonomic. Peripheral neuropathies affect the sensory (and sometimes motor) nerves of the sympathic and parasympathic nervous system. They occur in a transient manner when diabetes is not in good control, reversing when control is re-established. Neuropathies can

irreversibly occur as the disease progresses. They may involve a nerve root (raticulopathy), a mixed spinal nerve (mononeuropathy) or distal portions of many nerve fibers (polyneuropathy). Manifestations of these lesions include pain, parathesias or lessened sensory responses, motor defects, and weakness in the limbs and trunk. Autonomic neuropathy, as the name implies, affects organs under control of the autonomic nervous system: the gastrointenstial and genitourinary tracts, and cardiovascular system. Serious clinical manifestations include gall bladder dysfunction, diarrhea and constipation, hypotonic bladder, postural hypotension, sweating, and charcot joints. It is autonomic neuropathy that has been most often associated with organic impotence in male diabetics. Impotence results from inhibited vascular functioning which prevents erection. Many researchers also implicate the sensory deficits of peripheral neuropathy (Schaivi and Hogan, 1979) as causes of diabetic impotence. Additionally the incompetence of the internal bladder sphincter also causes retrograde ejaculation in men.

Neurophysiology of Sexual Functioning

Current understanding of the physiology involved in the structures and function of normal sexual functioning is very limited. For men, information is derived from animal studies and observations of individuals who have sufferred

brain and spinal cord injuries; for women, information is usually extrapolated from male models (Schiavi & Schreiner-Engel, 1980). Little has been done in the way of explanation of the neurophysiology of sexual functioning since the work of Masters and Johnson (1966) and it is that work that provides the basis of the following presentation.

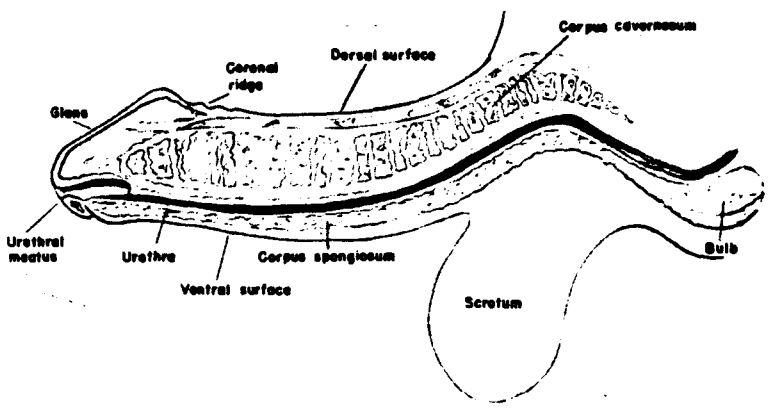
Minimally normal sexual functioning requires intact genital structures, an intact brain and spinal cord, and adequately functioning hormones. Sexual dysfunction can result if any one or combinations of these aspects are disrupted in some way.

Figures 1 to 3 present the anatomy of the male sexual organs (Masters and Johnson, 1966). The penis is composed of three cylindrical chambers, two of which lie parallel to one another and are called the corpora cavernosa, and the third lying underneath and called the corpus spongiosum. It is the latter structure which contains the urethra. The glans penis is formed from the expansion of the corpora cavernosa, and these structures diverge at the pelvis to form the crura, which attached the penis firmly to the pubis and ischium or pubic arch. Internally the chambers are composed of spongelike spaces between arteries and veins; erection occurs as a result of vasocongestion in these tissues. More specifically, during arousal, blood flows into these tissues and the resulting increase in hydraulic pressure results in erection and

enlargement of the penis. The precise mechanisms in erection are not known; Kolodny and his colleagues (1979) simply state: "When the rate of arterial inflow of blood is matched by the rate of venous return, a state of equilibrium is reached and the erection is maintained. The role of venous blockade in the process of erection is uncertain; detumesence occurs as a result of venous outflow exceeding arterial input p.5)".

Figure 1

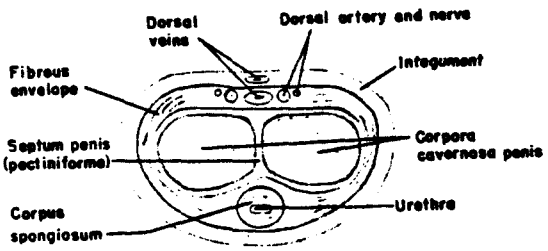
The Penis: Normal Anatomy (Lateral View)



(From Masters and Johnson, 1966)

Figure 2

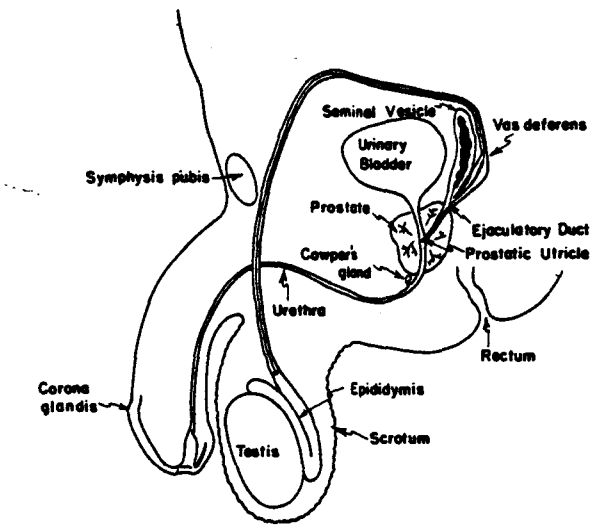
The Penis: Normal Anatomy (Transverse View).



(From Masters and Johnson, 1966)

Figure 3

Male Pelvis: Normal Anatomy (Lateral View)



(From Masters and Johnson, 1966)

Neurologically, these events are mediated by parasympathic neurons traveling to the genital structures and urinary bladder through the pelvic nerves. Some researchers believe that this action originates in the sacral cord roots S2 to S4 although Kolodny and his colleagues (1979) caution that this theory is still controversal. Dilatation of the arteries results from the stimulation of the splanchronic nerves; when the sympathethtic nerves cause constriction erection is lost. The source of stimulation may be psychogenic or somotogenic.

The vascular structures involved in erection include branches of the internal pudenal arteries, specifically the tunica albuginea, the cavernous arteries that run longitudinally through each corpus cavernosum, and two bulbournethral arteries running longitudinally through the corpus spongiosum, ventral to the urethra. The venus return occurs through the superficial dorsal vein running through the corpus spongiosum including the glans and the urethral bulb and the deep dorsal vein draining the corpora cavernosa. Other genital structures include the scrotum and testes which respond to sexual stimulation with myotonia and vasocongestion.

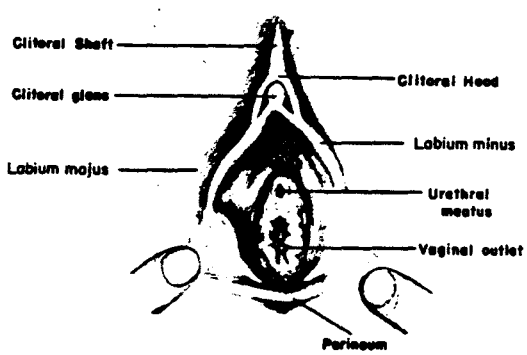
All of these structures are involved in the male orgasm, a very specific physiological response involving the expulsion of seminal fluid from the prostate, seminal

vessicles, and ejaculatory duct into the prostate urethra and from there into the urethral meatus; a process noted by Masters and Johnson (1966) to involve cortical functions as well as reflex action.

Figures 4 and 5 presents a depiction of the external female genitalia (Masters & Johnson, 1966), which includes the labia majora, labia minora, the clitoris, and the perineum. These authors note great variation among women in the size, pigmentation, shape, and location of these structures that has no relationship to the experience of the sexual response cycle.

Figure 4

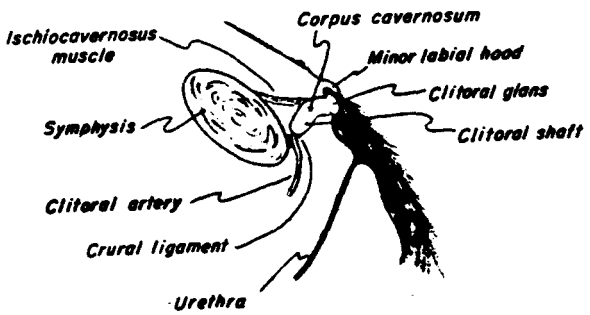
The Human Female External Genitalia



(From Masters and Johnson, 1966)

Figure 5

The Clitoris in Retraction (Lateral View)



(From Masters and Johnson, 1966)

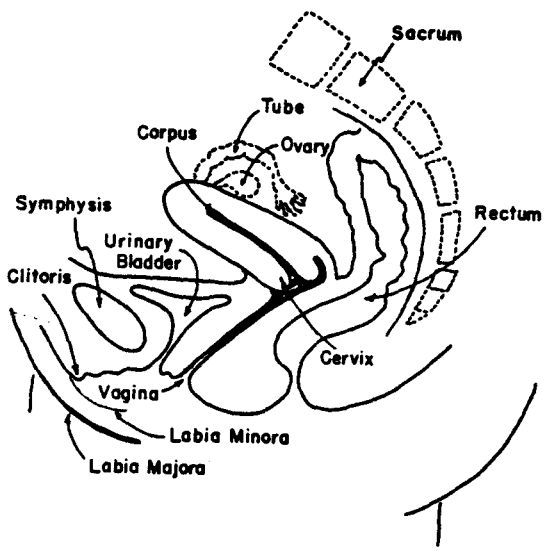
The clitoris (see figure 5) is the structure responsible for the subjective feeling of sexual pleasure and orgasm (although many women experience sexual pleasure and orgasm to a lesser extent vaginally). The neurophysiology of sensory transmission is little understood at present. Generally, these structures respond to pressure stimuli, with the amount and quality of pressure necessary for stimulation varying widely across women.

The other external genital structures depicted in Figure 4 generally provide protective covering for the clitoris and internal genital organs. These structures appear under control of the muscles and nerves of the autonomic nervous system which provides characteristic movement and change in these structures throughout the sexual response cycle.

Figure 6 presents a diagram of internal female genitalia; these include the vagina, cervix, uterus, fallopian tubes, and ovaries.

Figure 6

Female Pelvis: Normal Anatomy (Lateral View)



(From Masters and Johnson, 1966)

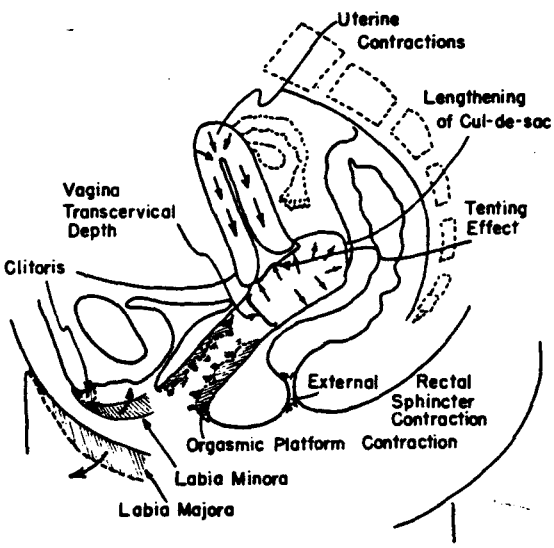
As was the case with external structures, these structures show great individual variation in terms of size, location, and arrangement as a function of such variables as age, reproductive history, and presence or absence of disease. Of these structures, the vagina has particular relevance for sexual functioning in women; the other structures, while ancillary in this process, have more major roles in conception, pregnancy, and birth.

The vagina is a barrel-like space that is basically collapsed in an unstimulated state but opens in response to sexual stimulation or in the process of birth to varying sizes that can be quite large (3.75-4.24 cm in transcervical width and 2.5-3.5 cm in length). It is the organ responsible for the lubrication that assists penile entry although the precise mechansisms of lubrication remain unknown. Masters and Johnson (1966) refer to vaginal lubrication as "a sweating phenomenon" and review the hypotheses surrounding the underlying mechanisms. Certain researchers have suggested the operation of glandular activity in the cervix or Bartholin glands but neither of these structures is able to produce enough secretions to account for the large amount of lubrication along the vaginal walls. The current thinking is that vaginal lubrication is probably a result of vasocongestive reactions that produce a transduction like material. Specifically, this reaction probably involves a marked

dilation of the venous plexus encircling the entire vaginal barrel. The other property of the vagina responsive to sexual interaction and thus relevant to this study is the phonemonon of vaginal orgasm. Masters and Johnson (1966) note that this phenomenon has been extremely controversial and subject to much myth. Their study results indicated that women vary greatly in their ability to experience a vaginal orgasm and that no variables have been isolated to date to explain this variation. Masters and Johnson (1966) note that there are a minimal number of vaginal nerve endings present and that those that do exist congregate at the outer third of the vagina and participate in orgasm as part of the orgasmic platform (See Figure 7).

Figure 7

Female Pelvis: Orgasmic Phase



(From Masters and Johnson, 1966)

In their research on human subjects, Masters and Johnson (1966) have described a four stage process in sexual response, cautioning that this generalized scheme provides only a structure in which to understand sexual functioning and not a definitive description of human sexual response. In the first phase, excitement, women exhibit vaginal lubrication, expansion of the inner two thirds of the vaginal barrel, elevation of the cervix, and the body of the uterus, flattening and elevation of the labia majora and increases in clitoral size. For men, manifestations of this stage include penile erection, a smoothing of the skin ridges on the scrotal sac, and partial elevation of the testes toward the perineum. The motivating forces of excitement are less well understood but can be physical and/or psychic in nature. There is a significant increase in sexual tension above unaroused levels during this stage.

The next stage is called the plateau phase and is used to describe that variable period in which sexual arousal is heightened to just below the threshold required for orgasm. In women, prominent vasocongestion occurs in the outer third of the vagina, causing narrowing of the vaginal opening, expansion of the inside of the vagina, increase in elevation of the uterus and a slowing in the rate of vaginal lubrication. Also the shaft and glans of the clitoris retract against the pubic symphysis. In men,

vasocongestion causes further increases in the size of the testes, and contributes to their elevation and anterior rotation so that the posterior testicular surfaces rest in firm contact with the perineum.

Masters and Johnson (1966) state that the specific neurophysiological mechanisms of orgasm, the third phase of the cycle are not known. In women the following changes were observed: simultaneous rythmic contraction of the uterus, the outer one third of the vagina, and rectal sphincter. In men this stage is characterized by a series of contractions of accessory sexual organs causing seminal fluid to pool in the prostatic uretha and finally causing ejacuation. In the last phase, resolution, men enter a refractory period in which there can be no further ejaculation; women, however, are not inhibited from further orgasm. The anatomical and physical changes occurring during the first two stages are reversed at this time.

Sexual Dysfunction-General Considerations

Disorders of sexuality may occur in any stage of the sexual response cycle. Meyer et al. (1983) present a discussion of the major types of sexual dysfunction that cause men and women to seek sexual consultation and therapy, and it is this discussion that forms the basis of the following presentation.

For men, impotence and premature ejaculation are the major disorders that most often result in consultation with

sex therapists. Impotence is defined as the inability to obtain or sustain an erection throughout the sexual response cycle. This difficulty may be organic and/or psychogenic in origin and may be primary (no prior erections), secondary (previous but not current erections), or situational in nature. The rate of impotence in the general population is quite low rising with age from .5% under age 25 years, 2% at age 35, 10% at 55, and 50% at 75 years of age. Organic impotence is viewed as resulting from medications, damage to the lower cord, damage to peripheral nerves, vascular complications, and insufficient testosterone levels.

Psychological factors are divided into three categories: intrapsychic, interpersonal, and experiential/behavioral. Table 1 presents a breakdown of each category.

Table 1

Psychological Factors Associated with Impotence

1. Intrapsychic
   - Unresolved Oedipal conflict
   - Fear of intimacy
   - Hostility towards woman
   - Sexual Guilt
   - Weak masculine image
   - Sexual aggression

2. Interpersonal
   - Unmet dependency needs
   - Competitive struggles
   - Chronic anger and resentment
   - Chronic illness of partner
   - Life crises

Table 1 (continued)

3. Experiential-Behavioral
   Lack of knowledge
   Faulty experience
   Performance anxiety
   Spectatoring

Meyer et al. (1983), p. 179.

Diagnostic evaluation is focused on differentiating organic from psychogenic impotence through the use of a detailed sexual history, nocturnal penile tumesence studies, and medical history. Treatment for organic etiologies include treatment of systemic illness, alteration of inhibiting drugs, control of alcoholism, treatment of depression, and in the case of irreversible impotence penile prosthetic implants. Psychogenic impotence is treated by traditional psychotherapy techniques.

Common female disorders of sexuality are anorgasmia and dyspareunia. Included under anorgasmia are problems of desire in which the woman has little or no interest in or an aversion to sexual interactions. There are problems of arousal in which the woman is unable to sustain the phase of excitement or plateau, and problems of orgasm in which there is a failure to achieve climax following sexual arousal and excitement. Unfortunately, little to no research has been done on the organic bases of these problems. The authors of most reports in scientific sexual

publications view the manifestations of these problems as psychogenic in etiology and thus requiring psychotherapy for resolution. Yet, given the neurophysiological similarities of the male and female response cycle, it seems quite likely that the same factors presented in the discussion of male dysfunction might contribute to an organic etiology of sexual dysfunction in women. These precipitants would be especially relevant in the desire and arousal categories (affecting vaginal lubrication, increasing sexual tension, pelvic congestion, and myotonia-tightening of the outer third of the vagina). As is the case for men, these disorders preclude the patient arriving at orgasm so that organic involvement in orgasm is not an issue.

Unlike these disorders, much research has been done for organic bases of dyspareunia, or painful intercourse. Tables 2 and 3 present some of these etiologies. Like problems with organic impotence, organic dyspareunia is treated by treatment of the underlying disorder; functional dyspareunia is treated with psychotherapy.

Table 2

Common Causes of Organic Dyspareunia

Cause	&
Vaginitis	40
Pelvic Infections	30
Senile Vaginitis	20

Table 2 (Continued)

Cause	&
External Factors	10
Allergic Reactions	
Hymeneal obstructions	----
	100

(From Meyer et al., 1983)

Table 3

Common Causes of Functional Dyspareunia

1. Vaginismus
2. Anorgasmia
3. Marital Maladjustment
4. Sexual Abuse
5. Character Disorder
6. Inhibition of Sexual Response
7. Concurrent Partner Pathology

(From Meyer et al., 1983)

Sexual Dysfunction in Insulin Dependent Diabetic Men

It is a well accepted clinical finding that many men suffer sexual dysfunction as a result of insulin dependent diabetes (Barnett & Desautels, 1985). Sexual difficulties occur both temporarily as a function of loss of metabolic control and attendant vascular problems and the general emotional malaise associated with not feeling well. Permanent sexual dysfunction occurs as a result of vascular pathology and autonomic and peripheral neuropathy (Schaivi and Hogan, 1979). Lehman and Jacobs (1983) note that the association between diabetes and

impotence was made as early as 1798 by Rollo and sexual dysfunction in diabetic men has been the subject of considerable research since at least the 1950's.

The nature of sexual dysfunction in insulin dependent diabetic men involves problems with impotence and retrograde ejaculation. Retrograde ejaculation is not a problem often reported by diabetic men and in fact often goes undiagnosed unless a secondary problem such as infertility is raised. Impotence, however, is a much more prevalent problem which directly disrupts sexual performance in 27 to 59 percent of diabetic men (Schiavi and Schreiner-Engel, 1980). At one time diabetic, impotence was divided into organic and psychogenic types, although current researchers believe that more of an interactional model is exact. (Fairburn et al. , 1982).

There have been many hypotheses suggested to explain the origins of organic diabetic impotence. Variables such as age, duration of diabetes, hormonal levels, metabolic control, vascular pathology, and neuropathies have been implicated (Fairburn et al., 1982; El-Bayoumi et al., 1984, Lehman and Jacobs, 1982; Ficher et al., 1983), but study results conclude that organic etiologies are dominated by duration of diabetes, metabolic control, and peripheral and autonomic neuropathies. Psychogenic contributions to impotence include general anxiety and depression and specific anxiety concerning sexual performance. Diagnosis

and treatment involved the same procedures as in the treatment of impotence from other etiologies.

Sexual dysfunction is a difficulty affecting Type I diabetic men in significant proportion compared to men in the general population. Barnett and Desaultales (1985) suggest that worries about sexual performance rank third among concerns of diabetic men, next to blindness and loss of limb. Their review of selected studies from 1945 to 1974 concerning diabetic men conclude that 40% to 50% of diabetic men surveyed reported significant penile erectile difficulties.

Sexual Dysfunction in Insulin Dependent Diabetic Women

While insulin dependent diabetic sexual dysfunction in men is well researched, interest in similar problems among Type I diabetic women has been minimal. This is a perplexing situation considering the physiological basis for hypothesizing sexual dysfunction in women as well as men who suffer insulin dependent diabetes. It seems likely that both organic and psychogenic etiologies are responsible for the disruption of sexual responsiveness in the areas of desire, arousal and dyspareunia.

It would seem likely that a general lowered pleasure threshold with subclinical levels of anxiety and depression that results from coping with a chronic illness with potential threats to life itself would interfere with sexual desire and arousal. Organically, the presence of

problems of metabolic control and neuropathy might reduce the level of normal sexual interest, as well as disrupt the arousal phase of the sexual response cycle by reducing the amount of vaginal lubrication and lowering the sensory threshold. As is the case with male diabetics the offending problems would be poor metabolic control, the presence of neuropathies, and vascular pathology.

While such difficulties can be reasonably hypothesized on the basis of studies with diabetic men, similar studies for diabetic women have been few and the results equivocal. Prior to Kolodny's (1971) study, the only references to the area of sexual dysfunction in women suffering insulin dependent diabetes were those addressing difficulties with contraception, pregnancy, and birth. This is not suprising considering the serious and potentially life threatening problem posed by insulin dependent diabetes to mother and fetus.

Kolodny (1971) undertook the first study of sexual dysfunction in diabetic women, comparing 125 hospitalized Type I diabetic females with 100 hospitalized nondiabetic women on measures of sexual history, marital status, menstrual and reproductive function, use of contraceptives, and history of prior psychiatric contacts. Utilizing a Chi Square with Yates Correction to analyze these comparisons, he found that significantly more diabetic women (35.2%) reported an absence of orgasm during the preceeding year

compared to controls (6%). Additionally, all but four of the nonorgasmic diabetic women had experienced good orgasmic function at some time in the past while the entire group of nonorgasmic control women had always suffered this problem. No other significant differences were noted between the two groups on other variables. Several difficulties are apparent in this study, most notably the lack of description of the two sample groups, the limited information concerning the questions posed to the subjects, and the subjective nature of those questions.

Following the rationale that, like men, diabetic women's sexual dysfunction would be primarily caused by pelvic autonomic neuropathy, Ellenberg (1977) compared an outpatient group of 54 diabetic women with neuropathy to 46 outpatient diabetic women without neuropathy on variables of sexual interest and orgasmic function. He found no difference between groups on either variable. While his attempt to compare the presence or absence of neuropathy's effect on sexual dysfunction an important step, several problems with the design render the results of questionable generalizability. He did not utilize a non-diabetic control group or objective measures of sexual dysfunction.

The variable results of these two studies raise the question of control of diabetes as an important contributing variable to sexual dysfunction. Although not

described in the study, it seems likely that Kolodny's (1971) hospitalized patients were experiencing control problems compared to the outpatient sample of Ellenberg (1977), who were more likely to be in good control. This hypothesis cannot be tested as neither researcher described the quality of control of subjects. However, it can be deduced that hospitalized patients are more likely to be in poor control than outpatients. Two major factors characteristic of diabetic patients would suggest this as a likely situation. First, control problems are major reasons for hospitalization among diabetic patients. Second, control is usually compromised when diabetic patients are hospitalized for other reasons.

Jensen (1981) compared 80 diabetic outpatient men and 80 outpatient diabetic women with 40 nondiabetic controls of each sex, all of whom were seen in a general medical practice. The researcher utilized the following sexual dysfunction model of Hertoft (1980) to analyze the data:

Men	Women
1. Erectile Dysfunction	1. Orgasmic Dysfunction
2. Premature Ejaculation	2. General Sexual Dysfunction
3. Retarded Ejaculation	3. Vaginismus

Utilizing a Chi Square analysis on measures of these dimensions, he found that 44% of the diabetic men reported sexual dysfunction compared to 12.5% of controls ($p<.05$) and that this dysfunction was specifically characterized by erectile problems and reduced libido. In contrast, there were no significant differences among diabetic women compared to controls on any variable of sexual dysfunction.

Tyrer et al. (1983) compared 84 insulin dependent diabetic women with 47 controls on variables of sexual functioning over the prior three months and attitudes towards self and spouse or sexual partner. They also attempted to study the relationship of neuropathy to sexual dysfunction, although their neuropathy group was too small (N=14) to generate valid conclusions. The results concerning sexual functioning were as follows: diabetic women showed no decrease in frequency of intercourse, were less likely to exhibit negative feelings towards sexual experiences, showed no difference in their quality of marriage scores, and showed no difference in orgasmic function. Although not significant, the diabetic group did exhibit less frequent sexual interest than controls and were more likely to report pain on intercourse. Compared to normal controls diabetic women seemed to cluster in the best and worst categories on the variable vaginal lubrication, a finding difficult to interpret and not addressed by the authors.

In a more recent study, Schrener-Engel et al. (1985) compared 50 Type I and II diabetic women and 50 controls matched for age, ethnic background, and duration of relationship on measures of sexual functioning and marital relationship on the Derogatis Sexual Functioning Inventory (DFSI), the Interview Schedule, and the Locke-Wallace Marital Inventory. On the first scale the diabetic women exhibited consistently lower scores compared to non-diabetic women. Additionally, they exhibited lowered scores on varied sexual experience and sex drive as well as on a global measure of sexual functioning. Finally, diabetic women scored lower marital adjustment and satisfaction than normal controls.

Newman and Bertelson (1986) compared 38 diabetic women with diagnosed sexual dysfunction (DSM III criteria) with 43 diabetic women not meeting such criteria. These groups were compared on scores from the DSFI, the Locke Wallace Marital Inventory, and the Beck Depression Index. Of those diagnosed with sexual problems, the majority were in the area of inhibited sexual excitement, inhibited desire, dyspareunia, and inhibited orgasm. A one way univariate analysis of variance resulted in significant differences on scores of depression, psychological symptoms, gender role orientation, and sexual satisfaction between the groups. There were no differences in groups for neuropathy, control, insulin dose, or duration of

diabetes. The diabetic women with diagnosed sexual dysfunction did show significantly greater frequency of urinary tract infections.

It is the current proposal that diabetic women do experience sexual dysfunction during the course of their illness and that this dysfunction has both organic and psychogenic bases.

Neurophysiologically, normal sexual functioning requires an intact brain and spinal cord (particularily the peripheral and autonomic nervous system) and an adequate vascular supply. Both of these systems are compromised in insulin dependent diabetes and cause a direct disruption of the erectile mechanism in men. The manifestations of problems for women are not as well studied but four potential problem areas exist: arousal, disruption in normal levels of vaginal lubrication, recurrent infections causing painful intercourse, and inhibition of orgasm. Two variables contributing to such systemic problems in diabetics are autonomic and peripheral neuropathies and control of blood glucose. These variables have been addressed in this aforementioned literature review but have not to date been studied together.

There are many psychogenic factors contributing to sexual dysfunctions. In general, women's sexual functioning is disrupted by negative affect states such as anger, anxiety, and depression and by difficulties in the

interpersonal relationship with the partner (Kaplan, 1979). For individuals with chronic illness these factors take on an even greater importance due to the assaults to self esteem, issues surrounding dependency, and the stress chronic illness places on family relationships.

It is the purpose of the present study to clarify the relationship of these variables to sexual dysfunction in insulin dependent diabetes through the use of multivariate statistics. The following variables will be explored: blood glucose control, neuropathy, duration of diabetes, affects, personality style, body image, and quality of marital or partner relationships.

CHAPTER III

Methodology

Overview

This chapter presents the methodology utilized to examine the research questions of the current study. Included in this information are descriptions of the subject samples, test instruments, study procedures, tested hypotheses and statical analyses.

Subjects

The sample for this study included a group of insulin dependent diabetic women and a control group of non-diabetic women. Women 18 years of age or older who were involved with a steady sexual partner over the prior six months were eligible for inclusion. A homogeneous sample in terms of race, education, and socioeconomic status was sought to maintain internal valididty. Women with a history of major psychiatric illness as defined by the DSM III (APA, 1980) were excluded from participation.

prior research has shown a high incidence of sexual dysfunction in such individuals (Meyer et al., 1983).

A sample of 80 diabetic and 80 non-diabetic women was sought for inclusion; however, only 40 women finally participated in each group. This reduction in sample size resulted from numerous factors and is illustrative of the well cited difficulty obtaining large samples of medical patients (LoPiccolo & Stock, 1986).

The diabetic women were recruited from two sources. Initially they were sought from the diabetic clinic of the Johns Hopkins Hospital in Baltimore, Maryland. As a result of the factors previously discussed only 32 women from this clinic completed the study; the additional eight women were recruited from an advertisement in the monthly publication of the Maryland Chapter of the American Diabetes Association.

Control subjects were initially sought from a general internal medicine clinic at Hopkins. However, upon review of the instruments the liason physician decided to exclude professional women from the pool of subjects. Subsequently no volunteers resulted from this source. After a two month waiting period the research committee decided to recruit volunteers from the entire hospital population by means of flyers. Forty women completed participation from this group. These were women who met the inclusion criteria

previously cited and who were in good health with no medical problems. All were hospital employees.

Procedure

Diabetic subjects were initally recruited from the diabetic clinic of the Johns Hopkins Hospital. Current clinic patients were contacted by telephone. At this time the study was explained, confidentiality was assured, and participation requested. Subjects were asked to come to the researcher's office at their convenience to complete the surveys and be interviewed concerning the length of time needed to complete the information, their reactions to the instruments, any difficulties completing information and a short interview to discuss any perceived sexual difficulties. All of the subjects declined to come to the hospital but agreed to complete the surveys by mail and to call the examiner to discuss these aspects of the study. Several subjects returned the materials with written responses to these questions. A total of three diabetic subjects called to provide the requested feedback.

New patients were approached at the time of their clinic appointment. The diabetologist explained the study while taking the medical history. Potential subjects were interviewed while waiting for their laboratory tests. The study was explained and participation requested. Only six patients met the inclusion criteria over a five month

period; four agreed to participate and took packets home; two completed the study; neither called with questions or feedback.

As a result of the difficulties obtaining a sufficient sample size another major medical center in the city was contacted for the purpose of recruiting subjects. Due to the lengthy process of research review with no promise of the center's participation this option was not determined to be a viable one.

The Maryland Chapter of the American Diabetes Association was very supportive of the study and recruited potential volunteers through the July, 1986 newsletter. Only eight subjects volunteered. As was the case at the hospital these subjects preferred to complete mailed surveys rather than come to the hospital.

Non-diabetic control subjects were initially sought from a general internal medicine clinic at Hopkins but this source did not result in any subjects as previously described. Subjects were finally recruited from general flyers to the hospital. If interested subjects were requested to call the researcher; at the time of this call the same procedure was followed for the diabetic subjects.

Subjects from both groups were assigned sequential code numbers. A master list of names and associated code numbers was maintained by the major researcher. This list was utilized to send reminder letters to subjects who did

not return their materials. A reminder letter was sent three weeks following the initial mailing and a reminder post card was mailed one week following this letter. This procedure was modeled after recommendations by Dillman (1978) for successful return rates for mail surveys.

Subjects were requested to complete a consent form to participate in the research. At the request of the Research Review Committee of the Johns Hopkins Medical Institutions two separate consent forms were utilized; one for diabetic patients and one for control subjects.

Instruments

Subjects from both groups were asked to complete five psychological surveys addressing demographic information, sexual functioning, dyadic satisfaction, and personality style. Due to copyright restrictions only the demographic data form is reproduced in Appendix B. For diabetic women from the Hopkins clinic information concerning blood glucose levels, neuropathy, and duration of illness was obtained from the diabetologist. For women from the Diabetes Association this information was requested on the demographic information form. One form, the demographic information form, was designed specifically for the purposes of this study.

Demographic Data Form. This questionnaire was used to collect information from all subjects concerning demographic information such as age, mental status,

religion, education, and occupation. Information concerning medical problems such as alcohol and mood altering drug usage, menstrual functioning, and sexual functioning relevant to the present research questions but not addressed in the other questionnaires. No validity and reliability data are available for these questions. In addition to this information, three questions addressed physiological issues in diabetics and have been implicated in prior sexual dysfunction connected with the disease: HGBA, diagnosed neuropathy, and duration of diabetes. These variables were added for the subjects not recruited from the Hopkins diabetic clinic. The diabetologist from the clinic provided the researcher with these data for Hopkins patients.

Derogatis Sexual Functioning Inventory. (DSFI) (Derogatis, 1975). The DSFI is a "multidimensional test that measures the current sexual functioning of the individual person" (Deragotis, 1980). In designing the instrument Deragotis and Melisaratos (1979) explain that the instrument is a self report inventory that measures current sexual functioning across several important domains as well as over composite scores of sexual functioning and satisfaction. The test requires approximately 45 to 60 minutes to complete. The two general measures of sexual functioning are the Sexual Functioning Index (SFI) and the Global Sexual Satisfaction Index (GSSI) that reflects the

individual's subjective judgement concerning the quality of her sex life. These scales are composite scores of the following subscale scores: Information, Experience, Drive, Attitudes, Psychological Symptoms, Affects, Gender Role Definition, Fantasy, Body Image, and Sexual Satisfaction (Table 4 presents descriptive information concerning these subscales).

TABLE 4

Derogatis Sexual Functioning Index

Subscale	Content
I. Information	Twenty-six true-false items that measure knowledge of the physiology, anatomy, and psychology of sexual relationships.
II. Experience	Twenty-four sexual behaviors requiring a yes-no response indicating the presence or absence of prior experience.
III. Drive	Five separate components each measured on a 9 point scale and summed to produce a total score. Sexualintercourse, masturbation, kissing and petting, sexual fantasy, and ideal frequency of intercourse comprise the components.
IV. Sexual Attitudes	Fifteen likert item scales that measure liberal and conservative attitudes towards sexual behavior. The total subtest score is a difference score weighted higher for liberalism.

Table 4 (continued)

Subscale	Content
V. Psychological Symptoms	This subtest is a brief version of the SCL-90-R (Deragotis, 1975, 1977). It contains 53 symptoms representing 9 dimensions (somatization, obsessions-compulsions, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism). Likert scale items measure frequency of occurrence of symptoms over the prior two weeks. A global index, the General Severity Index (GSI) contributes to the overall DSFI score.
VI. Affects	The Affect Balance Scale (ABS) (Deragotis, 1975) comprises this subscale of the DSFI. This instrument is a 40 item adjective check list scored on the the following affect dimensions: joy, contentment, vigor, affection, anxiety, depression, guilt, and hostility. The difference between positive and negative affects, the Affect Balance Index, contributes to the DSFI score.
VII. Gender Role Definition	An adjective check list measuring the presence of masculine and feminine gender traits. The total subscale score represents a difference between these traits.

Table 4 (continued)

Subscale	Content
VIII. Sexual Fantasy	Thirty-six fantasy themes scored as present or absent. The total score is the number of positively endorsed fantasies.
IX. Body Image	The total score of 15 items requiring a yes-no response. The items address satisfaction with various body parts.
X. Satisfaction	Ten items measuring sexual satisfaction. Items address two domains: frequency and variety of sexual activity. Items are true-false and the total score is the total number of items answered in the positive direction.

Psychometric data indicate the test is well constructed. Deragotis and Melisaratos (1979) report internal consistency and test-retest reliability coefficients ranging from .42 to .96 for the subtest and global scores. Most coefficients are larger than .70.

Deragotis (1980) reports empirical studies of instrument validity are underway. To date, predictive validity has been demonstrated with several populations, including individuals with diagnosed sexual dysfunction, their partners, and homosexuals. A factor analytic study isolated the following factors: psychological distress,

body image, heterosexual drive, autoeroticism, gender role, satisfaction, and sexual precociousness.

Other reviewers have verified the usefulness and psychometric integrity of the instrument (Herold,1985; Weis, 1985; Conte, 1986).

Deragotis Interview for Sexual Functioning-Female Form. (DISF-F) (Deragotis, unpublished test). This is a new scale designed to measure sexual dysfunction in medical patients. As such reliability and validity studies are in their initial stages with no reported results. The scale has two forms; one for men and one for women. Given the purpose of the scale it seemed worthwhile to utilize the DISF-F in the present study, although caution is certainly indicated concerning interpretation of results.

Table 5 presents more detailed information concerning the scale and its contents.

Table 5

Derogatis Interview for Sexual Functioning-Female Form (DISF-F)

Subscale	Content
1. Sexual Cognition/ Fantasy	A five item scale measuring frequency of occurrence of sexual thoughts, dreams, or fantasies over the prior 60 days.
2. Sexual Arousal/ Excitement	A five item scale measuring frequency of arousal as

Table 5 (continued)

Subscale	Content
	defined by subjective feelings of arousal and vaginal lubrication over the prior 60 days.
3. Sexual Behavior/ Experience	A five itme scale measuring frequency of sexual behaviors over the prior 60 days.
4. Orgasm	A six item scale measuring satisfaction with orgastic experiences over the prior 60 days.
5. Drive/Quality of Functioning	A two item scale measuring ideal frequency of intercourse and current satisfaction with sexual experiences.

Spanier Dyadic Adjustment Scale. (DAS) (Spanier, 1979). This scale measures the general quality of a marriage or significant dyadic relationship as well as measuring four components. Table 6 presents information concerning the various subscales of the DAS.

Table 6

Dyadic Adjustment Scale

Subscale	Content
1. Dyadic Satisfaction	An eight item subscale composed of likert scale items addressing general

Table 6 (continued)

Subscale	Content
	satisfaction with a relationship.
2. Dyadic Cohesion	The author (Spanier, 1979) does not operationalize this variable. The 5 items comprising this scale are likert scale items.
3. Dyadic Consensus	A 13 item likert scale subtest measuring agreement on matters important to dyadic functioning (Spanier, 1976).
4. Affectional Expression	Four likert scale items measuring the amount of direct display of affection among spouses.

Spanier (1979) reports overall scale reliability of .96 and subscale reliability coefficients ranging from .73 to .94. Sharpley and Cross (1982) and Spanier and Thompson (1982) report similarily high correlation coefficients. These coefficients are reported for both test-retest and internal consistency.

Spanier (1976) presents a detailed discussion of the construction of this instrument, with careful consideration to both reliability and validity. Independent judges were utilized to establish content validity. Out of an initial pool of all items utizized in other marital adjustment surveys, items that did not meet criteria of

dyadic adjustment for relationships in the 1970's were excluded. Items judged as confusing were similarily eliminated from the final form. A factor analysis of variables yielded the final 32 item scale, including the four previously described subscales. Criterion related validity was established by correlation of the scale with an external criterion of marital status for a married sample of 218 individuals and a divorced sample of 94. Each of the 32 items correlated significantly ($p<.001$) with this external criteria. Construct validity was established by correlating the scale with the most frequently utilized marital adjustment scale, the Locke-Wallace Marital Adjustment Scale (Locke & Wallace, 1959). Correlation coefficients for this analysis were .86 for married subjects and .88 for divorced subjects. Both of these correlation coefficients were significant at the $p<.001$ level. A factor analysis of the 32 items yielded the factors comprising the subscales.

Eysenck Personality Inventory. (Eysenck & Eysenck, 1968). This instrument is a 57 item forced choice personality inventory measuring the personality styles of introversion, extraversion and neuroticism (Eysenck & Eysenck, 1968). The authors report good reliability with test-retest correlation coefficients ranging from .84 to .94 and internal consistency correlation coefficients

ranging from .74 to .91. Studies of validity yielded equally high correlation coefficients (Eysenck & Eysenck, 1968). These authors report several factor analytic studies confirming the second-order factors of neuroticism and extraversion. High correlations are reported between extraversion and neuroticism and psychiatric diagnoses of psychopathy and hysteria. High correlations are reported between introversion and neuroticism and diagnoses of dysthymia. The authors cite these studies as evidence of construct validity. Similarily, Eysenck and Eysenck (1968) report high correlations between scores on the EPI and other instruments designed to measure the same factors, suggesting concurrent validity.

Confidentiality

In order to insure confidentiality several procedures were followed. Subjects were assigned code numbers which were used on all instruments and data were stored by these numbers in a computer file in the Department of Medical Psychology at Hopkins. At no time were data stored by subject name. A master list of names and code numbers was maintained in a private file by the chief investigator. The purpose of this file was to monitor the return of data and to allow for individual feedback of the results to subjects. Only the chief investigator was allowed access to this file. Subjects were informed of these procedures both verbally when a

request for participation was made (in the case of clinic patients) or when a volunteer contacted the investigator (other subjects). Additionally these procedures were again described in a letter sent with the research materials. While confidentiality is as essential aspect of all research with human participants, assuring subjects of the anonymity of their responses was particularily important in the current study due to the sensitive nature of the subject under investigation.

Debriefing

After the study's completion, subjects were debriefed. All subjects were provided with a written report of the findings of the study. Feedback sessions were made available to any subjects desiring individual feedback on the study in general or in their individual responses.

Hypotheses and Statistical Procedures

The following section describes the major hypotheses of the present study and the statistical techniques utilized to these these hypotheses.

Groups were examined for demographic equivalency by utilization of Chi Square Analyses for ordinal scale data. The variables in these analyses were Religion, Marital Status, and Socioeconomic Status. The variables Age and Number of Children were

analyzed by a T-Test for independent groups.

Hypothesis 1.

Do insulin dependent diabetic women exhibit greater sexual dysfunction compared to non-diabetic women?

A series of T-Tests for independent groups were utilized to test this hypothesis. The independent variable in these analyses was diabetes. The following dependent variables were tested: Age of first menses, Degree of menstrual discomfort, Number of vaginal infections over the prior six months, Frequency of pain during intercourse, Frequency of difficulty lubricating during intercourse, Frequency of use of commerical vaginal lubricants, Duration of foreplay, Age of first intercourse, all DSFI subscale scores and total scores, and all DISF-F subscale and total scores.

Hypothesis 2.

Which physiological and psychological variables best discriminates diabetic and non-diabetic women?

This hypothesis was tested by means of a stepwise discriminant analysis with backward elimination. This technique examines a set of independent variables for the purpose of identifying those variables that distinguish group membership, the dependent variable. Linear combinations of the variables are examined to determine the combination that provides the best

classification rule. The following specific questions are examines:

1. Is there a significant difference between the groups as measured by the independent variables? or Are the group centroids significantly different?

2. If the centroids are significantly different, what is the distance between the centroids?

3. What is the direction of the difference?

4. How accurately can the function predict group membership for an unclassified subject?

Variables selected for inclusion in the analysis were selected based on high correlation coefficients. Specifically the following variables were included in the analysis: Eysenck Lie and Neuroticism Scores; DISF-F variables-Total sexual arousal, sexual fantasy, sexual experiences, orgasm, quality of functioning; all DAS subscale and total scores; DSFI subscale scores-attitudes, psychological symptoms, fantasy, experience, information; total DSFI satisfaction, and individual items-number vaginal infections, lack of vaginal lubrication, and change in sexual functioning over the prior six months.

Hypothesis 3.

Among diabetic women which physiological and psychological variables contribute to sexual dysfunction?

Multiple regression analyses were be utilized to test this hyposthesis. This technique seeks the

best prediction equation for the dependent variable from a set of independent variables. Three analyses were be performed for the dependent variables diabetic control (HGBA level), neuropathy, and duration of diabetes. The independent variables were the same as noted above.

CHAPTER IV

RESULTS

Overview

In this chapter a discussion of the results of the statistical analyses utilized to test the hypotheses will be presented. A description of the study sample and supplemental statistical analyses will also be included in this chapter.

Missing Data

All subjects provided requested demographic data so that the demographic characteristics are presented for both groups in their entirety (see Table 7). Several respondents failed to complete various items of the demographic data form and analyses for these items are presented for a smaller N. The number of subjects completing each item is presented before the data for the item.

All subjects completed the Derogatis Sexual Functioning Inventory. The other sexual functioning

instrument, the Derogatis Interview for Sexual Functioning (Female Form) was completed by all control subjects but by only 35 diabetic patients. Analyses are thus presented for a smaller N for these data.

Data are also missing for the Eysenck Personality Inventory. A total of 37 diabetic patients and 39 control women completed this inventory. For the Spanier Dyadic Adjustment Scale, data are complete for 34 diabetic women and 37 control women. Analyses utilizing these scales were performed on a smaller N, as described above and noted in the tables.

Description of Sample

Table 7 presents data summarizing the demographic characteristics of the control and experimental groups.

Table 7

Demographic Variables

Variable	Diabetic Group (N=40)		Control Group (N=40)		Statistical Test
Age (years)					
Mean	31.9		33.4		t=1.09, df=78
S.D.	6.2		6.7		Not Significant
	N	%	N	%	
Marital Status					
Single	10	25.0	7	17.5	χ^2=5.95, df=4
Engaged	0	0.0	2	5.0	

Table 7 (continued)

	N	%	N	%	
Married	19	47.5	22	55.0	Not Significant
Separated	2	5.0	2	5.0	
Divorced	5	12.5	4	10.0	
Widowed	1	2.5	2	5.0	
Living with Partner	3	7.5	2	5.0	
Religion					
Catholic	15	37.5	15	37.5	χ^2=5.96, df=4
Protestant	9	22.5	8	20.0	
Jewish	5	12.5	8	20.0	Not Significant
Other	8	20.0	2	5.0	
No Affiliation	3	7.5	7	17.5	
Hollingshead Social Index					
I	3	7.5	9	22.5	χ^2=3.69, df=4
II	15	37.5	14	35.0	
III	12	30.0	9	22.5	Not Significant
IV	10	25.0	8	20.0	
V	0	0.0	0	0.0	

A two tailed t-test for independent groups was performed for the variable "Age" and a Chi Square analysis of variance was performed for the variables "Marital Status","Religion", and "Social Class". None of these analyses yielded significant differences, indicating that the groups are comparable in terms of demographic characteristics.

Table 8 presents data concerning the subjects' gynecological and sexual history, as derived from items on the demographic data form. These results indicate no significant differences between the control and diabetic groups on variables related to gynecological or sexual

history with two exceptions. The diabetic women showed a significantly greater incidence of a dry vagina at intercourse compared to nondiabetic controls. The diabetic women also reported significantly more vaginal infections over a six month period compared to the control subjects.

Table 8

Selected Gynecological and Sexual History

Variable	Diabetic Group		Control Group		Statistical Test
Menarche					
N	39		40		
Mean (Years)	13.00		12.40		t=.17, df=78
S.D.	1.89		1.40		Not Significant
Age of First Intercourse					
N	38		39		
Mean (Years)	18.6		18.5		t=.17, df=75
S.D.	2.4		2.4		Not Significant
Vaginal Infections					
N	38		40		
Mean	1.28		0.33		t=2.76, df=77
S.D.	2.10		0.69		p<.007
	N	%	N	%	
Degree of Menstrual Discomfort					
None	1	0.03	0	0.00	χ^2=2.92, df=3
Mild	6	0.16	3	0.08	
Severe	31	82.00	37	93.00	Not Significant
Total N	38		40		

Table 8 (continued)

	N	%	N	%	
Pain During Intercourse					
Never	20	51.30	19	47.50	χ^2=5.23, df=4
Rarely	10	25.70	17	42.50	
Sometimes	6	15.40	4	10.00	Not Significant
Usually	2	5.70	0	0.00	
Always	1	2.60	0	0.00	
Total N	39		40		
Dry/Tight Vagina					
Never	14	35.90	18	45.0	χ^2=11.64, df=4
Rarely	19	23.10	17	42.5	
Sometimes	8	20.60	5	12.5	p<.01
Usually	6	15.40	0	0.0	
Always	2	5.70	0	0.0	
Total N	39		40		
Use of Commercial Lubricants					
Never	27	69.2	28	70.0	χ^2=3.89, df=4
Rarely	3	7.7	7	17.5	
Sometimes	3	7.7	3	7.5	Not Significant
Usually	5	12.8	2	5.0	
Always	1	2.6	0	0.0	
Total N	39		40		
Duration of Foreplay					
< 1 minute	1	2.7	0	0.0	χ^2=9.91, df=6
1-3 minutes	4	11.1	0	0.0	
4-6 minutes	5	13.9	9	23.1	Not Significant
7-10 minutes	4	11.1	7	17.9	
11-15 minutes	11	30.6	16	41.0	
16-30 minutes	9	25.0	4	10.3	
> 30 minutes	2	5.6	3	7.7	
Total N	36		39		

Tests of Specific Hypotheses

Hypothesis 1: Diabetic women show a greater incidence of sexual dysfunction compared to non-diabetic women.

Tables 9 and 10 present results from the statistical analyses utilized to test these hypotheses.

Table 9

Derogatis Interview for Sexual Functioning (DSFI)

Variable	Diabetic Group (N=40)	Control Group (N=40)	Statistical Test
Information			
Mean	50.3	54.4	
SD	10.6	8.9	t=-1.84, df=78
SE	1.7	1.4	Not Significant
Experience			
Mean	48.8	49.9	
SD	9.4	9.3	t=-.71, df=78
SE	1.7	1.4	Not Significant
Drive			
Mean	49.9	52.5	
SD	9.1	8.6	t=-1.34, df=78
SE	1.4	1.4	Not Significant
Attitudes			
Mean	43.8	46.8	
SD	8.7	10.0	t=-1.38, df=78
SE	1.4	1.6	Not Significant
Symptoms			
Mean	46.0	52.7	
SD	9.4	12.9	t=-2.66, df=78,
SE	1.5	2.0	p<.009

Table 9 (continued)

Variable	Diabetic Group (N=40)	Control Group (N=40)	Statistical Test
Affects			
Mean	46.7	50.8	
SD	11.5	11.7	t=-1.58, df=78
SE	1.8	1.8	Not Significant
Gender Role			
Mean	51.3	52.0	
SD	8.8	10.9	t=-.34, df=78
SE	1.4	1.7	Not Significant
Fantasy			
Mean	49.1	47.3	
SD	12.5	11.6	t=.65, df=78
SE	2.0	1.8	Not Significant
Body Image			
Mean	37.8	41.3	
SD	8.5	10.5	t=-1.61, df=78
SE	1.3	1.7	Not Significant
Satisfaction			
Mean	49.8	53.5	
SD	9.5	7.8	t=-1.91, df=78
SE	1.5	1.2	Not Significant
GSSI			
Mean	50.1	52.4	
SD	9.3	7.8	t=-1.17, df=78
SE	1.5	1.3	Not Significant
SFI			
Mean	43.9	50.5	
SD	10.8	10.9	t=-2.71, df=78
SE	1.7	1.7	p<.008

Table 10

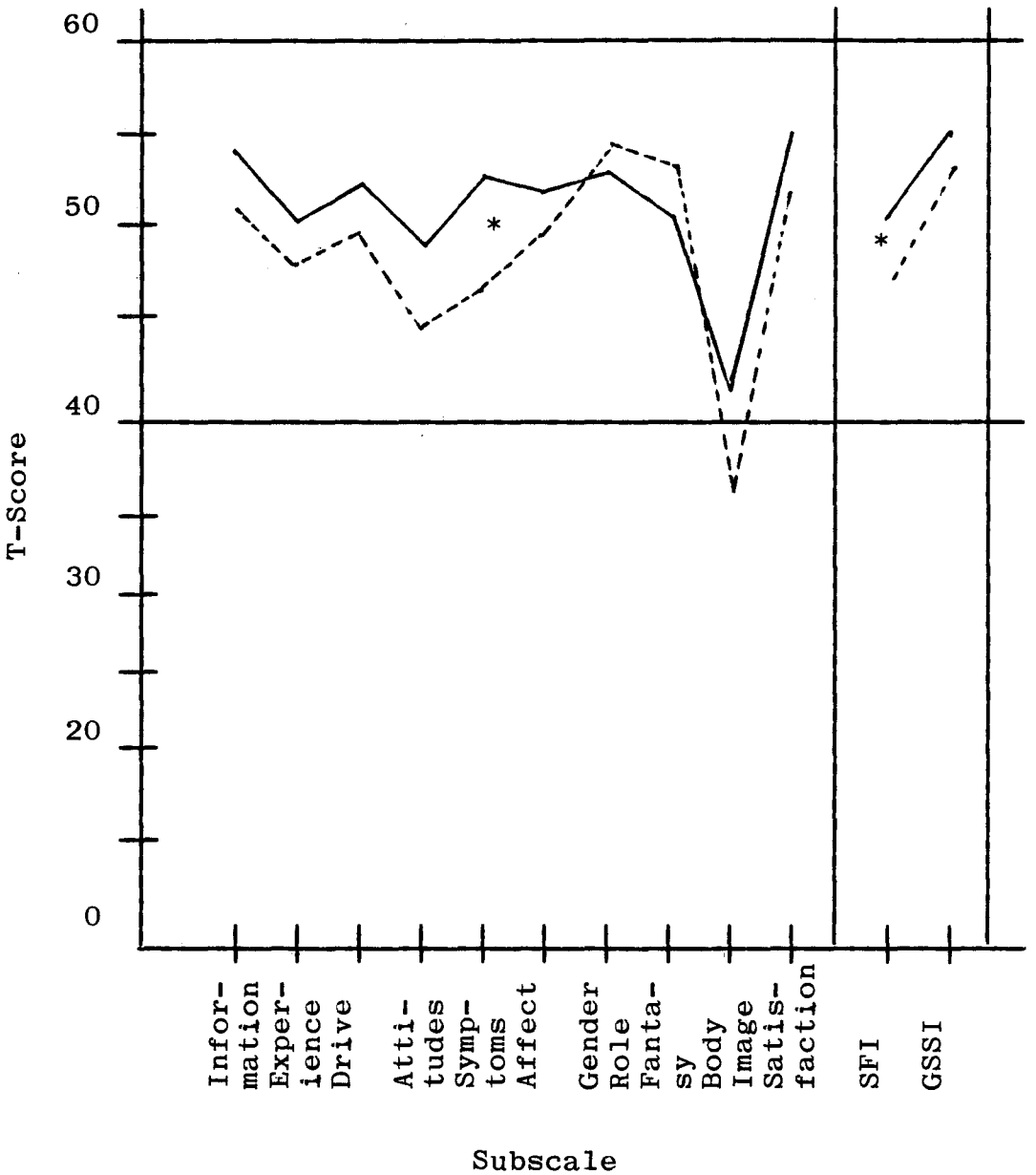
Derogatis Interview for Sexual Functioning-Female Form (DISF-F)

Variable	Diabetic Group (N=40)	Control Group (N=40)	Statistical Test
Sexual Fantasy			
Mean	15.4	17.3	
SD	10.0	9.5	t=-.83, df=72
SE	1.7	1.5	Not Significant
Sexual Arousal			
Mean	10.9	14.2	
SD	6.6	5.8	t=-2.30, df=72
SE	1.1	0.9	p<.02
Sexual Experience			
Mean	13.0	14.8	
SD	5.9	6.7	t=-.78, df=72
SE	1.0	1.1	Not Significant
Orgasm Quality			
Mean	13.6	14.6	
SD	6.7	5.3	t=-.70, df=72
SE	1.1	0.8	Not Significant
Overall Quality			
Mean	9.4	10.4	
SD	3.1	2.5	t=-1.54, df=72
SE	0.5	0.4	Not Significant

Figures 8 and 9 present mean scores for the variables in each of these tables in graphic form.

Figure 8

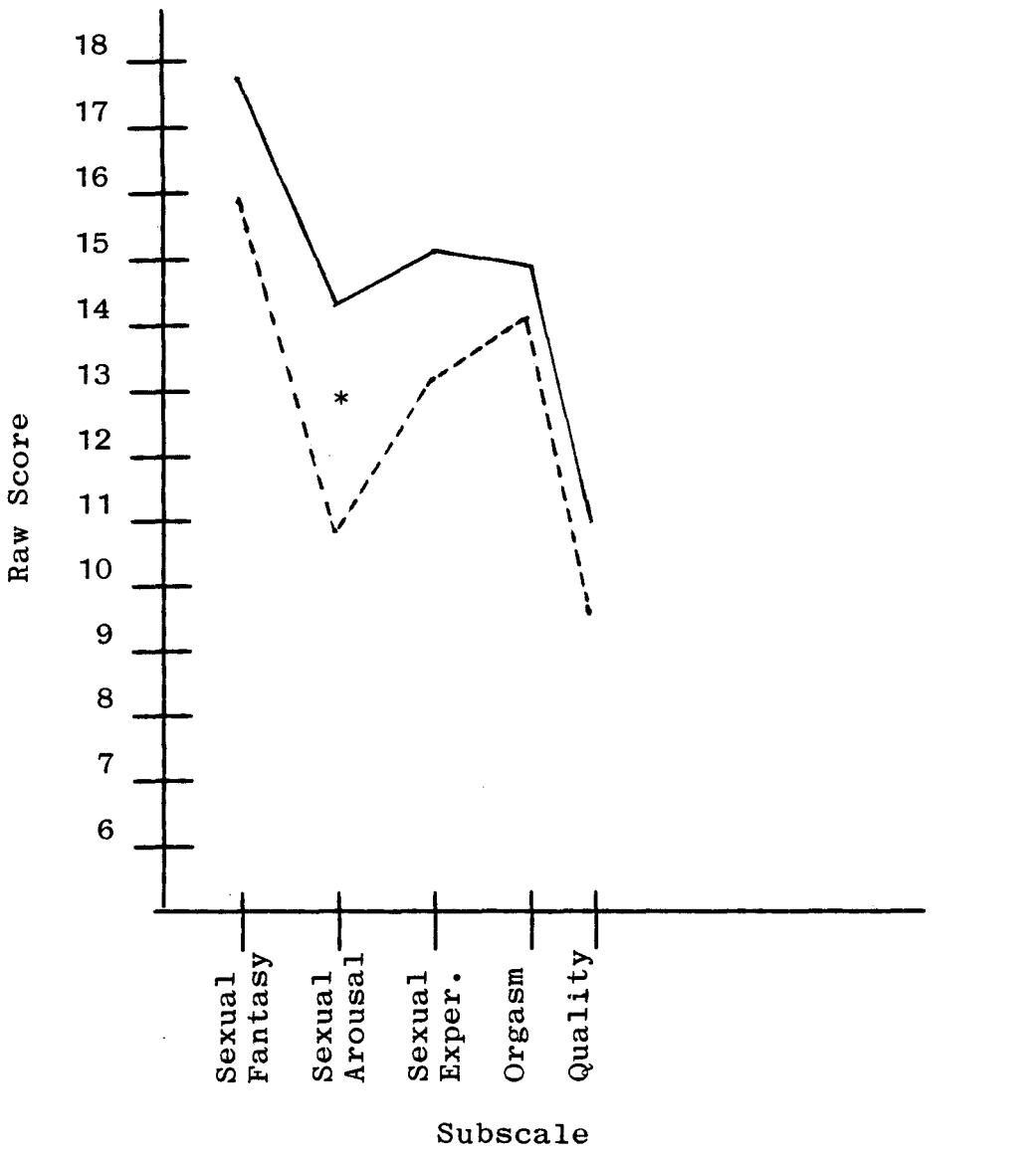
DSFI Score Profile



* $p < .01$

Figure 9

DISF-F Score Profile



An examination of the results presented in Tables 9 and 10 shows that the diabetic group scored significantly lower on several measures compared to the control group. The diabetic group scored significantly lower on the "Satisfaction" subscale of the DSFI and on the general measure of sexual functioning, the "SFI". This group also scored significantly lower on the subscale measuring presence of psychological and physical symptoms. On the DISF-F, diabetic women scored significantly lower on the "Sexual Arousal" subscale compared to non-diabetic controls.

In addition to these statistically significant differences between groups, the graphic display presented in Figures 8 and 9 indicates generally lower scores for diabetic women compared to controls. This finding is consistent for all variables on the DISF-F and for most variables on the DSFI. On the latter instrument, several subscale scores are higher for the diabetic group. These scales are "Gender Role" and "Fantasy". A final point is the lowered "Affect" subscale score for diabetic women compared to controls.

In conclusion diabetic women, exhibited sexual dysfunction compared to non-diabetic women as measured by the variables "Dry and/or Tight Vagina at Intercourse", the "Sexual Functioning Index", and the "Sexual Arousal" score.

Table 11 presents a comparison of diabetic and nondiabetic women on the Eysenck Personality Inventory measures. These data were analyzed utilizing a two tailed t-test for independent groups.

Table 11

Eysenck Personality Inventory

Variable	Diabetic Group (N=37)	Control Group (N=39)	Statistical Test
Extroversion			
Mean	11.1	11.9	
SD	4.2	3.1	t=-.91, df=74
SE	0.7	0.5	Not Significant
Neuroticism			
Mean	10.6	9.2	
SD	5.7	5.4	t=1.05, df=74
SE	0.9	0.9	Not Significant
Lie			
Mean	3.4	2.4	
SD	1.9	1.2	t=2.56, df=74
SE	0.3	0.2	p<.01

Data show that only one of these scales resulted in significant differences between groups. Diabetic women scored significantly higher on the Lie scale compared to non-diabetic women. There were no other significant differences between groups on this instrument.

Table 12 presents the results from a two tailed t-test for independent groups for the measures on the Spanier Dyadic Adjustment Scale.

Table 12

Spanier Dyadic Adjustment Scale
(DAS)

Variable	Diabetic Group (N=34)	Control Group (N=37)	Statistical Test
Dyadic Consensus			
Mean	46.1	47.7	
SD	7.9	8.3	t=-.85, df=69
SE	1.4	1.4	Not Significant
Affectional Expression			
Mean	8.1	8.4	
SD	2.5	1.7	t=-.34, df=69
SE	0.4	0.3	Not Significant
Dyadic Satisfaction			
Mean	29.9	30.7	
SD	5.7	5.3	t=-.73, df=69
SE	0.9	0.9	Not Significant
Dyadic Cohesion			
Mean	15.9	16.2	
SD	5.4	3.4	t=-.34, df=69
SE	0.9	0.6	Not Significant
Overall Adjustment			
Mean	99.9	100.4	
SD	16.2	19.1	t=-.13, df=69
SE	2.8	3.1	Not Significant

There were no significant differences between groups on any of the dyadic adjustment scores.

In summary, these data lend support for the first hypothesis. Diabetic women do experience diminished sexual functioning compared to non-diabetic women. This diminishment occurs for variables measuring arousal, vaginal lubrication (See Table 8), and general sexual functioning. For other variables related to sexual functioning, personality and dyadic adjustment, they show some lowered functioning compared to controls, although these differences did not reach statistical significance. The one exception is the variable Lie on the EPI. Diabetic women scored significantly higher on this variable compared to non-diabetic women.

Hypothesis 2:

Diabetic women can be discriminated from non-diabetic women in terms of sexual dysfunction based upon various physiological and psychological variables.

This hypothesis was tested by means of a stepwise discriminant analysis with forward selection and backward elimination (Norusis, 1986). Data were selected for entry on the basis of significant zero-order correlation coefficients ($p<.05$). The variables entered into the discriminant analysis were: the Eysenck Scales, the DAS scales, selected gynelogical variables, selected DSFI subscale scores, and all of the DISF-F subscale scores.

Table 13 presents the classification function coefficients for this stepwise discriminant analysis. Table 14 presents the canonical discriminant functions.

Table 13

Classification Function Coefficients
(Fisher's Linear Discriminant Functions)

Variable	Diabetic Group	Control Group
Sexual Arousal	-.6487596E-01	.2252275
Psychological Symptoms	.8584893	.9898430
Satisfaction	1.0418100	1.1674180
Vaginal Infections	-.4184192	-1.1321130
Neroticism	1.5927880	1.8423940
Dyadic Cohesion	1.4083420	1.3094310
Sexual Experience	-.3775849	-.5385033
Fantasy	.3921208	.3169704

Table 14

Canonical Discriminant Functions

Eigenvalue	Canonical Correlation	Wilks' Lambda	Chi Square	DF	P
.7606	.6573	.5680	32.807	8	p<.001

Standarized Canonical Discriminant Function Coefficients

Variable	Function 1
Sexual Arousal	1.02768
Symptoms	.85345
Satisfaction	.61891
Vaginal Infections	-.62156

Table 14 (continued)

Variable	Function 1
Neuroticism	.79724
Dyadic Cohesion	-.25816
Sexual Experience	-.58396
Fantasy	-.52793

Results from the summary table indicate that the variables sexual arousal (DISF-F), psychological symptoms (DSFI), satisfaction (DSFI), vagnial infections, neuroticism (EPI), dyadic cohesion (DAS), sexual experience (DISF-F), and fantasy (DSFI) were isolated as those variables that discriminate between the two groups. Specifically, a low sexual arousal score, low psychological symptoms score, low sexual satisfaction score, frequent vaginal infections, and low neuroticism score are indicative of membership in the diabetic group. While these variables are statistically predictive of diabetic group membership, the lack of corresponding statistically significant differences between group means for these variables would suggest caution in utilizing these variables for prediction in clinical practice. Further results indicate that this discriminant function is significant at the $p<.001$ level. Additionally results indicate 73.75% of the subjects will be accurately assigned to the diabetic and control groups using this function. In terms of practical use in future prediction of group

membership this function would be helpful, although approximately 27% of patients would misclassified. The hypothesis that diabetic women and non-diabetic women can be discriminated in terms of sexual dysfunction is thus supported from a statistical viewpoint, although the practical use of this information is limited.

Hypothesis 3:

Diabetic women with sexual dysfunction can be discriminated from diabetic women without such dysfunction on the basis of various physiological and psychological variables.

Multiple regression analyses were utilized to test this hypothesis. Three analyses were attempted for the dependent variable sexual functioning and the independent variables control of blood glucose (HGBA Level), neuropathy, and duration of diabetes. In these analyses the dependent variable sexual functioning was defined by scores from the from the DSFI and the DISF-F. Subscale scores utilized in these analyses were selected for entry on the basis of significant zero-order correlation coefficients ($p<.05$). Tables 15 through 17 present results of these analyses for the dependent variables Sexual Functioning Index (SFI), Sexual Experience (DSFI T-Score), and Pain on Intercourse. The independent variables were control of blood glucose (HGBA level), neuropathy, and duration of diabetes.

A forward stepwise mutltiple regression analysis with backward elimination isolated only one predictor variable accounting for a significant proportion of the variance in the Sexual Functioning Index. Table 15 presents data concerning this variable, control of blood glucose (HGBA Level). The Beta weight for this variable is .3809. Thus while the analysis of variance indicates that control of blood glucose as a predictor of the sexual functioning index is statistically significant, this beta weight would suggest that this predictor variable has limited practical utility. An examination of the index of relative predictability, this measure squared (squared R) reveals that only fifteen percent of the variance in the sexual functioning index is accounted for by control of blood glucose. Thus in a practical sense, use of control of blood glucose offers little predictive power in identifying diabetic women with sexual difficulties.

Table 15

Multiple Regression Analysis

Control of Blood Glucose, Neuropathy, and Duration of Illness on the Sexual Functioning Index

Multiple R	.38088
R Square	.14507
Standard Error	10.09048

Table 15 (continued)

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	656.52260	656.52260
Residual	38	3869.07740	101.81783
F=6.44801	p<.02		

A second stepwise multiple regression analysis isolated control of diabetes (HGBA Level) as the only predictor variable accounting for a significant proportion of the variance in the variable sexual experience. Table 16 presents the results of this analysis. The F ratio, $F(1,38) = 8.23$, $p < .01$, is statistically significant. This result indicates that control of blood glucose contributed a significant proportion of the variance for the dependent variable, sexual experience. The individual t-test for this variable indicates that the size of the proportion of the contributed variance is also significant. These results indicate that, at least statistically, control of blood glucose can be utilized to predict the amount of sexual experiences of a diabetic woman. To determine if this statistically significant result is useful in a practical sense, the relative predictability of the variable control was determined by examinining the squared multiple correlation coefficient. The result of this

examination indicated that the squared r is .16, so that in a practical sense the use of control to predict sexual problems as evidenced by the variable sexual experience is quite limited.

Table 16

Multiple Regression Analysis

Control of Blood Glucose, Neuropathy, and Duration of Ilness on Sexual Experience

Multiple R	.42192
R Square	.17801
Standard Error	10.67344

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	619.09291	619.09291
Residual	38	2858.68209	75.22848
F=8.22950	p<.01		

Table 17 presents results from the final multiple regression analysis. In this analysis the variable pain on intercourse serves as the marker for sexual functioning. A forward stepwise multiple regression analysis isolated neuropathy as a predictor variable accounting for a significant proportion of the variance in the dependent variable, pain on intercourse. The F ratio calculated for

the predictor variable, Neuropathy, is significant at the $p<.02$ level. This result indicates that neuropathy contributed a significant proportion of the variance for the dependent variable, pain on intercourse. Thus, statisically neuropathy can be utilized to predict pain on intercourse for diabetic women. Again, it is important to determine the relative utility of this variable as predictor in a practical sense. The squared multiple correlation coefficient for neuropathy is .15 which is quite low and indicates this variable offers little in the way of practical use as predictor of pain on intercourse.

Table 17

Multiple Regression Analysis

Control of Blood Glucose, Neuropathy, and Duration of Illness on Pain on Intercourse

Multiple R	.38567
R Square	.14874
Standard Error	.98000

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	6.20911	6.20911
Residual	37	35.53448	.96039

F=6.46518 p<.02

In conclusion the hypothesis tested by these analyses is supported, at least statistically. Control of blood glucose was isolated as a predictor of sexual dysfunction in diabetic women in terms of general sexual functioning and sexual experience. Neuropathy was isolated as a predictor of painful intercourse.

Summary

Chi Square analysis of variance and t-tests for independent groups were utilized to test for differences between the diabetic and control groups on demographic variables. Results from these analyses indicated no significant differences, thus suggesting the groups were comparably matched for demographics.

Chi Square analysis of variance and t-tests for independent groups were also utilized to compare the diabetic and control groups on items related to sexual and gynecological history. Results (Table 2) showed significant differences for the variable " number of vaginal infections" over the prior six months and for the variable " dry or tight vagina" on intercourse. For both of the variables the diabetic women's scores indicated more difficulty than the control group.

One of these variables, dry or tight vagina, is related to the first hypotheses, the question of whether diabetic women show difficulty in sexual functioning compared to non-diabetic women. Its relationship involves

the reduction in vaginal lubrication theoretically implicated in sexual dysfunction in female diabetic patients. The findings of the current study indicate this group does experience lower vaginal lubrication compared to the control group. An affirmative conclusion to the question posed by the first hypothesis also resulted from significant findings of the independent t-tests utilized with the sexual inventories in the study, the DSFI and DISF-F. Specifically, diabetic women showed significantly lowered general sexual functioning and arousal than the control group.

The next hypotheses concerned the delineation of variables able to predict group membership in terms of sexual functioning. A discriminant analysis revealed a significant discriminant function comprised of the following variables: sexual arousal, psychological symptoms, satisfaction, vaginal infections, and neuroticism.

Among diabetic women the variable control of blood glucose was the best predictor of general sexual functioning and sexual experience, although the relative predictive ability of this independent variable was too small to be of practical utility. Similarly neuropathy was the best predictor of pain on intercourse but the relative predictive ability was too small to be useful in any applied sense.

CHAPTER V

DISCUSSION

In this chapter a discussion of the study's results in terms of the specified hypotheses will be presented. The findings will be examined in relationship to related research as described in Chapter II. Support for prior research will be noted and an attempt made to explain discrepancies or conflicts with related studies. A discussion of the scope and limitations of this study will be presented with related clinical, theoretical, and methodological implications. Finally, suggestions for further research will be offered.

Discussion of Current Findings

A central issue in the current study is whether or not sexual functioning is disrupted in women with insulin dependent diabetes mellitus. This question has perplexed diabetic researchers for the last decade. Only a few studies have been conducted and results have been equivocal. In contrast, the question of diabetic sexual dysfunction in men has been clearly demonstrated in terms of higher incidence of erectile difficulties (Barnett &

Desautels, 1985; Buvat et al., 1985; El-Bayoumi et al., 1984). These researchers have explained diabetic impotence as both transitory and permanent with organic and/or psychogenic etiologies. Organic causes include vascular complications, and peripheral and autonomic neuropathies. Psychogenic causes include anxiety over prior performance failure (often secondary to organic inhibition of response), more globalized fear and anxiety related to chronic illness, specific fear and anxiety over the development of future diabetic complications, reduced self esteem, and fatigue and general malaise related to deregulation of blood glucose (Jensen, 1981). None of these factors is sex linked. Female diabetic patients suffer the same course of illness with the same possible complications. Neurophysiologically, the female sexual response cycle is analogous to the male. The female analogue to erection is vaginal lubrication. Women are vulnerable to the same psychological problems associated with diabetes and in fact may be more at risk to develop psychologically mediated sexual dysfunction. It is well accepted that female sexuality is more influenced by emotional factors than male sexuality (Kaplan, 1974; Meyer et al., 1983), and may in fact be more dysfunctional in terms of arousal compared to male counterparts. At the very least, women are as much at risk as men and the likely stage of the sexual response cycle to be threatened is the

stage of arousal and desire. Organically, women would be at risk as a function of peripheral and autonomic neuropathy and vascular problems. The objective indicator of such dysfunction would be decreased vaginal lubrication with possible progression towards painful or uncomfortable intercourse. Such a development could result in future anxiety and diminution of sexual desire. Other psychological factors inhibiting desire would be those emotional difficulties associated with the illness as described for men. One additional contributer to sexual desire problems might be difficult dyadic relationships. Jensen (1981) first noted the importance of this issue in sexual functioning in diabetic patients noting the possible "use and abuse of the disease in the marital power balance by patient and partner (p. 501)". Other researchers have judged this factor important to understanding sexual functioning in insulin dependent diabetic women (Newman & Bertelson, 1986; Schreiner-Engel et al., 1985).

The current study sought to answer the question of the presence of sexual dysfunction in diabetic women by comparing a group of insulin dependent diabetic women with a control group of nondiabetic women on instruments designed to measure sexual functioning across many facets, but including the stage of desire and arousal. Results generally supported the presence of problems of sexual arousal in women suffering insulin-dependent diabetes.

This general result came from three specific findings. Diabetic subjects indicated significantly greater difficulty with vaginal lubrication as measured by self report compared to control women. On the DSFI they scored significantly lower on the Sexual Functioning Index compared to nondiabetic women. Finally, on the DISF-F they scored significantly lower on the subscale designed to measure arousal. This subscale provides a composite score based on frequency of feelings of arousal while alone or with a partner, frequency of seeking satisfaction of arousal, and adequacy of vaginal lubrication while masturbating and during intercourse.

This study's affirmative answer to the question of sexual dysfunction in insulin dependent diabetic women is difficult to compare to previous study results for a variety of theoretical and methodological reasons. Early studies (Kolodny, 1971; Ellenberg, 1977; Jensen, 1981; Tyrer et al., 1983) looked to subjective reports of sexual satisfaction and orgasm as indicators of sexual functioning, rather than problems with desire or arousal. An understanding of the importance of problems of arousal in sexual dysfunction post dates many of these studies (APA, 1983; Meyer et al., 1983). That earlier research found no problems in the area of orgasm is not suprising. There is no neurophysiological basis to hypothesize orgastic dysfunction as a result of diabetes. Studies on

men confirm intact orgastic functioning (Barnett et al., 1985). Kolodny (1971) found orgastic difficulty in diabetic women compared to normals but subsequent studies failed to replicate these results. Ellenberg (1977), in discussing the disparate finding between his study and Kolodny's (1971), notes the obvious methodological problem in subjective measurement of sexual response. Both he and Kolodny (1971) requested that their subjects say whether or not they experienced satisfactory orgasms. This loose subjective measurement combined with the differences in populations (inpatient versus outpatient) renders the results of either study of questionable external validity.

Later studies (Jensen, 1981; Tyrer et al., 1983; Schreiner et al., 1985; Newman & Bertelson, 1986) also failed to isolate orgastic dysfunction as a result of diabetes in women.

The results of the present study are consistent with these findings. On variables related to or directly measuring orgastic function (the "Satisfaction" subscale of the DSFI and the "Orgastic Quality" subscale of the DISF-F) there were no significant differences between diabetic and non-diabetic women. In summary, the results of this investigation support the findings of these studies, at least for the issue of orgastic functioning in diabetic women.

Later studies (Newman & Bertelson, 1986; Schreiner-Engel et al., 1985) and the current work have addressed the issue of subjective measurement of sexual functioning by utilizing an objective measure of sexual functioning, the Derogatis Sexual Functioning Inventory (DSFI). The DSFI has been normed for both a healthy and sexually dysfunctional sample of women from the general population. In addition, the current study utilized an objective scale of female sexual functioning containing items tapping the dimension of sexual arousal. That this scale is new and currently without rigorous tests of its psychometric properties is an obvious disadvantage, but results are interesting from a theoretical point of view.

Through the use of these two instruments and various questions related to the gynecological/sexual history of subjects, the current study found significant differences in the arousal and desire stage of the sexual response cycle. The diabetic women showed lower functioning on all variables related to this stage. Schreiner-Engel et al. (1985), utilizing the DSFI and Interview for Sexual Functioning, found similar results. Specifically, they found significantly lowered sexual desire and vaginal lubrication in diabetic women compared to controls. Newman and Bertelson (1986) also obtained evidence of dysfunction in these areas and additionally found a higher incidence of dyspareunia (painful intercourse) in diabetic women

compared to normals. Their study compared diabetic women meeting DSM III (APA, 1983) criteria for sexual disorders with diabetic women without such criteria. They did not utilize a control group so that the meaning of their findings is difficult to interpret in light of the fact that the presence or absence of diabetes was the independent variable. They did utilize the DSFI.

While this study failed to find significant differences in dispareunia between diabetic and nondiabetic women, there was a significant positive correlation between the variable "pain on intercourse" and "neuropathy" among the diabetic women. Newman and Bertelson (1986) report no similar relationship, stating there was no significant difference between diabetic women with dysparuenia and diabetic women without dyspareunia on measures of neuropathy. These results are not necessarily inconsistent. In the present study a significant positive correlation was found between these variables, but only 18% of the variance in "painful intercourse" was accounted for by diabetic neuropathy. In the present study this finding was based on an extremely small N (N=14) and the number of subjects in this comparison study is not noted. For these reasons, it would not seem to be a settled issue, and would demand further investigation with larger samples.

In summary, when differences in samples, measurement instruments, and variables are taken into account, it does

seem that diabetic women present sexual problems in greater frequency than their non-diabetic peers. These problems also seem to characterize the desire/arousal stage of the sexual response cycle, leaving the rest of the sexual response cycle without disruption.

The next logical question is the determination of factors that contribute to sexual difficulties in diabetic women. Several possible factors have been previously mentioned in the discussion of the presence or absence of sexual functioning. It was the intent of the present study to examine the impact of several of these factors. The variables quality of dyadic relationship, personality, and mood were examined as contributors to sexual problems among diabetic women compared to controls. Among diabetic women the variables neuropathy, control of blood glucose, and duration of illness were studied as possible contibutors to sexual dysfunction.

The general variables were examined by use of a discriminant analysis for the diabetic and non-diabetic groups. Results indicated that decreased "sexual arousal", decreased "psychological symptoms", decreased "satisfaction", more frequent "vaginal infections", and higher "neuroticism" were isolated as predictors of diabetic group membership. The discriminant function was statistically significant. Results further indicated that 73.75% of group membership was successfully predicted using

this function. Given the preceeding discussion, the inclusion of sexual arousal, satisfaction, and vaginal infections is certainly expected. The inclusion of psychological symptoms and neuroticism demands further thought and explanation. Eysenck (1971) reports data to suggest that individuals with reported sexual dysfunction score high on the neuroticism scale. This score would be consistent with a tendency to minimize psychological symptoms and might suggest that these factors in a diabetic woman with genitourinary complications might indicate the presence of lowered sexual arousal and satisfaction.

The results of the discriminant analysis are difficult to interpret in reference to previous research. Prior to Schreiner-Engel et al. (1985), no study examined relationship or mood variables in sexual functioning in this population and to date no study has included personality variables. Thus in terms of viewing their interaction, the results of the current study stands alone unitl future replication or other means of verification can be made. One interesting discrepancy between the Schreiner-Engel et al. (1985) and the current work on one of these variables, "dyadic adjustment", is that in this study no significant differences in marital adjustment between the diabetic and control groups were found. Schreiner-Engel and colleagues (1985) reported lowered marital adjustment in the diabetic group. This difference

is difficult to interpret given the use of very different instruments to measure marital adjustment. Schreiner-Engel (1985) used a 1959 test to measure marital adjustment compared to the more contemporary instrument used in the present study. Furthermore, many of the subjects in the present study were dating or living together compared to the married couples who were the subjects in the earlier study. A final difference between these studies is the the the fact that the subjects in the Schreiner-Engel et al. (1985) study were generally older than the subjects in this study.

Following the delineation of factors contributing to diabetic sexual dysfunction in general in diabetic women compared to normal women, the question was raised as to which factors, if any, differentiated diabetic women among themselves. Multiple regression analyses isolated control of blood glucose as a predictor of impaired Sexual Functioning Index and Sexual Experiences. Neuropathy was isolated as a predictor of painful intercourse. However none of these variables resulted in much practical benefit in predicting sexual dysfunction in diabetic women. Previous studies have directly manipulated neuropathy as a factor in diabetic sexual dysfunction and have found neuropathy a significant factor in male diabetic sexual dysfunction. Results for women have been variable with findings of no relationship (Kolodny, 1971; Ellenberg,

1977; Tyrer et al., 1983) to a strong relationship (Jensen, 1981). Schrenier et al. (1985) did not consider this variable and Newman and Bertolt (1986) found no difference among groups.

Clinical, Theoretical, and Methodological Implications

The results of the current study combined with the previous controlled studies using objective measurement of sexually functioning concur that women with diabetes are at risk for sexual problems. Further, the results of the current study indicate that diabetic women may present themselves as healthier than they may feel, making it unlikely they would bring up sexual problems. Diabetic women in the current study scored significantly higher on the Lie Scale of the Eyssenck, a finding that may be interpreted to mean they wished to portray themselves in a favorable light (Eysenck & Eysenck, 1968). Given these two factors, one important clinical implication of the present work is the need to educate health professionals concerning this problem. In this manner they may begin to gently address this issue with their patients, assess the extent of any existing problem, and suggest remediation. In connection with this assessment the use of the DSFI has shown itself to be an excellent screening tool. This instrument takes only 30-40 minutes to complete is easily scored, and provides information as to the specific area of sexual problems. The instrument is also normed on a non-

medical, non-sexually disordered population, so that this information could be used with patients who might be denying the presence of illness.

In this connection the other instrument in the study, the DISF-F, may have future utility with diabetic women although this scale is new. It does show predictive ability in the present study, particularily in reference to the area of arousal. Psychometric studies are currently being conducted (Derogatis, personal communication). This instrument takes a much briefer time to complete (approximately 5-10 minutes) but does not presently have the norms available that the DSFI does.

Sexual dysfunction of the type experienced by female diabetics is easily ameliorated, for the most part. If the problem is one of mood secondary to irregular blood glucose, a medical solution is readily available and explanation and reassurance to both patient and spouse would probably sufficiently prevent further disruption of the relationship. If the problem concerns difficulties with vaginal lubrication with resultant uncomfortable or painful intercourse, an easy solution is to have the woman utilize a commercial lubricant. For broader problems such as major mood disorders, personality problems, or relationship problems, the primary care provider would have the basis for psychotherapy referral.

The results of the present study in combination with previous related findings offers a better understanding of the causes of sexual dysfunction in insulin dependent diabetic women, offers prescriptions for addressing the problems, and offers an inexpensive, quick screening device. A clinical limitation of the present study is the de-emphasis on mood factors. While the Affect Subscale of the DSFI addresses mood, other studies utilizing more depression oriented surveys have shown clearer differences between diabetic women with sexual disorder and mood (Newman & Bertelson, 1986).

Theoretically, the current study adds support to the growing conclusion that women diabetics, like their male counterparts, do suffer sexual problems. As with men these problems also manifest themselves in the desire and arousal stage of the sexual response cycle, leaving the other stages intact.

Results from this and previous studies do show difficulties in vaginal lubrication and in general desire for sexual interactions. The difference between male and female diabetics in terms of the degree of discomfort these respective difficulties cause is, however, quite different. Disorders of arousal in men, i.e. erectile problems, prevent further sexual interaction and are connected with serious assaults to self esteem. Further complications of anxiety and secondary impotence are likely. The

amelioration of this problem is often time consuming and costly. The scenario for women with lubrication problems is quite benign in comparison. Such difficulties do not result in reduction in sexual activity as shown by results of this and previous studies. While they may experience pain and discomfort these symptoms do not have the devastating effects on performance that impotence has for men.

Further delineation of the determinants of sexual dysfunction in insulin dependent diabetic women remains as a research task. The question of multiple determinants in sexual functioning in general is still unanswered rendering the issue for diabetic women all the more complex. The past two studies have attempted to address this question by including measures of marital adjustment and mood. The present study included the use of marital adjustment and personality. Prior studies have clarified the area of the sexual response cycle affected by this illness. Now the task is to delineate the contributions of possible factors to dysfunction with the ultimate aim of better understanding of the illness and better screening and treatment.

The results of this study do indicate multiple determinants to sexual dysfunction in insulin dependent diabetes. Further replications are necessary to make any

definitive conclusions concerning the results of the current study.

There are several methodological weaknesses in the present study. The number of subjects in each group is small and the number of diabetic women with neuropathy is very small (N=14). The further breakdown of diabetic women by control results in very small samples (N=18;23). That significant results were obtained in spite of these small numbers of patients is impressive, however. It also requires caution in terms of generalizing to a much larger population of patients.

Another problem concerns the measurement of critical variables such as blood glucose control level, neuropathy, and vaginal lubrication. As Newman and Bertelson (1986) note there is great variability in laboratory measurement of blood glucose levels. While most of the diabetic women had HGBA levels from the Hopkins laboratory, several (N=7) did not. Neuropathy was determined on the basis of physical examination for the Hopkins subjects, but the other subjects (N=10) just stated on the demographic data sheet whether or not they had diagnosed neuropathy. The diagnosis of neuropathy is quite complicated and the current researcher was unable to utilize the sophisticated resources to make this diagnosis.

Finally, the measurement of vaginal lubrication depended upon self report, a problem shared with all other

studies to date. That self reports confirm difficulties in this area is an important indicator of validity of this problem. More objective measures like photoplethysmography (Sintchak & Geer, 1975) would likely lead to more exact and replicable studies. The use of such techniques are costly and time consuming.

Future Research

The current study can best be viewed as an important step in a progression from very crude attempts to understand the impact of diabetes on sexuality in women to sophisticated designs attempting to isolate determinants of sexual dysfunction. Kolodny (1971) represents the first attempt by posing the general question as to whether or not diabetic women suffer sexual dysfunction. Investigations since that time have increasingly examined variables likely to contribute to sexual dysfunction.

Conclusions from this body of research, including the present study, suggest sexual dysfunction in diabetic women that falls into the category of disorders of arousal and desire. Such dysfunction is variously contributed to by physiological, psychological, personality, and dyadic factors.

The present study was the first to utilize multivariate statistics to study these factors. Many more studies are necessary to replicate the present study, utilize larger samples, obtain objective measures of

vaginal lubrication, and look at personality and mood. Additionally, studies of racial and cultural differences and of Type II diabetes would be interesting. Also obtaining partner measures on sexual satisfaction and dyadic satisfaction would greatly increase understanding of the specific dyadic dynamics of sexual problems in insulin dependent diabetic women.

Additionally, it would be worthwhile to examine diabetic women who do not develop sexual dysfunction with those who do along the aforementioned dimensions. This tack might shed light on the risk of development of vulnerability to sexual dysfunction.

Finally, the use of this model in studying sexual dysfunction in other medical illnesses would be interesting. Patients with renal disease or multiple sclerosis would be possible target groups, and depending upon the nature of the illness various stages of the sexual response cycle may be affected.

Sexual functioning is an important aspect of adult life. The preceeding study has sought to explore sexual functioning in women with chronic illness that potentially impairs such functioning. It is hoped that this study and ones like it will offer improvements to the quality of life of individuals suffering chronic illness.

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APPENDIX A

Glossary of Medical Terms

Detumescence-subsidence of a swelling.

Charcot Joints-a destruction of the joints, particularily in the feet; a complication of diabetic polyneuropathy.

Hypogylcemia-a condition characterized by an abnormally low concentration of sugar in the blood.

Hypotonic Bladder-reduced muscular tension in the bladder.

Internal Pudenal Arteries-arteries of the internal genitalia.

Myotonia-delayed reaction of a muscle after an initial contraction.

Nephropathy-any disease of the kidney.

Neuropathy-degeneration of cells in the nervous system.

Parasympathic-one division of the autonomic nervous system.

Postural Hypotension-a type of low blood pressure that occurs when an individual rises from a sitting or prone position.

Psychogenic-of mental origin or causation.

Retinopathy-degenerative disease of the retina.

Somotogenic-having origin in body cells.

Splanchnic Nerves-nerves related to the internal organs of of the body.

Sympathic-one division of the autonomic nervous system.

Tachycardia-Rapid beating of the heart.

Testosterone-the male hormone.

Urethra-a canal leading from the bladder, which discharges urine externally.

Venous-relating to a vein or veins.

Venous Plexus-a network of veins.

Ventral-situated nearer the undersurface of the body.

(Derived from Stedman, 1982)

APPENDIX B

Demographic Data Form

#_____

Date of Birth_____

Religion:
_____1. Catholic
_____2. Protestant
_____3. Jewish
_____4. Other
_____5. No Affiliation

Marital Status:
_____1. Single
_____2. Engaged
_____3. Married
_____4. Separated
_____5. Divorced
_____6. Widowed
_____7. Living with Someone
_____8. Remarried

Number of Children_____

Principal Wage Earner:
_____1. Self
_____2. Spouse
_____3. Parent
_____4. Other Relative
_____5. Other (Specify:_____)

Your Highest Education:
_____1. Elementary School
_____2. Some High School
_____3. High School Graduate
_____4. Some College
_____5. A.A. Degree
_____6. B.A./B.S.
_____7. M.A./M.S.
_____9. Doctorate

Current Occupation:_____

Average Yearly Family Income:_____

Current Medications (Type and Dosage):_____

Daily Alcohol Comsumption:_____

Daily Tobacco Comsumption:_____

Daily Consumption of Mood Altering Drugs
(Type and Amount):_____

Age of First Menstrual Period:_____

Degree of Menstrual Discomfort:
_____1. None
_____2. Mild
_____3. Severe

Number of Vaginal Infections Over the
Past Six Months:_____

How often do you experience vaginal burning, pain, or itching during intercourse?
_____1. Never
_____2. Rarely
_____3. Sometimes
_____4. Usually
_____5. Always

How often do you experience a dry or tight vagina that interfers with sexual intercourse?
_____1. Never
_____2. Rarely
_____3. Sometimes
_____4. Usually
_____5. Always

How often do you utilize commercial lubricants to help with sexual intercourse?
_____1. Never
_____2. Rarely
_____3. Sometimes
_____4. Usually
_____5. Always

What is the average duration of your foreplay prior to sexual intercourse?
_____1. less than one minute
_____2. 1-3 minutes
_____3. 4-6 minutes
_____4. 7-10 minutes
_____5. 11-15 minutes
_____6. 16-30 minutes
_____7. 30 minutes to one hour

At what age did you first have sexual intercourse?_____

Approval Sheet

The dissertation submitted by Linda D. Rice has been read and approved by the following committee:

Dr. Kevin J. Hartigan, Director
Assistant Professor, Counseling and
Educational Psychology

Dr. Gloria J. Lewis
Associate Professor and Chairperson,
Counseling and Educational Psychology

Dr. Jack A. Kavanagh,
Professor, Foundations of Education

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

April 15, 1987
Date

Kevin J. Hartigan
Director's Signature