Social Support and the Prevalence of Depressive and Anxiety Disorders in Low-Income Adults With Type 2 Diabetes and Other Chronic Illnesses.

Janet Leigh Thomas
Louisiana State University and Agricultural & Mechanical College

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SOCIAL SUPPORT AND THE PREVALENCE OF DEPRESSIVE AND ANXIETY DISORDERS IN LOW-INCOME ADULTS WITH TYPE 2 DIABETES AND OTHER CHRONIC ILLNESSES

A Dissertation
Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Doctor of Philosophy in The Department of Psychology

by
Janet Leigh Thomas
BA, University of California, Riverside, 1986
MSW, San Diego State University, 1990
MA, Louisiana State University, 1999
December, 2001

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The present study used a cross-sectional design to answer the following questions: (a) what is the prevalence of DSM-IV depressive and anxiety disorders in a population of low-income primary care patients with type 2 Diabetes Mellitus (DM), and does a diagnosis of type 2 DM contribute to an increased prevalence of affective disorders above the rate identified in other chronic illness groups and those suffering from no medical diagnoses, (b) does perceived social support, as measured by the Interpersonal Support Evaluation List (ISEL) have a direct and/or buffering effect on the association between chronic disease and affective disorder diagnoses, and (c) which aspects of social support (appraisal, tangible, belonging and self-esteem) serve as the best predictors of a diagnosis of an affective disorder in patients with chronic illness. The sample included 326 randomly selected adult female patients recruited from primary care clinics at a public hospital. The sample consisted predominantly of uninsured, African American, low-income, middle-aged females. Logistic regression analyses identified a significant main effect for illness group when age and education were statistically controlled \( \chi^2 = 22.66, df 4, p < .000 \). When posthoc comparisons were examined, significant contrast effects occurred when type 2 DM were compared with other chronic illnesses. Specifically, the odds of having an affective disorder increased in those with type 2 DM by 126%. Logistic regression also identified a significant interaction between social support and illness \( \chi^2 = 35.42, df 5, p < .000 \). Results indicated that social support was more beneficial for patients with chronic illness.
illness. Each $SD$ decrease in social support increased the odds of having an affective disorder by 67% for the total sample.

Although tangible support was identified as an important buffer for affective disorders, emotional sources of support appear to be equally important. Given the high prevalence of affective disorders identified in this sample and the beneficial effect of social support, intervention implications are suggested for those working in primary care settings.
INTRODUCTION

The comorbidity of mental and physical illness is currently of considerable interest. It is generally accepted that an increased risk of psychiatric impairment accompanies the presence of a medical illness (Schulberg & Burns, 1988; Barrett, Barrett, Oxman, & Gerber, 1988; Katon & Sullivan, 1990; Rodin & Voshart, 1986). Recent studies suggest that people with Diabetes Mellitus (DM) have higher levels of psychological disturbance than exist in the general population (Gavard, Lustman, & Clouse, 1993).

According to the results of epidemiological studies, depressive and anxiety disorders are more prevalent in patients with DM than in those who are medically healthy (Wells, Golding & Brunham, 1989; Weyerer, Hewer, Pfeifer-Kurda, & Dilling, 1989). Additionally, the results of clinical studies have also shown a high prevalence of depressive disorders among patients with diabetes (Friis & Nanjundappa, 1986; Lustman, Griffith, Clouse & Cryer, 1986; Marcus, Wing, Guare, Blair & Jawad, 1992; Popkin, Callies, Lenz, Colon & Sutherland, 1988; Wing, Marcus, & Blair, 1990). However, the evidence is contradictory, as there are also results that do not support the above conclusion (Robinson, Fuller & Edmeades, 1988; Wells, Golding, et al., 1988b). More importantly, prior studies have made biochemical assumptions attributing a higher prevalence of depressive disorders in patients with DM to a shared disturbance in the HPA axis; however, evidence that the incidence of depression is higher in patients with diabetes than those with other chronic illnesses has yet to be firmly established. In the two studies which have compared DM to other illness groups (Wells et al., 1988a; Weyerer et al., 1989) DM does not appear to contribute to a greater risk of psychiatric...
impairment. Unfortunately, the results of these studies are questionable as the diagnosis of DM was not verified by a physician. Additionally, the diabetic samples included both type 1 and type 2 DM (Nielson & Williams, 1980; Turner & Noh, 1988; Bennett, 1994).

Although prior studies have focused on the prevalence of depression in DM, our understanding of the incidence of anxiety disorders in patients with DM is more limited. Additionally, most prevalence studies have based their conclusion on the results of self-report measures of depression and anxiety symptoms, which limit diagnostic specificity. Thus, whether depressive and anxiety disorders are more common in type 2 DM than other chronic illnesses has yet to be reliably determined in the literature.

Substantial research reveals that personal coping resources may contribute to the variable impact of chronic illness on psychological health. Chronically ill patients who receive considerable social support have been found to be at decreased risk of developing a subsequent depression (Brown, Andrews, Harris, Adler, & Bridge, 1986; Holahan & Holahan, 1987). Two models have been proposed to explain the impact of social support. The direct-effect model assumes that social support has a beneficial effect on psychological health regardless of whether stress (e.g., due to illness) is present or not, thus suggesting that the effect of social support is independent of stress (Broadhead, Kaplan & James, 1983). According to the buffering model, social support mitigates the negative influence of stress on physical and psychological health, thus suggesting that its effects are mainly upon stress (Cobb, 1976; Cohen & Syme, 1985).

As most prior studies have been restricted to one specific disease, it has not been possible to determine whether the effects of social support differ across people with
different illnesses. However, there are some indications that the effectiveness of social support may depend on the type of support available and the specific characteristics of the disease (Folkman & Lazarus, 1980; Penninx, Kriegsman, van Eijk, Boek, & Deeg, 1996). For example, emotion-focused support strategies (e.g., expression of sympathy) have been found to be more effective in coping with situations that are not amenable to individual control (Pearlin & Schooler, 1978). Moreover, the degree of life threat (Feifel, Stack, & Nagy, 1987; Rolland, 1987) and the functional incapacitation resulting from the illness (Fitzpatrick, Newman, Archer, & Shipley, 1991) are also considered critical aspects.

It follows that social support that focuses on decreasing the emotional distress caused by a disease may be most beneficial to patients with illnesses that cannot be managed by individual or medical intervention. Ell, Nishimoto, Morvay, Mantell, and Hamovitch (1989) found that in a life threatening disease, emotional support from others appeared to protect patients from developing subsequent psychiatric impairment; whereas in patients suffering from illnesses that are functionally impairing, tangible support (e.g., task assistance) was found to be a more important determinant of comorbid psychopathology (Fitzpatrick et al., 1991). Therefore, as chronic diseases have different characteristics regarding prognosis, extent of functional incapacitation and amenability to treatment, the corresponding effectiveness of social support as a buffering agent may also vary.

Considering that the basic physiological mechanisms for metabolic control may be different in type 1 and type 2 DM, and given that the experiences of individuals with DM differ according to the characteristics of their disorder and the type of treatment
necessary (Leedom, Meehan, Procci, & Zeidler, 1991), it may be important to study psychiatric symptoms in these two patient populations separately. As type 2 DM represents 80% of diabetic patients, the present study focused exclusively on patients diagnosed with type 2 DM.

Previous research addressing psychological distress among individuals with DM has rarely been informed by a theoretically and conceptually driven model that specifies the interrelationships among relevant constructs (Connell, Davis, Gallant, & Sharpe, 1994). Therefore, this study attempts to address this limitation by exploring the influence of social support in the incidence of affective disorders in patients with chronic illness. However, in order to accomplish this goal, the first purpose of this study was to compare and contrast the prevalence of anxiety and depressive disorders in low-income primary care patients with type 2 DM, against those with other chronic illnesses and those with no medical illness. Following this determination, the present study explored the effects of social support on diagnosed depressive and anxiety disorders across groups. Although prior research has addressed the contribution of social support to glycemic control and dietary adherence; no prior studies have examined the direct and buffering effects of social support on the presence of affective disorders in patients with type 2 DM.

In conclusion, this study provides a unique contribution to the literature by conducting a cross-sectional study in a primary care sample consisting primarily of economically disadvantaged, urban African Americans with the following objectives: (1) To compare and contrast the prevalence of diagnosed depressive and anxiety disorders in patients diagnosed with type 2 DM, in those with other chronic illnesses...
and in those with no comorbid medical illness: (2) to determine the degree to which social support contributes to the prediction of a diagnosis of an affective disorder (that is, either a depressive or an anxiety disorder) in patients with no comorbid medical illness; (3) to determine whether perceived social support serves as a moderator in the association of medical illness with diagnosed affective disorder; and (4) to determine the type of social support (appraisal, belonging, self-esteem and tangible) most effective in moderating the stress associated with medical illness and affective disorders.

Although a cross-sectional design cannot directly address the issue of cause and effect, such a study can provide direction for future research and guidance for clinical management.

First, a review of the literature will provide an overview of the definition aspects, etiological theories, and epidemiologic evidence pertaining to DM. This examination will be followed by a general overview of the issue of psychopathology in primary care practice and a detailed examination of the literature pertaining to comorbid anxiety and depressive disorders in patients with DM. Finally, there will be a review of the social support literature, with special emphasis on the empirical studies examining the association between social support and DM.
REVIEW OF THE LITERATURE

Diabetes Mellitus

Definitional Aspects

Diabetes Mellitus (DM) generally refers to two separate medical conditions distinguished by elevated levels of blood glucose: type 1 and type 2 DM. Other types of diabetes (e.g., gestational DM, diabetes insipidus, maturity onset diabetes of the young [MODY]) will not be addressed in this review. Both types 1 and 2 DM are characterized by abnormalities in blood glucose metabolism caused by deficiencies in insulin production, utilization or both. Abnormal glucose metabolism can lead to chronically high (hyperglycemia) or low (hypoglycemia) blood glucose levels.

According to the American Diabetes Association (1999), blood glucose levels (BG) between 70-120mg/dl are considered normal and a value above or below this range represents poor glycemic control. Although both type 1 and type 2 DM are associated with long-term complications secondary to poor glucose control, there are significant differences between these two complex metabolic conditions.

The major difference between type 1 and type 2 DM lies in the underlying pathology and consequent treatment regimens. Individuals with type 1 DM require insulin injections to preserve life, as they do not produce endogenous insulin. Insulin regimens vary greatly depending on targeted blood glucose control and patient motivation. Some patients may require only one or two daily injections, whereas others following more intensive insulin regimens may require multiple daily injections or insulin pumps for continuous insulin delivery. Daily self-monitoring of blood glucose is essential for all patients with diabetes; however, those following more intensive
insulin regimens may require three to five daily finger sticks. Those with type 2 DM may use insulin to overcome their bodies’ resistance to endogenous insulin, but they do not require an external source of insulin in order to survive. Initial treatment for type 2 DM typically focuses on diet and exercise therapy to reduce weight, thereby decreasing insulin resistance. Eventually; however, oral medications and/or injections of insulin are frequently necessary to control blood glucose levels.

Hypoglycemia (BG < 70) is a condition attributable to the effects of low blood glucose on the central and autonomic nervous systems. Hypoglycemic episodes are not unusual for patients with DM who take glucose-lowering medications, such as insulin or the sulfonylurea drugs (e.g., glyburide, glipizide). On average, patients with type 1 DM have one or two episodes of hypoglycemia each week; however, hypoglycemic episodes rarely occur in patients with type 2 DM. The cause of hypoglycemia has been explained as insulin “doing its job too well” (ADA, 1999, p.158). In patients without DM, the body stops releasing insulin before glucose levels fall too low. However, in patients with DM, especially those injecting insulin, there is no shutdown mechanism to stop insulin release. Therefore, insulin can deplete the available supply of glucose in the blood. Mild hypoglycemic episodes (BG = 50-70) can be treated by ingesting fast-acting glucose (i.e. candy, fruit juice). However, these episodes are often disruptive as symptoms of low blood sugar typically include shakiness, nervousness, sweating, chills and clamminess, rapid heartbeat, trouble concentrating, headache, dizziness, light-headedness, moodiness, clumsiness, extreme hunger and irritability. More severe hypoglycemia (BG < 50) can cause marked neurobehavioral dysfunction and can progress to seizures, unconsciousness, coma and eventual death (ADA, 1999).
Alternately, high levels of blood glucose, hyperglycemia, (BG > 120) can also be dangerous.

In patients with type 1 DM, hyperglycemia can lead to diabetic ketoacidosis (DKA). DKA typically occurs in patients with poor glycemic control secondary to nonadherence, acute illness or extreme stress. Basically, in the presence of a significant stressful event or an illness, hormones block the effects of insulin and cause the liver to release stored glucose. When the body does not have enough insulin, muscles are deprived of glucose and the body breaks down fat for energy, thus ketones (fat metabolite) are formed and can be identified in the urine. Although DKA is typically diagnosed in patients with type 1 DM, high glucose levels can lead to a potentially fatal condition (hyperglycemic hyperosmolar nonketotic syndrome) in patients with type 2 DM.

Hyperglycemic hyperosmolar nonketotic syndrome (HHNS) is a condition that occurs exclusively in patients with type 2 DM. The diagnosis of HHNS is made when blood glucose levels increase to a range between 600 and 1000 (normal BG range = 70-120). The process leading to HHNS begins when blood glucose levels increase to a high level resulting in subsequent increased compensatory urine output. The process may continue for days or weeks and can eventually lead to severe dehydration. Extreme dehydration thus leads to confusion and consequent lack of ability to increase necessary fluid intake. Eventually, severe dehydration can lead to seizure, coma and death. HHNS is typically the result of undiagnosed and/or poorly managed type 2 DM. At least one-third of all cases of HHNS are diagnosed in patients residing in nursing home placements. Stress, alcohol, untreated infection, diuretics, or even a stroke can
contribute to the onset of HHNS (ADA, 1999). In addition to these potentially fatal acute conditions, DM can lead to long-term medical complications.

The longer the duration of DM, the greater the likelihood of developing DM-related medical complications (Shillitoe, 1988). Complications include degenerative changes in the micro and macro-vascular systems resulting in peripheral vascular disease, neuropathy, retinopathy and nephropathy (Kovar, Harris & Hadden, 1987). DM is the leading cause of blindness, lower extremity amputations and kidney transplants in the United States (Cox & Gonder-Frederick, 1992). The risk for lower extremity amputation has been reported to be 15 times greater in patients with DM than in nondiabetics. Diabetes has also been shown to have both transient and permanent neurocognitive sequelae, which have been associated with a variety of neuropsychological deficits (Holmes, 1990). As considerable brain development occurs throughout childhood and into adolescence, pediatric patients with diabetes are at elevated risk of neurocognitive impairment from this disease (Rovet & Fernandes, 1999). Additionally, rates of periodontal disease, systemic and peripheral infection and digestive disease are significantly higher in patients with DM than in the general population, and largely account for the higher rates of disability and mortality associated with this medical illness (Lustman, Griffith, Freedland, Kissel, & Clouse, 1998).

During the last decade, researchers have identified a group of risk factors for coronary heart disease which appear to commonly coexist: hyperinsulinemia, dyslipidemia, hypertension, and obesity. Coexistence of these cardiovascular risk variables has been termed insulin resistance syndrome (IRS) (DeFronzo & Ferrannini,
1991), deadly quartet (Kaplan, 1989), and multiple metabolic syndrome (Liese, Mayer-Davis, & Haffner, 1998), but is most commonly referred to as Syndrome X (Reaven, 1988). Up to 80% of patients with type 2 DM are estimated to have comorbid macrovascular risk factors (i.e., hypertension, hyperlipidemia, atherosclerosis) (Spanheimer, 2001). In the Framingham Heart Study, the primary incidence of coronary heart disease in patients with diabetes aged 45 to 74 years was more than two times greater in diabetic men and five times greater in diabetic women than in their non-diabetic counterparts (Kannel, 1985).

Syndrome X has been documented in both children and adults, and is likely influenced by the age related progression of insulin resistance found in type 2 DM (Chen et al., 2000). The fundamental abnormality leading to the manifestations that comprise Syndrome X is resistance to insulin regulation of muscle glucose uptake and adipose tissue decomposition. Epidemiological evidence has documented insulin resistance as an independent risk factor for atherosclerosis, hypertension, hyperlipidemia and coronary heart disease.

Fortunately, recent evidence confirms that improved glucose control in both type 1 and type 2 DM can result in improved outcomes and decreased risk of complications (Diabetes Control and Complications Trial Research Group [DCCT], 1996; United Kingdom Prospective Diabetes Study Group [UKPDS, 1998 a, b]). Thus, interventions aimed at regulating blood glucose and empirical research focusing on factors that mediate blood glucose fluctuations have very meaningful health implications (Goetsch, Abel & Pope, 1994).
In summary, both types 1 and 2 DM are complex medical disorders characterized by abnormal glucose metabolism and high rates of comorbid cardiac risk factors. Both are associated with potentially lethal acute medical sequelae, as well as increased risk of long-term disabling consequences including cognitive impairment, loss of vision, kidney failure and amputation. Although the prevalence of DM has been documented to affect more Americans than breast cancer and HIV/AIDS, research dollars dedicated to identifying the etiological and epidemiological factors associated with this disease significantly lag behind that allocated to these other chronic illnesses (Davidson, 1998).

Epidemiological Aspects

Diabetes Mellitus is a major medical, personal and public health problem. Over 10 million people in the United States are diagnosed with DM and estimates suggest that there may be another 5-6 million who are undiagnosed (Krein & Klamerus, 2000). It is further estimated that 200 million persons worldwide are affected with DM (Harris, 1995). Unfortunately, the incidence and prevalence of DM continues to rise (Center for Disease Control and Prevention [CDC], 1997, 1999; ADA, 1999). Approximately 1,800 new cases of DM are diagnosed each day, with approximately 657,000 new cases diagnosed each year (ADA, 1999). Additionally, DM is the seventh leading cause of death in the United States (CDC, 1999) and the second most common reason for patient contact with a physician (Janes, 1995). Each year approximately 130,000 deaths are directly attributable to the disease, while many other deaths are associated with DM-related complications (CDC, 1997).
Apart from being a serious medical problem, DM represents a large economic burden on individuals and society. Diabetes is estimated to account for 15% of all health care expenditures in the U.S. (Harris, 1995). Nationally, the annual cost of DM has been estimated at $92 billion, with hospital costs responsible for approximately two-thirds of medical care expenditures (CDC, 1999). Substantial costs are incurred not only for direct costs of medical care for diabetes, but also for indirect costs, including lost productivity resulting from diabetes-related premature disability (Harris, 1995). DM is the principal cause of new cases of blindness in working-aged adults; contributes to 50% of non-traumatic lower extremity amputations; is responsible for 35% of new cases of end-stage renal disease, and is associated with two to four times the increased risk for cardiovascular disease (Wingard & Barrett-Connor, 1995; Kuller, 1995).

Certain factors have been identified which increase the likelihood of developing DM. DM has been associated with a number of identifiable risk factors including gender, age and ethnicity. Although men and women are equally predisposed to develop type 1 DM, women are more likely to develop type 2 DM (Harris, 1995). The age-associated risk of onset between the two diseases also varies. Although children are at greatest risk of developing type 1 DM (LaPorte et al., 1981), type 2 DM typically starts in adulthood and increases substantially as a function of age. Type 2 DM is estimated to effect approximately 26 per 1000 persons of all ages; however, this rate doubles for those ages 45 to 64 years, and it is estimated to effect one in 10 adults older than age 65. Further, it is reported that over 20% of those over the age of 80 years have DM (National Center for Health Statistics, 1988). While the prevalence of DM has
remained fairly constant for White sub-populations during the last decade, rates for Non-White groups continue to rise.

Caucasians are slightly more likely than Non-White groups to develop type 1 DM (ADA, 1999). However, for patients with type 2 DM, minority groups are particularly at risk. Harris (1995) found that Hispanic patients were three times as likely to develop type 2 DM in comparison to their non-Hispanic counterparts. Additionally, Native Americans are nearly 11 times more likely to develop the illness. Another group particularly vulnerable to DM is the African American population. It is estimated that the prevalence of type 2 DM among African-American individuals is approximately twice that of White persons (Tull & Roseman, 1995).

Although the prevalence of DM among Caucasians began leveling off in 1975 (Butler, Segundy, & Romberg, 1994), disease incidence continues to increase among African Americans (National Center for Health Statistics, 1989). The age-adjusted incidence is approximately 50% higher in African American men than in White men, and more than twice as high in African American women than in White women (Ford, Tilley, & McDonald, 1998; Lipton, Liao, Cao, Cooper, & McGee 1993). Population studies indicate that one in four African American women age 55 and over have DM (Roseman, 1985). Additionally, the mortality rate for African Americans secondary to DM and its associated complications has been estimated at twice the rate for Caucasians. African Americans are at increased risk for the development of both lower-extremity amputations and kidney disease (Tun & Roseman, 1995). These data highlight the importance of identifying causal contributions to this observed racial discrepancy (Anderson-Loftin, 2000). Moreover, former President Clinton announced a
public health initiative to eliminate the disparity in the incidence of DM and its 
complications in U.S. minority populations by the year 2010 (ADA, 1999).

Unfortunately, the African American population continues to be underrepresented in 
DM research (Anderson-Loftin, 2000).

Among African-Americans, the rising incidence of DM and the higher rates of 
mortality and morbidity have prompted researchers to examine salient variables for 
clues explaining the gap in health status between Caucasians and African Americans. 
One factor postulated as a possible contributing factor associated with the observed 
increased mortality rate among African Americans is the high rate of poverty in this 
community (Liu et al., 1982; Winkleby, Fortmann, & Barrett, 1990; Haan, Kaplan, & 
Camacho, 1987; McCord & Freeman, 1990). Approximately one-third of all African 
Americans are reported to live in poverty (U.S. Department of Health and Human 
Services, 2000). However, the racial discrepancy in mortality appears to extend beyond 
economic status. While controlling for family income, Sorlie, Rogot, Anderson, 
Johnson, and Backlund (1992) studied mortality rates in a representative sample of U.S. 
African Americans and Caucasians (National Institute of Health, 1992). Although 
greater income was associated with lower mortality rates for both genders and for both 
Black and White persons between the ages of 25 and 64, African Americans exhibited 
greater mortality than Caucasians at every level of income. Interestingly, the lowest 
income identified was among African American women, 51% of whom reported an 
income below $10,000 per year.

Lower socioeconomic status and being of African American origin are also risk 
factors for cardiovascular diseases associated with diabetes (Gaillard, Schuster,
Bossetti, Green & Osei, 1997). In the United States, hypertension occurs more frequently among Black than White Americans with diabetes. It is further estimated that the prevalence of hypertension in Black adults with type 2 DM approaches 70%, and between 40% and 50% have diagnosed dyslipidemia (Tull & Roseman, 1995).

In conclusion, DM represents a major personal and economic health problem with an alarming rate of comorbid medical diseases. Several risk factors have been identified which place an individual at risk for developing DM and its complications including being a woman, being of low socioeconomic status and being of African American decent. Although diabetes is of public health importance for all ethnic groups, there is a need to address this problem specifically in the Black population. Thus, the mission of the American Diabetes Association, “to prevent and cure diabetes and to improve the lives of all people affected”, can only be met by targeting research efforts to those at highest risk (Davidson, 1998).

Etiological Aspects

Different etiological factors have been hypothesized to cause the onset of DM; however, no definitive theories have been documented. For both type 1 and type 2 DM, environmental factors acting in concert with predetermined genetic susceptibility are at the basis of most etiological assumptions. First, there is ample evidence to support the hypothesis that type 1 DM is caused by a combination of inherited and autoimmunologic processes that destroy the pancreatic beta cells. Beta cells are critical for life because they are responsible for the production of insulin, the hormone essential for glucose metabolism. Without insulin, glucose accumulates in the bloodstream as the body attempts to draw on other sources for energy until it eventually starves to death.
Persons with genetic markers for human leukocyte antigens (HLA) are at increased risk for developing type 1 DM. However, many patients with type 1 DM have no known family history of the disease and, furthermore, only 20% to 50% of identical twins of those with type 1 DM develop the disease. Therefore, researchers have suggested several non-genetic factors which may account for the onset of type 1 DM including autoimmune processes.

There is evidence to support the hypothesis that type 2 DM is also caused by a combination of heritable and environmental processes. In twin studies, the rate of inheritance of type 2 DM is between 60% and 75% (ADA, 1999). Although research has not yet isolated a single gene responsible for type 2 DM, an inhibitor protein called PC-1 appears to be more prevalent in those with type 2 DM. PC-1 is purported to block the insulin receptor, thereby creating insulin resistance. Although genetics also appear to play a role in the development of type 2 DM, the most important trigger of type 2 DM is obesity.

The prevalence of type 2 DM is increasing rapidly in the U.S. and industrialized nations for two reasons: the rate of obesity is rising and the population is aging. Obesity is not associated with type 1 DM; however, the association between obesity and type 2 DM is impressive. It is estimated that between 60% and 90% of adults with type 2 DM are obese (Body Mass Index score > 28). Additionally, siblings of diabetic patients are three times as likely to develop DM when they are overweight, as compared to their non-obese siblings (Davidson, 1998). However, the observation that the development of DM is not uniform among obese subjects has led researchers to hypothesize other possible causal contributions.
In Western industrialized countries it is estimated that approximately half of obese subjects develop DM, while in certain other ethnic groups (e.g., Native Americans), the incidence approaches 100%. Type 2 DM results when insulin resistance is insufficiently compensated by insulin secretion (Bjorntorp, Holm, & Rosmond, 1999). Insulin resistance is much more pronounced in patients with central abdominal obesity than in those with primary peripheral obesity. Specifically, when excess adipose tissue is concentrated in the visceral (abdominal, central) fat stores, the risk for developing DM is higher than in peripheral gluteo-femoral obesity (Ohlsson et al., 1985; Bergstrom et al., 1990; Bjorntorp, 1993; Kissebah & Krakower, 1994).

Bjorntorp (1997) hypothesized that the hypothalamic-pituitary-adrenal (HPA) axis appears to be hypersensitive to abdominal obesity. This results in a blunting of the feedback control mechanism by central glucocorticoid receptors, thus resulting in increased insulin resistance. Additionally, it has been suggested that insulin resistance may be an adaptive response to an overproduction of insulin (hyperinsulimia). In fact, the amount of excess body weight is related to the degree of hyperinsulimia (Davidson, 1986). Fortunately, substantial evidence now suggests that glucose tolerance can return to normal with weight loss in many patients with type 2 DM (ADA, 1999).

The demographic, genetic and environmental risk factors associated with the development of DM have been extensively studied, but psychological aspects have not been well characterized. The role of psychosocial factors in the etiology of type 1 DM has long been a controversial topic. Investigators at one extreme hypothesize that psychosocial factors play a causal role in the onset of the illness. For example, McClelland, Patel, Brown, and Kelner (1991) found that type 1 diabetic patients who
had recently experienced the loss of a loved one showed an increase in T-cell count (secondary to an autoimmune response) when reminded of the loss compared with subjects suffering from other diseases. Theoretically, this stress-induced heightened immune response is related to the autoimmune deficiency seen in type 1 DM. However, there is little additional empirical evidence that psychological factors contribute to the development of type 1 DM.

Contradictory findings have been reported about the role of emotional variables in the etiology of type 2 DM. Surwit and Feinglos (1988) speculate that the central nervous system, by way of various interactions between stress and the autonomic nervous system, may be involved in the development and course of type 2 DM. A variety of abnormalities in sympathetic nervous system activity have been documented in patients with type 2 DM including an exaggerated suppression of insulin secretion and profound hyperglycemia in response to epinephrine (i.e., stress response).

Although no definitive psychological factors have been identified as etiological variables, DM remains one of the most psychologically and behaviorally demanding of the chronic medical illnesses. Adequate management of diabetes requires satisfactory performance of a number of behavioral activities necessitating extensive disease self-management. However, one of the frustrating ironies of DM is that efforts to keep blood sugar under good control (e.g., insulin administration, diet control) increase the risk of overcompensation resulting in potentially lethal episodes of hypoglycemia. Perhaps most important from a psychological and behavioral perspective, patients must adhere to the demanding requirements of DM management while knowing that eventual onset of complications is almost inevitable (DCCT, 1993).
Behavioral Risk Factors

Patients following a DM regimen are faced with several unique psychological and behavioral challenges. The DM regimen typically involves multiple daily behavioral tasks (i.e., self-monitoring of blood glucose, foot care) as well as changes in basic lifestyle habits (i.e., diet, exercise), all of which must be performed for the duration of the patient's life. Treatment advances and disease progression also require the patient to be involved in continuing education and ongoing modifications in treatment regimens.

Fortunately, close adherence to recommended self-care activities can significantly lower the risk of associated diabetes-related complications. Of far-reaching importance is the recently concluded Diabetes Control and Complications Trial (DCCT, 1993). This 29-center, prospective, controlled clinical trial demonstrated the beneficial effect of intensive DM treatment (BG < 120) on retinopathy, nephropathy, and neuropathy in patients with type 1 DM. The newly completed United Kingdom Prospective Diabetes Study (UKPDS, 1998a) found similar results in patients with type 2 DM (Ohkubo et al., 1995). For twenty years, over 5,000 participants with type 2 DM were enrolled in the UKPDS. The results reveal that patients with type 2 DM who maintain tight glycemic control experience fewer microvascular complications. Additionally, if blood pressure remains in good control, patients can significantly reduce their risk of virtually all cardiovascular complications. Together, these important findings suggest that patients can minimize the potential complications of DM if adequate glycemic control is achieved and maintained. Unfortunately, many patients with DM do not adhere to their medical regimen.
The impact of non-adherence with recommended treatment regimens on health status is staggering (Leese, 1992). Wing, Norwalk, Marcus, Koeske, and Finegold (1986) reported that rates of non-adherence to health regimens among patients with diabetes range from 33% to 75%. Diabetes non-adherence can manifest in multiple areas including inconsistent self-monitoring of blood glucose, poor medication compliance, deficient dietary intake and irregular attendance to medical appointments. Given the complex nature of the disease and the variable capacity of patients to cope with its treatment requirements on a daily basis, it is not surprising that widespread individual differences exist in psychosocial adaptation to diabetes. Therefore, recent interest in the role of psychological factors in compliance has become an important research topic.

Under the influence of theoretical models such as the Health Belief Model (Rosenstock, 1974) and Social Cognitive Theory (Bandura, 1986), researchers have attempted to identify psychosocial factors related to self-care behaviors. In a recent review article, Glasgow (1995) concluded that among the most consistent variables associated with regimen adherence and self-care behaviors are environmental influences such as social and family support (Glasgow and Toobert, 1988; Littlefield, Rodin, Murray & Craven, 1990; Sherbourne, Hays, Ordway, Dimatteo, & Kravitz, 1992). Fisher et al. (2000) reviewed the literature regarding factors known to affect self-care practices for patients with type 2 DM. They suggest that, over time, the characteristics of the patient’s family, which is the primary social context of disease management, may account for the most variance in adherence rates. Several reasons exist for devoting more attention to the family regarding clinical management of type 2 DM.
First, most disease management behavior is sanctioned by, or takes place within the family setting. Second, the family embodies the patient’s most powerful and influential web of intimate personal relationships and can have an enormous supportive or deleterious effect on patient behavior, health and well-being (Rolland, 1994). Third, what is often interpreted as exclusive patient self-care behavior is often the result of combinations of patient and spouse behavior or spouse behavior alone (i.e. food preparation, exercise monitoring, health monitoring) (Fisher et al., 2000). Thus, from a clinical perspective the patient’s social environment may be an important place to target treatment intervention (Anderson, 1990).

In summary, patients following a DM treatment regimen are faced with several behavioral challenges. However, maintaining adequate glycemic control can significantly lower risks for associated long-term complications. Therefore, factors contributing to adherence (i.e., family support system) are currently of considerable policy and research interest. Recent attention has been given to the role of comorbid psychopathology in disease management. The unique importance of the management of psychopathology in medically ill populations (e.g., diabetes) may be its potential to indirectly improve the medical condition itself by increasing self-management efforts.

**Psychopathology in Primary Care**

The past decade of research has seen a proliferation of studies investigating the comorbidity of mental and physical illness. Epidemiological studies suggest that the prevalence of anxiety and depressive disorders in primary care settings range from 10% to 30% (Perez-Stable, Miranda, Munoz & Ying, 1990; Schulberg & Burns, 1988; Jenkins, 1995; Kirmayer, Robbins, Dwoerkind, & Yaffe, 1993). Katon (1982) found
that more than 33% of consecutive primary care attendees reported substantial levels of psychological distress, with approximately 15% to 25% meeting diagnostic criteria for an affective disorder. Currently, there is little doubt that affective disorders are highly prevalent in primary care and have untoward effects on patient health outcomes.

The high prevalence rate of psychiatric symptoms among primary care populations is of considerable clinical and policy interest for several reasons. First, psychiatric disorders complicate the clinical assessment of patients with chronic medical disease and vice versa. Second, primary care physicians may not always detect affective disorders in patients with medical disease. Third, treatments for the two types of disorders may interact and/or conflict. Fourth, coexisting affective disorders can increase the utilization rate of both medical and psychiatric health care services. Lastly, comorbid affective disorders may increase the disability of persons with chronic medical conditions (Wells, Rogers, Burnam & Camp, 1993). Whether occurring independently or comorbidly, anxiety and depression are the two most commonly encountered psychiatric problems in medically ill patients (Katon, 1982).

**Depression in the Primary Care Setting**

Depression is a major public health problem, with a clinical diagnosis affecting approximately 5% of the population (Myers et al., 1984; Robins et al., 1984). Specifically, approximately 2.3% to 3.2% of men and 4.5% to 9.3% of women are believed to suffer from a current episode of depressive illness (American Psychiatric Association [APA], 1994). However, the prevalence of depressive disorders in the primary care sector is even greater. Results of multiple primary care studies indicate that an alarming 30% of patients seen by primary care physicians suffer from a
depressive disorder (Kessler, Cleary, & Burke, 1985; Ruckler, Frye, & Cygan, 1986; Katon and Schulberg, 1992; Regier et al., 1993; Brantley, Mehan & Thomas, 2000). Moreover, approximately 50% of all patients who are treated for depressive illnesses are seen exclusively in primary care clinics. Considerable research over the last decade has clearly demonstrated the burden that depressive illnesses have on individuals and society as a whole (Simon, Von Korff, & Barlow, 1995).

Depression has been shown to produce profound social and vocational disability (Schulberg et al., 1997). The Rand Medical Outcomes Study (MOS) (Wells, Stewart et al., 1989) concluded that the debilitating effects of depression equal or surpass those of many chronic physical illnesses, including arthritis, heart disease and low back pain. Additionally, a diagnosis of depression is associated with an increased frequency of health care visits and associated health care costs (Simon et al., 1995). Simon et al. reported that patients diagnosed with depression had higher annual health care costs ($4,246 vs. $2,371, p<.001) than patients without a depressive diagnosis. The high prevalence rates and significant negative ramifications of depressive symptoms among primary care populations underscore the importance of identifying potential causal variables (Brantley et al., 2000).

Several hypotheses have been suggested to account for the elevated rates of depression in those with chronic illness including the distress associated with restricted physical activity and unfulfilled role obligations (Cohen & Lazarus, 1979; Wells, Golding, & Burnham, 1989); the unpredictable or uncontrollable course of illness symptoms (Smith, Peck, & Ward, 1990); the burden of disease management requirements (Connell, 1990); the disturbance in social activities (Connell, Fisher, &
Houston, 1992); and the impact of illness on quality of life, self esteem and morale (Connell, 1990; Connell, Storandt, & Lichty, 1991).

Although multiple studies have been conducted to evaluate rates of depression in primary care populations (Von Korff et al., 1987; Spitzer, Williams & Kroenke, 1994; 1995; Katon and Roye Byrne, 1989), less is known about the extent to which anxiety disorders and chronic medical illnesses co-occur (Broadhead, Blazer, George, & Tse, 1990). It has been hypothesized that research in primary care settings has not focused as much on anxiety disorders, especially GAD, because these problems are often seen as neuroses or transient reactions to stress rather than as psychiatric illnesses warranting clinical attention (Rickels & Schweizer, 1990). However, Zung, Broadhead and Roth (1993) identified that among the top 25 most common reasons for patients to seek medical attention, depression ranked 24th, and anxiety ranked 25th. Additionally, using data from the 1991 National Ambulatory Medical Care Survey, Schappert (1994) reported that 33.6% of patients with a psychiatric diagnosis who go to primary care providers list anxiety as the first reason for seeking medical attention. Therefore, it appears that anxiety in the primary care setting is a significant issue.

**Anxiety in the Primary Care Setting**

While fewer studies have examined anxiety in the U.S. primary care population as compared to depression (Fifer et al., 1994), epidemiological studies in the general population have reported anxiety symptoms and disorders at prevalence rates of 6.6% to 14.9% (Myers et al., 1984). According to the 1980-1984 Epidemiologic Catchment Area Study (Regier et al., 1988), anxiety disorders have a one-month prevalence rate in the U.S. of 7.3%. From 1990 to 1992, the National Comorbidity Study (Kessler et al.,
1994) identified that over a 12 month period, 1.3% of those aged 15 to 54 years met criteria for a DSM-III-R diagnosis of panic disorder, 2.8% for agoraphobia, 7.9% for social phobia and 3.1% for GAD. However, Orleans, George, Houpt & Brodie (1985) concluded that the incidence in primary care patients is significantly higher. They concluded that the incidence of a current anxiety disorder can be expected in 15% to 18% of primary care patients; and lifetime prevalence rates are estimated at 26% to 28%. These data support the contention that anxiety disorders are among the most common mental health problems (Regier et al., 1988). Additionally, anxiety disorders tend to be chronic conditions that may persist for many years (Taylor & Gorman, 1992; Brown, Rakel, Wells, Downs, & Akiskal, 1991) and can significantly impact employment and functional ability.

Anxiety disorders have also been associated with higher rates of other comorbid psychopathology, increased disability and poorer health outcomes. Much of the literature on the concurrence of anxiety disorders with other psychiatric conditions has focused on depression. In general, the odds of having an anxiety disorder if one also has Major Depressive Disorder (MDD) are nine to 19 times higher than in those who are not depressed (Body, Burke & Gruenberg, 1984). It is further estimated that approximately 35% to 60% of patients with depressive disorders also have significant anxiety symptoms (Roy-Byrne & Katon, 1997; Lydiard, 1991). Therefore, it appears that the comorbidity of anxiety and depression occurs in a significant percentage of patients.

Anxiety disorders have also been associated with increased utilization rates and worsened psychiatric and medical disease outcomes (Lustman, Griffith & Clouse,
1988). When anxiety disorders occur in combination with other serious psychiatric and medical illnesses, results include increased morbidity and service utilization, decreased quality of life, and substantial social costs (i.e., increased rates of unemployment, financial dependency) (Sherbourne, Wells, Jackson, Meredith, Camp, 1996; Schonfeld et al., 1997).

In summary, both depression and anxiety disorders are highly prevalent among patients attending primary care clinics. Additionally, both are associated with functional disability, increased health care costs and decreased medical adherence. It is further estimated that the two conditions occur concurrently in a majority of patients. The substantial differences in the quality of life between medically ill patients with and without anxiety and depressive disorders highlight the importance of identifying these affective disorders among primary care patients. Specifically, identifying and treating anxiety and depressive disorders in patients with DM may have important disease management implications.

Psychopathology and Diabetes Mellitus

Although DM has been described as a “hidden handicap” in that, when it is under control, there is no external evidence of the disease, sufferers of this life-long illness have been widely reported to be at risk of developing emotional disorders (Akinlade, Ohaeri & Suberu, 1996). In the last decade, interest in psychosocial factors in DM has increased (Berlin et al., 1997) and evidence suggesting that psychiatric disorders are more prevalent among adults with DM is mounting (Lustman et al., 1986; Popkin et al., 1988). However, whether these conditions are caused by, or result from, the diabetic disease remains unknown.
Diabetes Mellitus has been associated with a greater prevalence of psychiatric disorders of mild to moderate severity than expected in the general population (Mayou, Peveler, Davies, Mann, & Fairburn, 1991; Lustman, Skor, & Carney 1983; Wells, Golding & Burnham, 1988b; Wilkinson et al., 1988; Weyerer et al., 1989). Psychiatric disturbance has also been associated with poor compliance with DM treatment, poorer glycemic control and thus, an increased risk for diabetes-related complications (Lustman et al., 1998). Additionally, patients with DM have been reported to use more psychotropic drugs (Isacson & Stalhammar, 1987), psychiatric hospital days and more outpatient mental health services (Mayou et al., 1991) than non-diabetics. Comorbid psychopathology has also been associated with elevated medical risks and impaired quality of life in patients with DM (Helz & Templeton, 1990; Sherbourne et al., 1996).

Psychiatric disorders have been reported to be more common among sub-groups of diabetics. For instance, those with increased medical complications (Wulsin, Jacobson & Rand 1987), hospital admissions for poor glycemic control (Wrigley & Mayou, 1991), and those with "brittle" DM (Pickup, 1985; Tattersall, 1985). Such observations have led researchers to speculate that psychiatric disorders in persons with DM may have an organic etiology associated with the metabolic abnormalities associated with DM (Lustman, Amado, & Wetzel, 1983; Popkin et al., 1988). In contrast, others have postulated that DM may be causally independent of emotional factors, the apparent association being related to behavioral factors including the influence of psychiatric conditions on adherence to the DM management regimen (Lustman, Clouse & Carney, 1988).
Given the many psychosocial aspects associated with the management of DM, it might be expected that these patients would be predisposed to emotional symptoms. These factors include the extensive self-care demands required for successful disease management, the burden which adherence to treatment may have on many aspects of everyday life, the financial liability associated with disease management (i.e., medication, glucose meter, strips, time away from work), and the possibility of long-term physical disabilities resulting from the disease.

**Depression and DM**

It has been proposed that depression among individuals with DM may be reactive in nature, occurring in response to psychosocial hardships (e.g., physical disability, dietary restriction) related to their illness (Lustman et al., 1983). However, others have proposed that depressive symptoms among patients with DM may be organic in origin, caused by metabolic changes associated with DM (Popkin et al., 1988; Lustman et al., 1986; Grandinetti et al. 2000). For example, hyperglycemia has been associated with increased plasma cortisol concentrations, which have been reported to precipitate mood changes in some patients with DM (Cameron, Kronfel, Greden, & Carroll, 1984). Furthermore, DM may be associated with higher rates of depression than other diseases because, unlike other diseases, DM is a significant risk factor for a number of other debilitating and potentially fatal conditions (i.e., Syndrome X). These theories suggest that DM carries a special risk for psychological disturbance, beyond that attributable to chronic disease in general.

A comprehensive literature review undertaken by Gavard et al. (1993) found a significantly increased prevalence of depression in diabetic samples when compared
with non-diabetic samples in 8 of 9 studies. The range for the prevalence of current depressive disorder obtained from structured diagnostic interviews in diabetic samples was 8.5% to 27.3%. Although these rates are at least three times the prevalence of MDD found in the general adult population of the U.S., they are much less than that published by other investigators when using depression symptom scales (i.e., 21.8% to 46%) (Tun, Perlmuter, Russo, Nathan, 1987; Friis & Nanjundappa, 1986).

There is now evidence from several cross-sectional studies that comorbid depression is associated with poor glycemic control (Lustman et al., 1986; de Groot, Jacobson & Samson, 1994). Additionally, the influence of poor glycemic control to the subsequent development and progression of DM complications is well established (DCCT, 1993). Thus, it is logical to assume that the poor glycemic control seen in depressed diabetic patients would place these persons at increased risk of developing diabetic complications. Surprisingly, prior studies have not found an association between complications and depression in diabetic patients (Cohen, 1988). Lustman, Clouse and Carney (1988) reported that the occurrence of depressive episodes appeared independent of DM complications. They identified similar rates of complications (i.e. nephropathy, neuropathy, and retinopathy) in both depressed and nondepressed diabetic groups. They also suggested that depression is not directly related to advancing diabetic disease, as there were no significant differences at baseline and at 5-year follow-up in the prevalence rates of DM complications between the two groups.

Despite numerous studies reporting a high prevalence of clinical depression and depressive symptoms among diabetic patients (Murawski, Chazen, Balodimos, 1970; Sanders, Mills & Martin, 1975; Lustman et al., 1986; Popkin et al., 1988; Wilkinson et
al., 1988; Weyerer et al., 1989; Wing et al., 1990), evidence of a relationship between DM and depression remains inconclusive. For instance, the results of some studies fail to support the existence of this relationship (Robinson et al., 1988; Wells et al., 1988b). Additionally, several studies have found that while medical conditions in general are a risk factor for psychological disturbance, DM carries no special risk (Nielson & Williams, 1980; Turner & Noh, 1988; Bennett, 1994). Thus, suggesting that factors involved in the general burden of chronic illness contribute to the disturbance in affective state (Carney, 1998).

Two studies to date (Weyerer et al., 1989; Wells et al., 1988b) have compared rates of depression between people with DM and those with other medical conditions. The community interview study by Weyerer et al. (1989) found an increased, although nonsignificant, prevalence of current depression in diabetic individuals (27.3%) compared with individuals with another somatic illness (20.3%). The prevalence of any psychiatric disorder of any severity other than depression was virtually identical between diabetic individuals (15.8%) and healthy control subjects (15.6%), but was twice as high in those with other somatic diseases (30.4%). These findings indicate that DM may have a special propensity for depression and not for other psychiatric illnesses and that people with DM may be not be at higher risk than those with other somatic diseases.

Although neither Weyerer et al. (1989) nor Wells et al. (1988b) found a significant difference between the groups, they did not control for socioeconomic status or concomitant medical illness. Additionally, both studies reported a relatively low response rate (68%) and neither study verified the presence of DM by physician report.
The latter could have been a potentially serious limitation, as 26% of subjects may not have had a diagnosable diabetic condition (Wells et al., 1989).

Unfortunately, although many studies have been conducted, the conclusions that may be drawn from the existing epidemiological studies examining the prevalence of psychopathology in DM are limited by methodological problems. Most prior studies have been based on biased samples, such as those referred for psychiatric evaluation or patients with particular physical complications (Surridge et al., 1984; Lustman et al., 1986; Robinson et al., 1988; Wilkinson et al., 1988; Tallroth, Karlson, Nilsson & Agardh, 1989; Wrigley & Mayou, 1991). Response rates have been low, and study populations have frequently been heterogeneous with regard to age, type of DM and mode of treatment. Thus, it has not been possible to obtain reliable estimates of the prevalence in subsamples, including those known to have different levels of psychological disturbance in the general population (e.g., gender, age, race, SES). For instance, gender has consistently been found to be a risk factor for psychological disturbance in diabetic patients, with women twice as likely to be depressed as men. Peyrot and Rubin (1997) found that both depression and anxiety were more prevalent in unmarried, middle-aged women with fewer years of education and more diabetic complications. Low socioeconomic status has been found to be associated with depression (Freichs, Aneshensel & Clark, 1981; Comstock & Kelsing, 1976). Education is strongly associated with psychological disturbance, with college graduates experiencing less than half the risk of those who did not graduate from high school. Additionally, few studies have used the best available methods of psychiatric diagnostic assessment.
Although self-report measures may be used as a crude criterion for the possibility of diagnosable psychopathology, they have been found to have high rates of false positives and thus, low positive-predictive power for diagnosis. Additionally, a major limitation in their use is that it cannot be assumed that similar psychological phenomena are being measured in the diabetic populations. Somatic symptoms of depression and anxiety (e.g., tiredness, loss of libido, concentration impairment and sleep and appetite disturbance) which are generally indicative of affective disturbance in the general population and psychiatric patients, may be related to the acute and chronic complications of the underlying glycemic imbalance in patients with DM (Meadows et al., 1996).

Perhaps the most important limitation of prior studies is the observation that, although an estimated 80% of diabetic men and women have type 2 DM, this group has virtually been ignored. Prior studies have predominantly focused on patients with type 1 DM (Murawski et al., 1970; Sanders et al., 1975; Popkin et al., 1988; Wilkinson et al., 1988; Kronfel, Greden & Carol, 1981; Lustman et al., 1983), or have included individuals with both types 1 and 2 DM, but failed to report on the two groups separately (Weyerer et al., 1989; Robinson et al., 1988; Friis & Nanjundappa, 1986). Given the different etiological basis and the varied treatment regimens associated with type 1 and type 2 DM, it might be assumed that the prevalence and manifestation of psychopathology would also vary. Although few prior studies have limited their sample to patients with type 2 DM, there is evidence that these patients may be particularly vulnerable to stress and comorbid psychopathology given the late age of disease onset and the significant life-style change requirements (Surwit & Feinglos, 1988).
Eaton, Armenian, Gallo, Pratt, and Ford (1996) examined the prevalence of a diagnosis of a depressive disorder based on the DSM-III-Revised (APA, 1980) in patients with type 2 DM. They found that MDD, but not milder forms of depression or other psychiatric disorders predicted the onset of DM even after controlling for age, race, gender, SES, education and BMI. However, a major limitation of this work is the use of self-reported diagnosis of DM. Therefore, the problem of undetected DM limits the generalizability of these findings, especially in light of a recent estimate that as many as 50% of type 2 DM who would be diagnosed by hemoglobin assay do not report having the illness (Harris, 1995).

Although an increased prevalence of depression in DM relative to the general population is highly suggested by the literature, biases and methodological problems commonly encountered in prevalence studies may interfere with the strength of this conclusion. Whether an increased association exists between DM and the depressive disorders remains controversial, despite an abundant body of literature dedicated to this issue (Carney, 1998). There is clear need for studies that provide accurate estimates of diagnosable psychiatric disturbance rates as several recent hypotheses concerning higher rates of comorbid psychopathology among people with DM postulate disease factors as mediating or causal factors (e.g., elevated HPA activity).

**Anxiety and DM**

Although the last decade has seen a proliferation of interest in the area of psychosocial factors in DM (Berlin et al., 1997), few studies have focused on comorbid anxiety disorders. A review of the literature reveals that a variety of anxiety symptoms have been associated with both types 1 and 2 DM. Anxiety symptoms may be directly...
related to the management requirements of the diabetic condition. Specifically, in patients with type 1 DM, obsessional attempts at glycemic control may result in further problems. Beer, Lawson, and Watkins (1989) reported that the fear of low blood sugar is very common amongst patients who have had frightening or embarrassing experiences with hypoglycemic episodes. Such patients may monitor their blood glucose levels many times per day and tend to over-respond to the results, leading to erratic control and frequent hypoglycemic events. On the other hand, Tattersal, Gregory, Selby, Kerr, and Heller (1991) coined the term "compulsive aglycosuria" to describe patients who attempt to maintain low blood glucose levels ("run themselves low") secondary to a great fear of hyperglycemia and its related complications. Hence, these patients also increase their risk of dangerous hypoglycemic episodes.

Additionally, in a survey by Mollema, Snoek & Heine (1996), 4% of diabetic patients reported suffering from the fear of self-injecting insulin or self-monitoring blood glucose. Furthermore, fear of diabetes-related complications, including blindness and amputations, may cause considerable anxiety for many patients.

Peyrot and Rubin (1997) used the Zung Anxiety Scale (Zung, 1975) to identify rates of anxiety symptoms among adults with DM and to identify factors associated with increased risk. They reported that approximately 50% of their sample had significant comorbid anxiety symptoms. Only two studies to date have utilized gold standard, structured psychiatric interviews to ascertain the prevalence of anxiety disorders in adults with diabetes. Lustman et al. (1986) included patients with both types 1 and 2 DM. They found that GAD was present in an alarming 52.8% of patients. Furthermore, 26.3% of their sample was diagnosed with simple phobia; 15.8% with
agoraphobia, 10.5% with social phobia, 3.5% with panic disorder; and .9% with obsessive-compulsive disorder. Popkin et al. (1988) reported a prevalence rate of GAD to be approximately six times greater in patients with type 1 DM than in the general population. Considering the high rate of anxiety symptoms found in people with DM compared to the general population (Mayou et al., 1991), increased studies are needed to examine mediating and moderating variables so that effective interventions may be identified.

In summary, prevalence estimates of depressive and anxiety symptoms in patients with diabetes range from 20% to 50%; however, numerous methodological problems interfere with the strength of this conclusion. Spurious estimates could have resulted if the diabetic and control samples differed significantly on variables known to be associated with an increased risk of psychopathology (i.e., gender, lower SES). Additionally, prior prevalence estimates have primarily relied upon self-report measures to determine both the presence of DM and psychological disorders in patients with type 1 DM or combined samples of types 1 and 2 DM. Therefore, an increased prevalence of anxiety and depressive disorders in patients with documented type 2 DM relative to other somatic illnesses remains unproven.

Social Support

The past three decades have witnessed a number of studies investigating the relationship between coping mechanisms and the occurrence of both physical and psychological symptoms. One particular factor receiving attention is social support (Cobb, 1976; 1979; Gore, 1978; Henderson, 1981; Parry & Shapiro, 1986). Because of
the intuitive nature of the construct, dozens of conceptual definitions of social support have been offered.

Caplan (1974) first suggested that a social support system provides information and cognitive guidance, tangible resources and aid, and emotional sustenance in times of need. Cobb (1976) provided an alternate definition of social support, which excluded tangible aid and resources. Cobb initially defined social support as “information leading the subject to believe that he is cared for and loved, esteemed and a member of a network of mutual obligation” (p.300). Later, Cobb (1979) offered descriptions of three additional forms of support: instrumental, active and material support. While social support has been variously defined, House’s (1981) conceptualization has been most widely used in the literature.

House (1981) and later, Cohen and Wills (1985) suggest that social support consists of interpersonal transactions involving one or more of the following: emotional concern (i.e., expressions of liking, admiration, respect, love); instrumental aid or tangible assistance (i.e., the use of relationships as a means to achieve a goal, provide money, labor or time, modify the physical environment for others); informational aid (i.e., providing advice, suggestions, directives, information), and appraisal (i.e., information relevant to self-evaluation).

It is hypothesized that social support functions in a stressor-specific fashion. Rabkin and Struening (1976) developed a stressor-illness model, proposing that vulnerability to stress may be mediated by such factors as biological differences, psychological characteristics and social support. Stressors differ in the type of adaptational demands they require. Social support systems differ with respect to the
type of stress they can moderate. Thus, social support is effective in minimizing the negative effects of stress only when there is congruence between the adaptational demands of the stressor and the type of social support resources available. Thus, the link between social support and health has relied heavily on the work of Lazarus and colleagues.

Social Support and Stress

According to Lazarus and Folkman (1984), management of a chronic medical illness can be seen as a stressful life circumstance, which can subsequently influence both medical and mental health. However, it is the function of psychological factors (i.e. cognitive appraisal), to determine whether a particular life event is considered to be stressful. According to Lazarus and Folkman, people experience psychological distress when they confront a situation that requires some form of adaptation that exceeds their perceived capabilities. Therefore, the cognitive appraisal of a stressor plays a central role in the stress and coping process.

The cognitive appraisal process has been divided into two stages: primary (event) appraisal and secondary (resource) appraisal. Primary appraisal involves evaluating the degree of stress associated with the environmental event. This typically involves an appraisal of whether the stressful event involves threat, harm, loss, and/or other challenge. Secondary appraisal involves the evaluation of one’s coping repertoire or resources. This is the stage in the stress and coping process during which social support plays its major role (Cohen & McCay, 1985).

Prior researchers have identified two potentially coexisting models to explain the variability in the impact of social support as a coping resource. The direct-effect

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model assumes that social support has a beneficial effect on psychological health regardless of whether stress (e.g., due to illness) is present (Broadhead et al., 1983; Cassel, 1976). According to the buffering model, social support may mitigate the negative influence of stress on physical and psychological health (Cobb, 1976; Cohen & Syme, 1985).

The stress-buffering hypothesis asserts that social support lessens the impact of stress on well-being, but does not affect emotional health in the absence of stress (Thoits, 1985). In other words, according to this hypothesis, high levels of stress predict emotional disruption in persons receiving low levels of social support but not in those receiving high levels of social support. An extensive literature base argues that people who have smaller social networks experience increased risk of negative health outcomes.

Social Support and Medical Illness

Substantial research has revealed that personal coping resources may contribute to the variable impact of chronic illness on psychological health and medical outcomes. Chronically ill patients who receive considerable social support have been found to be at decreased risk of developing a subsequent depression (Brown et al., 1986; Holahan & Holahan, 1987). Additionally, the importance of assessing social support is suggested by research linking high levels of social support to positive medical health outcomes (Cohen & Syme, 1985; Ornish, 1988; Cohen, 1988; Uchino, Cacioppo, & Kiecolt-Glaser, 1996). Substantial research has supported the hypothesis that social support contributes to the following: decreased susceptibility to disease and lower cardiovascular reactivity (Kamark, Manuch, & Jennings, 1990); enhanced immune
function (Jemmott & Magliore, 1988; Kielcolt-Glaser et al., 1984); better adjustment to
and recovery from illness (Dunkel-Schetter, 1984; Mumford, Schlesinger, & Glass,
1982; Telawny-Ross & Russell, 1987; Wortman, 1984); and lower rates of mortality
(Berkman & Syme, 1979; Blazer, 1982; House, Robbins & Metzer, 1982; Ruberman,
Weinblatt, Goldberg, & Chaudhary (1984). Thus, the effectiveness of social support as
a coping resource has been well established. Therefore, as quoted in Penninx et al.
(1998), "the question for future research is not whether coping resources are important,
but to specify in more detail for whom...and under what circumstances various types of
social support can be expected to influence health" (p.557).

As most previous studies have mainly been restricted to one specific illness
group, it has not been possible to determine whether there is disease specificity in the
effectiveness of social coping resources. However, there is indication for such disease
specificity (Folkman & Lazarus, 1980; Penninx et al., 1996). For example, emotion-
focused strategies are reported to be more effective in situations that are not amenable
to individual control (Pearlin & Schooler, 1978). It follows that coping strategies
addressing the emotional distress caused by a disease may be most successful in
diseases that cannot be managed by individual or medical intervention. Specifically, in
a life threatening disease (e.g., terminal cancer), emotional support from others (e.g.,
empathy) appears to protect against depression (Ell et al., 1989). Alternately, problem-
solving coping strategies have been reported to be most effective in situations more
amenable to intervention. Therefore, in functionally disabled patients (i.e., those with
DM), instrumental or tangible social support may be an important determinant of
depression (Fitzpatrick et al., 1991). In sum, as chronic diseases have different
characteristics regarding prognosis, extent of functional incapacitation and amenability to treatment, the function of social support resources may also differ. This argument may be especially germane to diabetes, due to the great variability in symptoms, complications, and adaptations to self-management demands that have been reported among various samples (Connell et al., 1994).

Social Support and DM

A review of the literature reveals that social support has been associated with improved glycemic control, adherence to diabetic self-management regimens, and emotional well-being in both type 1 and type 2 DM. Anderson, Miller, Auslander, & Santiago (1981) found that increased family cohesion and decreased familial conflict led to improved metabolic control in adolescents with type 1 DM. Similarly, in a small study of adolescents, Orr, Golden, Myers, & Marrero (1983) identified social isolation as a contributing factor for poor metabolic control. Schafer, McCaul, & Glasgow (1986) demonstrated that higher levels of non-supportive family behaviors were related to reduced regimen adherence and poor glycemic control. In addition to family support, support from peers has also been shown to be an important contributor to the initial emotional adjustment to the diagnosis of DM (Varni, Babani, Wallander, Roe & Frasier, 1989).

Although less information is known about the effect of social support on patients with type 2 DM, the results of Griffith, Field and Lustman (1990) support the stress-buffering hypothesis for glycemic control. Specifically, they found that when life stress was high, subjects reporting higher social support satisfaction had significantly better glycemic control than subjects reporting lower social support. However, when
stress was low, satisfaction with social support appeared inconsequential in terms of glucose regulation.

Several researchers have identified social support as a beneficial resource for health behavior change and adherence (Wierenga, 1994). Specifically, the strength of a patient’s support system has been positively associated with an individual’s compliance with diabetic regimens including diet, urinary and blood glucose testing, foot care, medication adherence and exercise (Lloyd, Wing, Orchard, & Becker, 1993; Nagasawa, Smith, & Barnes, 1990). Additionally, Ruggiero, Spirito, Bond, Coustan, and McGarvey (1990) found increased adherence to insulin administration to be associated with higher social support scores in women with gestational diabetes. Glasgow and Toobert (1988) found family support to be the strongest and most consistent predictor of adherence to treatment in patients with type 2 DM. Garay-Sevilla et al. (1995) concluded that adherence to medication and diet in patients with type 2 DM was strongly associated with social support in a group of Hispanic patients residing in Mexico. Most recently, Anderson-Loftin (2000) reported that social support improved self-management in patients with type 2 DM and contributed to increasing positive lifestyle changes.

In current medical practice, virtually all patients with type 2 DM are advised to make life-style changes, such as ingesting fewer calories, exercising more, and adhering to a regimen of insulin and/or oral hypoglycemic agents (Kaplan & Toshima, 1985). Because the onset of type 2 DM is typically in the fifth decade of life or later, changing one’s life-style is often difficult. The role of social relationships in the achievement of life-style change is, therefore, of considerable theoretical and practical importance.
Thus, a great deal of empirical research conducted with samples of individuals with DM has focused on predictors of regimen adherence, self-care behavior and metabolic control. Although these outcomes are important, more recent attention has been afforded to psychosocial adaptation to DM (Connell et al., 1994).

Social support has been identified as an important contributor to emotional health among persons with DM (Connell et al., 1994; Bailey, 1996; Connell et al, 1992; White, Richter, & Fry, 1992; Littlefield et al., 1990). Unfortunately, prior research addressing psychological factors among individuals with DM has rarely been informed by a theoretically driven model (Connell et al., 1994). In one exception, Littlefield et al. (1990) tested the buffering model of social support on the incidence of depression among 158 adults with both type 1 and type 2 DM. They found that individuals reporting lower social support and high levels of illness-related disability were at highest risk for depression. Although this research made an important contribution to the literature, demographic and other background characteristics were not included in the tested model. Additionally, the generalizability of these findings is limited by the use of a self-reported screening instrument to establish the presence of depression. Additionally, although depressive symptoms have been negatively correlated with increased social support, the literature does not consistently support this association.

Connell et al. (1991) found that although diabetes-specific social support was highly predictive of self-care behaviors, it was not correlated with depression among older adults. Later, Connell et al. (1994) found that diabetes-specific social support was not a significant predictor of elevated Center for Epidemiologic Studies Depression

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scale (CES-D) (Radloff, 1977) scores in community dwelling adults with type 1 and type 2 DM.

In summary, although it has been repeatedly demonstrated that social support is a beneficial resource for diabetic glycemic control, health behavior change and adherence, very little is known about the impact of social support as a moderating variable in the incidence of affective disorders in patients with DM. Thus, this study contributes to the literature by investigating the direct and moderating effects of social support in the association of depressive and anxiety disorders in patients with type 2 DM.
PURPOSE OF STUDY

Summary

Approximately 16 million Americans or 6% of the U.S. population are living with Diabetes Mellitus and unfortunately, the incidence continues to increase. Apart from being a serious medical problem, DM represents a large economic burden on individuals and society. Each year approximately 130,000 deaths are directly attributable to the disease, while many other deaths are associated with DM-related complications. It is further estimated that the prevalence of DM among African-American individuals is approximately twice that of White persons. Additionally, women and the socioeconomically disadvantaged groups appear to be most afflicted with both the disease and DM-related medical complications.

Daily management of DM can be demanding and disease-related complications can lead to hospitalization, disability and death. Perhaps most important from a psychological and behavioral perspective, patients must adhere to the demanding requirements of DM management while knowing that eventual onset of complications is almost inevitable, thus contributing to increased stress. Chronic stress related to medical disorders has been identified as a strong predictor of the development of psychopathology. Therefore, the comorbidity of mental and physical illness is of considerable clinical interest.

The past decade of research has seen a proliferation of studies investigating the comorbidity of mental and physical disease. Epidemiological studies suggest that the prevalence of anxiety and depressive disorders in primary care settings range from 10% to 30%. Although an increased prevalence of these affective disorders in patients with
DM is suggested by the literature, biases and methodological problems commonly encountered in prevalence studies interfere with the strength of this conclusion (e.g., reliance on self-reported information). Therefore, whether an increased association between DM and depressive and anxiety disorders is present remains controversial despite an abundant body of literature dedicated to this question. Moreover, although an estimated 80% of diabetic men and women have type 2 DM, most studies examining the association between psychopathology and diabetes have focused on patients with type 1 DM.

An extensive literature reveals that social support may contribute to variability in the impact of chronic illness on psychological health and medical outcomes. Chronically ill patients who receive considerable social support have been found to be at decreased risk of subsequent psychopathology. However, there is some indication that the effectiveness of social support may depend on the type of support available and the specific characteristics of the disease, including functional incapacitation and degree of life threat.

Although prior research has established a positive contribution of social support to glycemic control and dietary adherence, no prior studies have examined the direct and buffering effects of social support in patients with type 2 DM. Additionally, no prior studies have examined which aspects of social support are most beneficial to patients with DM. Identification of these factors may have important intervention implications.

In conclusion, this study contributes to the literature by comparing the prevalence of diagnosed affective disorders in a group of socioeconomically
disadvantaged patients with type 2 DM to those with other chronic illnesses and identifies the main and buffering effects of social support in decreasing the likelihood of having an affective disorder. This study represents the first investigation of social support as a moderator of the association between type 2 DM and the prevalence of affective disorders in a sample of low-income patients attending primary care medical clinics. The extent to which DM has an impact on psychopathology in this population is an issue that has been neglected. Therefore, further study may provide valuable information leading to more effective interventions for patients with type 2 DM.

**Research Questions and Hypotheses**

**Purpose 1: Prevalence of Depressive and Anxiety Disorder Diagnoses**

The first purpose of this study was to examine the prevalence of DSM-IV diagnosed depressive and anxiety disorders in socioeconomically disadvantaged primary care patients with type 2 DM, as compared to those with other chronic illnesses and those with no chronic medical illnesses. Based on prior research, it was hypothesized that low-income, primary care patients would have a high prevalence of depressive and anxiety disorders in all three illness subgroups. Next, due to contradictory hypotheses reported in literature, no hypothesis was offered regarding the prevalence of depression and anxiety disorders in patients with type 2 DM versus other chronic illness groups. Lastly, it was hypothesized that those with no medical illnesses would have the lowest rates of depressive and anxiety disorders.

**Purpose 2: Direct Effect of Social Support as a Predictor of an AD**

The second purpose of this project was to determine whether social support served as an independent predictor of the incidence of an affective disorder in a group
of primary care patients with no chronic medical disorders. It was hypothesized that higher rates of perceived social support would directly result in lower rates of affective disorders for patients with no chronic illness.

**Purpose 3: Social Support as a Moderating Variable Between IG and AD**

The third purpose of this project was to determine whether social support served as a buffer between the stress of chronic illness and the presence of an affective disorder for each chronic illness group (i.e., type 2 DM, other chronic illness). In view of previous findings, it was hypothesized that social support would help in adaptation to chronic illness, and hence alleviate subsequent symptoms of psychological distress. Therefore, social support was hypothesized to serve as an overall buffer for the association between stress (associated with both type 2 DM and other chronic illnesses) and the presence of an affective disorder. Given the extensive self-management requirements and the threat of eventual disabling complications, it was further hypothesized that social support would serve as a more important predictor for the type 2 DM group, than for the group with other chronic illnesses.

**Purpose 4: Predictive Utility of Each Type of Social Support**

The fourth purpose of this project was to compare the association of each type of social support (appraisal, tangible, belonging and self-esteem) with the presence of an affective disorder in each medical illness group (i.e., no medical illness, type 2 DM, other chronic illness). In light of prior findings, it was hypothesized that tangible social support would help in moderating the heavy demands associated with medical illnesses. However, this effect was hypothesized to be most significant in those with type 2 DM secondary to the increased stress associated with this functionally demanding chronic
illness. Due to a lack of prior studies examining subtypes of social support, no hypotheses were offered regarding the association of the other three types of social support (appraisal, self-esteem, and belonging) with the prevalence of affective disorders in each medical illness group.
METHODS

Participants

Participants consisted of 326 randomly selected adult African-American patients between the ages of 18 and 80 recruited from the Family Practice and Internal Medicine Clinics of Earl K. Long Medical Center (EKL) in Baton Rouge, Louisiana. The population from which the sample was drawn consists predominantly of patients from lower socio-economic status (95.3%), with an average annual income of $6240. The majority of the population is uninsured (77%) and receives all of their medical care through public providers. The population is predominantly female (64.7%) and African American (77.2%). The average age is 45 years and the mean education level is 11 years.

Measures

Demographic Questionnaire

A 16-item questionnaire designed specifically to gather demographic information was used in the present study. This form includes questions regarding age, gender, race, marital status, educational level, job status, income, and insurance coverage. The demographic questionnaire is presented in Appendix A.

Medical Chart Review

Medical chart reviews were conducted by master’s level clinical graduate students under the supervision of a primary care physician to determine the presence or absence of the following: type 2 DM, asthma, arthritis, hypertension and no medical conditions. Participants diagnosed with other medical conditions (excluding the above) were excluded from further analyses. An additional chart review was conducted to determine specific medical information pertaining to patients with DM, including type of diabetes.
Diagnosis Interview Schedule for DSM-IV (DIS-IV)

The DIS-IV (Robins, Cottler, Bucholz, Compton, 1995) is a structured interview designed to provide reliable and valid psychiatric diagnoses based on the Diagnostic and Statistical Manual of Mental Disorders-IV (APA, 1994). It was developed as a research tool to determine the presence of mental disorders in a variety of research settings including both the National Comorbidity Survey (Kessler et al., 1994) and the Epidemiologic Catchment Area studies (Anthony et al., 1985). Designed for use by trained lay interviewers, the DIS interview allows for sufficient cost containment and manpower utilization. Although there is currently a lack of published empirical research documenting use of the DIS-IV, a number of studies examining the reliability and test-retest reliability of the DIS-III-R have reported ranges from .37 to .59. Additionally, adequate concordance validity (kappa coefficients from .47 to 1.00) has been documented between the diagnoses made by psychiatrists and the diagnoses of lay interviewers using the DIS interview (Helzer, Spitznagel, & McEvoy, 1987; Robins, Helzer, Croughan, & Ratcliff, 1981; Vandiver & Sher, 1991). There is also evidence for the sensitivity and utility of this diagnostic tool in studies of patients with diabetes, where symptoms of the medical disease, such as fatigue, sleep disturbances and sexual dysfunction may confound criterion symptoms of psychiatric disorders (Lustman et al., 1986).

For the purposes of the present study, only select DIS modules were administered including sections pertaining to depressive and anxiety disorders and other Axis I mental disorders. Modules pertaining to disorders arising in childhood (i.e. Attention Deficit Hyperactivity Disorder, Separation Anxiety) were not administered.
In order to address the specific purposes of the present study, four diagnostic subgroups were created based on the results of the DIS-IV interview. These groups included (1) depressive disorders (MDD, single and recurrent, Dysthymia and Depression Not Otherwise Specified); (2) anxiety disorders (Panic Disorder, Social Phobia, Post-traumatic Stress Disorder, Obsessive Compulsive Disorder and Generalized Anxiety Disorder); (3) both (one or more depressive and anxiety disorder occurring during the prior 12 month period); and (4) none (no DIS-IV diagnosis). These groups were later collapsed into two groups: affective disorders (AD) included all depressive disorders, anxiety disorders and both, and the second group included those with no DIS-IV diagnoses. Participants diagnosed with psychotic disorders and dementias were excluded from all analyses.

Interpersonal Support Evaluation List (ISEL)

The ISEL (Cohen, Mermelstein, Kamarch, & Hoverman, 1985) is a 40-item, self-report measure designed to assess the perception of social support availability. Respondents rate how accurately each item describes their access to social support on a four-point, Likert scale with responses ranging from definitely false (0) to definitely true (3). Higher ISEL scores are indicative of greater perceived social support. Examples of items include, “I often meet or talk with family and friends” and “If I were sick, I could easily find someone to help me with my daily chores”. A total social support score is generated by combining scores of the four domains tapped by the ISEL (Appraisal, Belonging, Self-esteem, and Tangible Support). Additionally, scores on each subscale can be calculated to determine four separate subscale scores. According to the Microsoft Flesch-Kincaid Index, the ISEL is written at a reading level of 6.2 years of education.
Cohen, Mermelstein et al. (1985) reported good test-retest reliability for the total score, with reliability coefficients averaging .87. Cohen and Wills (1985) reported adequate concurrent and discriminant reliabilities (r = .46 and r = .64, respectively). Concurrent validity has been reported based on significant correlations with the Inventory of Socially Supportive Behaviors (Barrera, 1981) and the Moos Family Environment Scale (Folkman & Lazarus, 1988). Construct validation includes significant correlations with the number of close friends and relatives. Normative information on the ISEL is available for both student and general populations (McColl & Skinner, 1995). For the present study, the total mean score of two ISEL administrations was used.

Procedure

This study was conducted as part of a larger, ongoing study of stress and psychopathology in medical utilization funded by the National Institute of Mental Health [NIMH] (R01 MH51194-01A1). The IRB Approval is enclosed in Appendix B. Randomly selected patients were approached in the waiting rooms of primary care clinics and asked to participate in the study. The study protocol was explained to all interested subjects and all questions were answered. In order to assure that all participants understood their rights and the procedures involved, a consent form (Appendix C) was signed by all participants prior to study participation. The low literacy rate in this population occasionally necessitated an offer to provide some assistance in explaining the consent form to assure adequate comprehension. Upon completion of the consent form, a demographic questionnaire and other measures pertinent to the larger study were completed by each subject. Participants completed a battery of self-report inventories.
including the first of two administrations of the ISEL. Participants were compensated $35 for the completion of these forms.

In order to increase subject retention, all participants were contacted by telephone on a randomly selected day every other month to administer a variety of measures of life stress. During the twelve-month follow-up interview, participants' self-administered the second ISEL questionnaire. Additionally, each participant was interviewed with the Diagnostic Interview Schedule for the DSM-IV (DIS-IV). Participants were paid $50.00 upon completion of the twelve-month interview and questionnaires. At this time, a chart review was performed by a primary care physician and a graduate student to determine the presence and number of chronic illnesses. An additional chart review was later completed to document illness specific information (i.e. type of diabetes) (See Table 1).

Table 1: Timeline of Administration of Measures

<table>
<thead>
<tr>
<th>Measure</th>
<th>Recruit (0 mo)</th>
<th>Call 1 (2 mo)</th>
<th>Call 2 (4 mo)</th>
<th>Call 3 (6 mo)</th>
<th>Call 4 (8 mo)</th>
<th>Call 5 (10 mo)</th>
<th>Interview (12 mos)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demogs</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISEL</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>DIS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Other</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Chart Review</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Preliminary Power Analyses

In order to determine if the proposed sample size (N = 400) was sufficient to detect a significant chi-square, a power analysis was performed (Precision and Power; Borenstein, Rothstein, Cohen, Schoenfeld & Berlin, 2000). The proposed sample size of 400 was assigned as follows: 25% in the type 2 DM group, 65% in the other chronic illness group and 10% in the no chronic illness group. Based upon the results of prior studies, it was further estimated that approximately 20% of both the Type 2 DM group and the other chronic illness group would suffer from a depressive disorder, another 20% an anxiety disorder; approximately 20% would have experienced both disorders during the past year and the remaining 40% would suffer from no DSM-IV diagnosis occurring during the prior 12-month period. According to prior prevalence studies conducted in primary care populations, it was estimated that 10% of the group with no medical illness would suffer from a depressive disorder, 10% from an anxiety disorder, 10% from both and 70% would have no diagnosed psychopathology. With the proposed sample size of 400, the present study was estimated to have power of 78.6% to detect an effect size of .182, assuming an alpha of .05 (2-tailed) (See Table 2).

Table 2: Power Analysis for 3X4 Chi-Square (Power = .79)

<table>
<thead>
<tr>
<th></th>
<th>Percentage of Patients Predicted in Each Cell</th>
<th>Proportion In Row</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Depression</td>
<td>Anxiety</td>
</tr>
<tr>
<td>Type 2 Dm</td>
<td>.20</td>
<td>.20</td>
</tr>
<tr>
<td>Other Illness</td>
<td>.20</td>
<td>.20</td>
</tr>
<tr>
<td>No Illness</td>
<td>.10</td>
<td>.10</td>
</tr>
</tbody>
</table>

Unfortunately, power for logistic regression (LR) analyses using combinations of predictor types (categorical and continuous predictors) is not well defined; therefore, to
determine sample size needed, a series of power analyses were conducted. One goal of the proposed study was to test the null hypothesis that the event rate or the proportion of each group having an affective disorder was identical. Thereby, the odds ratio was set at 1.0 and the relative risk at 1.0. In a LR, the effect size is determined by two elements, the proportion of subjects in each group and the relationship between the predictor (i.e., IG, SS) and outcome (how the rate of affective disorders varies between groups). The event rate was preset for .30 to correspond to the proportion of the group with no chronic illness hypothesized to have an affective disorder. For this distribution, effect size (event rates of .60, .60, .30), sample size (400), and alpha level (.05, 2-tailed), power was determined to be .88. This indicates that in a LR analysis with one categorical predictor with three levels (IG), 89% of studies would be expected to yield a significant effect (See Table 3). When power was computed for a LR comparing only the type 2 DM group to those with other chronic illness, the power was reduced to .72.

Table 3: Power Analysis for a Single Categorical LR Analysis (Power = .88)

<table>
<thead>
<tr>
<th>Relative Proportion</th>
<th>Event Rate</th>
<th>Odds Ratio</th>
<th>Relative Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 2 DM</td>
<td>25</td>
<td>.60</td>
<td>1.00</td>
</tr>
<tr>
<td>Other Illness</td>
<td>65</td>
<td>.60</td>
<td>1.00</td>
</tr>
<tr>
<td>No Illness</td>
<td>10</td>
<td>.30</td>
<td>.30</td>
</tr>
</tbody>
</table>

Given that another goal of the proposed study was to test the null hypothesis that no relationship existed between perceived social support (SS) and the presence of an affective disorder, a power analysis for a LR with one continuous predictor (i.e., SS), was calculated. For this analysis, the predicted mean for SS was calculated at a hypothesized score of 100 with 1 standard deviation (10). The predetermined event score was computed given the hypothesis that 35% of the sample would score > 1 SD
below the mean. Therefore, the odds ratio, or the odds of having an affective disorder were computed at .76, and the corresponding relative risk was calculated at .83. For this distribution, power was determined to be .70, indicating that 70% of studies would be expected to yield a moderate effect (.35), rejecting the null hypothesis that the odds of having an affective disorder are equal (See Table 4). It can thus be hypothesized that the results of these power analyses suggest that the proposed sample size of 400 was sufficient to detect a significant finding using LR analyses with one categorical and one continuous variable.

Table 4: Power Analysis for a Single Continuous LR Analysis (Power = .70)

<table>
<thead>
<tr>
<th>Distribution Of Predictor And Event Rate At Mean Of Predictor</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictor Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Social Support</td>
<td>100</td>
</tr>
</tbody>
</table>

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RESULTS

Preliminary Descriptive Analyses

Demographic Data

The original sample consisted of 429 randomly selected adult patients between the ages of 18 and 80 recruited from the Family Practice and Internal Medicine Clinics of Earl K. Long Medical Center (EKL) in Baton Rouge, Louisiana. Upon initial review of the data, it was determined that 12 participants were diagnosed with psychotic disorders including schizophrenia, schizoaffective disorder and schizophreniform disorder or dementia. Therefore, these persons were excluded from further analyses. Additionally, 14 of the remaining 417 participants had extensive missing data and were eliminated from further analyses. Demographic information on the remaining participants (N=403) are detailed in Appendix D.

Of the 403 participants, 77 participants were diagnosed with a variety of other chronic conditions (e.g., GERD, cancer, etc.) not including DM, hypertension, arthritis and asthma. As the apriori goals for the present study were to compare patients with type 2 DM against those with hypertension, asthma and arthritis and against those with no medical illness, these patients with other medical conditions were eliminated from further analyses. The remaining participants (N = 326) were used in all analyses.

Based on the results of the DIS-IV interview, four groups were formed. Participants meeting diagnostic criteria for the following affective disorders occurring during the course of the prior 12-month period were included in all analyses: Major Depressive Disorder, single or recurrent, Dysthymia and Depression Not Otherwise Specified; Panic Disorder, Social Phobia, Post-traumatic Stress Disorder, Obsessive Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.
Compulsive Disorder and Generalized Anxiety Disorder; one or more depressive and 
anxiety disorders occurring during the prior 12-month period; and those with no DIS-IV 
diagnosis occurring over the prior 12-month time period. These groups were later 
collapsed into two groups: affective disorders (AD) included all depressive disorders, 
anxiety disorders and both, and the second group included those with no DIS-IV 
diagnosis.

In order to generate a profile of the sample, descriptive statistics were 
calculated for all categorical and continuous variables and appear in Tables 5 and 6. 
The sample was predominantly female (80.4%) and African American (74.0%). 
Twenty-five percent of the sample was married. Fifty-nine percent of the sample was 
unemployed. The majority (77.2%) of the population had no health insurance; therefore 
it can be assumed that the greater part of the sample receives all of their medical care 
through public hospital providers.

As illustrated in Table 5, the average age of the sample (N = 326) was 47.2 (SD 
13.91) years and the mean education level was 11.1 (SD 2.72) years. The sample 
consisted of patients with an average monthly income of $498.19 (SD 451.06). The 
average body mass index was 31.03 (SD 8.56) and the number of chronic illnesses for 
the sample was 2.60 (SD 1.52). Overall, the sample was representative of the 
demographic profile of patients seen at public primary care clinics in the state of 
Louisiana (Brantley, Carmack, Boudreaux, & Scarinci, 1996).
Table 5: Demographic Data for the Sample (N = 326) (Categorical Variables)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency N = 326</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>262</td>
<td>80.4</td>
</tr>
<tr>
<td>Male</td>
<td>64</td>
<td>19.6</td>
</tr>
<tr>
<td>Race:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>242</td>
<td>74.2</td>
</tr>
<tr>
<td>White</td>
<td>83</td>
<td>25.5</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1</td>
<td>.3</td>
</tr>
<tr>
<td>Marital Status:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>81</td>
<td>24.9</td>
</tr>
<tr>
<td>Single</td>
<td>121</td>
<td>37.2</td>
</tr>
<tr>
<td>Other</td>
<td>123</td>
<td>37.8</td>
</tr>
<tr>
<td>*Job Status:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>190</td>
<td>59.0</td>
</tr>
<tr>
<td>Employed</td>
<td>132</td>
<td>41.0</td>
</tr>
<tr>
<td>Insurance:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>251</td>
<td>77.2</td>
</tr>
<tr>
<td>Medicare</td>
<td>28</td>
<td>8.6</td>
</tr>
<tr>
<td>Medical</td>
<td>21</td>
<td>6.5</td>
</tr>
<tr>
<td>Private</td>
<td>25</td>
<td>7.7</td>
</tr>
</tbody>
</table>

Table 6: Demographic Data for the Sample (N = 326) (Continuous Variables)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>47.28</td>
<td>13.91</td>
<td>18-78</td>
</tr>
<tr>
<td>Education</td>
<td>11.10</td>
<td>2.72</td>
<td>0-16</td>
</tr>
<tr>
<td>Income</td>
<td>498.19</td>
<td>451.06</td>
<td>0-3600</td>
</tr>
<tr>
<td>BMI</td>
<td>31.03</td>
<td>8.56</td>
<td>16.9-70.0</td>
</tr>
<tr>
<td># chronic illnesses</td>
<td>2.60</td>
<td>1.52</td>
<td>0-8</td>
</tr>
</tbody>
</table>

Measurement Data (ISEL)

Descriptive statistics were calculated for the total ISEL score (average of two administrations) and each ISEL subscale (Appraisal, Tangible, Belonging, Self-esteem) score. Table 7 illustrates the means and standard deviations of each. For comparative purposes, Table 7 also includes a description of normative data collected on the multiple-choice version of the ISEL (Cohen et al., 1985). The mean total score for the
ISEL was 88.92 (SD 17.07). The mean total for the appraisal subscale score was 21.44 (SD 5.31), the tangible subscale was 23.41 (SD 5.42); the self-esteem subscale was 21.60 (SD 3.99) and the belonging subscale was 22.49 (SD 4.73). As is indicated in Table 7, the perceived social support subscale scores reported by the sample were significantly lower than that of the normative sample, comprised of community subjects (34.69 - 35.40) (Schonfeld, 1991). No significant differences were identified between any of the three illness groups in total social support or subscale scores.

Table 7: Means and Standard Deviations of the Normative and Sample Data for the ISEL Total and Subscale Scores

<table>
<thead>
<tr>
<th></th>
<th>Normed Data Means (SD)</th>
<th>Sample Data (N = 326) Means (SD)</th>
<th>Type 2 DM</th>
<th>Other Chronic Illnesses</th>
<th>No Illness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total score</strong></td>
<td>88.92 (17.07)</td>
<td>86.6 (18.2)</td>
<td>89.0 (16.5)</td>
<td>92.6 (15.8)</td>
<td></td>
</tr>
<tr>
<td><strong>Subscales:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appraisal</td>
<td>35.40 (4.58)</td>
<td>21.44 (5.31)</td>
<td>20.35 (5.7)</td>
<td>21.68 (5.0)</td>
<td>22.72 (4.8)</td>
</tr>
<tr>
<td>Tangible</td>
<td>36.13 (3.78)</td>
<td>23.41 (5.42)</td>
<td>22.63 (6.1)</td>
<td>23.65 (5.1)</td>
<td>24.11 (4.8)</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>33.36 (3.48)</td>
<td>21.60 (3.99)</td>
<td>21.35 (4.0)</td>
<td>21.42 (4.1)</td>
<td>22.55 (3.4)</td>
</tr>
<tr>
<td>Belonging</td>
<td>34.69 (4.92)</td>
<td>22.49 (4.73)</td>
<td>22.30 (5.1)</td>
<td>22.34 (4.5)</td>
<td>23.23 (4.3)</td>
</tr>
</tbody>
</table>

**Power Analyses**

**Power of Chi-Square Analyses**

Given the change in sample size following the elimination of participants excluded for other medical conditions, a second series of power analyses was performed. In order to determine if the actual sample size of 326 was sufficient to detect a significant chi-square, the original power analysis was modified to reflect actual distributions determined by the preliminary descriptive analyses. Accordingly, 30% of the sample was assigned to the type 2 DM group, 50% to the other chronic illness group and 20% to the no illness group. It was estimated that approximately 20%
of both the type 2 DM group and the other chronic illness group would suffer from a depressive disorder, another 20% from an anxiety disorder, approximately 20% would have experienced both disorders during the past year and the remaining 40% would suffer from no DSM-IV diagnosis occurring during the prior 12-month period. According to prior prevalence studies conducted in primary care populations, it was estimated that 10% of the group with no medical disorder would suffer from a depressive disorder, 10% from an anxiety disorder, 10% from both and 70% would have no diagnosed psychopathology. These distributions convert to an effect size of .241. Based on the Power and Precision program (Borenstein et al., 2000), the present study was determined to have power of 92.5% to detect an effect of this magnitude. As indicated in Figure 1, power reaches .80 at approximately a sample size of 250.

![Power as a Function of Sample Size](image)

**Figure 1:** Power analysis for 3 X 4 Chi-square (N = 326)

**Power of Logistic Regression Analyses**

In order to determine if the actual sample size was sufficient to detect a significant logistic regression with one continuous and one categorical predictor, several additional power analyses were conducted. One goal of the present study was to test the
null hypothesis that the event rate of AD is identical in the three illness groups. Therefore, power was computed based on the results of descriptive statistics. The diagnostic groups occurred in the following proportions: 30% type 2 DM, 50% other chronic illnesses and 20% no medical illnesses. The event rate of AD was set at 50% for those with type 2 DM, 50% for those with other chronic illnesses and .30 for those with no illness. For this distribution, effect size (event rates of .50, .50, .30), sample size (326), and alpha level (.05, 2-tailed), power is .82. This indicates that in a LR analysis with one categorical predictor with three levels (IG), 82% of studies would be expected to yield a significant effect, rejecting the null hypothesis that the event rates are identical (See Figure 2).

![Power as a Function of Sample Size](image)

**Figure 2: Power Analysis for a Single Categorical LR Analysis (N = 326)**

Given that another goal of the proposed study was to test the null hypothesis that no relationship exists between perceived social support (SS) and the presence of an affective disorder, a second power analysis for a LR with one continuous predictor (i.e., SS) was calculated. For this analysis, the mean for SS was calculated at 90 (based on the observed ISEL mean score of 89.92) with event rate reduction with every one
standard deviation (17). For this distribution, power was determined to be .78, indicating that 78% of studies would be expected to reject the null hypothesis that the odds of having an affective disorder are equal (See Table 10). The results of these power analyses suggest that the current sample size was sufficient to detect a significant finding using LR analyses with one categorical and one continuous variable (See Figure 3).

![Power as a Function of Sample Size](image)

**Figure 3: Power Analysis for a Single Continuous LR Analysis (N = 326)**

**Preliminary Descriptive and Inferential Analyses**

The Statistical Package for the Social Sciences (1994) program was used for all statistical analyses. In order to compare and contrast each medical illness group, (IG, [no medical illness, type 2 DM, and other chronic illnesses]) descriptive and inferential statistics were calculated. Additionally, each psychiatric diagnostic group (depression only, anxiety only, both and no DSM-IV diagnoses) was compared. Lastly, descriptive
and inferential analyses were conducted to examine the sample when divided into those with an affective disorder (AD [depression only, anxiety only and both]) and those with no affective disorder or other DSM-IV diagnoses. These results will be presented in three sections: Illness Groups, Diagnostic Groups and Affective Disorder Groups.

Medical Illness Groups

Table 8 delineates the demographic representation of each medical illness group and the results of chi-square comparative analyses. Results of these preliminary analyses indicate that 17.8% (n = 58) of the sample had no chronic illnesses, 31.9% (n = 104) had been diagnosed with type 2 DM and 50.3% (n =164) had HTN, asthma or arthritis ("other chronic illness"), but not type 2 DM.

Inferential statistics were computed to identify significant differences in each categorical demographic variable (gender, race, marital status, job status and insurance coverage). Results of the chi-square analyses found no significant differences were found in race ($\chi^2 = 6.25, p < .181$), and insurance coverage ($\chi^2 = 5.73, p < .453$).

However, results of the chi-square analysis identified significant group difference in gender distribution ($\chi^2 = 9.46, p < .009$), marital status ($\chi^2 = 41.57, p < .000$), and job status ($\chi^2 = 9.46, p < .009$) (See Table 8).

Specifically, analyses of standard residuals showed that a significantly smaller percentage of males than expected were found in the no illness group as compared to those with type 2 DM. Additionally, a significantly smaller percentage of females were diabetic as compared to those who had no medical illness. No gender differences were observed between those with type 2 DM and those with other chronic illnesses. Next, analyses showed that a higher than expected number of participants in the group with no
medical illness were single as compared with the type 2 DM and the other illness group. Additionally, the group with no medical illness also had fewer participants indicating that their marital status was "other" (separated, widowed, cohabitating) than either medical illness group. No statistically significant differences in marital status were identified between those with type 2 DM and those with other chronic medical illnesses. Lastly, a significantly higher percentage of patients with no medical illness were employed as compared to those with type 2 DM and those with other chronic illnesses. Additionally, those with type 2 DM had a higher percentage of unemployment as compared to those with other chronic illnesses and those with no medical illness.

Table 8: Percentages, Number of Cases, and Chi-Square Significance of each Categorical Demographic Variable for each Medical Illness Group (N=326)

<table>
<thead>
<tr>
<th>Variable</th>
<th>No Medical Illness n = 58</th>
<th>Type 2 DM n = 104</th>
<th>Other Chronic Illness n = 164</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>93.1% (54)</td>
<td>73.1% (76)</td>
<td>80.5% (132)</td>
<td>.009**</td>
</tr>
<tr>
<td>Male</td>
<td>6.9% (4)</td>
<td>26.9% (28)</td>
<td>19.5% (32)</td>
<td></td>
</tr>
<tr>
<td>Race:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>72.4% (42)</td>
<td>78.8% (82)</td>
<td>72.0% (118)</td>
<td>.18 NS</td>
</tr>
<tr>
<td>White</td>
<td>25.9% (15)</td>
<td>21.2% (22)</td>
<td>28.0% (46)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>1.7% (1)</td>
<td>0% (0)</td>
<td>0% (0)</td>
<td></td>
</tr>
<tr>
<td>Marital Status:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>50.9% (29)</td>
<td>16.3% (17)</td>
<td>21.3% (35)</td>
<td>.000**</td>
</tr>
<tr>
<td>Married</td>
<td>38.6% (22)</td>
<td>48.1% (50)</td>
<td>29.9% (49)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>10.5% (6)</td>
<td>35.6% (37)</td>
<td>48.8% (80)</td>
<td></td>
</tr>
<tr>
<td>Job Status:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>44.8% (26)</td>
<td>69.2% (72)</td>
<td>57.5% (92)</td>
<td>.009**</td>
</tr>
<tr>
<td>Employed</td>
<td>55.2% (32)</td>
<td>30.8% (32)</td>
<td>42.5% (68)</td>
<td></td>
</tr>
<tr>
<td>Insurance:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>81.0% (47)</td>
<td>76.9% (80)</td>
<td>76.1% (124)</td>
<td>.45 NS</td>
</tr>
<tr>
<td>Medicare</td>
<td>3.4% (2)</td>
<td>12.5% (13)</td>
<td>8.0% (13)</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>6.9% (4)</td>
<td>3.8% (4)</td>
<td>8.0% (13)</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>8.6% (5)</td>
<td>6.7% (7)</td>
<td>8.0% (13)</td>
<td></td>
</tr>
</tbody>
</table>
Results of an ANOVA identified significant group differences in age ($F = 55.40$, df 2, $p < .000$); education ($F = 15.75$, df 2, $p < .000$) and number of chronic illnesses ($F = 133.37$, df 2, $p < .000$). No significant differences were identified in monthly income ($F = .78$, df 2, $p < .459$) (See Table 9). Post-hoc analyses identified that those with no chronic illness were significantly younger than those with either type 2 DM or other chronic illnesses; however, no significant age differences were identified between those with type 2 DM and those with other chronic illnesses. Not surprisingly, those with no medical illnesses had significantly fewer chronic illnesses than either those with type 2 DM or other illnesses, however, no significant differences emerged when post hoc analyses compared those with type 2 DM versus those with other illnesses. Lastly, all three groups differed significantly in number of years of education. Specifically, those with no medical illness completed the highest number of years of education (12.5); followed by those with other chronic illnesses (11.1) and those with type 2 DM (10.1).

The Levine test of homogeneity of variances indicated that the data violated the parametric assumption of homogeneity in education level ($F = 7.3$, df 2, $p < .001$) and number of chronic illnesses ($F = 7.36$, df 2, $p < .001$). Given these violations, two separate Kruskal Wallis Tests were computed. Results of the Kruskal Wallis also found a significant difference between the three illness groups in education level ($\chi^2 = 30.13$, $p < .000$) and number of chronic illnesses ($\chi^2 = 138.24$, $p < .000$).
Table 9: Means, SD, F Values, DF and ANOVA Significance of each Continuous Demographic Variable for each Medical Illness Group (N = 326)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>F (df)</th>
<th>p</th>
<th>Kruskal Wallis Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Chronic Illness</td>
<td>32.19</td>
<td>11.34</td>
<td>55.40 (2)</td>
<td>.000**</td>
<td>N/A</td>
</tr>
<tr>
<td>Type 2 DM</td>
<td>50.59</td>
<td>12.18</td>
<td>12.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Chronic Illness</td>
<td>50.52</td>
<td>12.19</td>
<td>12.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Chronic Illness</td>
<td>12.55</td>
<td>1.69</td>
<td>15.75 (2)</td>
<td>.000**</td>
<td>.000**</td>
</tr>
<tr>
<td>Type 2 DM</td>
<td>10.16</td>
<td>3.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Chronic Illness</td>
<td>11.19</td>
<td>2.56</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Chronic Illnesses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Chronic Illness</td>
<td>.431</td>
<td>.651</td>
<td>133.37 (2)</td>
<td>.000**</td>
<td>.000**</td>
</tr>
<tr>
<td>Type 2 DM</td>
<td>3.29</td>
<td>1.21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Chronic Illness</td>
<td>2.93</td>
<td>1.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Chronic Illness</td>
<td>496.42</td>
<td>393.98</td>
<td></td>
<td>.459 NS</td>
<td>N/A</td>
</tr>
<tr>
<td>Type 2 DM</td>
<td>455.34</td>
<td>460.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Chronic Illness</td>
<td>525.99</td>
<td>464.45</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Diagnostic Groups

Table 10 delineates the demographic representation of each diagnostic group (depression only, anxiety only, both anxiety and depressive disorder occurring during the past year, and no DSM-IV diagnoses) and the results of chi-square comparative analyses. Results of these preliminary analyses indicated that 10.1% (n = 33) of the sample suffered from a depressive disorder occurring during the past year, another 10.1% (n = 33) from an anxiety disorder, 8.6% (n = 28) met diagnostic criteria for both, and 71.2% (n = 232) had no DSM-IV psychiatric disorder in the past year.

Inferential statistics were computed to identify any significant differences between each diagnostic group on each categorical demographic variable (gender, race, marital status, job status and insurance coverage). No significant differences were found in gender ($\chi^2 = 5.67, p < .129$), race ($\chi^2 = 4.57, p < .600$), marital status ($\chi^2 =$ 67

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9.26, \( p < .159 \), and insurance coverage (\( \chi^2 = 9.51, p < .392 \)). However, results of the chi-square analysis identified significant differences in each diagnostic groups in terms of job status (\( \chi^2 = 8.01, p < .046 \)) (See Table 10). Specifically, a smaller percentage of those with anxiety only were employed than those with no DSM-IV diagnoses and those with depression only. This difference in job status was most apparent when examining the group diagnosed with both a depressive and an anxiety disorder. Those diagnosed with both disorders in the past year had higher rates of unemployment than any of the diagnostic groups. No statistically significant differences were observed in rates of employment in those with no DSM-IV diagnoses as compared to those with depression only.

Table 10: Percentages, Number of Cases, And Chi Square Significance of Each Categorical Demographic Variable for Each Diagnostic Group (N=326)

<table>
<thead>
<tr>
<th>Variable</th>
<th>No DX n = 232</th>
<th>Depression Only n = 33</th>
<th>Anxiety Only n = 33</th>
<th>Both n = 28</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>77.2% (179)</td>
<td>90.9% (30)</td>
<td>84.8% (28)</td>
<td>89.3% (25)</td>
<td>.129 NS</td>
</tr>
<tr>
<td>Male</td>
<td>22.8% (53)</td>
<td>9.1% (3)</td>
<td>15.2% (5)</td>
<td>10.7% (3)</td>
<td></td>
</tr>
<tr>
<td>Race:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>75.8% (176)</td>
<td>60.6% (20)</td>
<td>78.8% (26)</td>
<td>71.4% (20)</td>
<td>.600 NS</td>
</tr>
<tr>
<td>White</td>
<td>23.7% (66)</td>
<td>39.4% (13)</td>
<td>21.2% (7)</td>
<td>28.6% (8)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>.4% (1)</td>
<td>0% (0)</td>
<td>0% (0)</td>
<td>0% (0)</td>
<td></td>
</tr>
<tr>
<td>Marital Status:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>28.4% (66)</td>
<td>21.2% (7)</td>
<td>6.3% (2)</td>
<td>21.4% (6)</td>
<td>.159 NS</td>
</tr>
<tr>
<td>Married</td>
<td>35.3% (82)</td>
<td>33.3% (11)</td>
<td>53.1% (17)</td>
<td>39.3% (11)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>36.2% (84)</td>
<td>45.5% (15)</td>
<td>40.6% (13)</td>
<td>39.3% (11)</td>
<td></td>
</tr>
<tr>
<td>Job Status:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>59.8% (137)</td>
<td>54.5% (18)</td>
<td>42.4% (14)</td>
<td>77.8% (21)</td>
<td>.046*</td>
</tr>
<tr>
<td>Employed</td>
<td>40.2% (92)</td>
<td>45.5% (15)</td>
<td>57.6% (19)</td>
<td>22.2% (6)</td>
<td></td>
</tr>
<tr>
<td>Insurance:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>76.7% (178)</td>
<td>72.7% (24)</td>
<td>81.3% (26)</td>
<td>82.1% (23)</td>
<td>.392 NS</td>
</tr>
<tr>
<td>Medicare</td>
<td>9.5% (22)</td>
<td>9.1% (3)</td>
<td>0% (0)</td>
<td>10.7% (3)</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>7.3% (17)</td>
<td>9.1% (3)</td>
<td>3.1% (1)</td>
<td>0% (0)</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>6.5% (15)</td>
<td>9.1% (3)</td>
<td>15.6% (5)</td>
<td>7.1% (2)</td>
<td></td>
</tr>
</tbody>
</table>

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Table 11 delineates the results of both the descriptive statistics computed to describe the continuous demographic variable representation of each diagnostic group and the results of parametric tests conducted to identify any significant differences between these groups on the continuous demographic variables (age, education, number of comorbid medical illnesses and monthly income). Results of the ANOVA found no significant group differences in age ($F = 2.14, df 3, p < .095$); number of chronic illnesses ($F = .646, df 3, p < .586$) and monthly income ($F = 1.90, df 3, p < .129$).

Although education was found to be significantly different ($F = 3.39, df 3, p < .018$) in the overall ANOVA, interestingly, post hoc analyses failed to identify any significant differences when all four diagnostic groups were compared (.081 - 1.00). Upon close examination of the education mean scores, it appears that the statistically significant F test is accounted for by the fact that the group with no DSM-IV diagnosis has the lowest mean education level (10.81) and the other three diagnostic groups (depression only, anxiety only, both) had higher, albeit, very similar mean scores (12.10, 11.75, 11.60, respectively). Therefore, the significant difference is found when the no DSM-IV group is compared against the other three diagnostic groups.

The groups were found to have heterogeneous variances in monthly income (Levine statistic 2.64, df 3, $p < .049$). Therefore, given the violation of the parametric assumption of homogeneity of variances, Kruskal Wallis Test was computed. Results of the Kruskal Wallis also did not find a significant difference between the four diagnostic groups in regards to income ($\chi^2 = 5.673, p < .129$) (See Table 11).
Table 11: Means, SD, Df, F Values and ANOVA Significance of each Continuous Demographic Variable for each Diagnostic Group (N = 326)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>F (df)</th>
<th>P</th>
<th>Kruskal-Wallis Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No DSM-IV DX</td>
<td>48.14</td>
<td>14.40</td>
<td>2.14 (3)</td>
<td>.095 NS</td>
<td>N/A</td>
</tr>
<tr>
<td>Depressed Only</td>
<td>46.18</td>
<td>13.37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety Only</td>
<td>47.45</td>
<td>11.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td>41.25</td>
<td>12.32</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No DSM-IV DX</td>
<td>10.81</td>
<td>2.80</td>
<td>3.39 (3)</td>
<td>.018*</td>
<td>N/A</td>
</tr>
<tr>
<td>Depressed Only</td>
<td>12.10</td>
<td>2.69</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety Only</td>
<td>11.75</td>
<td>2.25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td>11.60</td>
<td>2.13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Chronic Illnesses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No DSM-IV DX</td>
<td>2.54</td>
<td>1.46</td>
<td>.646 (3)</td>
<td>.586 NS</td>
<td>N/A</td>
</tr>
<tr>
<td>Depressed Only</td>
<td>2.93</td>
<td>1.39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety Only</td>
<td>2.66</td>
<td>1.77</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td>2.60</td>
<td>1.83</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No DSM-IV DX</td>
<td>478.83</td>
<td>437.74</td>
<td>1.90 (3)</td>
<td>.129 NS</td>
<td>.129 NS</td>
</tr>
<tr>
<td>Depressed Only</td>
<td>558.31</td>
<td>454.75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety Only</td>
<td>647.45</td>
<td>502.93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td>411.85</td>
<td>471.33</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Affective Disorders Groups

Table 12 delineates the demographic characteristics and group differences between those in the sample with and without an affective disorder. As was previously mentioned, the affective disorder category was defined to include those meeting criteria for a depressive disorder only, an anxiety disorder only and both a depressive and an anxiety disorder occurring during the past year. Results of these preliminary analyses indicated that 28% (n = 94) of the sample suffered from an affective disorder and 71.2% (n = 232) did not meet DIS-IV diagnostic criteria for an affective disorder or any other psychiatric disorder occurring during the past year.
Inferential statistics were computed to identify any significant differences between those with and without an affective disorder diagnosis on each categorical demographic variable (gender, race, marital status, and job status and insurance coverage). Results of the chi-square analysis identified no significant differences between the two affective disorder groups in terms of race ($\chi^2 = 1.66, p < .435$), marital status, ($\chi^2 = 5.39, p < .067$), insurance coverage ($\chi^2 = 3.26, p < .353$), or job status ($\chi^2 = 220, p < .639$). However, a significant difference was identified between the two groups in terms of gender ($X^2 = 5.26, p < .02$). Specifically, a significantly smaller percentage of males had an affective disorder than expected when compared to the percentage identified in females.

Table 12: Percentages, Number of Cases, and Chi-Square Significance of each Categorical Demographic Variable for each Affective Disorder Group (N = 326)

<table>
<thead>
<tr>
<th>Variable</th>
<th>No Affective Disorder n = 232</th>
<th>Affective Disorder n = 94</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>77.2% (179)</td>
<td>88.3% (83)</td>
<td>.022*</td>
</tr>
<tr>
<td>Male</td>
<td>22.8% (53)</td>
<td>11.7% (11)</td>
<td></td>
</tr>
<tr>
<td>Race:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>75.9% (176)</td>
<td>70.2% (66)</td>
<td>.435 NS</td>
</tr>
<tr>
<td>White</td>
<td>23.7% (55)</td>
<td>29.8% (28)</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>.4% (1)</td>
<td>0% (0)</td>
<td></td>
</tr>
<tr>
<td>Marital Status:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>28.4% (66)</td>
<td>16.1% (15)</td>
<td>.067 NS</td>
</tr>
<tr>
<td>Married</td>
<td>35.3% (82)</td>
<td>41.9% (39)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>36.2% (84)</td>
<td>41.9% (39)</td>
<td></td>
</tr>
<tr>
<td>Job Status:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>59.8% (137)</td>
<td>57.0% (53)</td>
<td>.364 NS</td>
</tr>
<tr>
<td>Employed</td>
<td>40.2% (92)</td>
<td>43.0% (40)</td>
<td></td>
</tr>
<tr>
<td>Insurance:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>76.7% (178)</td>
<td>78.5% (73)</td>
<td>.353 NS</td>
</tr>
<tr>
<td>Medicare</td>
<td>9.5% (22)</td>
<td>6.5% (6)</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>7.3% (17)</td>
<td>4.3% (4)</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>6.5% (15)</td>
<td>10.8% (10)</td>
<td></td>
</tr>
</tbody>
</table>

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Table 13 illustrates the results of both the descriptive statistics and parametric tests conducted to identify any significant differences between those with and without an affective disorder on each continuous demographic variable (age, education, number of comorbid medical illnesses, monthly income). Results of the ANOVA found no significant group differences in age (F = 3.08, df 1, p < .08), number of chronic illnesses (F = 1.09, df 1, p < .29) and monthly income (F = 1.48, df 1, p < .22).

However, results of the ANOVA found significant group differences in education (F = 9.65, df 1, p < .002). Specifically, those with an affective disorder had a higher number of years of education than those with no DSM-IV diagnosis (11.83 Vs. 10.81, respectively).

Table 13: Means, SD, DF, F Values and ANOVA Significance of each Continuous Demographic Variable for each Affective Disorder Group (N=326)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>F</th>
<th>p</th>
<th>Kruskal-WallisTest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Affective Dx</td>
<td>48.14</td>
<td>14.40</td>
<td>3.08</td>
<td>.08 NS</td>
<td>.04*</td>
</tr>
<tr>
<td>Affective Disorder</td>
<td>45.16</td>
<td>12.45</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Affective Dx</td>
<td>10.81</td>
<td>2.80</td>
<td>9.65</td>
<td>.002**</td>
<td>.002**</td>
</tr>
<tr>
<td>Affective Disorder</td>
<td>11.83</td>
<td>2.36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># Chronic Illnesses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Affective Dx</td>
<td>2.54</td>
<td>1.46</td>
<td>1.09</td>
<td>.29 NS</td>
<td>N/A</td>
</tr>
<tr>
<td>Affective Disorder</td>
<td>2.74</td>
<td>1.65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Affective Dx</td>
<td>478.83</td>
<td>437.74</td>
<td>1.48</td>
<td>.22 NS</td>
<td>.461 NS</td>
</tr>
<tr>
<td>Affective Disorder</td>
<td>545.98</td>
<td>481.46</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The groups were found to have heterogeneous variances in age (Levine statistic 3.95, p < .048); education (4.02, p < .046); and monthly income (8.28, p < .004).

Therefore, given the violation of the parametric assumption of homogeneity of variances, a Kruskal Wallis Test was computed. Results of the Kruskal Wallis found a
significant difference between the two affective disorder groups in age ($\chi^2 = 4.19, p < .04$) and education ($\chi^2 = 9.5, p < .002$). Kruskal–Wallis Test did not identify significant differences in income ($\chi^2 = .544, p < .461$).

**Preliminary Logistic Regression**

A preliminary logistic regression (LR) was conducted in order to identify potential confounds as possible covariates in later analyses. A backward stepwise LR was conducted using a significance of $p < .05$ to retain variables in the model. Based on the above preliminary univariate chi-square and ANOVA results, the only potentially significant demographic predictors of an AD diagnosis were gender, marital status, age, job status and education. Therefore, these potential confounds were entered as a block. As seen in Table 14, the model for demographic variables indicated that higher rates of affective disorders were associated with gender and education.

**Table 14: Preliminary Backward LR of Demographic Variables as Predictors of AD**

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>Wald (df)</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95% C.I. for Odds Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (female)</td>
<td>0.699</td>
<td>3.63 (1)</td>
<td>0.054</td>
<td>2.012</td>
<td>0.987</td>
<td>4.09</td>
</tr>
<tr>
<td>Education</td>
<td>0.150</td>
<td>7.80 (1)</td>
<td>0.005</td>
<td>1.162</td>
<td>1.046</td>
<td>1.292</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.497</td>
<td>15.15 (1)</td>
<td>0.000</td>
<td>0.082</td>
<td>-----</td>
<td>-----</td>
</tr>
</tbody>
</table>

Explicitly, results of the preliminary LR identified that women had increased odds of having an affective disorder by 2.01 or by 101%. As education increased, the probability of developing an affective disorder increased by a multiple of 1.162 or by 16% for each year of education. Given that gender was approaching significance at the $p < .05$ level ($p < .054$) and considering the theoretical evidence relating gender to the prediction of an AD diagnosis (i.e., rates are approximately 2:1 for females), gender
will be treated as a potential confound in the present study. Therefore, both gender and education will be statistically controlled in further analyses.

**Main Analyses**

**Data Analyses**

In order to fulfill the objectives of the current study, descriptive and chi-square analyses were conducted, followed by two separate logistic regression analyses. In the first LR model, gender and education were entered as the first block, followed by IG in block 2. In subsequent analyses, social support was entered as block 3 and the interaction of social support and illness group was entered as block 4. The first overall LR model is detailed in Table 19. In the second LR analysis, gender and education were entered into the first block, followed by IG in the second block and each type of social support was entered simultaneously into the third block. Based upon the results of this LR, subsequent blocks were added to the model to test the pertinent hypothesis.

**Purpose 1: Prevalence of Depressive and Anxiety Disorder Diagnoses**

The first purpose of the present study was to compare and contrast the rates of DSM-IV affective disorders for each medical illness group (no illness, type 2 DM and other chronic illness). Descriptive statistics were used to generate a profile of each illness group based on the presence of depression only, anxiety only, both anxiety and depression occurring during the past year and those with no DSM-IV diagnosis. As illustrated in Table 15, 28% (n = 94) of the total sample met diagnostic criteria for a DSM-IV affective disorder during the prior 12-month period. Specifically, 10% (n = 33) met criteria for a depressive disorder only, 10% (n = 33) met criteria for an anxiety
disorder only, and 8.6% (n = 28) met criteria for both a depressive and an anxiety disorder, occurring during the past year.

Inferential statistics were computed to identify any significant differences in the prevalence of depression, anxiety, both and no DSM-IV diagnosis in each medical illness group. In order to determine if there were any significant differences between each illness group in terms of prevalence of an affective disorder diagnosis, a 3 by 4 chi-square was conducted. Results of the chi-square analysis identified no significant differences in the rates of affective disorders in patients with Type 2 DM as compared to those with other chronic illnesses in the prevalence of depressive or anxiety disorders. Although it was hypothesized that a significant difference in rates of depression and anxiety disorders would be observed when the chronic illness groups were compared to those with no chronic medical illnesses, results of chi-square failed to identify a significant difference ($X^2 = 8.18, df 6, p < .225$) (See Table 15).

Table 15: Descriptive Statistics and Overall Chi-Square Results of the Prevalence of DSM-IV Diagnoses within each Medical Illness Group

<table>
<thead>
<tr>
<th>DX groups:</th>
<th>Total Sample N = 326</th>
<th>No Chronic Illness N = 58</th>
<th>Type 2 DM n = 104</th>
<th>Other Chronic Illness n = 164</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>No DX</td>
<td>71.2% (232)</td>
<td>69.0% (40)</td>
<td>64.4% (67)</td>
<td>76.2 (125)</td>
<td>.22 NS</td>
</tr>
<tr>
<td>Depression Only</td>
<td>10.1% (33)</td>
<td>6.9% (4)</td>
<td>12.5% (13)</td>
<td>9.8% (16)</td>
<td></td>
</tr>
<tr>
<td>Anxiety Only</td>
<td>10.1% (33)</td>
<td>12.1% (7)</td>
<td>10.6% (11)</td>
<td>9.1% (15)</td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td>8.6% (28)</td>
<td>12.1% (7)</td>
<td>12.5% (13)</td>
<td>4.9% (8)</td>
<td></td>
</tr>
</tbody>
</table>

As was previously described, in order to compare the prevalence of affective disorders versus no DSM-IV diagnosis in the three medical illness groups, the four diagnostic groups were collapsed into two categories, affective disorders and no DSM-IV diagnoses. Descriptive statistics were used to generate a profile of the sample based

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on the rates of psychopathology in each illness group. As is illustrated in Table 16, the vast majority of the total sample (71%, n = 232) did not meet diagnostic criteria for a DSM-IV diagnostic disorder.

In order to determine if there were any significant differences between each illness group in terms of prevalence of an affective disorder, a 3 by 2 chi-square was conducted. Results of the chi-square analysis identified no significant differences in the rates of affective disorders in patients with Type 2 DM as compared to those with other chronic illnesses. It was hypothesized that a significant difference would be observed when the chronic illness groups were compared to those with no medical illness; however, results of the chi-square analysis found no significant differences between any of the three illness groups in terms of prevalence of affective disorders ($X^2 = 4.48$, df 2, $p < .106$) (See Table 16).

Table 16: Descriptive Statistics and Overall Chi-Square Results of the Prevalence of an AD for the Total Sample and Within Each Illness Group

<table>
<thead>
<tr>
<th>Diagnostic group</th>
<th>Total Sample N = 326</th>
<th>No Chronic Illness n = 58</th>
<th>Type 2 DM n = 104</th>
<th>Other Chronic Illness n = 164</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>No DX</td>
<td>71.2% (232)</td>
<td>69.0% (40)</td>
<td>64.4% (67)</td>
<td>76.2% (125)</td>
<td>.10 NS</td>
</tr>
<tr>
<td>AD</td>
<td>28.8% (94)</td>
<td>31.0% (18)</td>
<td>35.6% (37)</td>
<td>23.8% (39)</td>
<td></td>
</tr>
</tbody>
</table>

In order to determine whether IG would predict a diagnosis of AD after the influence of confounds were controlled, the first of two logistic regression analyses were conducted. As prior analyses indicated that gender and education level were potential confounds, these variables were statistically controlled in the model. Thus, the outcome variable was affective disorder (AD) and the predictors were gender, education, and IG.
Results of the overall hierarchical LR model found a significant main effect for gender, education, and IG. Specifically, when gender and education were entered together in block 1, a significant main effect was found ($X^2 = 14.30$, df 2, $p < .001$). Results of the LR indicated that the odds of having an AD increase by a multiple of 2.01 or by 101% for females (since $[2.01-1] \times 100 = 101$). Additionally, the odds of having an AD increased by a multiple of 1.16 or by 16% for each year increase in education.

In block 2, illness group (IG) was entered and a significant main effect was observed ($X^2 = 22.66$, df 4, $p < .000$). As is indicated in Table 17, a significant main effect for IG suggests that the presence of a chronic illness is a significant predictor of AD when gender and education are controlled. Interestingly, although a significant main effect was found for the overall illness group model, after examining post-hoc comparisons, it appeared that the only significant medical illness contrast occurred when comparing those with type 2 DM with those with other chronic illnesses. Hence, when gender and education are controlled, the odds of having an AD increased for those with type 2 DM by a multiple of 2.26 or by 126% as compared to those with other chronic medical illnesses. When those with type 2 DM were compared with those with no chronic illness, results failed to meet significance at the $p < .05$ level; however, results indicated that the data approached significance at $p < .052$. Hence, these results may identify a trend for the odds of having an AD to increase for those with type 2 DM by 198% as compared to those with no chronic illness.
Table 17: Hierarchical LR Results of Gender, Education, and IG

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>Wald (df)</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95% C.I. Odds Lower</th>
<th>95% C.I. Odds Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.802</td>
<td>4.57 (1)</td>
<td>.033*</td>
<td>2.22</td>
<td>1.06</td>
<td>4.64</td>
</tr>
<tr>
<td>Education</td>
<td>.181</td>
<td>9.57 (1)</td>
<td>.002**</td>
<td>1.19</td>
<td>1.06</td>
<td>1.34</td>
</tr>
<tr>
<td>Overall F:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illness Group</td>
<td></td>
<td>8.31 (2)</td>
<td>.016*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contrasts:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM2 Vs. No Ill</td>
<td>.732</td>
<td>2.096 (1)</td>
<td>.052 NS</td>
<td>2.98</td>
<td>.993</td>
<td>4.357</td>
</tr>
<tr>
<td>Other Vs. No Ill</td>
<td>-.086</td>
<td>.370 (1)</td>
<td>.804 NS</td>
<td>.917</td>
<td>.465</td>
<td>1.81</td>
</tr>
<tr>
<td>DM2 Vs Other</td>
<td>***</td>
<td>6.74 (1)</td>
<td>.005**</td>
<td>2.26</td>
<td>1.28</td>
<td>4.01</td>
</tr>
</tbody>
</table>

*** β value (.818) from analyses in which other illness group was used as the indicator

Purpose 2: Direct Effect of Social Support as a Predictor of an AD

In order to determine whether perceived social support was associated with a diagnosed affective disorder, social support was added to the LR model described above. As was previously defined, SS was defined by the average total score from the two ISEL administrations, converted to a z-score (mean = 0, SD = 1).

In block 3, SS was entered and a significant main effect was observed \( \chi^2 = 35.47, \) df 5, \( p < .000 \). The significant main effect for SS suggested that perceived social support is beneficial for all medical illness groups in decreasing AD diagnoses when the main effects of illness, gender and education are controlled. As was hypothesized, higher rates of perceived social support were associated with lower rates of affective disorders for both the subgroup of patients with no chronic illness and those with type 2 DM and other chronic illnesses. Thus, these results suggest a generic, overall beneficial effect of social support. Specifically, as illustrated in Table 18, the results of this LR indicated that for each standard deviation increase in social support, the corresponding odds of having an affective disorder decreased by a multiple of .618 or by 38.2%.
Purpose 3: Social Support as a Moderating Variable Between IG and AD

Logistic regression analyses was used to determine whether social support moderates the impact that having a medical illness has on the odds of having an affective disorder. For this series of analyses, gender and education were statistically controlled and the predictor variables were SS and IG and the interaction of SS and IG. It was hypothesized that a significant interaction between SS and IG would be observed, reflecting a greater beneficial effect of social support among those with type 2 DM, followed by the group with other chronic illness, with the least benefit being for those with no medical illness.

As described in purpose 2, gender and education were entered as a block 1, followed by IG (block 2) and SS (block 3). In order to determine whether a moderating effect existed between SS and IG, block 4 involved forcing the interaction term (SS * IG) into the model. Results of this LR found a significant chi-square for the interaction term ($X^2 = 43.07, df 7, p < .000$). As Table 19 indicates, results of the overall LR model in which gender, education, IG, SS, and the interaction of SS * IG were entered simultaneously, found a significant interaction effect ($p < .032$).
Table 19: LR Results of Gender, Education, IG, SS and IG X SS

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>Wald (df)</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95% C.I. for Odds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>Gender</td>
<td>.757</td>
<td>3.91(1)</td>
<td>.048*</td>
<td>2.13</td>
<td>1.00 4.51</td>
</tr>
<tr>
<td>Education</td>
<td>.185</td>
<td>9.66 (1)</td>
<td>.002**</td>
<td>1.20</td>
<td>1.07 1.35</td>
</tr>
<tr>
<td>Illness Group</td>
<td>-----</td>
<td>5.645 (2)</td>
<td>.059 NS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contrasts:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM2 Vs. No Ill</td>
<td>.678</td>
<td>2.75 (1)</td>
<td>.097 NS</td>
<td>1.97</td>
<td>.884 4.39</td>
</tr>
<tr>
<td>Other Vs. No Ill</td>
<td>-.035</td>
<td>.009 (1)</td>
<td>.926 NS</td>
<td>.966</td>
<td>.464 2.01</td>
</tr>
<tr>
<td>DM2 Vs Other</td>
<td>***</td>
<td>5.262(1)</td>
<td>.022*</td>
<td>2.04</td>
<td>1.10 3.75</td>
</tr>
<tr>
<td>Social Support</td>
<td>.310</td>
<td>.758 (1)</td>
<td>.384 NS</td>
<td>1.36</td>
<td>.679 2.74</td>
</tr>
<tr>
<td>Interaction:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(IG X SS)</td>
<td>-----</td>
<td>6.86 (2)</td>
<td>.032*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contrasts:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM2 Vs. No Ill</td>
<td>-1.12</td>
<td>6.83 (1)</td>
<td>.009**</td>
<td>.326</td>
<td>.141  .755</td>
</tr>
<tr>
<td>Other Vs. No Ill</td>
<td>-.824</td>
<td>3.97 (1)</td>
<td>.046*</td>
<td>.438</td>
<td>.195  .987</td>
</tr>
<tr>
<td>DM Vs. Other</td>
<td>****</td>
<td>.860 (1)</td>
<td>.354 NS</td>
<td>.743</td>
<td>.397 1.392</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.97</td>
<td>19.85 (1)</td>
<td>.000**</td>
<td>.020</td>
<td></td>
</tr>
</tbody>
</table>

***β value (.713) from analyses in which other illness group was the indicator
****β value (-.297) from analyses in which other illness group was the indicator

Specifically, post-hoc comparisons revealed that when those with type 2 DM were compared with those with no medical illness, a significant interaction was found (p < .009). Explicitly, each standard deviation decrease in SS increased the odds of having an AD by .326 or by 67% for those with type 2 DM as compared to those with no chronic illness. Similarly, a significant interaction effect was also found when those with other illnesses were compared to those with no medical illness (p < .046).

Specifically, each standard deviation decrease in SS increased the odds of having an AD by .438 or by 56% for those with other chronic illnesses as compared to those with no medical illness. However, when those with type 2 DM was compared to those with other chronic illnesses, no significant interaction was identified (Wald = .860, df 1, p < .354). Hence, as is displayed in Figures 4 and 5 (See Appendix E), these results

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supported the hypothesis that social support serves as an important moderating variable for those with both type 2 DM and those with other chronic illnesses and appears to be more important for those with diabetes.

**Purpose 4: Predictive Utility of each Type of Social Support**

In order to determine whether there was a differential impact of each type of social support (appraisal, tangible, belonging, self-esteem), a backward stepwise LR was conducted. It was hypothesized that tangible social support would contribute significantly to a decrease in AD in those with type 2 DM due to the extensive self-management requirements of this disease. In order to compare the association of each type of social support with the presence of an affective disorder, the outcome variable was AD and the predictors were IG and each SS subscale. First, gender and education were entered as block 1, followed by IG in block 2. Next, in block 3, all four SS subscale (converted into z scores) scores were entered simultaneously in a backward stepwise fashion. When entered simultaneously, all social support subscales yielded a significant chi-square \( X^2 = 34.04, \text{df } 5, p < .000 \). Therefore, as a group, all four social support subscales were very predictive of an AD. However, as presented in Table 20, when backward elimination was used, only tangible support was retained in the model as a significant predictor of AD. Specifically, each SD increase in tangible social support decreased the odds of having an AD by a multiple of .642 or by 35.8%.

Given the identification of tangible social support as the only significant subscale variable retained, in the next LR, the tangible social support X illness group interaction term was forced into the model. As illustrated in Table 21, the interaction term missed significance at the p<.05 level, (Wald 5.00, 2 df, \( p < .082 \)). However, the
interaction yielded the same pattern of results as the total score, indicating that tangible support may have a stronger protective function in patients with diabetes and other chronic illnesses than in those with no illness.

**Table 20: LR Results of Gender, Education, IG and SS Subscales (Appraisal, Tangible, Self-Esteem, Belonging)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>Wald (df)</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95% C.I. for Odds Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.820</td>
<td>4.78 (1)</td>
<td>.029*</td>
<td>2.27</td>
<td>1.08</td>
<td>4.75</td>
</tr>
<tr>
<td>Education</td>
<td>.182</td>
<td>9.85</td>
<td>.002**</td>
<td>1.19</td>
<td>1.07</td>
<td>1.34</td>
</tr>
<tr>
<td>IG</td>
<td>6.39</td>
<td>(2)</td>
<td>.041*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Contrasts:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM2 Vs. No Ill</td>
<td>.602</td>
<td>2.45 (1)</td>
<td>.117 NS</td>
<td>1.82</td>
<td>.859</td>
<td>3.87</td>
</tr>
<tr>
<td>Other Vs. No Ill</td>
<td>-.143</td>
<td>.164</td>
<td>.686 NS</td>
<td>.867</td>
<td>.435</td>
<td>1.73</td>
</tr>
<tr>
<td>DM2 Vs. Other</td>
<td>***</td>
<td>6.23 (1)</td>
<td>.012*</td>
<td>2.10</td>
<td>1.174</td>
<td>3.774</td>
</tr>
<tr>
<td>Tangible support</td>
<td>-.443</td>
<td>11.15 (1)</td>
<td>.001</td>
<td>.642</td>
<td>.495</td>
<td>.833</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.80</td>
<td>19.63 (1)</td>
<td>.001</td>
<td>.022</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***β value (.744) from analyses in which other illness group was used as the indicator

**Table 21: LR Results of Gender, Education, IG, Tangible Support and the Tangible Support X IG Interaction**

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>Wald (df)</th>
<th>p</th>
<th>Odds Ratio</th>
<th>95% C.I. for Odds Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.796</td>
<td>4.34 (1)</td>
<td>.037*</td>
<td>2.21</td>
<td>1.04</td>
<td>4.68</td>
</tr>
<tr>
<td>Education</td>
<td>.186</td>
<td>10.09 (1)</td>
<td>.001**</td>
<td>1.20</td>
<td>1.07</td>
<td>1.35</td>
</tr>
<tr>
<td>Illness group</td>
<td>5.45</td>
<td>.065 NS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Contrasts:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM2 Vs. No Ill</td>
<td>.654</td>
<td>2.70 (1)</td>
<td>.100 NS</td>
<td>1.92</td>
<td>.882</td>
<td>4.19</td>
</tr>
<tr>
<td>Other Vs. No Ill</td>
<td>-.038</td>
<td>.011 (1)</td>
<td>.916 NS</td>
<td>.963</td>
<td>.473</td>
<td>1.95</td>
</tr>
<tr>
<td>DM Vs. Chronic</td>
<td>***</td>
<td>5.09 (1)</td>
<td>.024*</td>
<td>1.99</td>
<td>1.09</td>
<td>3.64</td>
</tr>
<tr>
<td>Tangible SS</td>
<td>.268</td>
<td>.530</td>
<td>.466 NS</td>
<td>1.30</td>
<td>.635</td>
<td>2.69</td>
</tr>
<tr>
<td>Illness X Tangible SS</td>
<td>5.00 (2)</td>
<td>.082 NS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Contrasts:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM2 / No Ill X Tangible</td>
<td>-.955</td>
<td>5.00 (1)</td>
<td>.025*</td>
<td>.385</td>
<td>.167</td>
<td>.889</td>
</tr>
<tr>
<td>Other / No Ill X Tangible</td>
<td>-.733</td>
<td>3.01 (1)</td>
<td>.082 NS</td>
<td>.480</td>
<td>.210</td>
<td>1.09</td>
</tr>
<tr>
<td>DM2 / Other X Tangible</td>
<td>****</td>
<td>.549 (2)</td>
<td>.459 NS</td>
<td>.801</td>
<td>.446</td>
<td>1.44</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.94</td>
<td>20.51 (1)</td>
<td>.000**</td>
<td>.019</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***β value (.692) from analyses in which other illness group was used as the indicator

****β value (-.222) from analyses in which other illness group was used as indicator
DISCUSSION

This study provides a unique contribution to the literature by comparing the prevalence of diagnosed depressive and anxiety disorders in a group of low-income patients with type 2 DM against those in the same cohort with hypertension, arthritis and asthma and those with no medical illness. Additionally, this study was the first to explore the moderating effects of social support on the incidence of affective disorders in primary care patients with type 2 DM. It was found that social support appears to make a difference in the emotional well-being of low-income, primary care patients with chronic illness.

The present sample consisted primarily of uninsured, socioeconomically disadvantaged African American, middle-aged females. Although it is estimated that 6% of the U.S. population currently suffers from DM, a startling 32% of the current sample was diagnosed with type 2 DM. Further, an additional 50% of the sample suffered from hypertension, asthma and/or arthritis, and over 53% suffered from comorbid obesity. The fact that the majority of the sample experiences several risk factors for psychopathology (i.e., female gender, low-income, high rates of obesity), in addition to the observed high rate of chronic illness, increases the likelihood of comorbid psychopathology and underscores the importance of identifying possible moderating factors.

Prevalence of Affective Disorders

Consistent with prior research examining the prevalence of depressive disorders in primary care populations (e.g., Schulberg et al., 1995) results of the current study identified that 10% of the sample met DSM-IV criteria for a depressive disorder.
occurring over the prior 12-month period. While fewer studies have examined anxiety in U.S. primary care samples, Orleans et al. (1985) concluded that the incidence of a current anxiety disorder can be expected in 15% to 18% of patients seen in primary care settings. The present study identified 10% of the total sample who met criteria for an anxiety disorder; however, an additional 9% suffered from both a depressive and an anxiety disorder occurring during the past year. Therefore, it can be estimated that approximately 19% of the present sample suffered from an anxiety disorder during the prior 12-month period, and 29% suffered from either a depressive or an anxiety disorder during the year. These results are at the high end of the 10% to 30% reported in prior epidemiological studies (Perez-Stable et al., 1990; Schulberg & Burns, 1988; Kirmayer et al., 1993).

The high prevalence of affective disorders identified in this sample can be explained by several possible factors. First, although methodological differences in community-based epidemiologic studies have resulted in inconsistent prevalence rates of affective disorder associated with the African-American population (Kessler et al., 1994; Vernon and Roberts, 1982; Brown, Schulberg & Madonia, 1996), this minority group has consistently been shown to have higher rates of medical comorbidity, decreased physical functioning, and higher reported incidence of sleep disturbance (Weissman, 1987) than that found in Caucasian samples. These stress-inducing factors have been linked to higher rates of affective disturbance. Thus, the racial composition of the sample may have contributed to the observed elevated rates of depressive and anxiety disorders.
The high prevalence of affective disturbance reported by this socioeconomically disadvantaged sample may also be indicative of the stress of living in an impoverished environment. Bruce, Takeuchi, and Leaf (1991) found that those living in poverty had a two-fold increased risk of an episode of at least one psychiatric disorder. Indeed, the greatest prevalence of mental health problems occurs among the lower socioeconomic groups. Additionally, this low-income, primary care population is characterized by other risk factors for stress including high rates of unemployment, low rates of health insurance coverage and severe financial hardship. These liabilities create a lack of available resources necessary to overcome the most prevalent stressful financial, medical and social situations and have been linked to higher rates of affective disturbance.

The predominance of women in the current sample (80%) inherently predisposes this group to higher rates of affective disturbance. Consistent with prior research, logistic regression results identified that the odds of having an affective disorder in women was approximately 100% higher than that of men. Biological research has implicated genetic factors and hormonal influences as essential variables for increased vulnerability to psychopathology in women. Additionally, multiple psychosocial stressors, including role overload, troubled relationships, losses and trauma also place women at increased risk of depression.

Results of the present study also identified education level as a unique contributor to the prevalence of an affective disorder; although, not in the direction expected. Research examining the social patterns of depression has consistently found higher levels of education to be associated with lower levels of depression (Ross &
Wirowsky, 1989); however, results of the present study indicated that as the number of years of formal education increased, the corresponding odds of having an affective disorder also increased (at a rate of 16% per year of education). The finding that education contributed to an increased prevalence of affective disorders is consistent with the findings of Yokopenic, Clark and Aneshensel (1983). They reported that having more education enhanced recognition of depressive problems, thereby contributing to higher rates of problem identification and treatment seeking. Patients with higher levels of education have consistently been found to present with more cognitive and affective symptoms when describing their psychological disturbance, thus leading to increased identification and diagnostic accuracy as compared to lower educated patients, who are more likely to present with a higher number of somatic symptoms associated with psychological distress (Simon, Gater, Kisely and Piccinelli, 1996). This tendency may be compounded by the presence of true medical symptomatology.

Lastly, the increased prevalence of affective disturbance identified in the current sample may be explained by the increasing trend for patients to utilize primary care practice for mental health care. Regier, Goldberg and Taube (1978) hypothesized that the high prevalence rates of psychiatric disorders in primary care settings are the result of patients using primary care settings to secure treatment for mental health problems. It is now well documented that mental health concerns are one of the major health problems encountered in the primary health care setting. Katon and Schulberg (1992) found that more than 33% of consecutive primary care attendees reported substantial levels of psychological distress. This increased utilization of primary care settings to
secure mental health care has been explained by the dramatic decrease in availability of state and county funded mental health services.

Although the prevalence rates of poverty have not significantly changed in the past decade, the availability of federal, state, and county-financed mental health services have considerably declined (Bruce et al., 1991). Mental health services have been drastically reduced to the point that only those individuals with severe psychiatric illness, who are at risk of hospitalization, are eligible for funded services. In addition, the influx of the managed care industry has resulted in decreased availability of specialty mental health services for the insured patient. Changes in the availability of mental health services have resulted in increased utilization of primary care providers for mental health treatment throughout the general population. Thus, given so few mental health services, the primary care sector is experiencing a deluge of patients seeking treatment for affective disturbance.

Following the identification of the overall high prevalence of affective disorders in the current sample, the next purpose of the present study was to examine the rates of DSM-IV depressive and anxiety disorders in patients with type 2 DM as compared to those with other chronic illness. Although the past decade of research has seen a proliferation of studies establishing a high rate of affective disorders in patients suffering from diabetes, few have attempted to examine those with type 2 DM in a comparison study against those with other chronic illnesses. Therefore, in order to determine if diabetes contributes uniquely to the presence of affective disorders, patients with type 2 DM were compared to those with no medical illness and to those diagnosed with hypertension, asthma and/or arthritis.
Type 2 DM Vs. Other Chronic Illnesses in the Incidence of AD

Once the contribution of gender and education was statistically controlled, logistic regression results indicated that type 2 DM contributed uniquely to the prediction of affective disorders above that identified in patients with hypertension, arthritis and asthma. Indeed, those with type 2 DM were found to increase the odds of experiencing an affective disorder by 126% when compared to those suffering from the other chronic illnesses examined in this study. Although the prevalence of type 2 DM has been documented to be twice as high in women (ADA, 1999), these findings were only evident after the contribution of gender and education were parceled out. Therefore, it appears that factors related to type 2 DM place an individual at increased risk of an affective disturbance above that associated with gender and chronic illness in general.

A higher prevalence of affective disturbance in patients with type 2 DM can be expected given the extensive self-management demands of this chronic illness. Daily management of diabetes can be demanding as it often involves controlled dietary intake, social interference, exercise requirements, weight loss and the threat of long-term functional impairment. Perhaps most important from a psychological and behavioral perspective, patients must adhere to the demanding requirements of DM management while knowing that eventual onset of complications is almost inevitable, thus contributing to increased stress.

Nevertheless, these results conflict with those found by Weyerer et al. (1989) who identified that although patients with diabetes (types 1 and 2) had a higher prevalence of psychiatric impairment than those with no somatic illness, no differences
were noted when they were compared to those with other somatic illnesses. However, their study included predominantly Caucasians with both types 1 and 2 DM who volunteered to participate in a community field study. Additionally, in the Los Angeles part of the Epidemiologic Catchment Area Program, Wells et al. (1988b) provided data on psychiatric disorders and eight chronic medical conditions in a community sample of 2554 adults. This study revealed that although most chronic medical illnesses were strongly associated with psychiatric disorders, diabetes was not. However, the diagnosis of diabetes was not validated by physician examination. Given that a large U.S. study revealed that approximately 50% of those who meet criteria for diabetes do not know that they are diabetic (Kovar, Harris & Hadden, 1987), highlights this as a significant limitation. The results of this study indicate that patients with type 2 DM significantly differ from those with other chronic illnesses in the prevalence of affective disorders.

These results support prior research (Penninx et al., 1998; Folkman & Lazarus, 1980) that chronic stress related to medical disorders serves as a strong predictor of the development of psychopathology and suggests that diabetes contributes uniquely to an increased prevalence of affective disturbance in a low-income, primary care population with chronic medical illnesses. Given that an extensive literature has revealed that social support may contribute to the variability in the impact of chronic illness on psychological health, the next purpose of the present study was to determine whether perceived social support was negatively associated with affective disturbance in low-income, primary care patients.
Social Support

Chronically ill patients who receive considerable social support have been found to be at decreased risk of subsequent psychopathology. Prior research has identified that the efficacy of social support resources may depend on the type of support available and the specific characteristics of the stressor (i.e., disease). Therefore, in order to examine whether social support has an overall beneficial effect of decreasing the incidence of affective disorders, the effects of social support were examined in those with and without medical illness. Results indicated that social support provides a generic, overall beneficial effect, thereby supporting the apriori hypothesis that social support is a moderating variable for low-income, primary care patients with and without a chronic medical illness. However, a significant interaction effect was also identified between social support and illness group.

Results indicated that social support was more beneficial for patients in both chronic illness groups: however, no buffering effect was identified in patients with no chronic medical conditions. The traditional buffering hypothesis states that the impact of stress on mental health is stronger when social support is low. Additionally, the association between social support and mental health is stronger under conditions of high versus low stress (Kessler & McLeod, 1985). Additionally, Wheaton (1983) argued that buffering might be more pronounced for chronic rather than acute stress. The findings in the present study support both of these hypotheses and lead to the conclusion that in a sample of chronically ill, low-income, poorly educated, primary care patients with multiple sources of stress, social support contributes to improved
emotional well-being. However, the association between chronic illness, social support and affective disorders may not be so direct.

Affective disturbance, social support and type 2 DM may be related by several possible mechanisms that are not mutually exclusive. For example, depression and/or anxiety symptoms may arise from the direct biological effects of chronic medical diseases; from the personal meaning of the illness, or from the reaction of the individual and his social support network to the disability and discomfort associated with daily management of a long-term illness. In addition, psychosocial complications of illness, including loss of income or employment and possible disturbances in family and social relations, may also contribute to the development of affective disturbance.

The "buffering model" of social support is based on the assumption that social support serves a protective function with respect to mental health when individuals are faced with stressful life circumstances (Cohen and Wills, 1985). In medical patients, the degree of stress associated with disease may be related to emotional loss, physical impairment, lifestyle interference, or threatened disability. Fitzpatrick et al. (1988) tested the moderating effect of social support in severely impaired rheumatoid arthritis patients, however, evidence for a buffering effect was not found. However, they measured social support using a scale designed to assess the emotional aspects of social support (appraisal, belonging, self-esteem), which may be most important for those whose needs for physical support are not high. Among the medically ill, these aspects of social support may be effective buffers; however, other aspects of social support may be more relevant.
Thus, in the present study, it was hypothesized that among those with disabling medical illnesses (i.e., type 2 DM), more substantive forms of social support (i.e., task completion, transportation assistance, financial aid, coping with illness-related deficits) would be the most significant aspects of support. In an effort to determine whether tangible social support would be more protective of low-income patients coping with multiple sources of stress, each of the four types of social support assessed by the ISEL was independently evaluated. After analyzing the data using a backward elimination logistic regression, tangible social support emerged as the strongest predictor of affective disturbance for the entire sample of participants. However, each of the four social support subscale scores were so highly correlated that none contributed uniquely to the prediction of an affective disorder. Therefore, although it appears that tangible support is an important buffer for affective disorders in those coping with the daily stress associated with socioeconomic disability, multiple chronic health concerns, and lack of health insurance, emotional sources of support appear to be equally as important.

The identification that both tangible social support and the more emotion-focused types of support were so highly correlated in this sample raises the issue of adequacy in the operationalization of the construct of social support. In order to demonstrate that these conceptually different functions of support are related to health, it is important to demonstrate that the measures of the different support functions are distinguishable in function (House & Kahn, 1985). Sarason, Pierce, and Sarason (1987) found that the four social support scales correlated highly with one another, suggesting that they measured the same construct. Similarly, Schonfeld (1991) reported that the
appraisal, tangible and belonging scales were moderately correlated with each other and suggested that the tentative nature of the reliability of the difference scores suggests that the ISEL scales are not multidimensional. Brookings and Bolton (1988) also identified large correlations among the four factors suggesting a general second-order social support factor; however, they suggest that the four subscales provide sufficiently unique information to warrant maintaining the four subscale scores in the measure. Nevertheless, there is sufficient information to suggest that the construct of tangible support is not adequately tapped by the questions on the ISEL. However, this issue may also be examined from a construct perspective.

The present finding of an absence of clearly delineated social support dimensions reflected in the ISEL subscales is consistent with a number of prior research findings (Schonfeld, 1991; Sarason et al., 1987). Therefore, it is possible that the overlap in the scales reflects a characteristic inherent to social support. That is, when one type of support is activated, a conceptually different type of support is also mobilized (Schonfeld, 1991). For example, if a person responds to a tangible-support item on the ISEL by strongly agreeing that they could find someone to help them with their chores if sick, it is likely that those providing that type of tangible support would also be a source of emotional provisions. Namely, this very support person would also be likely to supply advice (appraisal), encouragement (self-esteem) and companionship (belonging) to the ill respondent. Therefore, future studies investigating the influence of social support are advised to examine the adequacy of the measurement instruments employed in assessing support functions.
In conclusion, in a low-income, primary care population with multiple sources of stress, it appears that patients with chronic illness may benefit both from concrete, daily assistance with task completion and assistance with illness-related activities; however, more emotion-focused sources of support are also important in buffering the association with affective disturbance.

**Intervention Implications**

These results suggest important implications for the recognition of affective disorders in this low-income, primary care population. Particularly, the high rate of affective disorders found in this sample of primary care patients, emphasizes the need for screening measures that sensitize clinicians to the presence of affective disorders. Additionally, given that social support clearly makes a difference in the emotional well-being of patients with chronic illness, increasing sources of social support for patients with chronic illness may significantly decrease the prevalence of depression and anxiety. Increasing social support in the primary care setting may be accomplished by offering educational seminars, peer support groups and provisions for transportation, child care and medical supplies.

Additionally, encouraging patients to utilize family, community and regional resources may assist in providing tangible resources in addition to increasing a sense of belonging. Because family efforts to help those with diabetes have been associated with negative emotional responses (Bailey & Kahn, 1993), dyadic or group counseling for those with diabetes and their primary support providers may facilitate social support by increasing the clarity of communication and modeling new ways to offer, receive and refuse assistance.

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Limitations and Future Directions

Several methodological and theoretical limitations may have contributed to the findings in the present study. This study was conducted with predominantly low-income, poorly educated, primary care patients. Therefore, the first limitation of the current study pertains to the lack of generalizability of the results. The results of the present study may be limited to similar primary care populations: that is low-income, African-American, females. Although the intention of the current study was to evaluate this high-risk population in order to determine the prevalence of affective disorders and the association of social support, these results should not be assumed to apply to all low-income patients in other settings and in other demographic regions.

A second limitation pertains to the possibility that other demographic and medical factors, not examined in the current study, serve as more powerful predictors of affective disturbance in this population. Although a good deal of effort was made to control for demographic risk factors for affective disorders, factors which may be associated with increased affective impairment may not have been evaluated. Perhaps most important, degree of functional impairment associated with disease was not adequately assessed.

Previous research suggests that psychological distress increases in relation to physical impairment, although this relationship is not necessarily linear (Littlefield, 1990). The role of social support as a protective factor with respect to mental health may be most apparent in individuals faced with particularly stressful life circumstances (Cohen & Wills, 1985). In medical patients, if degree of physical impairment is regarded as a stressor, the moderating effect of social support should be most apparent.
for patients who are more impaired. Littlefield et al. (1990) examined the association between social support and level of severity of type 1 diabetic illness. Indeed, they found that depressive symptoms, as assessed with the Beck Depression Inventory, positively correlated with functional impairment and that social support moderated depression in the face of greater functional impairment.

Future studies are recommended to examine degree of functional incapacitation in order to establish consistent differences in affective disorders across medical illnesses, thus providing more support for a disease-specific model of illness. Although the results of the present study suggest that low-income adults with type 2 DM may be at increased risk for affective disorders (i.e., a disease-specific model), other illness factors (disease severity, duration of disorder) were not assessed. Further identification of stressors relatively unique to a particular disorder, as well as those common across disorders, may assist in elucidating factors contributing to increased affective disturbance and assist clinicians in planning interventions.

From a statistical point of view, this study is limited by sample size. Although power analyses were conducted prior to the onset of the study and the original sample size possessed adequate power to detect modest effects with an alpha < .05 for chi-square and logistic regression analyses, when the sample was divided into each of three illness groups and further divided into four psychiatric diagnostic groups, the cell sizes were decreased dramatically. Therefore, future studies are recommended to attempt to replicate these findings using larger sample sizes.

Finally, the standard limitations regarding cross-sectional, behavioral research apply to the present study. First, causal interpretations pertaining to the development of
affective disorders given lower rates of social support are discouraged. However, these results suggest a causal link which may be identified with a longitudinal design. Future studies are recommended to examine the influence of high and low levels of social support as variables in the development of affective disorders in patients with diabetes versus those with other chronic diseases. Second, the use of self-report to determine social support opens the door to the possibility of response bias. Future studies are advised to utilize additional objective assessment methods including other-report, direct behavioral observation, and/or daily monitoring. A multi-modal assessment would account for this possible confound and would serve to strengthen the confidence of the present conclusions.

**Summary**

Despite the limitations mentioned above, the present study contributed unique findings to the literature pertaining to affective disturbance, social support and type 2 DM. This study represents one of the first to examine the DIS-IV determined prevalence of affective disorders in primary care patients with type 2 DM as compared to those with hypertension, asthma, and arthritis. Results support prior research that the prevalence of affective disturbance is high in primary care samples and suggests that type 2 DM contributes uniquely to both depressive and anxiety disorders in low-income patients. The present study also served to advance the literature by evaluating the association of social support and affective disorders across those with and without chronic illnesses. Results indicate that social support is an important moderator of affective disorders for patients with chronic illness. These findings have important intervention implications for primary care practice including increasing efforts to
diagnose and treat affective disturbance in low-income patients and offering supportive services and/or encouraging patients to utilize the supportive services offered by community resources.
REFERENCES


Brantley, P.J., Mehan, D. J. Jr., & Thomas, J.L. (2000). The Beck Depression Inventory (BDI) and the Center for Epidemiologic Studies Depression Scale (CES-D). In M. Marush (Ed.), Handbook of psychological assessment in primary care settings: London: Lawrence Erlbaum Associates.


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APPENDIX A: DEMOGRAPHIC QUESTIONNAIRE

1. Subject Number: ________________ 2. Age: __________________________

3. Medical Record #: ________________ 4. Clinic: ( ) Medicine ( ) Family Practice

5. Sex (Circle one): Male Female 6. Job/Occupation: ___________________

7. Marital Status: (Circle one)
   Single
   Married
   Separated
   Divorced
   Other (Specify) ______

8. Race (Circle one):
   White (Non-Hispanic)
   African-American
   Hispanic
   Asian
   Other: (specify) __________

9. What is the highest grade you have completed:
   Grade school (1 - 12): ______
   College/Trade school: ______
   Have you completed high school (circle one): Yes No
   If you have not graduated from high school; do you have a GED? Yes No

10. Other education (please specify type and number of years):

11. What is your average monthly income? $___________

   Where does this money come from? (circle each one that applies to you and
   indicate the amount of money you receive from that source each month)

   My job/career $______________
   Public assistance/Welfare $__________
   Social Security/Disability $____________
   Unemployment $__________
   Child Support/Alimony $__________
   Allowance $__________
   Other sources: $__________
   $__________
12. How many people are in your home? __________
   
   What is the total monthly income including everyone in your home? ______
   
   Where does this money come from? (circle all that applies to your family and indicate the amount of money your family receives from that source each month)
   
   My job/career $ __________
   Public assistance/Welfare $ __________
   Social Security/Disability $ __________
   Unemployment $ __________
   Child Support/Alimony $ __________
   Allowance $ __________
   Other sources: $ __________
                   $ __________
                   $ __________

13. Have you ever received treatment for a mental health problem? Yes No
   What kind of problem? _____________________________

14. Have you ever received treatment for a drug or alcohol problem? Yes No
   What kind of problem? _____________________________

15. Do you have any health insurance? Yes No
   If yes, what kind? _____________________________

16. Your address: _____________________________

17. Your phone number: _____________________________
Institutional Review Board
Louisiana State University
Baton Rouge Campus

(504) 345-3145

APPROVAL DATE: July 18, 1995

FROM: Institutional Review Board

TO: Dr. Phillip Brantley
Pennington Biomedical Research Center

RE: Proposal No. 1871

This is to certify that a quorum of the Institutional Review Board reviewed the proposal entitled:

Stress and Psychopathology in Medical Utilization.

The committee evaluated the procedures of the proposal following the guidelines established for activities supported by federal funds involving human research subjects.

Recommendation of Committee: X APPROVED

NOT APPROVED

Comments: License No. 72-3
Multiple Assurance No. M1128

A review of this proposal by the Committee will be considered at least on an annual basis, and at more frequent intervals depending on the element of risk.

W. Sheldon Bivin, Chairman
APPENDIX C: INFORMED CONSENT FORM

LOUISIANA STATE UNIVERSITY MEDICAL CENTER IN NEW ORLEANS
CONSENT FORM

1. **Study Title:** The Roles of Stress, Social Support, and Psychopathology in Primary Care Utilization.

2. **Performance Site:** Family Practice and General Medicine Clinics at Earl K. Long Medical Center, Baton Rouge, Louisiana.

3. **Names and Telephone Numbers of Investigators:**
   - For 24-hour access, please call Isabel Scarinci at (504)358-1105.
   - John Howe, M.D. (504) 358-1103
   - Janet L. Thomas (504) 358-3927
   - Glenn N. Jones, Ph.D. (504) 358-1105
   - Phillip J. Brantley, Ph.D. (504) 358-1105

4. **Purpose of the Study:** This is a research study to determine the roles of stress, mental health, social support, and coping strategies in primary care utilization.

5. **Subject Inclusion Criteria:** Male and female volunteers ages 18 and older who are patients in the EKL Department of Family Medicine or EKL General Medicine Clinic will qualify as subjects in this research project.

6. **Subject Exclusion Criteria:** Subjects will be excluded from Phase II of the project for not having a telephone at home.

7. **Description of the Study:** This is a research study to determine the roles of stress, mental health, social support, and coping strategies in primary care utilization. Subjects will participate in the study in two phases. Subjects do not have to participate in Phase II to participate in Phase I. Subjects must participate in Phase I to participate in Phase II. In Phase I, subjects will be chosen from waiting rooms at the EKL Department of Family Medicine and General Medicine Clinics. Subjects who agree to will complete the demographics questionnaire and the General Health Questionnaire (GHQ).

   Phase II of this project will be divided into 4 tasks:
   (1) Subjects will complete the following questionnaires on the same day: the Interpersonal Support Evaluation List (ISEL) (a measure of social support), the Ways of Coping Questionnaire, (WOC) (a measure of coping strategies), the Weekly Stress Inventory (WSI) (a measure of minor stress), the 1994 Behavioral Risk Factor Questionnaire (a measure of health risk behaviors), and the Ways of Religious Coping Scale (a measure of religious coping).
   (2) Subjects will be asked to complete the WSI and a self-report hospital utilization questionnaire (SRU) bimonthly for one year, and in the sixth month the Life Experiences Survey (LES) (a measure of major stressors) will be added to the phone interview. A research assistant will contact subjects by telephone once every other
month in order to collect the responses to these questionnaires and to answer any
questions subjects may have;
(3) One year after the initial contact, subjects will be scheduled to complete the
following at the Center for Primary Care Research at EKL: (a) Composite International
Diagnostic Interview (CIDI) (a mental health interview), (b) ISEL, (c) WOC, and
(d) SRU.
(4) Subjects will be contacted by telephone 3, 6, 9 and 12 months following the
interview and asked to answer the SRU.

8. Benefits to Subject: At the end of study, subjects will be provided with a summary
report of findings and their relevance to primary care utilization, at their request. If
needed, subjects will receive a referral to an appropriate agency.

9. Risks to Subject: No known physical risks. Participation in this study may involve
unforeseen risks.

10. Alternatives to Participation in the Study: Since no treatment is involved in this
study, the only alternative to participation in the study is not to participate.

11. Subject Removal: Subjects will be removed from the study if they fail to complete
(1) Phase I; (2) part 1 of Phase II; (3) 80% or more of requested bimonthly interviews;
(4) part 3 or 4 of Phase II. There is no risk involved in being removed from the study.

12. Subjects Right to Refuse to Participate or Withdraw: Study subjects may refuse to
participate or withdraw from the study at any time without jeopardizing, in any way,
their medical treatment at this institution in the present or future. Should significant
new findings develop during the course of the research, which may relate to the
subject's willingness to continue participation, that information will be provided to the
subject. There are no special risks involved in withdrawal from the study.

13. Subjects Right To Privacy: The results of the study may be released to the funding
agency. The results of the study may be published. The privacy of subjects will be
protected and they will not be identified in any way.

14. Release of Information: The medical records related to the study are available to the
sponsoring agency. Information provided during the course of the study is confidential.
The only exceptions are in cases where subjects indicate suicidal desires, homicidal
desires, or child abuse. In these instances, the researchers are ethically and legally
required to inform their supervisor regarding the subject's desires.

15. Financial Information: A. Participation in this study will not result in any extra
charges beyond those routinely incurred by patients with similar illnesses. B. The costs
of the study related to unforeseen complications must be met by subjects. C. Subject
Payment: Subjects will be paid $15 (fifteen dollars) for completing Phase I of the study.
Subjects will be paid $20 (twenty dollars) for completing part 1 of Phase II. Subjects
will be paid $10 (ten dollars) for each telephone interview completed during part 2
Phase II. Subjects will be paid $50 (fifty dollars) for completing part 3 of Phase II and $10 (ten dollars) for each phone interview completed during part 2 Phase II. Subjects will be paid $50 (fifty dollars) for completing part 3 of Phase II and $10 (ten dollars) for each phone interview completed during part 4 of Phase II.

16. **Signatures:** The study has been discussed with me and all my questions have been answered. I understand that additional questions regarding the study should be directed to investigators listed on page one of this consent form. I understand that if I have questions about subjects rights, or other concerns, I can contact the Chancellor of the LSU Medical Center, at (504) 568-4800. I agree to the terms above and acknowledge I have been given a copy of the consent form.

<table>
<thead>
<tr>
<th>Signature of Subject</th>
<th>Date</th>
<th>Signature of Witness</th>
<th>Date</th>
</tr>
</thead>
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APPENDIX D: DEMOGRAPHIC PROFILE OF THE ORIGINAL SAMPLE

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<th>Categorical Variable</th>
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<th>Percent</th>
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<td></td>
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<tr>
<td>Female</td>
<td>324</td>
<td>80.4</td>
</tr>
<tr>
<td>Male</td>
<td>79</td>
<td>19.6</td>
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<tr>
<td>Race:</td>
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<td></td>
</tr>
<tr>
<td>Black</td>
<td>295</td>
<td>73.2</td>
</tr>
<tr>
<td>White</td>
<td>108</td>
<td>26.8</td>
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<tr>
<td>Marital Status:</td>
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<tr>
<td>Married</td>
<td>150</td>
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<tr>
<td>Single</td>
<td>109</td>
<td>37.4</td>
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<tr>
<td>Other</td>
<td>142</td>
<td>35.4</td>
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<td>Job Status:</td>
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<tr>
<td>Unemployed</td>
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<tr>
<td>Employed</td>
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<td>41.0</td>
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<tr>
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<tr>
<td>Medicare</td>
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<td>8.5</td>
</tr>
<tr>
<td>Medical</td>
<td>27</td>
<td>6.7</td>
</tr>
<tr>
<td>Private</td>
<td>29</td>
<td>7.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Continuous Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
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<td>13.94</td>
<td>18-78</td>
</tr>
<tr>
<td>Education level</td>
<td>11.13</td>
<td>2.68</td>
<td>0-16</td>
</tr>
<tr>
<td>Income</td>
<td>487.87</td>
<td>441.29</td>
<td>0-3600</td>
</tr>
<tr>
<td>BMI</td>
<td>31.03</td>
<td>8.56</td>
<td>14.9-70.6</td>
</tr>
<tr>
<td># chronic illnesses</td>
<td>2.48</td>
<td>1.46</td>
<td>0-8</td>
</tr>
</tbody>
</table>
Figure 4: Linear Model of Social Support (X) as a Moderating Variable Between Illness Group and Affective Disorders as Determined By Logged Odds (B)
Figure 5: Odds of Having an Affective Disorder Diagnosis for Females with 11.3 Years of Education for Each Illness Group with Social Support as a Moderating Variable
VITA

Janet Leigh Thomas was born in Pittsburgh, Pennsylvania. She received a Bachelor of Arts degree in psychology from the University of California at Riverside in 1986 and a Master of Social Work degree from San Diego State University in 1990. In 1999 she earned a Master of Psychology degree from Louisiana State University. She completed an internship in clinical psychology at the University of California, San Diego and the Veterans Affairs San Diego Healthcare System Internship Training Program and received a doctor of philosophy from Louisiana State University in September, 2001. Her future academic aspirations include completing a postdoctoral research fellowship in nicotine dependence at the Mayo Clinic in Rochester, Minnesota.
Candidate: Janet Leigh Thomas

Major Field: Psychology

Title of Dissertation: Social Support and the Prevalence of Depressive and Affective Disorders in Low-Income Adults with Type 2 Diabetes and Other Chronic Illnesses

Approved:

[Signatures]

Dean of the Graduate School

EXAMINING COMMITTEE:

[Signatures]

Date of Examination: September 24, 2001