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Assessing Students' Risk Factors for Type II Diabetes at a Midwest Public University

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ASSESSING STUDENTS' RISK FACTORS FOR TYPE II DIABETES AT A
MIDWEST PUBLIC UNIVERSITY

By

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Abstract

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The purpose of this study was to assess students' risk factors for type II diabetes at a Midwest public university. It further examined students' perceived susceptibility, perceived severity, and self-efficacy of the disease. The design of the cross-sectional study was based on risk factors for type II diabetes listed by the American Diabetes Association and the Health Belief Model's constructs of perceived susceptibility, perceived seriousness, and self-efficacy. A survey was distributed to non-diabetic college students aged 18 and older enrolled in general education courses at a Midwest public university. A purposive sampling of 432 students enrolled in Health 101 and Psychology 101 at Minnesota State University, Mankato was used in this study. The survey included questions on risk factors for type II diabetes, perceived susceptibility, perceived seriousness, and self-efficacy toward the disease.

Data analysis showed the most common risk factors for type II diabetes among college students were lack of physical activity, increased body mass index, and an apple body shape. Males possessed more risk factors than females. Findings from the study in relation to the Health Belief Model's perceived susceptibility, perceived severity, and self-efficacy showed that on a group level, participants with more risk factors for type II diabetes perceived themselves as more susceptible to the disease, and participants with

familial history of type II diabetes perceived the seriousness of the disease at the same level as those with no family history. As for the Health Belief Model's construct of self-efficacy, nearly three-quarters of the participants felt confident that they can prevent type II diabetes.

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Introduction

Diabetes is a significant public health problem (Latachan et al., 2010). Diabetes

has been termed an epidemic, as the prevalence has skyrocketed (Mainous, Diaz, &

Everett, 2007). Diabetes and its complications are substantial causes of morbidity and

mortality, and contribute radically to health care costs (Cowie, Rust, Byrd-Holt, &

Eberhardt, 2003). In the United States (U.S.), diabetes is currently the sixth leading cause

of death. It also is the leading cause of pregnancy complications, blindness, foot

amputation, and kidney failure (Powell, Hill, & Clancy, 2007). In 2007, the estimated

cost of diabetes in the U.S. was 174 billion dollars (U.S. Department of Health and

Human Services, Centers for Disease Control and Prevention (U.S. HHS & CDC), 2008).

The diabetes epidemic has certainly taken its toll on the U.S. population, and the

problem is projected to worsen. Among all demographic categories, including age, race,

and sex, diabetes is increasing. One-third of people born in the U.S. in the year 2000 are

predicted to develop diabetes at some point in their life. Census projections along with

results from the National Health Interview survey report a 225 percent increase in

diabetes is projected between 2000 and 2050. This means an increase in prevalence from

4.4 percent to 9.7 percent, or 12 to 39 million individuals diagnosed with diabetes

(Engelgau, Geiss, Saaddine, Boyle, Benjamin, Gregg, et al., 2004).

A prominent factor in driving the diabetes epidemic is the increase in overweight

and obesity (Mainous et al., 2007). Obesity is a major risk factor for diabetes, and its

prevalence is increasing among men, women, and children. As of 2007-2008, 32.2 percent of adult men, along with 35.5 percent of adult women were obese (Flegal, Carroll, Ogden, & Curtin, 2010).

Diabetes is increasingly diagnosed among adolescents and young adults (Mainous et al., 2007). Gaining weight during college puts students at risk for developing type II diabetes. A study conducted by the Robert Wood Johnson Foundation and National Institutes of Health found that both women and men gain an average of 7.8 pounds during their first year at college (Patridge, 2007). Thirty-five percent of undergraduate college students are overweight or obese in the U.S. (Lowry, Galuska, Fulton, Wechsler, Kann, & Collins, 2000). Among 18 to 29 year olds with some college education, obesity rates have increased rapidly (Huang, Shimel, Lee, Delancey, & Strother, 2007). Many college students are putting their health at risk through lifestyle choices such as insufficient physical activity and non-nutritious food choices. These decisions result in a high prevalence of overweight and obese college students, thus putting themselves at high risk for type II diabetes (Lowry et al., 2000).

Yet another issue remains; many people with diabetes are unaware of their condition. In one-third of all people with diabetes, the condition remains undiagnosed (Engelgau, et al., 2004). It is typical for diabetes to be asymptomatic for extended periods of time, during which microvascular complications can develop (Latachan et al., 2010). To limit the chances of grave complications, diabetes must be treated in a timely manner (Nijhof, ter Hoeven, & deJong, 2008).

Because diabetes is often undiagnosed, an imperative step in preventing or delaying type II diabetes and its complications is to recognize people at high risk so they can receive appropriate medical care (Heikes, Eddy, Arondekar, & Schlessinger, 2008). Since diabetes leads to extensive morbidity and mortality, prediction of one's high risk for type II diabetes is an important issue as it can lead to early recognition and treatment. Prediction of high risk for type II diabetes can also help guide interventions and health policy development (Mainous et al., 2007). Screening for diabetes has been shown to be cost-effective and encourages prevention and early diagnosis of the disease, improving long-term outcomes (Latachan et al., 2010).

In spite of high overweight and obesity rates among college students, few studies have examined metabolic risks in this population (Huang et al., 2007). Many risk tests for diabetes are available; however they have limited utility in a younger adult population. Studies have shown that a risk score for the development of type II diabetes created from a middle-aged population is less accurate in the prediction of development of type II diabetes in a younger population (Mainous et al., 2007). As the prevalence of type II diabetes rises among young adults, it is crucial to be able to identify high risk populations (Mainous, et al., 2007).

One of the most widely used conceptual frameworks studying health behavior is the Health Belief Model (HBM). It is a guiding framework for health behavior interventions, and has been used to explain change and continuation of health-related behaviors. In the 1950's the HBM was created by a group of U.S. Public Health Service psychologists. They used the model to explain a general failure of people to partake in

programs to prevent and identify disease. It was later used to explain people's behaviors in response to symptoms, diagnosed illness, and devotion to medical regimens (Glanz, Lewis, Marcus, & Rimer, 2002).

The HBM is a value-expectancy theory. When applying the theory, several value-expectancy concepts exist: the aspiration to avoid illness or to get healthy, the belief that a precise health action accessible to a person would prevent illness, the individual's approximation of personal susceptibility and severity of the disease, and the probability of being able to decrease the threat through individual action (Glanz, et al., 2002).

Three HBM concepts applied in this study are self-efficacy, perceived susceptibility and perceived severity. Self-efficacy is defined as one's confidence in his or her ability to act. Perceived susceptibility refers to an individual's perception of risk of contracting a health condition. Perceived severity is one's idea of how serious a condition and its sequelae are. Combined, perceived susceptibility and perceived severity have been termed perceived threat (Glanz et al., 2002).

Statement of the Problem

College students are an understudied population with a considerable risk for obesity and metabolic dysfunctions (Huang et al., 2007). Little is known about college students' risk for type II diabetes, nor about students' perceived threat of the disease. There is an urgent need to better identify and understand metabolic dysfunctions among U.S. college students (Huang, Kempf, Strother, Li, Lee, Harris, et al., 2004). The ultimate goal of this research is to determine college students' risk factors for type II diabetes and

students' perceived susceptibility, perceived severity, and self-efficacy toward the disease.

In order to attain the research goal, a survey was distributed to adults aged 18 and older enrolled in introductory health science and psychology classes at Minnesota State University, Mankato (MSU, M). The survey assessed college students' risk factors for type II diabetes. Further, it examined students' perceived susceptibility, perceived severity, and self-efficacy toward the disease.

Significance of the Problem

In spite of high overweight and obesity rates among college students, few studies have examined metabolic risks in this population (Huang et al., 2007). Many risk tests for type II diabetes are available; however they have limited utility in a younger adult population (Mainous et al., 2007). Further study of college students' risk factors for type II diabetes will provide needed information to assist in the development of more effective programs and interventions for early detection and treatment of type II diabetes among the college population. Early detection and treatment of diabetes could ultimately reduce morbidity, mortality, health care costs, and diabetes-related complications in the future.

Research Questions

This study examined college students' risk factors for type II diabetes, as well as students' perceived susceptibility and seriousness of the disease. The independent variables were risk factors, gender, confidence, and family history of type II diabetes. The dependent variables observed in the study were perceived severity and perceived seriousness.

The following research questions were addressed in the study:

1.	What risk factors for type II diabetes are most common among MSU, M college students?

2.	Which gender has more risk factors for type II diabetes?

3.	Do students who report more risk factors for type II diabetes perceive themselves as more susceptible for type II diabetes?

4.	Do students who report familial history of type II diabetes perceive the disease as more serious?

5.	How confident are students that they can prevent type II diabetes?

Limitations

The following limitations were beyond the control of the researcher:

1.	Few current studies have examined metabolic risks in the college population. There is lack of literature to review on this topic.

2.	Ideally, the researcher would have surveyed all students at MSU, M. This, however, was not feasible. The data the researcher has is a sample of MSU, M's students. Data came from participants enrolled in Health 101

and PSYC 101, both introductory courses. They are general education

classes, and the majority of participants enrolled are freshmen.

3.   Printed surveys were used to collect data. Data were self-reported from

participants, and may not be 100 percent accurate.

4.   If a participant left a risk factor question blank, it was considered a "No".

5.   If a participant answered "Unsure" or "I don't know" for a risk factor, it

was considered a "No".

6.   Figures for weight (in pounds), height (in inches), and number of days per

week of physical activity were rounded down if a decimal or range was

included in the answer.

Delimitations

The following delimitations were used to limit the scope of the study:

1.   Due to time constraints, the survey used to gather data was distributed

during the months of January and February 2011.

2.   The survey was distributed to students enrolled in Health Science and

Psychology classes at MSU, M.

3.   Only adults aged 18 years and older completed the survey.

4.   Participants who had been previously diagnosed with diabetes were

instructed not to complete the survey.

5.   The HBM was used for a basis for several of the survey questions.

Assumptions

These assumptions were thought to be true about the study:

1.   The participants answered the survey questions to the best of their ability

and were truthful.

2.   The researcher assumed that students would know if they were diabetic.

Definition of Terms

These definitions were used throughout the research and are unique to the study:

Type II diabetes risk factors. The risk factors for diabetes defined by the

American Diabetes Association include: middle-old age, certain race or ethnic

backgrounds, overweight, low physical activity level, high blood pressure, high

cholesterol, family history of diabetes, central obesity, and history of diabetes

during pregnancy (American Diabetes Association, n.d.).

Health belief model. A value-expectancy theory that explains health behavior

change and continuation (Glanz et al., 2002).

Perceived severity. A Health Belief Model construct; perceived severity is

defined as one's belief of how serious a condition and its sequelae are (Glanz et

al., 2002).

Perceived susceptibility. A Health Belief Model construct; perceived

susceptibility is defined as one's belief regarding the chance of getting a condition

(Glanz et al., 2002).

Perceived threat. The combination of the Health Belief Model's constructs of

perceived susceptibility and perceived severity (Glanz et al., 2002).

Self-efficacy. One's confidence in his or her ability to act (Glanz et al., 2002).

Chapter Two: Review of Related Literature

Introduction

The purpose of this study was to examine college students' risk factors for type II diabetes at a Midwest public university. In identifying literature pertinent to this study, peer-reviewed publications were used that reported research related to diabetes, college students, and the health belief model's constructs of self-efficacy, perceived susceptibility, and perceived severity. This chapter is a review of the literature pertaining to type II diabetes and college students. The first section describes diabetes as a disease: types, prevalence, risk factors, prevention, and treatment. The second section presents a review of literature regarding the complications and cost of diabetes. The third section investigates college students' risk for type II diabetes. Lastly, published research using the Health Belief Model to assess students' health behaviors and options to control the prevalence of diabetes are reviewed.

Diabetes

In the U.S., diabetes is a major cause of morbidity and mortality (Cowie et al., 2003). Diabetes is defined as a group of diseases characterized by elevated levels of blood glucose due to defects in insulin action, insulin production, or both. Diabetes typically begins with insulin resistance, a problem in which insulin is improperly used by the body's cells. The need for insulin increases, and the pancreas loses its ability to manufacture it. The disease can cause serious complications and even premature death, yet many steps can be taken to control the disease, thus lowering the risk of

complications (U.S. HHS & CDC, 2008). There are several types of diabetes which include: type I, type II, pre-diabetes, gestational diabetes, and the metabolic syndrome.

Types of Diabetes

Type I diabetes occurs when the body's immune system kills pancreatic beta cells, which produce insulin. Five to ten percent of all diagnosed cases of diabetes are classified as type I. Type I diabetes has previously been termed juvenile-onset diabetes or insulin-dependent diabetes as it typically involves children (Engelgau et al., 2004).

Type II diabetes occurs when target tissues fail to properly use insulin, a condition termed insulin resistance (Engelgau et al., 2004). Ninety to ninety-five percent of all diagnosed cases of diabetes are classified as type II. It was previously termed adult-onset diabetes or non-insulin dependent diabetes (U.S. HHS & CDC, 2008).

Pre-diabetes is defined as a condition in which individuals have elevated blood glucose levels, but not high enough to be classified as diabetes (U.S. HHS & CDC, 2008). Evidence shows that pre-diabetes is associated with co-morbidities and complications (Koopman, Mainous, Everett, & Carter, 2008). Although not defined as diabetes, people with pre-diabetes are at risk for developing stroke, heart disease, and type II diabetes. Those with pre-diabetes have an increased risk of development of type II diabetes of 30 percent over four years, and 70 percent over 30 years (Heikes et al., 2008). By losing weight and increasing physical activity, pre-diabetics can return their blood glucose levels to normal and prevent or delay diabetes. Progression from pre-diabetes to type II diabetes is not inevitable. Research has shown lifestyle interventions to be more

cost-effective than medication in preventing and delaying the progression of pre-diabetes to diabetes (U.S. HHS & CDC, 2008).

Gestational diabetes appears for the first time during pregnancy (ADA, *Stopping diabetes starts now*, n.d.). Hormones released from the placenta during pregnancy block the action of the mother's insulin in her body, causing insulin resistance. Without insulin, glucose builds up to abnormally high levels in the blood and causes hyperglycemia. Each year in the U.S. approximately four percent of pregnant women develop gestational diabetes (ADA, *What is gestational diabetes?*, n.d.*).* Developing gestational diabetes elevates one's risk for type II diabetes later in life (ADA, *Stopping diabetes starts now*, n.d.).

Metabolic syndrome is defined as a cluster of metabolic risks including impaired glucose metabolism, hypertension, low levels of high-density lipoprotein cholesterol, high triglycerides, and central obesity (Huang, et al., 2007). An underlying feature of the metabolic syndrome is insulin resistance. Individuals with metabolic syndrome have an elevated risk for developing diabetes. Perhaps because two-thirds of the U.S. adult population is overweight, the current prevalence of the metabolic syndrome, 22 percent, is now higher than ever before (Ford, Giles, & Dietz, 2002).

Prevalence of Diabetes

The prevalence of diabetes in the U.S. is increasing at an alarming rate. Because of the high prevalence of diabetes, it is being called an epidemic (Mainous et al., 2007). Between 2000 and 2050, the prevalence is estimated to increase 165 percent (Powell et al., 2007). In 2006, the *New York Times* published an article stating that the number of

diabetics in the U.S. had grown by 80 percent in the past decade (Nijhof et al., 2008). In 2007, 23.6 million, or 7.8 percent of the entire U.S. population had diabetes. Of the 23.6 million, 17.9 million were diagnosed cases of diabetes, and an estimated 5.7 million cases were undiagnosed. Prevalence estimates of individuals 20 years of age and older are striking, as 10.7 percent of people in this age group have diabetes. In addition to the diabetes crisis, 57 million adults had pre-diabetes (U.S. HHS & CDC, 2008). Worldwide, it is estimated that at least 171 million people have diabetes. By 2030, this number is expected to grow to 366 million (Nijhof et al., 2008).

Risk Factors for Type II Diabetes

The American Diabetes Association defines the following as risk factors for developing type II diabetes:

1. Age over 45 years

2. Race or ethnic background of Non-Hispanic Black, Hispanic/Latino American, Asian American, Pacific Islander, American Indian, or Alaskan Native

3. Being overweight

4. Carrying excess fat in the mid-section ("Apple" body shape)

5. Low physical activity level

6. High blood pressure

7. Abnormal cholesterol

8. Family history of diabetes

9. Gestational diabetes

Age. The risk of developing type II diabetes increases with age, especially after 45 years. This is most likely because people tend to gain weight and lose muscle mass due to less physical activity as they become older (Mayo Clinic Staff, 2009). Although there is nothing one can do to prevent aging, staying active and monitoring blood glucose levels can help reduce the risk of developing type II diabetes (ADA, *Age, race, gender & family history,* n.d.).

Race/ethnicity. An individual's race can put his or her at risk for type II diabetes. Non-Hispanic Black, Hispanic/Latino American, Asian American, Pacific Islander, American Indian, and Alaskan Native populations are disproportionately affected, as individuals in these groups have two to four times higher rates of diabetes than in the majority population (Engelgau et al., 2004). This is due in part to the fact that these populations tend to be overweight (ADA, *Age, race, gender & family history,* n.d.).

Overweight. Two major risk factors for type II diabetes are overweight and obesity. Being overweight or obese is defined as having a body mass index of 25 or greater (National Diabetes Information Clearinghouse, 2008). Both conditions have reached epidemic proportions in all age groups in the U.S. In fact, two-thirds of U.S. adults are overweight (Huang, Harris, Lee, Nazir, et al., 2003), while 32.2 percent of adult men and 35.5 percent of adult women are obese (Flegal et al., 2010). Thirty-five percent of undergraduate college students are overweight or obese in the U.S. (Lowry et al., 2000). Nearly 90 percent of individuals with type II diabetes are overweight (Partridge, 2007). The more fatty tissue one has, the more resistant the body's cells become to insulin (Mayo Clinic Staff, 2009). Carrying more fat around one's middle, rather than hips, also

increases one's risk of type II diabetes. This is referred to as having an apple body shape, also known as central obesity (ADA, *Healthy weight loss*, n.d.).

Low physical activity. Physical activity makes the body's cells more sensitive to insulin, uses glucose for energy, and helps control weight. The less a person exercises, the greater his or her risk for type II diabetes (Mayo Clinic Staff, 2009). The American Diabetes Association defines low physical activity as exercising less than five days per week for 30 minutes or more (ADA, *Physical activity*, n.d.).

Hypertension. Nearly one-third of American adults have hypertension, also known as high blood pressure. Hypertension, defined as blood pressure higher than 130/80 mmHg, occurs when blood moves through vessels with too much force. When blood pressure is high, the heart has to work harder, and the risk for diabetes and heart disease increases (ADA, *High blood pressure,* n.d.). Blood pressure can be controlled with medication or lifestyle changes (ADA, *High blood pressure (Hypertension)*, n.d.).

Cholesterol. Blood glucose and blood pressure affect cholesterol levels. Abnormal cholesterol levels can increase one's chance for developing type II diabetes. To prevent type II diabetes, the American Diabetes Association suggests the following targets (ADA, *All about cholesterol,* n.d.):

a. Low-density lipoprotein (LDL, known as "bad" cholesterol) should be less than 100 mg/dL

b. High-density lipoprotein (HDL, known as "good" cholesterol) should be greater than 60 mg/dL

c. Triglycerides should be less than 150 mg/dL.

Cholesterol can be controlled by eating a healthy diet, exercising, not smoking, losing excess weight, and/or by taking a prescription medication (ADA, *All about cholesterol,* n.d.).

Family history. Having a first degree relative with type II diabetes increases one's own odds of being diagnosed with the disease. (Whitford, McGee, & O'Sullivan, 2009). If one's father, mother, brother, or sister has type II diabetes, his or her risk is increased (ADA, *Age, race, gender & family history,* n.d.).

Prevention of Type II Diabetes

Among people with impaired glucose tolerance, increased physical activity and weight management have been documented to reduce the risk of developing type II diabetes (Cowie et al., 2003). The evidence is undisputable that those with high risk for type II diabetes can efficiently prevent the disease by lifestyle modification (Lindstrom & Tuomilehto, 2003). National objectives for exercise and diet have been created to help individuals prevent disease. There are three main physical activity objectives. First, accumulate at least 30 minutes of reasonable physical activity most days of the week. Second, take part in physical activities that improve and maintain muscular endurance, strength and flexibility. Lastly, participate in vigorous physical activity that promotes cardio respiratory fitness for 20 plus minutes at least three days per week. National objectives for healthy dietary behaviors include reduced consumption of dietary fat and increased consumption of vegetables and fruits (Lowry et al., 2000).

Treatment for Type II Diabetes

Individuals diagnosed with type II diabetes can follow a healthy meal plan and exercise program, take oral medication, and lose excess weight to control and treat their diabetes. Often, diagnosed individuals need to take blood pressure and cholesterol medications to better control their blood glucose. A key step in improving quality of life and health outcomes of diabetics is self-management training and education. Focusing on checking blood sugar, healthy eating, self-care behaviors, and being active can help manage diabetes. This tends to be a collaborative process in which diabetes educators help diabetics gain the knowledge, problem-solving, and coping skills they need to productively self-manage the disease and its associated conditions (U.S. HHS & CDC, 2008).

Complications of Diabetes

The consequences of diabetes can be severe (Smith, 2007). Diabetes can lead to grave complications such as death, heart disease and stroke, hypertension, blindness, kidney disease, nervous system disease, lower extremity disease, dental disease, pregnancy complications, diabetic ketoacidosis, and disability. Many of these complications can be avoided by controlling blood glucose, blood lipids, and blood pressure (U.S. HHS & CDC, 2008).

Death. Diabetics have twice the risk of death compared to people without diabetes of similar age. In 2005, diabetes contributed to 233,619 deaths. Studies have shown that diabetes as a cause of death is likely to be underreported. Only approximately 35 to 40 percent of descendants with diabetes list it anywhere on the death certificate, and 10 to 15

percent list it as an underlying cause of death (U.S. HHS & CDC, 2008). Life expectancy is reduced by five to ten years among middle-aged diabetics, and reduced an estimated 13 years among the entire population of people with diabetes; the elevated risk for death is even greater for younger individuals (Engelgau et al., 2004).

Heart disease. Diabetic adults' heart disease rates are two to four times higher when compared to adults without diabetes. Their risk for stroke is also two to four times higher (U.S. HHS & CDC, 2008). Among diabetics aged 35 and older, 37.2 percent reported being diagnosed with cardiovascular disease. In diabetics aged 18 to 44 years of age, the prevalence of ischemic heart disease was nearly 14 times higher than among those without diabetes (Engelgau et al., 2004).

Hypertension. A study done in 2003-2004 found that three-quarters of all adults with diabetes either had elevated blood pressure or were taking prescription medications for hypertension (U.S. HHS & CDC, 2008). Because of the risks of high blood pressure to people with diabetes, the National Institutes of Health and the American Diabetes Association recommend a lower blood pressure target (130/30 mmHg) than the general public (American Diabetes Association, *High blood pressure (Hypertension),* n.d.).

Blindness. Blindness and visual impairment are common among diabetics (Engelgau et al., 2004). Among adults aged 20-74 years, diabetes is the leading cause of new cases of blindness. Each year, 12,000 to 24,000 new cases of blindness result from diabetic retinopathy (U.S. HHS & CDC, 2008). A national survey found that one-quarter of diabetics had sizeable visual impairment; roughly twice the proportion among persons without diabetes (Engelgau et al., 2004).

Kidney failure. Diabetes is the leading cause of kidney failure. In 2005, it accounted for 44 percent of new cases (U.S. HHS & CDC, 2008). Diabetics are the fastest growing group of recipients of dialysis and kidney transplantation (Engelgau et al., 2004). In 2005, 46,739 diabetics initiated treatment for end-stage kidney disease in the U.S. and Puerto Rico. Also in 2005, 178,689 individuals with end-stage kidney disease due to diabetes were living with a kidney transplant or on chronic dialysis in the U.S. and Puerto Rico (U.S. HHS & CDC, 2008).

Nervous system disease. Of people with diabetes, 60 to 70 percent have mild to severe forms of nervous system damage. Nervous system damage results in erectile dysfunction, carpal tunnel syndrome, slowed digestion of food in the stomach, and impaired sensation or pain in the feet or hands. A large contributor of lower-extremity amputations is diabetic nerve disease (U.S. HHS & CDC, 2008).

Lower extremity disease. Lower extremity disease results in increased rates of lower-extremity amputations among diabetics. The disease includes peripheral arterial disease and peripheral neuropathy, or both. Nearly 48 percent of individuals with diabetes had at least a single lower extremity condition including lower-extremity amputation, insensate feet, ulcer, peripheral neuropathy, or peripheral artery disease (Engelgau et al., 2004). Greater than 60 percent of lower-limb amputations take place in diabetics. Seventy-one thousand non-traumatic lower-limb amputations were performed in people with diabetes in 2004 (U.S. HHS & CDC, 2008).

Periodontal disease. Diabetics have a higher risk for periodontal disease. Young adults with diabetes have approximately twice the risk of developing the disease

compared to those without diabetes. People with uncontrolled diabetes were almost three times more likely to have severe periodontitis that those without diabetes (U.S. HHS & CDC, 2008). Current research also suggests a bi-directional relationship between diabetes and periodontal disease. People with diabetes are at higher risk for periodontal disease; and periodontal disease makes diabetes harder to control by altering blood glucose levels (ADA, *Diabetes and oral health problems,* n.d.).

Pregnancy complications. Gestational diabetes affects the mother late in pregnancy. At this time, the baby is growing. Poorly controlled or untreated diabetes results in giving the baby high blood glucose levels. The elevated glucose levels cause the baby's pancreas to produce extra insulin to normalize blood glucose levels. This results in the baby getting more energy than it needs; and the extra energy is stored as fat. This can lead to macrosomia, or a "fat" baby. Macrosomia babies have health problems, often including shoulder damage from birth (ADA, *What is gestational diabetes?,* n.d.*).* The excessive size of the baby poses a risk to both mother and child (U.S. HHS & CDC, 2008). Newborns may have extremely low blood glucose levels at birth and are at higher risk for breathing problems due to the extra insulin made by the baby's pancreas. Gestational diabetes puts babies at risk for obesity and type II diabetes later in life (ADA, *What is gestational diabetes?,* n.d.*).*

Diabetic ketoacidosis. When the body's cells do not get the glucose they need for energy, they burn fat, which produces ketones. Ketones are acids that accumulate in blood and appear in urine when the body has inadequate insulin levels. High levels of ketones can lead to diabetic coma or death (ADA, *Ketoacidosis,* n.d.). In the U.S., the

number of hospitalizations resulting from the condition in 1980 was 61,000, and had increased to 99,913 in 2001 (Engelgau et al., 2004).

Disability. Diabetics also suffer an increased rate of physical and cognitive disabilities. The 1998 National Health Interview Survey found that diabetics have nearly double the prevalence of physical disability as compared to those without diabetes (Engelgau et al., 2004). Additionally, diabetics experience twice the risk for dementia at an elderly age as compared to those without diabetes (Engelgau et al., 2004).

Cost of Type II Diabetes

The cost of diabetes is immense. In 2007, the overall cost of the disease in the U.S. was $174 billion. Of this figure, $116 billion resulted from direct medical costs. Among people with diagnosed diabetes, average medical expenses are 2.3 times greater than expenditures in non-diabetics. The remaining $58 billion result from indirect costs, including work loss, disability, and premature mortality (U.S. HHS & CDC, 2008).

A vital step in preventing or delaying type II diabetes and its complications is to recognize individuals with pre-diabetes and undiagnosed diabetes so they can be given the proper care (Heikes et al., 2008). Early recognition and treatment of diabetes could prevent considerable morbidity and mortality. As previously noted, the American Diabetes Association has identified risk factors to identify populations at high risk for type II diabetes (Mainous et al., 2007).

College Students' Risk for Diabetes

Enrolled in the nation's 3,600 colleges and universities are greater than 12 million students. In the U.S., one-quarter of people aged 18 to 24 years is either a part-time or

full-time college student. Fifty percent of people aged 20 to 24 years have attended

college. Many of these students are making unhealthy lifestyle choices, such as

inadequate physical activity and poor food choices. These decisions place their health at

risk and are creating a high prevalence of overweight among the college population

(Lowry et al., 2000). The fastest growing rate of both obesity and type II diabetes can be

found in the young adult population. Another alarming fact is that type II diabetes is more

aggressive when it occurs in younger adults as compared to the older adult population

(Seo, Torabi, Li, John, Woodcox, & Perera, 2008).

The National College Health Risk Behavior Survey conducted a study in 1999

that found 35 percent of college students to be overweight or obese (Huang et al., 2003).

Obesity rates have grown most rapidly among those with some college education, aged

18 to 29 years old (Huang et al., 2007). A study by the Robert Wood Johnson Foundation

and National Institutes of Health found that college students gained an average of 7.8

pounds during their first year at college. Further, another study by the National Institutes

of Health demonstrated that each year after their first year, students continue to gain

weight (Partridge, 2007). This weight gain puts college students at risk for developing

type II diabetes.

Students' poor lifestyle choices typically are most likely responsible for weight

gain. These choices usually involve inadequate nutrition and low levels of physical

activity. (Partridge, 2007). Research findings demonstrate that college students are not

following recommended components of the Dietary Guidelines of America (Anding,

Suminski, & Boss, 2001). College students consume a diet low in fruit, vegetables, and

fiber (Huang et al., 2003), and excessively high in alcohol and fat (Anding et al., 2001). This inadequate diet puts college students at risk for chronic disease, as the diet is lacking phytochemicals and antioxidants from fruit and vegetables, which help prevent disease (Anding et al., 2001).

Several reasons are suggested to be the cause of inadequate nutrition among college students. First, the buffets in dining services offered to students living on campus offer a bounty of food choices, and often students' meals turn into all-you-can-eat affairs. Many students are not accustomed to regulating their own food intake at meals, and overeat on a regular basis. Second, studies have shown that high stress levels contribute to unhealthy eating. A Carnegie Mellon University study found that students turn to fatty foods as a way to procrastinate when they are feeling stress at school. Typically, male students choose foods high in fat and fiber, and female students choose foods high in sugar. Lastly, if students are living on campus without their own transportation, they may lack the opportunity to healthy restaurants and grocery store alternatives (Partridge, 2007).

Another factor contributing to overweight and obesity among college students is a sedentary lifestyle (Anding et al., 2001). A national survey found that nearly a quarter of 18 to 34 year olds report never engaging in physical activity. Most students fail to meet the minimum physical activity goal of 30 minutes per day most days. This number worsens with age, as research findings show that physical activity levels decline as students become older (Huang et al., 2003).

Limited Data among the College Population

In spite of high overweight and obesity rates among college students, few studies have examined metabolic risks in this population (Huang et al., 2007). Research among the college population is urgently needed to assess physical activity, diet, and clinical risk for obesity and the metabolic syndrome (Huang et al., 2003).

One study that has examined diabetes among the college population was performed by Seo et al. in 2008. Seo et al.'s study investigated perceived susceptibility to diabetes and attitudes towards preventing diabetes among college students. The study found that students who were overweight or obese, pre-diabetic, or did not know their blood glucose levels were more likely to perceive themselves at an increased risk for developing diabetes. The study recommended increasing efforts to improve college students' knowledge and understanding of diabetes and its prevention (Seo et al., 2008).

Many risk tests for type II diabetes are available; however they have limited utility in a younger adult population. Studies have shown that a risk score for the development of type II diabetes created from a middle-aged population were less accurate in the prediction of development of type II diabetes in a younger population (Mainous et al., 2007). As the prevalence of type II diabetes rises among young adults, it is crucial to be able to identify high risk populations (Mainous, et al., 2007).

Using the Health Belief Model to Assess Students' Health Behaviors

One of the most widely used conceptual frameworks studying health behavior is the Health Belief Model (HBM). It is a guiding framework for health behavior

interventions, and has been used to explain change and continuation of health-related behaviors (Glanz et al., 2002).

The HBM explains change and continuation of health-related behaviors. The constructs of perceived susceptibility and perceived severity help identify the perceived threat of a certain health condition. The constructs can be used to help define populations at risk, personalize risk based on a person's behavior, make perceived susceptibility more consistent with an individual's actual risk, and specify the consequences of the risk and its conditions. For a behavior change to succeed, the HBM suggests that people must feel threatened by their present behavioral patterns (perceived susceptibility and perceived severity) and believe that change of a specific kind will result in the desired outcome at an acceptable cost. Making a lifestyle change is complicated, and requires self confidence, referred to here as self-efficacy. A person needs to believe that he or she is able to make the lifestyle adjustment before successful change is possible. One must also feel capable to conquer perceived barriers to taking action. The construct of self-efficacy can be used to provide training and guidance in taking action, reduce anxiety, demonstrate desired behaviors, use progressive goal setting, and give verbal reinforcement (Glanz et al., 2002).

Strategies to Reduce Prevalence of Type II Diabetes

Type II diabetes is preventable, and reducing the prevalence of the disease is an urgent public health priority. One of the most effective ways to decrease the prevalence of type II diabetes and its complications is to reverse the obesity epidemic. This can be done by simple lifestyle changes. Improving diet, increasing physical activity, and then

sustaining these lifestyle changes can decrease body weight and risk of type II diabetes (Mokdad, Ford, Bowman, Dietz, Vinicor, Bales et al., 2003).

Health professionals can also help this effort. Professionals must educate their patients on the importance of physical activity and a balanced diet for effective weight loss. National programs that promote these healthy lifestyle changes must be implemented (Mokdad et al., 2003).

There is much to be done to prevent type II diabetes at the college level. The college and university setting is an ideal one for the prevention, observation, and intervention of obesity and the metabolic syndrome (Huang et al., 2004) because students are still developing lifestyle patterns (Huang et al., 2003). Developmentally, this could be students' last opportunity for prevention and cost-effective health education interventions (Huang et al., 2003). Colleges and universities need to take advantage of this time period to promote healthy weight management practices (Lowry et al., 2000).

To promote better lifestyle practices among students, behavior and health science professionals should be encouraged to offer opportunities for regular physical activity and to offer healthy food choices on campus (Anding et al., 2001). Research findings show that there is a need for nutrition educators to emphasize dietary guidelines for sugar and fat, the recommended number of servings from the five food groups, and recommended daily allowance nutritional adequacy (Schuette, Song, & Hoerr, 1996).

Summary

There is a lack of research information specific to college students' risk factors for type II diabetes. It is known that in 2007, 23.6 million, or 7.8 percent of the entire

U.S. population had diabetes. Of these, 17.9 million cases were diagnosed, and an estimated 5.7 million were undiagnosed. For prevalence estimates of individuals 20 years of age and older, the rates look even worse, as 10.7 percent of people in this age group have diabetes.

In spite of high overweight and obesity rates among college students, few studies have examined metabolic risks in this population (Huang et al., 2007). Many risk assessments for type II diabetes are available; however they have limited utility in a younger adult population. Studies have shown that a risk score for the development of type II diabetes created from a middle-aged population are less accurate in the prediction of development of type II diabetes in a younger population (Mainous et al., 2007).

This review of literature revealed that there is much research on prevalence of diabetes in the middle-aged adult population. Most of the studies reviewed provided evidence that metabolic dysfunctions are increasing among college students. With education and lifestyle changes, the prevalence of diabetes and its complications could be decreased.

Chapter Three: Methodology

Introduction

This chapter describes the research methods used to assess college students' risk factors for type II diabetes at a Midwest university. In the following section, the rationale for the choice of methodology is identified, to answer the following research questions. 1) What risk factors for type II diabetes are most common among MSU, M college students? 2) Which gender has more risk factors for type II diabetes? 3) Do students who report more risk factors for type II diabetes perceive themselves as more susceptible to the disease? 4) Do students who report familial history of type II diabetes perceive the disease as more serious? 5) How confident are students that they can prevent type II diabetes?

In this chapter, the selection of instrumentation and subjects are described along with the process of data collection, processing, and analysis. This study was approved by and conducted in accordance with guidelines set by the Institutional Review Board of MSU, M regarding research involving human subjects (See Appendix A). Sufficient detail will be included in the presentation of methodology so that replication of this study would be possible.

Research Design

The purpose of this study was to assess college students' risk factors for type II diabetes at a Midwest public university. The relationship between risk factors for type II diabetes and self-efficacy, perceived severity, and perceived seriousness were analyzed.

Identifying common risk factors and perceived threat of type II diabetes among college students can aid in the development of targeted interventions and focused marketing efforts for college-age individuals.

The design of this cross-sectional study was based on risk factors for type II diabetes as defined by the American Diabetes Association (ADA). The risk factors served as a guide for the development of the questionnaire used in the study. A written survey was used to collect descriptive data from participants, which allowed for the gathering of data from a large sample. The data were analyzed using the electronic version of the Statistical Package for the Social Sciences Version 19 (SPSS) and directly applied to the study's research questions.

Variables in the study were measured to provide information related to research questions. The independent variables were risk factors, gender, confidence, and family history of type II diabetes. The dependent variables observed in the study were perceived severity and perceived seriousness.

Participants

In this study, purposive sampling of 432 MSU, M participants was used. Participants were only included if they were 18 years of age or older and had no prior diagnosis of type I or II diabetes. In order to achieve the research goal, the type II diabetes risk questionnaire was distributed to several introductory health and psychology classes. The purpose of the sample selection was to identify data related to risk factors for type II diabetes, self-efficacy, and perceived threat of diabetes among the college population.

Instrumentation

In this research, the data collection instrument included items related to risk factors for type II diabetes and perceived threat of the disease. The questions included risk factors as defined by the ADA, perceived susceptibility, perceived severity, and self-efficacy. The items were intended to ease completion of the questionnaire, increase the likelihood of truthful responses, and simplify data analysis (see Appendix B for a copy of the questionnaire).

Reliability and Validity of Type II Diabetes Risk Questionnaire

The American Diabetes Association's risk factors for diabetes and the Health Belief Model's constructs of self-efficacy, perceived susceptibility, and perceived seriousness have not been tested in previous studies. Therefore reliability and validity of the data collection instrument had not been previously established.

To test for face and content validity, a panel of experts ($n = 5$) reviewed and made suggestions for improvement of the research instrument. The experts' titles included:

1. Assistant Professor of Health Education, Ph.D., M.S., CHES
Minnesota State University, Mankato

2. Health Educator, M.S.
Big Lake High School

3. Professor of Dental Hygiene with previous diabetes research, RDH, Ph.D., M.S.
Minnesota State University, Mankato

4. Professor of Health Education, Ed.D.
Minnesota State University, Mankato

5. Registered Nurse, RN, B.S.N.
St. Cloud Hospital

The researcher provided the experts with a feedback question after each item on the survey instrument. Dependent upon the specific item, an example of one question was: Is this question essential, useful, but not necessary, or not necessary? After answering the questions, the experts provided feedback designed to improve the survey instrument.

Pilot Study

In order to test the instrument and gain feedback, a pilot study was conducted. The pilot study was conducted with 20 participants in the Dental Hygiene Program at MSU, M. The pilot test surveys were sent to a Dental Hygiene professor, who distributed them in person. This resulted in a 100 percent response rate. The pilot participants were not given a time limit.

All 20 participants were female. All participants were in their early twenties, and approximately one-third of the participants had an immediate family member with type II diabetes. The participants responded similarly to questions that measured self-efficacy, perceived seriousness, and perceived susceptibility of type II diabetes.

Written feedback on the survey was solicited from the participants after completion. Participants were asked if the directions were understandable, if the survey was easy to read, and if they had any further suggestions. There were no suggestions for changes.

Based on the pilot study, similar results from the research sample on familial history of diabetes, self-efficacy, and perceived threat were expected. More variety in

age, gender, and race were expected due to a larger and more diverse sample size, representative of the targeted population.

Procedure

Prior to the distribution of the surveys, the researcher contacted several professors at MSU, M to gain permission to come into the classroom and distribute the survey instruments. The professors were selected by prior relationship with the researcher and area of study. The classes chosen were sections of Health 101 and Psychology 101, both general education courses. After gaining permission, the researcher went into eight classrooms and distributed the diabetes risk questionnaires. The participants were given an implied consent form. The implied consent form contained information on the research and provided the students with a link to the ADA's online risk test for type II diabetes. Upon giving their consent, the participants were given fifteen minutes to complete the questionnaire. After the survey, the participants put the survey and implied consent form in an envelope that was sealed after all students turned them in. The implied consent form was used to help protect the participants' identities and privacy. Envelopes were sealed and collected by the researcher after all participants handed them in.

Data Analysis

Data was gathered by the researcher and entered electronically using the SPSS computer program for data analysis. Risk factors, self-efficacy, perceived susceptibility, and perceived seriousness responses were analyzed by descriptive statistics to determine frequency of responses and tests of association. After the information was compiled and

entered into SPSS, results were analyzed using descriptive statistics, independent t-tests, and a correlation test to establish the significance of the results.

Questions measuring risk factors for type II diabetes were scored and then compared to self-efficacy and perceived threat for each participant.

Summary

This chapter described the methodology used to measure risk factors for diabetes among college students at MSU, M. Questionnaires were handed out to a purposive sample of convenience during a class periods of general education courses in January and February 2011. Findings were reported with descriptive research and comparative analysis. The survey instrument was evaluated for face and content validity by a panel of five experts during the instrument design process. A pilot study acted as a quality measure before data collection from a sample selected by the researcher. Descriptive statistics, independent samples t-tests, and a Pearson-product correlation analysis answered the study's research questions. The next chapter will review the findings of the study including analysis of data and findings of the study pertinent to the research questions.

Chapter Four: Findings

Introduction

The purpose of this study was to assess college students' risk factors for type II diabetes and students' self-efficacy, perceived susceptibility, and perceived severity of the disease at a public university. This chapter presents the findings of the study and their implications. Descriptive data for the sample were collected and presented in the first section of the chapter. Data was analyzed using descriptive statistics, independent samples t-tests, and a correlation analyses. Results of these tests are presented in the second section of the chapter. In the third section, the findings are reported with respect to each research question. The last section summarizes the findings in relation to the Health Belief Model and review of the literature.

Summary of Descriptive Findings

A total of 432 participants, attending a large Midwestern public university, were surveyed in the winter of 2011. Of the 432 participants, ages ranged from 18 to 47 years, with a mean age of 19.74 years. The majority of the participants (86.4%, $n = 370$) were Caucasian. Gender for the participants was 284 female and 148 male.

Findings Related to Research Questions

Research Question #1: What risk factors for type II diabetes are most common among MSU, M college students?

Descriptive data for the most common risk factor is displayed in Table 4.1. Of the 432 participants who completed the risk factor assessment for type II diabetes questionnaire, 62.9% ($n = 272$) had been exercising less than five days per week for 30 minutes or more as recommended by the American Diabetes Association (ADA, *Physical activity,* n.d.*).* Descriptive data showed increased body mass index, defined as a body mass index of 25 or greater, (34.4%, $n = 141$) to be the second most common risk factor (National Diabetes Information Clearinghouse, 2008). Possessing an apple body shape (33.2%, $n = 141$) was the third most common risk factor for type II diabetes among participants.

Table 4.1

Risk Factors for Type II Diabetes Found among College Students

Risk Factor	Frequency (*n*)	Percentage
Exercise 30+ min < 5 days/wk	272	62.9%
Body Mass Index ≥ 25	141	34.4%
Apple Body Shape	141	33.2%
At-Risk Ethnicity	58	13.6%
Family History of Type II Diabetes	49	11.3%
Hypertension	7	1.6%
High Cholesterol	3	0.7%
History of Gestational Diabetes (females only)	2	0.7%
Age ≥ 45 years	1	0.2%

Research Question #2: Which gender has more risk factors for type II diabetes?

Descriptive statistics were used to determine which gender had more risk factors for type II diabetes. Male participants (M = 1.78, SD = 1.00) on average reported more risk factors for type II diabetes than female participants (M = 1.43, SD = 0.99). An independent samples t-test was completed to determine if the difference in number of risk factors between males and females was significant. The test was significant, $t(430) = 3.44$, $p < .01$. Independent samples t-tests were also performed to determine if a

significant difference existed for individual risk factors. No significant difference by gender was found for any specific risk factor.

Research Question #3: Do students who report more risk factors for type II diabetes perceive themselves as more susceptible for type II diabetes?

The type II diabetes questionnaire used in this research addressed eight risk factors for males, and nine risk factors for females. The additional question that only pertained to females addressed gestational diabetes.

Among male participants, 8.8% ($n = 13$) reported zero risk factors, 31.1% ($n = 46$) reported one risk factor, 39.2% ($n = 58$) reported two risk factors, 16.2% ($n = 24$) reported three risk factors, 4.1% ($n = 6$) reported four risk factors, and 0.7% ($n = 1$) reported five risk factors. None of the male participants had greater than five risk factors for type II diabetes.

Among female participants, 15.5% ($n = 44$) reported zero risk factors, 43.7% ($n = 124$) reported one risk factor, 26.8% ($n = 76$) reported two risk factors, 10.9% ($n = 31$) reported three risk factors, 2.8% ($n = 8$) reported four risk factors, and 0.4% ($n = 1$) reported five risk factors. None of the female participants had greater than five risk factors for type II diabetes.

A Pearson test was used to determine if there was a significant correlation between the number of risk factors and the perception of susceptibility to type II diabetes. Susceptibility was determined by the following question: "I believe I am at the following risk for type II diabetes." Participants chose a number from one through ten, with one meaning "low risk", five meaning "moderate risk", and ten meaning "high risk". The

relationship between risk factors for type II diabetes and perceived susceptibility was investigated using a Pearson product-moment correlation coefficient. A separate analysis was performed for each gender as there was an additional risk factor for females on the diabetes questionnaire that addressed history of gestational diabetes. Among males, there was a small, positive correlation between the two variables, $r(146) = .19$, $p < .05$, with high numbers of risk factors for type II diabetes associated with perceived high susceptibility to type II diabetes. Among females, there was a medium, positive correlation between the two variables, $r(279) = .34$, $p < .01$, with high numbers of risk factors for type II diabetes associated with high perceived susceptibility to type II diabetes.

For both males and females, a significant association was found between number of risk factors and perceived susceptibility to type II diabetes. On a group level, an association was found to indicate that participants with little or no risk factors for type II diabetes perceived themselves as less susceptible to the disease than those with a higher number of risk factors.

Another item used to investigate perceived susceptibly of type II diabetes on the questionnaire was: "How likely do you think it is that you would develop type II diabetes in your lifetime compared to other (women/men) of your age in Minnesota?" The participants could choose "much less likely" (coded as one), "likely (similar)" (coded as two), and "much more likely" (coded as three). The descriptive data is displayed in table 4.2. With the exception of five risk factors, most participants' perceived susceptibility to type II diabetes increased with number of risk factors.

Table 4.2

Comparing Number of Risk Factors for Type II Diabetes and Responses to "How Likely do You Think it is That You Would Develop Type II Diabetes in Your Lifetime Compared to Other (Women/Men) of Your Age in Minnesota?"

Number of Risk Factors for Type II Diabetes	Mean Susceptibility Score	Standard Deviation
0	1.3	0.48
1	1.29	0.48
2	1.42	0.55
3	1.55	0.58
4	2.07	0.83
5	1.00	0.00

Research Question #4: Do students who report familial history of type II diabetes perceive the disease as more serious?

Having a first degree relative with type II diabetes increases one's own odds of being diagnosed with the disease. (Whitford et al., 2009). If one's father, mother, brother, or sister has type II diabetes, his or her risk is increased (ADA, *Age, race, gender & family history,* n.d.). Of the 432 participants, 11.3% ($n = 49$) reported having a mother, father, sister, or brother with type II diabetes. An independent samples t-test was used to determine if there was a significant difference between familial history and the perception of seriousness of type II diabetes. Seriousness was determined by the following question: "How serious would it be for you if you got type II diabetes in the next year?" Participants chose a number from one through ten, with one meaning "not serious at all", five meaning "moderately serious", and ten meaning "very serious". The test was not significant, $t(427) = 4.57$, $p = .13$. Participants with family history of type II diabetes (M = 7.58, SD = 2.09) on average perceived the seriousness of type II diabetes at the same level as those with no family history of type II diabetes (M = 7.08, SD = 2.58). No

significant association between perceived seriousness of type II diabetes and family history of the disease was found.

Several items on the questionnaire provided additional insight into perceived seriousness. When asked if type II diabetes is an easy condition to treat, 19.8% ($n = 85$) reported they agreed or strongly agreed, 52.8% ($n = 227$) were unsure, and 27.5% ($n = 118$) disagreed or strongly disagreed. When asked if diabetes can result in many serious complications, 69.7% ($n = 301$) reported they agreed or strongly agreed, 27.4% ($n = 118$) were unsure, and 2.8% ($n = 12$) disagreed or strongly disagreed.

A correlation test was used to determine if participants with family history of type II diabetes in fact believed family history increased their risk for the disease. Susceptibility due to family history was determined using the following question: "My family history increases my risk of type II diabetes." Participants could choose "strongly agree" (coded as one), "agree" (coded as two), "unsure" (coded as three), "disagree" (coded as four), or "strongly disagree (coded as five). The relationship between family history of type II diabetes and increased susceptibility due to family history was investigated using a Pearson product-moment correlation coefficient. There was a medium, positive correlation between the two variables, $r(430) = .31$, $p < .01$. On a group level, an association was found that indicated participants with family history of type II diabetes believed their family history increased their risk for the disease.

Research Question #5: How Confident are Students that They Can Prevent

Type II Diabetes?

Descriptive data presenting participants' level of confidence that they can prevent type II

diabetes is displayed in Table 4.3. Of the 431 participants who responded to this item on

the questionnaire, the majority (74.2%, $n = 320$) strongly agreed or agreed when asked if

they were confident they could prevent type II diabetes.

Table 4.3
Participants' Responses to the Phrase "I am Confident I can Prevent Type II Diabetes".

Response	Frequency (*n*)	Percentage
Strongly Agree	88	20.4
Agree	232	53.8
Unsure	96	22.3
Disagree	13	3.0
Strongly Disagree	2	0.5
Total	431	100

Interpretation

Findings from the study in relation to the Health Belief Model's perceived

susceptibility and perceived severity show that on a group level, participants with more

risk factors for type II diabetes perceive themselves as more susceptible to the disease.

Participants with familial history of type II diabetes perceive the seriousness of the

disease at the same level as those with no family history. Additionally, the majority of

participants thought that diabetes can result in many serious complications, and those

with family history of the disease believed it did increase their risk for type II diabetes.

As for the Health Belief Model's construct of self-efficacy, nearly three-quarters of the

participants strongly agreed or agreed when asked if they were confident they could prevent type II diabetes. Male participants tend to have more risk factors for type II diabetes than females. Three of the most common risk factors for type II diabetes among participants were lack of physical activity, an increased body mass index, and an apple body shape. This would support the review of literature suggesting that nearly 35 percent of college students are sedentary and overweight or obese, drastically increasing the risk of type II diabetes.

Summary

Statistical tests were used to assess college students' risk factors for type II diabetes and students' perceived susceptibility and severity of the disease at a public university. A total of 432 participants completed the type II diabetes risk questionnaire. Of the 432 participants, ages ranged from 18 to 47 years, with a mean age of 19.74 years. The majority of the participants (86.4%, $n = 370$) were Caucasian. Gender for the participants was 284 female and 148 male. The mean number of risk factors per participants was 1.55 (SD = 1.00), with the most common risk factors for type II diabetes being lack of physical activity, increased body mass index, and an apple body shape. This study adds to the body of research regarding assessing risk for type II diabetes and college students.

Chapter Five: Summary, Conclusions, Discussion, and Recommendations

Introduction

This chapter includes a summary of the study, conclusions based on findings, a discussion of the results, and recommendations for future research. The first section reviews the study. The second section of this chapter discusses the relevance of findings, especially in relation to risk factors for type II diabetes among college students. The third section interprets the results, and the final section concludes with suggestions for further study.

Summary

The purpose of this study was to assess college students' risk factors for type II diabetes and their self-efficacy, perceived susceptibility, and perceived severity of the disease at a public university. The data was used to determine what risk factors are most prevalent among college students, and how the risk factors affected their confidence, perceived severity and perceived susceptibility to type II diabetes. The researcher intends to use the information from this study to add to the body of research regarding type II diabetes risk factors prevalent among college students.

The Health Belief Model is one of the most widely used conceptual frameworks for studying health behavior. It is a guiding framework for health behavior interventions, and has been used to explain change and continuation of health-related behaviors (Glanz et al., 2002). The constructs of perceived susceptibility and perceived severity help identify the perceived threat of a certain health condition, such as type II diabetes.

College students are an understudied population with a considerable risk for obesity and metabolic dysfunctions (Huang et al., 2007). Little is known about college students' risk for type II diabetes, nor about students' perceived threat of the disease. There is an urgent need to better identify and understand metabolic dysfunctions among U.S. college students (Huang et al., 2004).

In order to attain the research goal, a survey was distributed to adults aged 18 and older of non-diabetic status enrolled in introductory health science and psychology classes at Minnesota State University, Mankato (MSU, M). The survey assessed college students' risk factors for type II diabetes. Further, it examined students' confidence and perceived threat the disease. A total of 432 participants were surveyed. Of the 432 participants, ages ranged from 18 to 47 years, with a mean age of 19.74 years. The majority of the participants (86.4%, $n = 370$) were Caucasian. Gender for the participants was 284 female and 148 male.

Conclusions

This study is relevant to the body of research on type II diabetes and college students, especially in the area of assessing risk factors and perceived threat of the disease.

Several findings of this study are comparable to conclusions made from a similar study that assessed college students' perceived susceptibility and attitudes toward preventing diabetes. In their study, Seo et al., 2008 found that having an increased body mass index and family member with diabetes were significant predictors for perceived susceptibility to diabetes. Overweight and obese participants were more likely than

participants of a normal weight to perceive themselves at risk for developing diabetes. This is comparable as this study found that as a group, the participants with more risk factors for type II diabetes perceived themselves as more susceptible to the disease. Because family history and increased body mass index are risk factors for diabetes, it is encouraging that in both this study and Seo et al.'s, students were aware that these factors put them at increased risk for diabetes. (Seo, Torabi, Li, John, Woodcox, & Perera, 2008).

Diabetes is a significant public health problem (Latachan et al., 2010). It has been termed an epidemic, as the prevalence has skyrocketed (Mainous et al., 2007). Diabetes and its complications are substantial causes of morbidity and mortality, and contribute radically to health care costs (Cowie, et al., 2003). Interventions to decrease the prevalence of type II diabetes need to target the population at an early age, and there is much to be done to prevent type II diabetes at the college level. The college and university setting is an ideal one for the prevention, observation, and intervention of obesity and the metabolic syndrome (Huang et al., 2004) as students are still developing lifestyle patterns (Huang et al., 2003). Developmentally, this could be students' last opportunity for prevention and cost-effective health education interventions (Huang et al., 2003). Colleges and universities need to take advantage of this time period to promote healthy weight management practices (Lowry et al., 2000). Using the type II diabetes questionnaire for college students can assist in identifying the most common risk factors among the college population, and help create interventions to stop the increasing prevalence of diabetes.

Discussion

Four hundred thirty-two participants took part in the research. The most common risk factors for type II diabetes were lack of physical activity, increased body mass index, and apple body shape. Of the 432 participants who completed the risk factor assessment for type II diabetes questionnaire, 62.9% ($n = 272$) reported exercise less than days per week for 30 minutes or more as recommended by the American Diabetes Association (ADA, *Physical activity,* n.d.*).* The second most prevalent risk factor was an increased body mass index, which 34.4% ($n = 141$) possessed. The third most prevalent risk factor was an apple body shape (33.2%, $n = 141$). Analysis of the data demonstrated that male participants (M = 1.78, SD = 1.00) reported more risk factors for type II diabetes than female participants (M = 1.43, SD = 0.99).

Findings from the study in relation to the Health Belief Model's perceived susceptibility showed that on a group level, participants with more risk factors for type II diabetes perceived themselves as more susceptible to the disease. This is encouraging as it indicates that overall, participants with a higher number of risk factors recognized that those risk factors elevate their odds of developing type II diabetes.

An additional item that measured participants' perceived susceptibility to type II diabetes was the question, "How likely do you think it is that you would develop type II diabetes in your lifetime compared to other (women/men) your age in Minnesota?" With the exception of participants who had a total of five risk factors for type II diabetes, most participants' perceived susceptibility to type II diabetes increased with number of risk factors. What is alarming about those participants with five risk factors is that although

they had the highest number of risk factors for type II diabetes, they felt they were at lower risk for the disease than their peers.

Conclusions from the study in relation to the Health Belief Model's perceived severity showed participants with familial history of type II diabetes perceived the seriousness of the disease at the same level as those with no family history. This result was surprising, as the researcher was expecting to find that participants with familial history of the disease perceive type II diabetes as more serious. This finding may imply that those who have family members with type II diabetes have access to effective treatments, and are able to monitor their condition quite easily.

Additional findings related to perceived severity included that the majority of participants were unsure if diabetes is an easy condition to treat, and strongly agreed or agreed that diabetes can result in many serious complications. Although it is promising that the majority of participants acknowledged type II diabetes can lead to serious complications, it is disturbing that most participants were unsure if diabetes is an easy condition to treat. This shows that the participants have not been well educated in the treatment of diabetes.

Lastly, on a group level, an association was found that indicated participants with family history of type II diabetes did in fact believe their family history increased their own risk for the disease. This is a positive finding, as it indicates that overall the participants did accept family history as a causal factor of type II diabetes.

As for the Health Belief Model's construct of self-efficacy, nearly three-quarters of the participants strongly agreed or agreed when asked if they were confident they

could prevent type II diabetes. This is startling as even at a young age (M = 19.74), 63 percent of participants exercise less than recommended, 34 percent are overweight or obese, and 33 percent possess an apple body shape. Students seem to be unaware that their current lifestyle habits are putting them at risk for type II diabetes, and the only way to reverse the current diabetes epidemic is through education and prevention at an early age when one's lifestyle is still relatively modifiable.

Based on these findings, future studies are warranted to have a better understanding of college students' attitudes towards type II diabetes. Because of their increased number of risk factors, attention should be focused on targeting educational efforts and interventions at male students and those with high numbers of risk factors, yet little perceived susceptibility to type II diabetes. It is imperative, however, that all students receive more education on type II diabetes, as several of the above findings show that many are uneducated when it comes to prevention, control, and treatment of the disease.

Recommendations

The following recommendations for further research are based upon the findings from this study.

1. Replicate the study with a more diverse sample in respect to age and class level. Include freshmen, sophomores, juniors, and seniors from all majors. In addition, consideration could be made to distribute and collect surveys in a different manner, for example by an online survey.

2. Prior to distributing the survey, discuss and show images of an apple body shape versus a pear body shape. Many students were unsure of what body shape theirs resembled.

3. Utilize interdisciplinary research to create a more scientific study. Team with nursing faculty and take height, weight, blood pressure, and cholesterol readings to obtain more accurate risk factor results.

4. Future studies should consider investigating individual's perceptions of whether their current body mass index and level of physical activity alone puts them at risk for type II diabetes.

5. Interventions should focus on helping college students be more aware of diabetes and engage in healthy choices to prevent them from developing type II diabetes.

In spite of high overweight and obesity rates among college students, few studies have examined metabolic risks in this population (Huang et al., 2007). Research among the college population is urgently needed to assess physical activity, diet, and clinical risk for obesity and the metabolic syndrome (Huang et al., 2003). To promote better lifestyle practices among students, behavior and health science professionals should be encouraged to offer opportunities for regular physical activity and to offer healthy food choices on campus (Anding et al., 2001). Research findings show that there is a need for nutrition educators to emphasize dietary guidelines for sugar and fat, the recommended number of servings from the five food groups, and recommended daily allowance nutritional adequacy (Schuette et al., 1996).

Many risk tests for type II diabetes are available; however they have limited utility in a younger adult population. Studies have shown that a risk score for the development of type II diabetes created from a middle-aged population are less accurate in the prediction of development of type II diabetes in a younger population. As the prevalence of type II diabetes rises among young adults, it is crucial to be able to identify high risk populations (Mainous, et al., 2007).

The researcher recommends a risk test for type II diabetes be included in the curriculum for all introductory health classes. It is vital that students are educated on the topic of type II diabetes, and are knowledgeable in the prevention and control of the disease. Because many college students are required to take one general education health course, it may be their only opportunity in their higher education career to learn about their risk factors for type II diabetes. If students take the risk test, and are therefore able to identify their own risk factors for type II diabetes, they will have a better idea of how to adjust their own lifestyle now, and in the future, to assist them in preventing the disease. Early detection and treatment of diabetes could ultimately reduce morbidity, mortality, health care costs, and diabetes-related complications in the future.

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Appendix A

Amy Hedman, Ph.D.
Health Science Department
213 HC North
Minnesota State University, Mankato
Mankato MN 5601

November 24, 2010

Dear Amy:

Re: IRB Proposal, Log **#5795** entitled *"Assessing Students' Risk for Type II Diabetes of a Midwest State University"*

Your IRB Proposal has been approved as of November 24, 2010. On behalf of the Institutional Review Board I wish you success with your study. Remember that you must seek approval for any changes in your study, its design, funding source, consent process, or any part of the study that may affect participants in the study. Should any of the participants in your study suffer a research-related injury or other harmful outcome, you are required to report them to the IRB as soon as possible.

The approval of your study is for one calendar year from the approval date. When you complete your data collection, or should you discontinue your study, you must notify the IRB. Please include your log number with any correspondence with the IRB.

This approval is considered final when the full IRB approves the monthly decisions and active log. The IRB reserves the right to review each study as part of its continuing review process. Continuing reviews are usually scheduled. However, under some conditions the IRB may choose not to announce a continuing review.

Sincerely,

Patricia M. Hargrove, Ph.D.
IRB Coordinator
CC: File

Appendix B

Diabetes Questionnaire

This purpose of this survey is to identify the current risk factors for type II diabetes among college students. <u>Non-diabetic college students over the age of 18</u> are asked to complete this survey. The American Diabetes Association defines type II diabetes as a condition that results when the body does not produce enough insulin, or the cells ignore the insulin. If you have type I or type II diabetes, please do NOT complete this survey. This survey is confidential and anonymous (do NOT put your name on this survey). Please read each question carefully and answer the questions to the best of your ability. Thank you for your participation.

1. Are you male or female?
   a. Male
   b. Female

2. What is your age?
   _____ years

3. Do any of your biological family members have type II diabetes?
   (Check all that apply. If no one in your family has diabetes, please go to question 4.)
   a. ___yes, my mother
   b. ___yes, my father
   c. ___yes, my sister
        If so, how many sisters with diabetes do you have? ___
   d. ___yes, my brother
        If so, how many brothers with diabetes do you have? ___
   e. ___ I am not sure if any family members have diabetes

4. How tall are you?
   _____feet _____inches

5. How much do you weigh?
   _____lbs

6. What is your body shape; "apple-shape" or "pear-shape"?
   Apple-shape: your body has a tendency to store fat around your middle section
   Pear-shape: your body has a tendency to store fat around your hips section
   a. Apple
   b. Pear
   c. Unsure

7. How many days per week do you typically participate in any physical activities or exercises such as running, golf, walking, or calisthenics for exercise for 30 minutes or more?
   _____days/per week

8. Do you **currently** have high blood pressure, also known as hypertension?
(Blood pressure higher than 130/80mm Hg is defined as hypertension.)

      a. Yes

      b. No

      c. I do not know

9. Answer this question only if you have been diagnosed with high blood pressure.
Do you **currently** take a prescription medication to lower your blood pressure?

      a. Yes

      b. No

10. Do you **currently** have high cholesterol?
(LDL cholesterol higher than 100 mg/dL is defined as high cholesterol.)

      a. Yes

      b. No

      c. I do not know

11. Answer this question only if you have been diagnosed with high cholesterol.
Do you **currently** take a prescription medication to normalize your cholesterol levels?

      a. Yes

      b. No

12. What race/ethnicity best describes you?

      a. Caucasian

      b. Non-Hispanic Black

      c. Hispanic/Latino American

      d. Asian American

      e. Pacific Islander

      f. American Indian

      g. Alaskan Native

      h. Other (please list) _____

13. Answer this question only if you are female.
Have you had gestational (pregnancy) diabetes?

      a. Yes

      b. No

Regarding questions 14 to 22, read each statement and indicate to what extent you agree or disagree with the following statements.

14. My current lifestyle behaviors (eating habits and activity level) decrease the chances I will develop type II diabetes before age 45.
a. Strongly agree   b. Agree   c. Unsure   d. Disagree   e. Strongly disagree

15. My current lifestyle behaviors (eating habits and activity level) decrease the chances I will developing type II diabetes <u>after age 45</u>.
a. Strongly agree   b. Agree   c. Unsure   d. Disagree   e. Strongly disagree

16. My family history increases my risk of type II diabetes.
a. Strongly agree   b. Agree   c. Unsure   d. Disagree   e. Strongly disagree

17. I am confident that if I was diagnosed with type II diabetes, I would be able to manage (treat) the diabetes.
a. Strongly agree   b. Agree   c. Unsure   d. Disagree   e. Strongly disagree

18. Type II diabetes is a condition that is easy to treat.
a. Strongly agree   b. Agree   c. Unsure   d. Disagree   e. Strongly disagree

19. If I were to get type II diabetes, I would have access to effective treatments.
a. Strongly agree   b. Agree   c. Unsure   d. Disagree   e. Strongly disagree

20. If I were to get type II diabetes, I could die from the disease or its resulting complications.
a. Strongly agree   b. Agree   c. Unsure   d. Disagree   e. Strongly disagree

21. Type II diabetes can result in many serious complications.
a. Strongly agree   b. Agree   c. Unsure   d. Disagree   e. Strongly disagree

22. I am confident that I can prevent type II diabetes.
a. Strongly agree   b. Agree   c. Unsure   d. Disagree   e. Strongly disagree

For the following questions, indicate on the scale provided the extent of your response.

23. I believe I am at the following risk for type II diabetes:

1	2	3	4	5	6	7	8	9	10
Low Risk				Moderate Risk					High Risk

24. How serious would it be for you if you got type II diabetes in the next year?

1	2	3	4	5	6	7	8	9	10
Not Serious at All				Moderately Serious					Very Serious

25. How likely do you think it is that you will develop type II diabetes in the next year?

1	2	3	4	5	6	7	8	9	10
Not Likely at All				Moderately Likely					Very Likely

26. How likely do you think it is that you would develop type II diabetes in your lifetime compared to other (women/men) of your age in Minnesota?
a. Much Less Likely   b. Likely (Similar)   c. Much More Likely

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