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## Sampled University Students' Perceived Risk of Diabetes & Self-reported Diabetes Risk Factors

Ajibike R. Shodunke  
*Minnesota State University - Mankato*

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SAMPLED UNIVERSITY STUDENTS' PERCEIVED RISK OF DIABETES  
& SELF-REPORTED DIABETES RISK FACTORS

by

AJIBIKE R. SHODUNKE

A THESIS SUBMITTED

IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE DEGREE

MASTER OF SCIENCE

IN

COMMUNITY HEALTH EDUCATION

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This thesis paper has been examined and approved.

Examining Committee:

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Amy S. Hedman, PhD, Chairperson

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Dawn Larsen, PhD

---

Hans-Peter de Ruitter, PhD, RN

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## ABSTRACT

**Sampled University Students' Perceived Risk of Diabetes  
& Self-reported Diabetes Risk Factors**

**Ajibike R. Shodunke, M.S., Minnesota State University, Mankato,  
May, 2014. 54p.**

**Keywords:** Diabetes, Diabetes Risk Factors, Type II Diabetes, Perceived Risk, University Students, Students, Health Belief Model, Physical Activity, Overweight, Obese, Obesity

**Objectives:** The purpose of this research was to measure university students' perceived risk of diabetes and self-reported diabetes risk factors.

**Method:** Informed consent forms and survey questionnaires were distributed to students in randomly sampled courses ( $n=357$ ), with students aged 18 to 24. Out of the 357 surveys completed, 325 surveys were used for analysis of this study.

**Results:** Forty-eight percent of participants between ages 18 to 24 perceived themselves at minimal risk for developing type II diabetes. Sampled participants reported a mean of 2.25 (type II) diabetes risk factors out of 18 diabetes risk factors. Additionally, there were significant differences ( $p<0.05$ ) in the number of risk factors reported among perceived risk groups, with the exception of the no risk and minimal risk groups, who reported average of 1.92 risk factors. Among racial groups, there were no significant differences ( $p<0.05$ ) in the number of risk factors reported.

**Conclusions:** Result corresponds with university students' perception of diabetes, as concerns for developing type II diabetes is not critical or top priority while in higher education (Dong-Chul, 2008). Students' perception may also indicate that they are not knowledgeable about diabetes and diabetes risk factors.

**Recommendations:** Health educators should create awareness about the development of diabetes at an earlier age. It is imperative to start educating university students about diabetes prevention and other health complications that can result from being overweight or obese. With 34% of university students overweight or obese, health educators should create educational materials (tailored to university-aged students) to encourage making healthy dietary choices and engaging in frequent physical activity.

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## CHAPTER ONE

### INTRODUCTION

One of the most common chronic diseases in school-aged children is diabetes, which affects about 200,000 young people in the U.S. In terms of diseases, diabetes is the sixth leading cause of death in the U.S. Long-term complications of diabetes include but are not limited to cardiovascular disease, stroke, blindness, kidney failure, nerve disease, gum disease, and amputation of the leg or foot (Centers for Disease Control and Prevention [CDC], 2011; National Diabetes Education Program [NDEP], 2010). Currently, there is no cure for diabetes, but it can be prevented, delayed, or managed to minimize the risk of complications (NDEP, 2010).

In 2010, nearly two million people aged 20 years and older were diagnosed with diabetes (CDC, 2011), and 25.6 million (11%) people age 20 years or younger were living with diabetes. According to the Centers for Disease Control and Prevention and Simon & Zieve, approximately 79 million (25%) Americans aged 20 years or older have pre-diabetes, a condition that increases the risk of full-blown diabetes (CDC, 2011; Simon & Zieve, 2012).

#### **Statement of the Problem**

For the past few decades, type II diabetes was mainly found in overweight or obese adults of 40 years of age and older. There has been an increase in the number of children and young adults in the U.S. who are overweight or inactive, leading to an increase of diabetes development in young people (NDEP, 2010). The risk of developing type II diabetes increases with age. As people age, they are likely to decrease physical

activity, which causes loss of muscle mass and increases potential for weight gain (Hurtado-Ortiz, Santos, & Reynosa, 2011; Mokdad et al., 2003; Mokdad et al., 2001; Mokdad, 1999). In 2010, when compared to Caucasians, the risk of diagnosed diabetes was 18% higher among Asian Americans, 66% higher among Hispanics, and 77% higher among African Americans (CDC, 2011a).

According to a 2008 study conducted by Dong-Chul and colleagues, 32% of university students perceived themselves at risk for developing diabetes. The rise of diabetes among young adults has substantially increased over the past ten years, especially as the rise of obesity continues to reach new heights. In a university lifestyle regimen, students are in a stressful setting that consists of constant studying and taking exams. Consequently, health seems to lose priority (Dong-Chul et al., 2008).

### **Significance of the Problem**

University students' lack of knowledge and low perceived risk of diabetes poses a significant problem. Students' perceive diabetes as an issue for later in life, and they generally do not view it as a concern in the present (Dong-Chul et al., 2008). Assessing students' knowledge and perceived risk of diabetes can help health educators develop an intervention or preventive methods, tailoring specifically to university-aged students.

Another reason why diabetes does not raise concern among university students is due to the sparse research on diabetes related to university students, when in fact students' lifestyle in a university setting can contribute to the onset of type II diabetes (Dong-Chul et al., 2008; Mokdad et al., 2003). Type II diabetes used to be common among adults age 40 and older (CDC, 2011a). Type II diabetes is more alarming and raises more concern when it occurs in younger adults as compared to older adults,

especially being overweight and obesity continues to increase in the U.S. If diabetes is left untreated into adulthood, it can lead to detrimental health complications (Dong-Chul et al., 2008) such as kidney damage, nerve damage, glaucoma, cataract or blindness, and foot numbness (ADA, 2012a). The purpose of this study is to assess sampled university students' perceived risk of diabetes and the mean number of self-reported diabetes risk factors.

### **Research Questions**

Research questions were formulated to address lack of awareness and susceptibility of diabetes among university students. The research questions measured include:

1. Among sampled university students, what is the perceived risk of developing type II diabetes?
2. What is the mean number of self-reported type II diabetes risk factors among sampled university students?
3. Among perceived risk groups, are there differences in the number of reported risk factors?
4. Among racial groups, are there differences in the number of reported risk factors?

### **Limitations**

1. The findings of this study were based on data from a random sample of classes of 325 participants.
2. This research is not representative of the whole student population.

3. The research data were collected during a two-week period.
4. There were unequal sample sizes of groups within the research (racial groups and perceived risk groups).

### **Delimitations**

1. Random sampling of Minnesota State University, Mankato students.
2. This research solely investigated factors related to type II diabetes in the United States.
3. Survey questions were limited to perceived risk of type II diabetes and type II diabetes risk factors.

### **Assumptions**

1. Type II diabetes risk factors such as dietary choices, alcohol use, and physical inactivity may be primary contributing risk factors to the development of diabetes among university students.
2. Participants' perception of developing type II diabetes is based on their knowledge, and perceived severity and seriousness of diabetes.
3. Participants will complete survey questionnaire honestly.
4. Students will report at least five diabetes risk factors.

### **Definition of Terms**

1. *Diabetes* - "a serious condition resulting in where the body is unable to use blood glucose for energy" (National Diabetes Information Clearinghouse [NDIC], 2011, p. 1).

2. *Diabetes self-management* - “process of managing diabetes (including meal planning, planned physical activity, monitoring blood glucose, taking diabetes medication, and more)” (NDIC, 2011, p. 1).
3. *Health belief model (HBM)* - a theoretical model that tries to explain health behaviors by focusing on attitudes and beliefs of individuals (Janz & Becker, 1984).
4. *High blood pressure* - “a condition where blood flows through the blood vessels with greater than normal force. Hypertension can strain the heart, damage blood vessels, and increase the risk of heart attack, stroke, kidney problems, and death” (also known as high blood pressure) (NDIC, 2011, p. 1).
5. *Obesity* - “a condition in which a greater than normal amount of fat is in the body; considered more severe than overweight” (NDIC, 2011, p. 1).
6. *Perceived risk (susceptibility)* - “a belief about the chance of experiencing a risk of getting a condition or disease” (Cottrell & McKenzie, 2011, p. 67).
7. *Pre-diabetes* - “blood glucose levels are higher than normal, but not high enough to be diagnosed as diabetes. Individuals with pre-diabetes are at increased risk for developing type II diabetes” (American Diabetes Association [ADA], 2012a, p. 1).
8. *Type I diabetes* - “the body does not produce insulin,” therefore, insulin must be taken daily (ADA, 2012a, p. 1).
9. *Type II diabetes*- “the body does not produce enough insulin, or the cells ignore the insulin” (ADA, 2012a, p. 1).

## CHAPTER TWO

### REVIEW OF LITERATURE

The purpose of this research was to measure university students' perceived risk of diabetes and self-reported diabetes risk factors. For the purpose of this research, literature was reviewed in the following categories: definition of diabetes; risk factors for type II diabetes; scope of diabetes among university students; review of the Health Belief Model; diet and lack of physical activity; perception and attitudes of diabetes; and family history, ethnicity, and gender related to diabetes. The aforementioned categories are areas of study.

#### **Definition of Diabetes**

The American Diabetes Association defines diabetes as a chronic disease in which blood glucose (sugar) levels are outside of normal ranges (American Diabetes Association [ADA], 2012a). Type I diabetes (also known as juvenile diabetes) can occur at any age, but onset typically occurs in children or young adults. Type I diabetes occurs when the immune system attacks the insulin-producing cells of the pancreas (beta cells), and destroys them. Consequently, the pancreas can no longer produce insulin. Individuals with type I diabetes must take insulin daily for diabetes self-management (ADA, 2012b).

Type II diabetes (formerly called adult-onset diabetes), is the most common form of diabetes. Type II diabetes initiates insulin resistance, a condition where the muscle, liver, and fat cells do not use insulin properly. The pancreas loses the ability to secrete adequate insulin in response to meals or to control glucose levels (ADA, 2012b; NDIC, 2011; Simon & Zieve, 2012). The purpose of this research was to improve understanding

on diabetes, identify university students' perceived risk of developing type II diabetes, and measure self-reported diabetes risk factors, therefore type II diabetes remains the focal point.

### **Risk Factors - Type II Diabetes**

Risk factors that contribute to the development of type II diabetes can be controllable or uncontrollable.

Type II Diabetes risk factors include:

- Overweight or obese (NDIC, 2012; Simon & Zieve, 2012)
- Fat distribution, which is body fat stored mainly in abdominal area (NDIC, 2012)
- Heavy alcohol consumption (Emanuele, Swade, & Emanuele, 1998)
- High cholesterol (less than 35mg/dl of high-density lipoprotein [HDL]), also known as “good” cholesterol above (NDIC, 2012; Simon & Zieve, 2012)
- High levels of triglycerides: 250mg/dl and above (NDIC, 2012; Simon & Zieve, 2012)
- Diagnosis of pre-diabetes (NDIC, 2012)
- History of gestational diabetes during pregnancy (NDEP 2010; NDIC, 2012; Simon & Zieve, 2012)
- Physical inactivity (ADA, 2012b; NDIC, 2012; Simon & Zieve, 2012).
- Sleep problems such as sleep apnea (NDIC, 2012)
- Race or ethnicity, specifically African American, Hispanic or Latino Americans, Native Americans or Alaskan Natives, and Asian Americans or Pacific Islanders (NDIC, 2012; Simon & Zieve, 2012)
- Age (NDIC, 2012; Simon & Zieve, 2012)

- Autoimmune disease (NDIC, 2012)
- High blood pressure of 140/90mm Hg (NDIC, 2012; Simon & Zieve, 2012)
- Emotional stress or anxiety (Pouwer, Kupper, & Adriaanse, 2010)
- Polycystic ovary syndrome (NDIC, 2012)
- Family history (NDEP, 2010; NDIC, 2012; Simon & Zieve, 2012)
- Giving birth to at least one baby weighing more than 9 pounds (NDIC, 2012; Simon & Zieve, 2012)

To prevent or delay the development of type II diabetes and its health complications, it is preferred to seek a health professional for personal suggestions. Some basic suggestions on how to prevent or delay diabetes development include engaging in regular physical activity, maintaining a well-balanced diet, and losing weight if overweight or obese (NDIC, 2012).

### **Scope of Diabetes among University Students**

Nearly a decade ago, about seven percent of the United States population (20.8 million) was projected to have diabetes, including 14.6 million people who were diagnosed (Boyle et al., 2001; Dong-Chul et al., 2008). By the year 2050, it is projected that there will be nearly 29 million diagnosed cases of diabetes in the U.S. (CDC, 2005; Dong-Chul et al., 2008; Narayan, et al., 2003). According to Dong-Chul (2008), and Narayan and colleagues (2003), predictions indicate that one-third of Americans born in the year 2000 will develop diabetes at some point in their lifetime (Dong-Chul et al., 2008; Narayan, Boyle, Thompson, Sorensen, & Williamson, 2003).

As the cost to manage care for type II diabetes amplifies, it demands health care professionals to tailor diabetes educational materials to individuals at an early age, specifically towards university students (Reyes-Velazquez & Hoffman, 2011). The educational materials should emphasize how to delay or prevent diabetes onset, since diabetes is 90-95% preventable (NDEP, 2011). Racette and colleagues at Washington University School of Medicine reported in the *Journal of American University Health* that about 70% of students gained significant amount of weight within their first couple of years in university (Racette et al., 2005). Since the relation between elevated body mass index (weight and height) and diabetes is well recognized, university students who are overweight or obese, or have pre-diabetes could benefit from diabetes education early on (Franz & Wylie-Rosett, 2007). Additionally, university students who are not overweight, obese, or have pre-diabetes could benefit from diabetes education, as reports indicate that university students make poor dietary choices (Jackson, Berry, & Kennedy, 2009), and often lead sedentary lifestyles (American University Health Association [ACHA], 2008).

In a 2008 National University Health Assessment by the American University Health Association (ACHA) reports indicated that with 83, 070 students from different universities, 23% of participants did not exercise, 34% indicated they were slightly overweight, and only nine percent reported eating five or more servings of vegetables per day (ACHA, 2008). Lack of physical activity and failure to meet dietary guidelines (CDC, 2011b) pose significant health problems (such as obesity) for students who may already be at risk for developing type II diabetes (Reyes-Velazquez & Hoffman, 2011).

### **Health Belief Model (HBM)**

The Health Belief Model (HBM) was selected as the theoretical model for the basis for this research, with concentration on university students' perceived risk of diabetes and self-reported diabetes risk factors. Originally developed by Godfrey Hochbaum in 1958, the HBM attempts to describe and foresee health behaviors, with emphasis on attitude and beliefs (Glanz, Rimer, & Lewis, 2002; Hochbaum, 1958; Rosenstock, 1974). HBM is a framework that uses concepts to understand health behaviors and potential reasons for compliance and non-compliance with health behaviors (Janz & Rosenstock, 1984).

With the HBM, the probability that a person will engage in preventive health behavior is contingent on the costs and benefits of that particular action, which in most cases is perceived susceptibility or risk, perceived severity and perceived seriousness of the situation. A combination of these types of perceptions increases the likelihood to act and change health behavior, to achieve the perceived benefit of that health behavior.

The HBM entails four major perceptions, which serve as the construct for health behavior: perceived seriousness, perceived susceptibility, perceived benefits, and perceived barriers (Glanz, Rimer, & Viswanath, 2008; Turner, Hunt, DiBrezza, & Jones, 2004). The purpose of this research is to determine how students perceive diabetes as a personal health concern.

### **Diet & Physical Activity**

In addition to the obesity epidemic serving as a tremendous factor for the increased rate of diabetes among young people (CDC, 2011; Hatcher & Whittemore, 2007), it is believed that university students are at risk of developing type II diabetes due

to the increased use of alcohol, physical inactivity, and poor nutrition. These three significant factors are prevalent in the university lifestyle and culture, and can immensely contribute to obesity among young people (Hurtado-Ortiz, Santos, & Reynosa, 2011; Mokdad et al., 2003). Research reviewed posits that a substantial proportion of students lead sedentary lifestyles (Anding, Suminski, & Boss, 2001; Behrens, & Dinger, 2003; Blanchard et al., 2008; Hurtado-Ortiz, Santos, & Reynosa, 2011; Liang, Lee, Tam, Bridges, & Keating, 2007; Suminski, Petosa, Utter, & Zhang, 2002). As physical activity has declined for decades, sedentary lifestyle increased; which coincides with the increased use of motor vehicles to travel to destinations instead of walking, jogging, or bicycling (Ershow, 2009).

Several studies also depict a high prevalence of unhealthy eating practices and patterns among students (Brunt, Rhee, & Zhong, 2008; Huang et al., 2003; Hurtado-Ortiz, Santos, & Reynosa, 2011; Lowry, Galuksa, Fulton, Wechsler, & Kann, 2000). The ubiquitous availability of fast food contributes to eating in larger quantities, and the physiological sensation of having an insatiable appetite (Cohen, 2008; Vartanian, Herman, & Wansink, 2008; Wansink, 2004).

In a 2010 report by the American University Health Association (ACHA), only about five percent of university students ate five or more fruits and vegetables a day. About one-third of university students were overweight or obese (ACHA, 2010; Hurtado-Ortiz, Santos, & Reynosa, 2011). Unhealthy eating habits and physical inactivity contribute tremendously to the onset of diabetes. In fact, several studies have indicated that university students are not meeting standard dietary and physical activity guidelines (Hurtado-Ortiz, Santos, & Reynosa, 2011; Suminski, Petosa, Utter, & Zhang, 2002).

Lack of physical activity also tends to be higher for female university students compared to male students (Ajibade, 2011; Huang et al., 2003; Hurtado-Ortiz, Santos, & Reynosa, 2011; Myers, Romero, Anzaldúa, & Trinidad, 2011; Suminski, Petosa, Utter, & Zhang, 2002). Previous studies claim diet, exercise, and behavior modification can substantially prevent the development of type II diabetes, even among high risk populations diagnosed with hypertension, having a direct family member with diabetes, or being overweight (Dong-Chul et al., 2008).

Another influence on the development of diabetes is truncated sleep duration or sleep deprivation. Truncated sleep duration relates to overweight and obesity, as well as risk of developing diabetes (Ershow, 2009; Gangwisch et al., 2007). Studies posit that untreated sleep problems such as sleep apnea can increase the risk of type 2 diabetes. Individuals with sleep apnea do not know they have it and it frequently goes undiagnosed. Individuals who work night or overnight shifts have problems with sleep may also encounter an increased risk for obesity and type II diabetes (NDIC, 2012). University students continuously encounter the challenge of getting adequate sleep. University students tend to stay up all night studying or working a job. Although individual needs vary, the recommendation for young adults and adults is to get seven to nine hours of sleep per day. Sleep deprivation may result in feeling sleepy, sluggish during the day, and trouble concentrating. Sleep deprivation can be a risk factor for comorbid diseases and conditions, such as diabetes, obesity, and cardiovascular diseases (CDC, 2013b).

## **Perception/Attitude**

This review revealed that there is little research focusing on risk perception and attitudes about diabetes prevention among university students. Once people who are at high risk for diabetes perceive susceptibility, they can strive towards modifying their lifestyle to prevent diabetes. This type of change in health behavior is supported by the health behavior theories, including the Health Belief Model (HBM), the Theory of Reasoned Action (TRA), and Theory of Planned Behavior (TPB) (Dong-Chul et al., 2008; Slovic, 2001). The HBM states that in order for at-risk persons to modify their behavior, perceived susceptibility must be present (Glanz, Rimer, & Lewis, 2002). Additionally, TRA and TPB propose that a person's behavior is determined by one's intention to perform the behavior, which affects health behavior (Dong-Chul et al., 2008; Glanz, Rimer, & Viswanath, 2008).

Based on a study conducted at a large Midwestern University, of 707 university students surveyed about perceived susceptibility to diabetes and attitudes towards preventing diabetes, 32% perceived themselves at risk of developing diabetes. Seventy-five percent believed lifestyle was associated with diabetes onset. Students who were overweight or obese, diagnosed as pre-diabetic, or did not know their blood glucose levels were more likely to perceive an increased risk of developing diabetes than their cohorts when controlling for age, race and ethnicity, and having a direct family member with diabetes. This specific study concluded that university students perceive diabetes as a concern for later in life and not an immediate concern (Dong-Chul et al., 2008; Mobley et al., 2012).

## **Family History, Ethnicity, and Gender**

Family history is profoundly influential on the development of many health conditions and diseases. Common health problems, including diabetes arise through multigenerational familial patterns. Many families affect the health of their members through genetic vulnerability to illness and various diseases and conditions. Further, generally, families tend to instill beliefs, attitudes, and behaviors to its members throughout their lifetime (Crouch, 2007; Guttmacher, Collins, & Carmona, 2004; Hegele, 1999). Diabetes is hereditary; if an immediate member of a family has the disease, it increases the likelihood for other members of the family to develop the disease (CDC, 2013). The majority of people with diabetes have a direct family member affected by the disease; that means, mother, father, brother, or sister (NDEP, 2013).

According to Cullen & Buzek (2009), 78% of parents were aware of their own risk for developing diabetes, but less than 59% perceived their children were at risk of developing diabetes at some point in their lifetime. Additionally, risk perception for diabetes has shown to increase when factors such as family history of diabetes, or knowing a friend with diabetes were apparent (Cullen & Buzek, 2009; Montgomery, Erblich, DiLorenzo & Bovbjerg, 2003).

Minorities are especially at a heightened risk for developing type II diabetes. Researchers believe genes associated with insulin functioning contribute to the development of type II diabetes. African Americans, Hispanics/Latinos, and American Indians/Alaska Natives are about twice as likely to develop diabetes as Caucasians (CDC, 2013c). African Americans and Hispanic Americans are the two largest minority groups,

and they have a higher risk of diabetes than other minority group. Socioeconomic factors play a role in the prevalence of obesity among African Americans.

One of the biggest factors that contribute to the prevalence of diabetes among Hispanic Americans is diet. Heavy carbohydrate consumption is very common among Hispanic/Latinos, mainly because they consume foods high in starches. Tortillas, high in starches are the core of Mexican American diet. Rice and beans very popular in Hispanic recipes are also high in starches (Alexander, Lockwood, Harris, & Melby, 1999; Jovanovic & Harrison, 2004).

Although, an estimated nine percent of Asian Americans have diabetes (CDC, 2013), according to a meta-analysis study, it was found that higher white rice consumption was linked with a significantly elevated risk of type II diabetes. It appears this linkage is stronger for Asians than Western populations, as Asians generally consume white rice daily. The study also posits that each serving of white rice consumption per day was associated with an 11% increased risk of diabetes (Hu, Pan, Vasanti, & Sun, 2012).

According to the CDC, in 2010, out of approximately 26 million adults diagnosed with diabetes, 12.6 million were women. Health complications resulting from diabetes are more serious among women than men, such as heart disease (CDC, 2013c) and gestational diabetes (NDEP, 2013). Women with diabetes have a shorter lifespan compared to women without diabetes. Women are also at greater risk of blindness from diabetes than men (CDC, 2013c). Studies from nationally representative samples specify that African American men are 20-50% more likely to develop diabetes when compared to Caucasians, while African American woman are 100% more likely to develop diabetes

(Jovanovic & Harrison, 2004; Lipton, Liao, Cao, Cooper, & McGee, 1993; Resnick, Valsania, Halter, & Lin, 1998). This result clearly indicates that gender plays a role in diabetes; although it is more prevalent in men, it causes more health complications among women (CDC, 2013c).

Family history, ethnicity, and gender are all contributing risk factors to the development of diabetes. These specific risk factors are inherently uncontrollable, therefore increasing susceptibility. Uncontrollable risk factors serve as caveats to take control of controllable risk factors, for the betterment of one's health.

## CHAPTER THREE

### METHODOLOGY

This chapter explains the research method used for the purpose of this research. This chapter describes the research design, participants, instrumentation, data collection, and data analysis.

The research method measured:

1. Sampled university students' perceived risk of developing type II diabetes.
2. The mean number of self-reported diabetes risk factors among sampled university students.
3. Among perceived risk groups, the differences in the number of reported risk factors.
4. Among racial groups, the differences in the number of reported risk factors.

#### **Research Design**

Descriptive research was used for this research. This type of research design uses numbers, percentages, and averages of the characteristics of a group of people.

Descriptive research is non-experimental, statistical research (Cottrell & McKenzie, 2011). It helps identify areas of concerns that can assist health educators to design and implement diabetes prevention programs tailored specifically to university-aged students.

#### **Participants**

Since the purpose of this research was to assess university students' perceptions, a random sample of university students attending Minnesota State University, Mankato (MSU, M) during Spring Semester 2014 was selected. The participants ranged from first

year students to final year students, between ages 18 to 24. A random sample of 100-200 level courses was selected, and a total of 357 students participated in this study.

Researcher reviewed the MSU, M course schedule and identified all courses with an enrollment of 80 or higher. These courses and their section numbers were written on individual Post-it® notes.

### **“Out of Hat”**

As an appropriate method of simple random sampling, selected high enrollment courses were placed in a box and 15 individual Post-it® notes were drawn. Course disciplines included Sociology, Psychology, and Marketing. Instructors of these courses were contacted via email and asked to participate in the study. Of those contacted, four instructors agreed to participate, representing the course disciplines (See Appendix A for invitation email sent to instructions).

Researcher visited four classes during a two-week period in Spring of 2014. Participants in these randomly selected courses were given an informed consent form, which did not require a signature. The informed consent form was given prior to survey distribution and completion of the survey implied consent, as stated on the informed consent document (see Appendix B).

### **Instrumentation**

The survey was designed with the intent to measure university students' perceived risk of diabetes and the mean number of risk factors reported by students (See Appendix C). The survey questions were formulated to address four research questions:

1. Among sampled university students, what is the perceived risk of developing type II diabetes?
2. What is the mean number of self-reported type II diabetes risk factors among sampled university students?
3. Among perceived risk groups, what are the differences in sampled university students' self-reported type II diabetes risk factors?
4. Among racial groups, are there differences in the number of reported type II diabetes risk factors?

The survey consisted of 22 questions. One question identified perception of diabetes risk factors, using a four-point semantic differential adjective scale (no risk, minimal risk, moderate risk, and high risk). Eighteen questions identified self-reported diabetes risk factors. Three questions identified demographics of participants (See Table 1).

### **Pilot Test**

A pilot test was conducted to assess the readability and usability of the survey. The survey was distributed to 24 students in a 200 level health science course. Pilot test participants were asked to review the survey (for grammar, typographical errors, wordiness, etc.), and provide comments and suggestions on ways to improve the survey. Information collected from the pilot test was not used for research purposes, but rather as a formative tool to improve the survey. Based on comments and suggestions from the pilot testing participants, revisions were not necessary.

In addition to the pilot test, several survey experts ( $n=4$ ) reviewed the survey to verify content validity. The survey experts were asked to provide feedback on relevancy

of each survey item to the research questions of the study. The survey experts indicated all survey items were essential and useful to measure the proposed research questions for the study.

### **Procedure**

This research study involved human research participants, consequently approval was required from the Institutional Review Board (IRB) at Minnesota State University, Mankato (MSU, M) (See Appendix D).

Information about the research study and confidentiality statements were included in the informed consent form, which was distributed to participants along with the survey. Participation in the research was voluntary. To ensure anonymity, no personal identifiers such as name or other forms of identification were asked of participants.

### **Data Collection**

Surveys and informed consent forms were distributed to MSU,M students in four randomly selected classes. The purpose of the survey was explained and emphasis was made on voluntary participation. Participants were asked to place completed surveys in a sealed envelope upon completion. No incentives were provided for survey completion.

### **Data Process & Analysis**

The SPSS software was used to analyze data to answer research questions. Frequencies, descriptive statistics, and analysis of variance were used to investigate the research questions. Table 1 summarizes the table of specifications analyses used to measure the research questions.

Table 1

*Table of Specifications*

Research Question (RQ)	Survey items used to assess RQ'S	Level of Data (Nominal, Ordinal, Interval/Ratio)*	Analysis needed to assess RQ
1) Among university students, what is the perceived risk of developing type II diabetes?	Questions: 1	1-Ordinal	Frequencies
2) What is the mean number of self-reported type II diabetes risk factors among sampled university students?	Questions: 2-17 & 20-22	2- Nominal 3- Nominal 4-Ordinal 5-17- Nominal 20-22-Nominal 5-17 & 20-22 - Summated Risk Factors – 0-18 – Interval/Ratio	Descriptive Statistics (including measures of central tendency and dispersion)
3) Among perceived risk groups, are there differences	Questions: 1, 5-17, & 20-22	1-Ordinal 5-17 & 20-22 -	ANOVA

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in the number reported risk factors?		Summated Risk	
		Factors – 0-18 –	
		Interval/Ratio	
4) Among racial groups, are there differences in the number of reported risk factors?	Questions: 5-17, 20-22	5-17 & 20-22 - Summated Risk Factors – 0-18 – Interval/Ratio	ANOVA

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### *Perceived Risk*

A frequencies analysis was conducted to measure university students' perceived risk of developing type II diabetes. Perceived risk of diabetes was categorized into four groups (no risk, minimal risk, moderate risk, and high risk).

### *Mean Number of Reported Risk Factors*

A descriptive statistics (including measures of central tendency and dispersion) analysis was conducted to calculate the mean number of self-reported diabetes risk factors among university students. Fifteen risk factors applied to males, and 18 risk factors applied to females for calculation.

### *Number of Risk Factors Reported among Perceived Risk Groups*

Repeated measures Analysis of Variance (ANOVA) was utilized to determine if significant differences were found in the number of risk factors reported among

perceived groups. Participants indicated their perceived risk of diabetes, therefore they were categorized into perceived risk groups (no risk, minimal risk, moderate risk, and high risk).

#### *Number of Risk Factors Reported among Racial Groups*

Repeated measures Analysis of Variance (ANOVA) was also utilized to determine if significant differences were found in the number of risk factors reported among racial groups. To compare racial groups, 14 risk factors (applied to males) and 17 risk factors (applied to females) were used to analyze this question (racial group question is also a diabetes risk factor).

This chapter explained the research method and procedures that were used to measure the research questions within this study. Items measured included: sampled university students' perceived risk of developing type II diabetes, the mean number of self-reported type II diabetes risk factors among sampled university students, the differences in the number of reported risk factors among perceived risk groups, and the differences in the number of reported risk factors among racial groups. The research and data collection procedures were conducted upon receiving approval of procedure to protect human subjects, by the IRB of Minnesota State University, Mankato.

## CHAPTER FOUR

### ANALYSIS OF FINDINGS

The general purpose of this study was to measure sampled university students' perceived risk of type II diabetes and mean number of self-reported type II diabetes risk factors. The specific purpose was to investigate four research questions:

1. What is sampled university students' perceived risk of developing type II diabetes?
2. What is the mean number of self-reported type II diabetes risk factors among sampled university students?
3. Among perceived risk groups, are there differences in the number of reported risk factors?
4. Among racial groups, are there differences in the number of reported risk factors?

#### **Participation Criterion**

A sum of 357 survey were collected for the research, and 325 surveys were used for research analysis. Thirty-two surveys were not used for the following reasons:

1. Participant(s) were under the age of 18.
2. Participant(s) were over the age of 24.
3. Participant(s) did not answer three or more questions on the survey questionnaire.
4. Participant(s) did not answer vital questions, i.e., body mass index (BMI).

### Participant Demographics

For this research, 133 participants were male (40.9%), and 188 participants were female (57.8%). Participants, ranging in age from 18 to 24 years of age were enrolled in 100-200 level classes. The mean age of participants was 19.32. Table 2 displays the demographical information of participants.

Table 2

*Demographic characteristics of participants*

Characteristics	<i>n</i>	%	M
Gender	2		
Male	133	40.9	
Female	188	57.8	
Age			19.32
18	97	29.8	
19	123	37.8	
20	51	15.7	
21	30	9.2	
22	11	3.4	
23	9	2.8	
24	4	1.2	

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	<i>n</i>	%
Race/Ethnicity		
Caucasian	254	78.4
African American/Black	22	6.8
Native American/American Indian/Alaskan		
Native	2	.60
Asian/ Pacific Islander	25	7.7
Latino/Hispanic	9	2.8
Other	12	3.7
Missing	1	.30

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### **Research Results**

Statistical Package for the Social Sciences (SPSS) software was used to analyze research questions for this research. A frequencies analysis was conducted to answer research question (1): *Among university students, what is the perceived risk of developing diabetes?*

Results indicated the majority of participants perceived themselves at minimal risk of developing type II diabetes. Forty-eight percent ( $n=158$ ) perceived themselves at minimal risk, 24.6% ( $n=80$ ) perceived self at no risk, 22.5% ( $n=73$ ) perceived themselves at moderate risk, and only 4.9% ( $n=16$ ) perceived themselves at high risk.

Descriptive statistics (including measures of central tendency and dispersion) was used to analyze research question (2): *What is the mean number of self-reported (type II) diabetes risk factors among university students?*

Results indicated that 2.26 is the mean number of self-reported type II diabetes risk factors among sampled participants. This means on average, sampled participants reported about two risk factors based on the 18 risk factors that were included on the survey. A sum of 15 risk factors were listed for females, and 18 risk factors were listed for females, but when comparing racial groups, a total of 14 risk factors were measured for males, and 17 risk factors were measured for females. The range of reported risk factors was 0-10, the minimum number of risk factors reported among students was .00, the maximum number was 10.00, with a standard deviation of 1.69.

The most frequently reported risk factors were having more fat around the stomach area (41%,  $n=133$ ), BMI calculation of being overweight or obese (34%,  $n=110$ ), and having trouble sleeping throughout the night (27%,  $n=89$ ). University students also reported experiencing more stress daily than the average individual does (27%,  $n=88$ ), engage in less than three hours of physical activity a week (22%,  $n=70$ ), and consuming seven or more alcoholic beverages per week (12%,  $n=39$ ).

The least frequently reported risk factors were developed diabetes during the course of pregnancy (0%,  $n=0$ ), diagnosed with polycystic ovary syndrome (.3%,  $n=1$ ), and delivered a baby weighing over nine pounds (.3%,  $n=1$ ). University students also reported diagnosed with diabetes (1.5%,  $n=5$ ), been told by a physician or doctor that my triglyceride level is higher than normal (1.8%,  $n=6$ ), and been told by a physician or doctor that I have an autoimmune disorder/disease (2.8%,  $n=9$ )

Table 3 summarizes self-reported type II diabetes risk factors.

Table 3

*Self-reported Type II Diabetes Risk Factors*

Risk Factor	Risk Factor Reported <i>n</i> (%)	Missing <i>n</i> (%)
I have been diagnosed with diabetes.	5(1.5)	7(2.2)
I have a mother, father, sister, or brother with diabetes.	53(16.3)	3(.9)
I drink seven or more alcoholic beverages per week.	39(12.0)	0(0.0)
I have more fat around my belly.	133(40.9)	0(0.0)
I developed diabetes during the course of my pregnancy.	0(0.0)	2(0.6)
I have delivered a baby weighing over nine pounds.	1(.3)	2(0.6)
I smoke tobacco at least once per day.	17 (5.2)	0(0.0)
I engage in less than three hours of physical activity per week.	70(21.5)	0(0.0)
I have been diagnosed with polycystic ovary syndrome.	1(.3)	1(.3)
I have problem sleeping throughout the night.	89(27.4)	0(0.0)
On a daily basis, I experience more stress than an average individual does.	88(27.10)	0(0.0)
I have been told by a physician or doctor that I have an autoimmune disorder/disease.	9(2.8)	0(0.0)
I have been told by a physician or doctor that my blood sugar level is higher than normal.	10(3.1)	2(.6)

I have been told by a physician or doctor that my blood pressure is higher than normal.	11(3.4)	1(.3)
I have been told by a physician or doctor that my triglyceride level is higher than normal.	6(1.8)	0(0.0)
Member of a racial minority group.	90(21.5)	1(.3)
Body mass index (BMI) calculation indicates overweight or obese.	110(33.8)	0(0.0)

An Analysis of Variance (ANOVA) and Tukey's Post Hoc Test were used to analyze research question (3): *Among perceived risk groups, are there differences in the number of reported risk factors?* Results indicated that among perceived risk groups, there were significant differences ( $p < 0.05$ ) in self-reported type II diabetes risk,  $f(3,305) = 19.540, p < .05$ . There were significant differences ( $p < 0.05$ ) among all perceived groups, with the exception of the no risk and minimal risk groups. Table 4 illustrates the mean number of self-reported type II diabetes risk factors among perceived risk groups.

Table 4

*Self-reported Risk Factors among Perceived Risk Groups*

Perceived Risk Group	<i>n</i>	M(SD)
No Risk	70	1.93(1.57)
Minimal Risk	147	1.91(1.42)
Moderate Risk	69	2.82(1.69)
High Risk	14	4.85(1.69)

An Analysis of Variance (ANOVA) and Tukey's Post Hoc Test were also used to analyze research question (4): *Among racial groups, are there differences in the number of reported risk factors?* For the purpose of this study, 18 risk factors were analyzed. This specific research questions analyzed risk factors among racial groups, consequently racial group or ethnicity was not included as a risk factor. Results indicated that there were no significant differences ( $p < 0.05$ ) in the number of self-reported risk factors among racial groups ( $p = .35$ ).  $f(5,303) = 1.111$ ,  $p > .05$ . Additionally, it is important to note that there were unequal sample sizes to represent racial groups.

### **Summary**

As a summary of this study, results showed that 48% of participants between ages 18 to 24 perceived themselves at minimal risk of developing type II diabetes. Participants reported an average of 2.25 (type II) diabetes risk factors out of 15 diabetes risk factors for males and 18 diabetes risk factors for females. Findings also indicated that there were significant differences in the number of risk factors reported among perceived risk groups, with the exception of the no risk and minimal risk groups, who reported an average of 1.92 risk factors. As far as racial group comparisons, there were no significant differences in the number of risk factors reported. It is important to note that in this study, there were unequal sample sizes for perceived risk groups and racial groups.

## CHAPTER FIVE

### CONCLUSIONS & RECOMMENDATIONS

The main purpose of this study was to measure university students' perceived risk for developing type II diabetes and mean number of reported diabetes risk factors. A survey was distributed to a random sample of university students to analyze the following research questions:

1. Among sampled university students, what is the perceived risk of developing type II diabetes?
2. What is the mean number of self-reported type II diabetes risk factors among sampled university students?
3. Among perceived risk groups, are there differences in the number of reported risk factors?
4. Among racial groups, are there differences in the number of reported risk factors?

#### **Summary**

Research question (1) investigated sampled university students' perceived risk of diabetes. According to the results from this research, nearly half of participants perceived self at minimal risk for developing type II diabetes. Followed by that, nearly one-fourth of participants perceived themselves at no risk of developing type II diabetes.

Research question (2) investigated the mean number of type II diabetes risk factors reported by participants. Results indicated that out of 18 risk factors, participants reported an mean of 2.25 diabetes risk factors. The most frequently reported risk factors

were excessive fat around abdomen area (41%), overweight or obese (based on BMI calculator) (34%), trouble sleeping throughout the night (27%), and experiencing more stress than the average person on a daily basis (27%).

Using the Analysis of Variances (ANOVA) and Tukey's Post Hoc Test, research question (3) investigated the number of risk factors reported among perceived risk groups (no risk, minimal risk, moderate risk, and high risk). Results indicated there were significant differences in the number of risk factors reported among most perceived risk groups, and the high risk group reported the highest number of risk factors. The no risk and minimal risk groups reported an average of 1.9 risk factors. The moderate risk group reported an average of almost 2.8 risk factors. The high risk group reported an average of 4.9 risk factors.

Using the Analysis of Variances (ANOVA) and the Tukey's Post Hoc Test, research question (4) investigated the differences in the number of reported type II diabetes risk factors among racial groups. As part of the analysis, racial groups were not included in the total number of diabetes risk factors, which resulted to a sum 14 risk factors for males and 17 risk factors for females. Results from this study showed there were no significant differences in the number of risk factors reported among racial groups. It is important to note that there were unequal sample sizes for the racial groups as well as the perceived risk groups.

## **Conclusions**

Nearly 75% of students perceived themselves at minimal or no risk (susceptibility) for developing type II diabetes. This result corresponds with university students' perception of diabetes, as concerns for developing type II diabetes are not

critical or top priority while in higher education (Dong-Chul, 2008). Students' perception may also indicate that they are not knowledgeable about diabetes and diabetes risk factors.

Because being overweight or obese is a primary risk factor for developing diabetes, and more than 40% of participants reported that they have excessive fat around their stomach, health educators should provide education about the development of diabetes at an earlier age.

It is imperative to educate university students about diabetes prevention and other health complications that can result from being overweight or obese. Based on the BMI calculator, about 27% of participants reported to be overweight, and nearly seven percent reported to be obese or extremely obese. These results support other research that suggests a substantial portion of students engage in sedentary lifestyles, and practice unhealthy eating patterns (Hurtado-Ortiz, Santos, & Reynosa, 2011; Reyes-Velazquez & Hoffman, 2011).

I was surprised that there were no significant differences in the number of risk factors reported among racial groups, especially considering African Americans and Hispanics have two times the rate of diabetes than Caucasians (CDC, 2013c). Although sample size by race was small, this could indicate that risk comparable at younger ages is the same, and then differs over time into adulthood. About two percent ( $n=5$ ) of participants in this study were diagnosed with diabetes, which is lower than the state's average of about 7 percent ( $n=300,000$ ) of adults in Minnesota (CDC, 2013a). Additionally, I expected a substantial portion of students to perceive themselves at low risk of diabetes, which coincides with results from this research, but I was surprised that

the mean number of reported risk factors was lower than anticipated. As stated, participants reported a mean of 2.26 risk factors, and with the rate of unhealthy eating pattern, physical inactivity, and other health behaviors, I expected participants to report a mean of at least five risk factors.

### **Recommendations for Practice**

This demonstrates that although health educators should provide diabetes education, diabetes among university students is not quite as alarming as predicted. University students should make efforts to meet health dietary guidelines with the meal plans offered by the university, and students should also take advantage of the university's recreation center for physical activity. Weather can contribute to the lack of motivation students may have to go to the recreation center. To encourage students to engage in regular physical activity, university officials should consider placing convenient-sized exercise equipment in the dorm facilities. This will encourage students to engage in physical activity when they lack motivation to go to the university's recreation center or do not desire to be in a public or social environment. Another method university officials can use to encourage students to engage in physical activity is to provide incentives for students who utilize the farthest parking lots. Health organizations within the university can implement health fairs each semester to encourage and promote use of the recreation center. During these fairs, university officials can provide incentives and prizes for students who utilize the farthest parking lots, which promotes physical activity.

This research can impose a call to action among health educators to implement preventive programs such as tailoring educational media content (billboards, television

advertisement, social media: Facebook, Twitter) about diabetes and diabetes risk factors to the university student population, including encouraging students to check their blood glucose level during doctor visits. Educational materials should be tailored especially to minority groups, as they are at higher risk for developing type II diabetes (CDC, 2013c), and on average also reported more diabetes risk factors than Caucasian students.

### **Health Belief Model (HBM)**

According to the Health Belief Model (HBM), understanding university students' knowledge, beliefs, and attitudes is necessary to create educational materials that can encourage healthy behavior changes (Becker & Rosenstock, 1984), such as eating healthy and engaging in regular physical activity.

Using the HBM, health educators can focus on the HBM constructs and address students' perceived susceptibility, perceived benefits, perceived barriers, perceived severity, and self-efficacy. Results from this study suggest nearly 75% of students perceived susceptibility for diabetes at minimal to no risk. Health educators can use educational tools to create awareness of the perceived benefits for not developing diabetes, address possible barriers that students may encounter, and create awareness of the severity of diabetes development. To address self-efficacy, health educators can encourage making healthy dietary choices and engaging in physical activity.

### **Recommendations for Future Research**

Based on results from this research, for future research it is recommended to: include questions in the survey questionnaire about blood glucose level, conduct a study which measures students' knowledge of diabetes and diabetes risk factors, conduct a

study with concentration on diabetes among minority groups (as they are at increased risk for developing type II diabetes). Additionally, future research can conduct research with a convenient sample of students that is representative of the student population (including international students), and conduct research with a focus on diet and health behaviors related to diabetes and cardiovascular diseases.

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## Appendix A

*Email to Instructors*

My name is Amy Hedman and I am an Associate Professor at Minnesota State University, Mankato teaching in the Department of Health Science. I am currently advising a graduate student, Ajibike Shodunke who is conducting a study to assess students' perceptions of diabetes risk and self-reported diabetes risk factors.

The purpose of this study is to:

- 1) Determine college students' perceived risk of developing type II diabetes
- 2) Determine number of self-reported type II diabetes risk factors among college students

We have conducted a random sample of 100-200 courses with large enrollment and your course \_\_\_\_\_, section \_\_\_\_\_ was selected. We are requesting your participation in this study. Participation involves willing students in your class to complete a closed-ended 2 page questionnaire following a brief introduction on the study's purpose given by the researchers. Participants will be asked to read the Informed Consent handout prior to completing the questionnaire. It is anticipated that with an introduction, description of the study and informed consent, and questionnaire completion, 15 minutes of your class time will be needed.

Your participation is greatly appreciated. Please reply "Yes" to this email and we will follow up with you to schedule a date to visit your class. We are hoping to collect data prior to Spring Break.

Upon your request, we will send a summary of the research findings and conclusions of this study.

Thank you for your consideration and time.

Sincerely,

Amy Hedman, PhD  
Department of Health Science  
213 Highland Center North  
Minnesota State University, Mankato  
Phone: (507) 389-5382  
Email: amy.hedman@mnsu.edu  
and  
Ajibike Shodunke, Graduate Student  
Department of Health Science

IRBnet ID 570144  
irb@mnsu.edu

## Appendix B

*Informed Consent Form***Informed Consent Form****Selected College Students' Perceived Risk of Diabetes  
& Self-reported Diabetes Risk Factors**

You are requested to participate in research supervised by Dr. Amy Hedman on college students' perceived risk of diabetes and self-reported diabetes risk factors. This survey should take about 3 to 5 minutes to complete. The goal of this survey is to measure college students' self-reported diabetes risk factors, and identify college students' perceived risk of developing type II diabetes. You will be asked to answer questions about this topic. If you have any questions about the research, please contact Amy Hedman or Ajibike Shodunke at amy.hedman@mnsu.edu or ajibike.shodunke@mnsu.edu.

Participation is voluntary. You have the option not to respond to any of the questions. You may stop taking the survey at any time. Participation or nonparticipation will not impact your relationship with Minnesota State University, Mankato. If you have questions about the treatment of human participants and Minnesota State University, Mankato, contact the IRB Administrator, Dr. Barry Ries, at 507-389-2321 or barry.ries@mnsu.edu.

Responses will be confidential.

The risks of participating are no more than are experienced in daily life.

There are no direct benefits for participating. Society might benefit by the increased understanding and knowledge of diabetes and diabetes risk factors.

Submitting the completed survey will indicate your informed consent to participate and indicate your assurance that you are at least 18 years of age.

Please keep this copy for your future reference.

**MSU IRBNet ID# 570144**

**Date of MSU IRB approval: 2/18/14**



7. I have delivered a baby weighing over nine pounds.  
 Yes             No             N/A
8. I smoke tobacco at least once per day.  
 Yes             No
9. I engage in at least three hours of physical activity per **week**.  
 Yes             No
10. I have been diagnosed with polycystic ovary syndrome.  
 Yes             No             N/A
11. I have problem sleeping throughout the night.  
 Yes             No
12. On a daily basis, I experience more stress than an average individual does.  
 Yes             No
13. I have been told by a physician or doctor that I have an autoimmune disorder/disease.  
 Yes             No
14. I have been told by a physician or doctor that my blood sugar level is higher than normal.  
 Yes             No
15. I have been told by a physician or doctor that my blood pressure is higher than normal.  
 Yes             No
16. I have been told by a physician or doctor that my cholesterol level is higher than normal.  
 Yes             No
17. I have been told by a physician or doctor that my triglyceride level is higher than normal.  
 Yes             No
18. What is your age? \_\_\_\_\_
19. Are you male or female?    Male                       Female
20. What is your height? \_\_\_\_\_ ft. \_\_\_\_\_ in.
21. How much do you weigh? \_\_\_\_\_ lbs

22. Which race/ethnicity do you identify with?

- Caucasian/White
- African American/Black
- Native American/American Indian/Alaskan Native
- Asian/Pacific Islander
- Latino/Hispanic
- Other: \_\_\_\_\_

*Thank you for taking the time to complete the survey! All responses are confidential.*

## Appendix D

*IRB Approval Letter*

February 18, 2014

Dear Amy Hedman:

Re: IRB Proposal entitled "[570144-4] Selected College Students' Perceived Risk of Diabetes & Self-reported Diabetes Risk Factors"

Review Level: Level II

Your IRB Proposal has been approved as of February 18, 2014. On behalf of the Minnesota State University, Mankato IRB, 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.

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. If you have any questions, feel free to contact me at [irb@mnsu.edu](mailto:irb@mnsu.edu) or 507-389-5102.

Cordially,

A handwritten signature in black ink that reads "Mary Hadley".

Mary Hadley, Ph.D.  
IRB Coordinator

A handwritten signature in black ink that reads "Sarah Sifers".

Sarah Sifers, Ph.D.  
IRB Co-Chair