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# Perceived Diabetes Susceptibility Among African American Female College Students

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Walden University
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Abstract

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Doctor of Philosophy

Health Promotion and Education

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Abstract

Type 2 diabetes is a leading cause of death among African American women ages 20-44 years, and African American female college students are at high risk. Research shows that college students tend to underestimate their susceptibility to Type 2 diabetes, despite their existing risk factors. There is a gap in knowledge concerning African American female college students and their perception of diabetes susceptibility, despite their increased risk. The purpose of this quantitative nonexperimental, correlational study was to identify the factors associated with perceived personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students. The theoretical framework was the health belief model. A convenience sample of 116 African American female college students, 18–24 years of age and without Type 2 diabetes, were recruited to complete a self-report survey. Analysis featuring a simple linear regression and an independent sample t-test showed that participants had a low Type 2 diabetes risk perception and moderate Type 2 diabetes-related health behavior. Perceived peer susceptibility, self-efficacy, and actual Type 2 diabetes risk were the factors significantly related to perceived personal susceptibility. Self-efficacy was the only factor that had a significant relationship with health behavior. This study can potentially effect positive social change by informing the development of health education programming that promotes awareness of Type 2 diabetes risk factors and susceptibility. Greater awareness of risk factors and susceptibility may encourage healthier behaviors among African American female college students.

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# Dedication

This dissertation is dedicated to my loving husband, Josh, and my children, Joshua and Sheba, who have supported me during this journey in more ways than I could mention. I thank them for their patience and continued love and encouragement. They have inspired me every day in this process, and it was because of their love that I was able to push myself to complete this study. They gave me the space to write, but at the same time never left my side. Knowing that they were in my corner every step of the way was the fuel that I needed to keep going.

I conducted this study thinking of my daughter, Sheba, and my niece, Aliyah. As they continue through adolescence and into emerging adulthood, I want them to know and understand the health risks that face them as African American females, future college students, and future adults. We have type 2 diabetes and other chronic conditions in our family history, but it does not have to be our outcome. I hope that this study influences them and other young African American women to make healthy choices so that they may live a life of quality and quantity and influence their families and communities to do the same.

# Acknowledgments

I thank God for ordering my path to and through this dissertation process. I thank God for providing the insight, inspiration, ideas, and confidence to complete this large task. I could not have done this without your spiritual guidance.

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Mommy, I am so thankful for all the sacrifices you made so that I could get a good education. Thank you for offering comfort during times of need and words of wisdom when I had no clue. Your love and support mean more to me than I could ever express. Thank you! To my sister, Asia, and my brother, Kas, I am so blessed with such wisdom from the both of you. You two have always took care of your baby sister. That love and care continues to give me the strength to continue my journey. I would not be here without your prayers and sometimes telling me what to do. You both are loved and appreciated. Georgette, you are loved and appreciated for your continuous support.

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# Chapter 1: Introduction to the Study

Diabetes is one of the top leading causes of death and disability in the United States (Ahmad & Anderson, 2021). It is the fourth leading cause of death among African American women overall; among African American women ages 20-44, it is the fifth leading cause of death (Centers for Disease Control and Prevention [CDC], 2019a). Type 2 diabetes is the most prevalent form of diabetes and typically affects middle to older adults (American Heart Association [AHA], 2015a). However, there has been a rise of Type 2 diabetes in youth, specifically those 10-19 years old (CDC, 2019b). These trends have also been shown in racial and ethnic populations, with African American youth having the second highest prevalence (CDC, 2019b).

Specific data concerning rates of Type 2 diabetes among U.S. college students is lacking, although there is evidence of the prevalence of this type of diabetes in youth 18-19 years of age, which is within the traditional undergraduate college student age range of 18 to 24 years (National Center for Education Statistics, 2018). African American female college students, although they are not considered youth, are still impacted by these trends and as they emerge into adulthood. They are also impacted by the prevalence of Type 2 diabetes in Black/African American women, as Black women disproportionately experience higher Type 2 diabetes rates and associated risk factors than other women (Bancks et al., 2017; Bower et al., 2019). Black women have greater odds of developing Type 2 diabetes from young adulthood to middle adulthood than White women (Bancks et al., 2017). As of 2018, the rates for Type 2 diabetes among African American women were 1.7 times higher than White women (HHS, Office of

Minority Health, 2019). African American women also experience a higher incidence of prediabetes and Type 2 diabetes after having gestational (during pregnancy) diabetes, although they are equally as likely to develop gestational diabetes as others (Bower et al., 2019).

This aim of this study was to identify the factors that are associated with perceived personal susceptibility and Type 2 diabetes-related health behavior among African American female college students. It is important to understand the factors associated with this population's perceived Type 2 diabetes risk and the factors that prompt action against the threat of diabetes. College and university health education programming plays a crucial role in providing relevant, gender- and race-specific Type 2 diabetes education for students (Mongiello et al., 2016; Reyes-Velazquez & Sealey-Potts, 2015). The results of this study can inform the development and targeting of programs aimed at enhancing personal susceptibility and health behavior related to Type 2 diabetes among African American female college students. Historically Black colleges and universities (HBCUs) have been appropriate settings to encourage better lifestyle choices for students at risk of poor health behaviors (Jones et al., 2019). They are equipped to create a shift in culture that can influence personal health behavior as these young adults emerge into full adulthood, thus creating positive social change.

In this chapter, I will explore the background of the study by discussing the impacts of Type 2 diabetes on African American female college students and the importance of perceived personal susceptibility in health behavior. The problem and purpose of the study will be addressed, and the four predictor variables and two outcome

variables used in the study will be identified. Also, I will present the eight research questions (RQs) and hypotheses, which center on the relationship between the predictor and outcome variables. Next, I will discuss the theoretical framework and the nature of the study. The chapter also includes definitions of key terms and discussion of the significance of the study.

## Background

As African American female college students are at risk for diabetes, it is important to understand how they perceive their risk. Despite the growing rates of diabetes in youth, college students of any ethnicity tend to underestimate their risk of Type 2 diabetes (Mongiello et al., 2016a; Sealey-Potts & Reyes-Velazquez, 2014), even when risk factors such as obesity are present (Gross et al., 2015). Some students of all ethnic groups were found to have no knowledge that they are at increased risk based on their race / ethnicity (Mongiello et al., 2016b). In terms of underestimating risks, college students are more likely to perceive their peers as being at risk for developing Type 2 diabetes than they are to perceive their own personal risk (Reyes-Velazquez & Sealey-Potts, 2015). Females are more likely than males to perceive higher personal risk and lower risks among their peers (Reyes-Velazquez, Sealey-Potts, 2015). Understanding how this population perceives peer Type 2 diabetes risk is important as females are more likely to have a greater perceived personal risk when they have a friend with diabetes (Montgomery et al., 2003).

The health belief model (HBM) suggests that for a person to take action against the threat of a disease they must feel they are susceptible and that they have the ability to

act (Skinner et al., 2015). When a vulnerable population such as college students underestimate their risk for Type 2 diabetes, they are more likely to engage in behaviors that will increase their risk, putting them at an even greater odds for developing the disease. The risk factors for Type 2 diabetes include lifestyle choices such as poor diet and inactivity. There are also biological risk factors such as obesity, low HDL cholesterol, high blood pressure, abnormal blood glucose, and prediabetes (AHA, 2015a; National Institute of Diabetes and Digestive Kidney Diseases [NIDDK], 2016). Both lifestyle and biological risk factors are preventable, whereas age and family history are Type 2 diabetes risk factors that cannot be changed (AHA, 2015a).

African American female college students are at greater risk for Type 2 diabetes due to modifiable risk factors associated with the disease. There is a gap in the literature concerning African American female undergraduate college students and their perception of diabetes susceptibility, despite their increased risk for Type 2 diabetes. This study is needed as several studies of college students show that Black/African American young adult women of college age have more risk factors associated with Type 2 diabetes than other racial and ethnic groups (Andes et al., 2020; Lee et al., 2021; Sa et al., 2016). According to Andes et al. (2020), one in four young adults have prediabetes, and those with a higher BMI have a higher prevalence of prediabetes. In this same study, Black young adults were found to have a higher hemoglobin A1C (blood glucose) than other groups. In a 2016 study of college students at an HBCU, researchers found that African American female college students had higher rates of obesity (measured by BMI), physical inactivity, and family history of obesity than African American male college

students (Sa et al., 2016), putting them at greater risk for Type 2 diabetes. Although Lee et al. (2021), found that Black female college students have a more accurate perception of weight status than their male counterparts, they also have greater odds of weight gain. This shows that risk perception does not translate into action for this population, as Black females showed lower participation in physical activity (Lee et al., 2021). Other research studies that have shown positive associations between Type 2 diabetes and anthropometric measurements (BMI, waist-to-hip ratio, and hip circumference) have also found that Black women had higher values of BMI and fasting blood glucose, leading to higher incidences of Type 2 diabetes than other groups of women (Hardy et al., 2019; Luo et al., 2019). This evidence provides support for further investigation of African American female college students' perceptions of their risk susceptibility for Type 2 diabetes.

## Problem Statement

Young adult African American females of college age are at risk for Type 2 diabetes given that the rates of this disease are increasing among the African American youth population (CDC, 2019b). Although there are several studies of diabetes in college students, there is a gap in the literature, as some of the studies are not inclusive of different ethnic and cultural groups (Kowall et al., 2017) or do not consider sex- or gender-related differences in diabetes risk perception (Reyez-Velazquez & Sealey-Potts, 2015). In reviewing the literature, I found no recent studies that center on the risk of Type 2 diabetes solely among African American female college students. I addressed the gap in this study by targeting African American female undergraduate college students attending

an HBCU. I examined their perceived personal Type 2 diabetes susceptibility, personal health behaviors, and the factors associated with their perception and behaviors.

African American females were the target as they are an ethnic minority group that is disproportionately affected by Type 2 diabetes. The disease is the fourth leading cause of death for all Black women in the United States and the fifth leading cause of death for Black women ages 20-44 (CDC, 2019a; Williams, 2002). Black women are also one of the groups of women who have higher rates of death due to diabetes than White women (Williams, 2002). Additionally, college students are particularly at risk of Type 2 diabetes due to unhealthy lifestyle habits such as inactivity, improper nutrition, and inconsistent sleeping patterns (Mongiello et al., 2016b). They also have been shown to have limited knowledge about the risk factors for diabetes (Mongiello et al., 2016b). Specifically, African American college students have been found less likely than other groups to participate in diabetes preventive behaviors such as fruit and vegetable consumption (Amuta & Barry, 2015). Although having a family history of Type 2 diabetes is associated with the utilization of nutritional information when buying foods, African American college students were found less likely to utilize this information than other groups (Amuta & Barry, 2015). Education is necessary to promote the prevention of diabetes on college campuses (Amuta & Barry, 2015; Mongiello et al., 2016b), especially among African Americans. As this research indicates, further examination of African American female college students' knowledge and behavior related to Type 2 diabetes is merited.

## Purpose of the Study

The purpose of this quantitative correlational study was to examine the perception of personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students in relation to their perceived peer susceptibility, family history, actual Type 2 diabetes risk, and self-efficacy. The predictor variables are perceived peer susceptibility to Type 2 diabetes, family history of diabetes, actual Type 2 diabetes risk, and self-efficacy of controlling Type 2 diabetes risk. The outcome variables were perceived personal susceptibility to Type 2 diabetes and type 2 diabetes-related health behavior.

## Research Questions and Hypotheses

RQ1: Is there a relationship between perceived peer susceptibility to Type 2 diabetes and perceived personal susceptibility to Type 2 diabetes among African American female college students?

$H_0$1: There is no statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and perceived personal susceptibility to Type 2 diabetes among African American female college students.

$H_A$1: There is a statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and perceived personal susceptibility to Type 2 diabetes among African American female college students.

RQ2: Is there a relationship between self-efficacy of controlling Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students?

$H_0$2: There is no statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

$H_A$2: There is a statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

RQ3: Is there a relationship between actual Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students?

$H_0$3: There is no statistically significant relationship between actual Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

$H_A$3: There is a statistically significant relationship between actual Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

RQ4: Is there a statistically significant difference in perceived personal susceptibility to Type 2 diabetes between African American female college students with and without a family history of Type 2 diabetes?

$H_0$4: There is no statistically significant difference in perceived personal susceptibility to Type 2 diabetes between African American female college students with and without a family history of Type 2 diabetes.

$H_A4$: There is a statistically significant difference in perceived personal susceptibility to Type 2 diabetes between African American female college students with and without a family history of Type 2 diabetes.

RQ5: Is there a relationship between perceived peer susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students?

$H_05$: There is no statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students.

$H_A5$: There is a statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students.

RQ6: Is there a relationship between self-efficacy of controlling Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students?

$H_06$: There is no statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

$H_A6$: There is a statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

RQ7: Is there a relationship between actual Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students?

$H_0$7: There is no statistically significant relationship between actual Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

$H_A$7: There is a statistically significant relationship between actual Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

RQ8: Is there a difference in Type 2 diabetes-related health behavior among African American female college students with and without a family history of Type 2 diabetes?

$H_0$8: There is no statistically significant difference in Type 2 diabetes-related health behavior between African American female college students with and without a family history of Type 2 diabetes.

$H_A$8: There is a statistically significant difference in Type 2 diabetes-related health behavior between African American female college students with and without a family history of Type 2 diabetes.

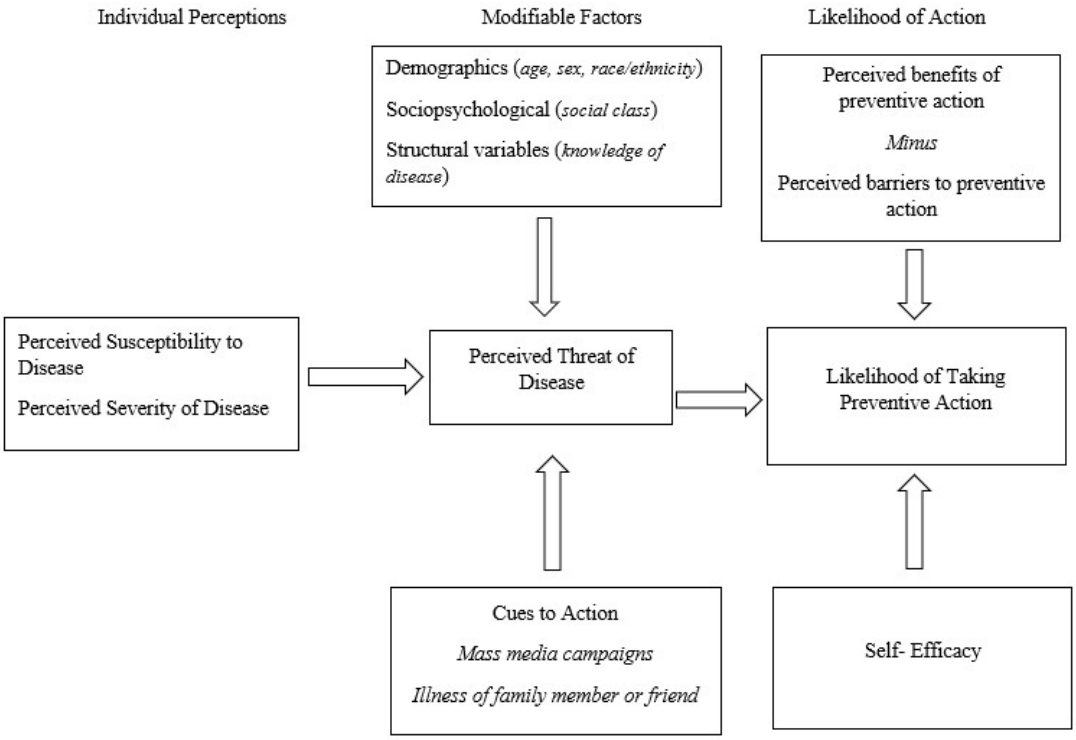
## Theoretical Framework

The HBM was the theoretical framework for this study. The authors, Godfrey Hochbaum, S. Stephen Kegels, Howard Leventhal, and Irwin M. Rosenstock, were a group of social psychologists in the U.S. Public Health Service in the 1950s (Rosenstock, 1974; Skinner et al., 2015). They were conducting research to solve a public health

problem associated with the lack of engagement in health screening and prevention programs. The purpose of the HBM is to identify factors that predict participation in preventive behavior (Becker et al., 1974). In the initial study, Hochbaum (1958) attempted to understand the factors associated with participation in X-ray screenings for tuberculosis. Out of that study emerged the premise of the HBM, which suggests that an individual is more likely to act against a health threat if they perceive they are at risk (Hochbaum, 1958; Rosenstock, 1974; Skinner et al., 2015). The major constructs of the model include perceived susceptibility, perceived severity of the threat, perceived benefits of taking action, perceived barriers in the way of taking action, cues to action, and self-efficacy (Rosenstock, 1974; Skinner et al., 2015). The model also suggests that these perceptions are modified by demographic, structural, and sociopsychological factors (Becker et al., 1974). Self-efficacy was not originally apart of the HBM; however Rosenstock et al. (1988) found that the model could be enhanced with the construct self-efficacy, which was from social learning theory. The idea was that for an individual to act against a threat, they must believe they are capable of taking action (Rosenstock et al., 1988). An illustration of the HBM, as applied to this study, is shown in Figure 1. I adapted the model from Becker et al. (1974) and incorporated Rosenstock et al.'s (1988) concept of self-efficacy.

**Figure 1**

*The Health Belief Model*




*Note.* Adapted from "A New Approach to Explaining Sick-Role Behavior in Low Income Populations," by M. H. Becker, R. H. Drachman, and J. P. Kirscht, 1974, *American Journal of Public Health, 64*(3), p. 206 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1775416/pdf/amjph00803-0007.pdf). In the public domain.

The HBM was an appropriate theory, I concluded, for studying the perceived threat and susceptibility of Type 2 diabetes based on perceived peer susceptibility, family history, actual risk, and self-efficacy of controlling Type 2 diabetes risk. The HBM

constructs that I explored in this study were perceived susceptibility, cues to action (measured by family history, perception of peer susceptibility, and actual risk), and self-efficacy. A more detailed explanation of each of the theoretical constructs appears in Chapter 2.

## Nature of the Study

I used a quantitative, nonexperimental, correlational research design. By using this research design, a researcher is able to identify a relationship between predictor (independent) and outcome (dependent) variables (Creswell & Creswell, 2017). In this study, I sought to identify the association between the predictor variables (perceived peer susceptibility to Type 2 diabetes, family history of diabetes, actual Type 2 diabetes risk, and self-efficacy of controlling Type 2 diabetes risk) and outcomes variables (perceived personal susceptibility of Type 2 diabetes and Type 2 diabetes-related health behavior).

The data I collected were from a nonprobability homogenous convenience sample of African American female undergraduate college students attending an HBCU. Participants completed a self-report paper survey. I performed quantitative data analysis using three different types of analyses. In the first analysis, I described the sample population by age, academic classification, race / ethnicity, and residence. The descriptive statistics included the mean, standard deviation, standard error, frequency, and minimum and maximum of the independent and dependent variables. In the second analysis, I used a simple linear regression to test for a relationship between self-efficacy and perception of personal susceptibility, perception of peer susceptibility and perception of personal susceptibility, and actual diabetes risk and perception of personal

susceptibility. In the third analysis, I performed an independent sample t-test to assess whether there was a difference in the perception of personal susceptibility of Type 2 diabetes between those with and without a family history of Type 2 diabetes. Also, I used a simple linear regression to test for a relationship between self-efficacy and Type 2 diabetes-related health behavior, perception of peer susceptibility and Type 2 diabetes-related health behavior, and actual Type 2 diabetes risk and Type 2 diabetes-related health risk behavior. I performed another independent sample t-test to determine whether a difference existed in Type 2 diabetes-related health behavior between those with and without a family history of Type 2 diabetes.

## Definitions

Definitions for the study variables and other terms used in the study are as follows:

*Actual Type 2 diabetes risk*: Participants' actual Type 2 diabetes risk based on existing risk factors as outlined in the ADA Diabetes Risk Test (ADA, 2019).

*African American/Black*: Persons with origins in African ancestry (American Psychological Association, 2020).

*Emerging adults/young adults*: A stage of development between adolescence and adulthood, typically ages 18-25, where there is a greater degree of independence without the responsibilities of typical adulthood (Arnett, 2000). It is a time of exploration and possibilities for future life (Arnett, 2000).

*Family history of diabetes*: The presence of diabetes in family members who share the same genetic and environmental factors; clinicians use family history to identify disease susceptibility in individuals (Yoon et al., 2002).

*Health disparity*: Differences in health among those with socioeconomic and environmental disadvantages due to differences in race/ethnicity, religious affiliation, sex/gender, age, physical and mental disabilities, sexual orientation, and geographic location (Healthy People 2020, 2014).

*Historically Black college/university* (*HBCU*): An institution of higher education established prior to 1964 in an effort to provide access to higher education for African Americans during segregation, greatly contributing to their improvement in socioeconomic status (National Center for Education Statistics, n.d.). Although originally designed for African Americans, they currently educate students of all races (National Center for Education Statistics, n.d.).

*Metabolic syndrome*: The presence of a group of health conditions (abdominal obesity, high blood pressure, hyperglycemia, low HDL cholesterol, and high triglycerides) that increase the likelihood of developing Type 2 diabetes or cardiovascular disease (Zimmet et al., 2005).

*Outcome variable*: A variable that is influenced by a predictor variable (Creswell & Creswell, 2017). The outcome variables tested in this study were perception of personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior.

*Perceived peer susceptibility to Type 2 diabetes*: Participants' opinion or belief of how likely their peers are to develop Type 2 diabetes compared to themselves (Skinner et al., 2015).

*Perceived personal susceptibility to Type 2 diabetes*: Participants' opinion or belief about their risk for Type 2 diabetes (Skinner et al., 2015).

*Predictor variable*: A variable that is used in survey methods to predict specific outcomes that may occur when this variable is present (Creswell & Creswell, 2017). The predictor variables tested in this study were perceived peer susceptibility to Type 2 diabetes, family history of diabetes, actual type 2 diabetes risk, and self-efficacy of controlling type 2 diabetes risk.

*Self-efficacy of controlling Type 2 diabetes risk*: Feelings of self-control over health habits that will decrease the risk of Type 2 diabetes (see Bandura, 2004).

*Type 2 diabetes:* A disease that occurs when the body does not make enough insulin or use it well enough to control the levels of sugar (glucose) in the blood, resulting in hyperglycemia, or high blood sugar (NIDDK, 2017).

*Type 2 diabetes-related health behavior*: Participants' engagement in risky health behaviors such as the lack of proper nutrition, physical activity, and health care that increase the risk of type 2 diabetes (ADA, 2017; Siegel et al., 2018).

A more detailed analysis of how the study variables were coded and measured is described in the Methodology section of Chapter 3.

## Assumptions

The assumptions in this study were undergirded by the postpositivist approach that I followed. According to Creswell and Creswell (2017), a postpositivist approach is one that assumes that "causes (probably) determine effects or outcomes" (p. 6). These assumptions typically depend on an existing theory. In this study, I assumed that the predictor variables (perceived peer susceptibility, actual Type 2 diabetes risk, family history, and self-efficacy) were associated with the outcome variables (perception of personal susceptibility, Type 2 diabetes-related health risk behavior), per the HBM (Rosenstock, 1974; Skinner et al., 2015). As a result, the assumption was that participants' perceived susceptibility to Type 2 diabetes would determine their actions against the threat of Type 2 diabetes (see Skinner et al., 2015). Related assumptions were that participants were knowledgeable of Type 2 diabetes and of all predictor and outcome variables. Other assumptions were that participants would be comfortable enough to answer survey questions correctly and honestly. To bolster participants' knowledge, I provided operational definitions of Type 2 diabetes and other key words in the preface to the survey. To address comfortability, I did not collect any personal identifiers so that the responses could not be traced back to any participant. The informed consent document specified confidentiality and anonymity of completed surveys.

## Scope and Delimitations

Limitations that are purposely placed within the research design are called delimitations. According to Rudestam and Newton (2014), delimitations are controlled by the researcher and typically "restrict the populations to which the results of the study can

be generalized" (p. 122). The delimitations in this study are reflected in the homogenous population of African American female undergraduate college students ages 18-24. The sample was a convenience sample from a HBCU. I chose this population because it is underrepresented in the Type 2 diabetes literature concerning perception of susceptibility and behavior. African American women are a population at high risk of many chronic conditions (Asiedu et al., 2017), and college students, particularly African American college students, often have unhealthy nutrition and physical activity behaviors (Amuta & Barry, 2015; Mongiello et al., 2016b).

## Limitations

Study limitations are those existing challenges and barriers within a study that are not under the control of the researcher (Rudestam & Newton, 2014). There are several limitations, challenges and barriers that exist with this study. One limitation is the use of a convenience sample from one HBCU. The use of a convenience sample means that the results cannot be generalized to all African American female undergraduate college students (Creswell & Creswell, 2017). Another limitation is the use of self-report data. In addition, the survey instrument did not include questions regarding Type 2 diabetes knowledge. Participants could have over- or underexaggerated their perception of risk due to their limited knowledge of Type 2 diabetes and associated risk factors. Additionally, I did not consider socioeconomic status, which could potentially have an impact on family history, diabetes-related risk behavior, and perceived risk, especially in females (van Zon et al., 2017). Obtaining permission from the university to conduct the study was a potential barrier. Furthermore, the COVID-19 social distancing guidelines in

place at the time of data collection may have impeded access to the study population. Some students were not on campus at the time of data collection, but at home. They could have had limited access to electronic devices, internet, campus email, and on-campus advertisements, creating a challenge for recruiting enough participants for the study. The small sample size might have been the result of this limitation, which could have decreased the statistical power and potential significance of the study (Creswell & Creswell, 2017; Serdar et al., 2021).

## Significance

Findings from this study add to the existing scholarly research literature on college students' perceived Type 2 diabetes risk and personal Type 2 diabetes-related health behavior. This study focused on a population of African American female college students to provide insight into their perceived peer Type 2 diabetes susceptibility and how that perception, along with family history and self-efficacy of controlling diabetes risk, is associated with their perceived personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health risk behaviors. Diabetes prevention is possible among the target population through early detection and awareness of risk factors (Antwi et al, 2020). In addition, knowledge of Type 2 diabetes, and susceptibility among peers, could help students to increase their perceived personal susceptibility and possibly change their risky health behavior (Paige et al., 2018). The insights from this study may inform the development of health education programming that emphasizes individual and peer diabetes susceptibility, as well as modifiable and nonmodifiable risk factors of Type 2 diabetes that are relevant to the African American female college student. Participation in

this type of programming among the target population may promote early Type 2 diabetes screening and detection (Paige et al., 2018) and a cultural behavior change that can improve the health outcomes of individuals, therefore mobilizing social change.

## Summary

In this chapter, I presented an overview of the prevalence of Type 2 diabetes in the United States and the rise of Type 2 diabetes in youth, particularly African American youth. I also presented literature regarding the risk of Type 2 diabetes among the targeted population of African American female undergraduate college students. This population is underrepresented in the literature concerning diabetes perception and susceptibility among college students, despite their increased risk for Type 2 diabetes (CDC, 2019b; Sa et al., 2016). The purpose of this quantitative correlational study was to examine the perception of personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students in relation to their perceived peer susceptibility, family history, actual type 2 diabetes risk, and self-efficacy. The HBM was the theoretical framework; I explored the constructs perceived susceptibility, cues to action, and self-efficacy as study variables.

The results of this study may contribute to positive social change by informing the development and tailoring of intervention programs like the CDC's National Diabetes Prevention Program, to address the factors associated with Type 2 diabetes risk perception and Type 2 diabetes-related health behavior among the population of interest (Gruss et al., 2019). The study may promote awareness of Type 2 diabetes risk factors and increase perceived Type 2 diabetes susceptibility leading to early Type 2 diabetes

screening and detection (Paige et al., 2018). Another implication of this study is that it may motivate college campuses to create culturally specific opportunities for students to increase Type 2 diabetes-related knowledge, engage in healthier behavior, and improve self-efficacy (San Diego & Merz, 2020). African American female college students may also create a cultural change in health care standards. They can use the knowledge learned to bring their type 2 diabetes risk to the attention of their health care providers, mobilizing them to enhance screening during routine visits (Gruss et al., 2019; Saylor et al., 2018). This change in knowledge and behavior may improve the health outcomes of individuals. In Chapter 2, I will review the current literature relevant to Type 2 diabetes, risk factors for Type 2 diabetes, and the associated behaviors of susceptible populations. I will also provide an explanation of the HBM and its constructs as they relate to this study.

# Chapter 2: Literature Review

## Introduction

Young adult African American females of college age are at risk for Type 2 diabetes. One factor is that African American women are disproportionately impacted by Type 2 diabetes. It is the fourth leading cause of death for African American women overall and the fifth leading cause of death in the population who are aged 20-44 (CDC, 2019a). Bancks et al. (2017) found that Black women have greater odds of developing Type 2 diabetes from young adulthood to middle adulthood than White women. Another factor is age. There are increasing rates of Type 2 diabetes among the African American youth population, and, among all U.S. youth, African Americans have the highest incidence of the disease (CDC, 2019b).

College students tend to underestimate their risk of Type 2 diabetes (Mongiello et al., 2016a; Sealey-Potts & Reyes-Velazquez, 2014), even as serious risk factors are present (Gross et al., 2015). College students are at risk due to unhealthy lifestyle habits, including having improper or inconsistent sleeping patterns (Mongiello, 2016b) and not reading nutritional information (Amuta & Barry, 2015). Although female college students are more likely to perceive a higher personal susceptibility to Type 2 diabetes than their peers, they typically do not engage in healthier behavior (Reyes-Velazquez & Sealey-Potts, 2015). As for African American female college students in particular, studies have shown that they have higher rates of Type 2 diabetes risk factors, such as high blood sugar, obesity, physical inactivity, and family history of obesity, than African American

males (Andes et al., 2020; Sa et al., 2016). These risk factors support further investigation of issues related to Type 2 diabetes among African American female college students.

The purpose of this quantitative correlational study was to examine the perception of personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students in relation to their perceived peer susceptibility, family history, actual Type 2 diabetes risk, and self-efficacy. There is little known about perceived diabetes susceptibility among African American female college students (Corliss et al., 2016). There is a need for further research to establish a greater understanding of their knowledge of risk and perceived personal and peer susceptibility and their associated health behaviors. This knowledge is important because African American females and college students are susceptible to type 2 diabetes.

In this literature review, I analyze studies relating to Type 2 diabetes prevalence in the United States among African Americans and among young adults and college students. I also present literature about the risk factors associated with Type 2 diabetes, including family history, diet, physical activity, obesity, metabolic syndrome (MetS), and prediabetes. Additionally, I analyze knowledge and perceptions of Type 2 diabetes risks and self-efficacy as they pertain to personal and peer susceptibility among college students and associated health behaviors. Furthermore, I include an overview of the HBM, focusing on studies in which the model underpinned the researchers' exploration of diabetes perception.

## Literature Search Strategy

In searching the literature, I sought articles on the relationship between perception of peer Type 2 diabetes risk, personal risk perception of Type 2 diabetes, and personal diabetes risk behavior. The keywords I used in the initial library search were *diabetes*, *college* or *university* or *undergraduate students*, *women* or *female or woman*, *risk perception*, *risk behavior*, *susceptibility* or *vulnerability*, *peer susceptibility* or *risk*, *African Americans*, *Blacks*, and *health belief*. I searched other keywords combinations such as *family history of diabetes*, *obesity* and *Type 2 diabetes*, *prediabetes*, *metabolic syndrome* and *Type 2 diabetes*, *self-efficacy of controlling diabetes risk*, *peer influence*, and *peer support* to identify research articles for the other study variables. I accessed databases such as CINAHL Plus, MEDLINE with Full Text, Embase, ProQuest Health and Medical Collection, PsycInfo, ProQuest Nursing and Allied Health Source, and EBSCOhost through the Walden University Library. In the search parameters, I included the years 2015–2022. I found earlier articles by scanning references from the literature. Full-text, peer-reviewed articles, and textbooks were the resources that I used in the literature review.

## Theoretical Foundation

Health behavior theories consist of interrelated constructs that are used to explain or predict behaviors and identify ways to change behavior (Glanz et al., 2015). The HBM is the health behavior model that I used as the theoretical framework for this study. A group of social psychologists (Godfrey Hochbaum, S. Stephen Kegels, Howard Leventhal, and Irwin M. Rosenstock) in the U.S. Public Health Service developed this

model in the 1950s (Rosenstock, 1974; Skinner et al., 2015). As part of their research on the lack of engagement in health screening and prevention programs, they created the HBM to identify factors that predict participation in preventive behavior (Becker et al., 1974). In the initial study, Hochbaum (1958), attempted to understand the factors associated with participation in X-ray screenings for tuberculosis. Out of that study emerged the premise of the HBM, which suggests that an individual is more likely to act against a health threat if they perceive they are at risk (Hochbaum, 1958; Rosenstock, 1974; Skinner et al., 2015). It suggests that perceived susceptibility and perceived threat of a health problem are precursors for action against the threat of that health problem (Skinner et al., 2015). The HBM is made up of six constructs, which include perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Skinner et al., 2015).

The HBM was appropriate for this study because it has been utilized as a framework for several other studies that assessed individual perception of Type 2 diabetes to predict or identify behaviors related to the disease (e.g., Ard et al., 2020; Ledford et al., 2019; Merzah, 2016; Mongiello et al., 2016b; Paige et al., 2018). Mongiello et al. (2016a) studied a sample of college students with multiple Type 2 diabetes risk factors to assess their personal perception about their risk for the disease. Ledford et al. (2019) applied the HBM to compare patients' personal perception of Type 2 diabetes among patients from different geographic locations and of different race / ethnicities. Merzah (2016) determined college students' status in regard to each of the HBM constructs, their Type 2 diabetes knowledge, and related health factors. Paige et al.

(2018) explored the perceived threat of Type 2 diabetes among adult rural residents who did not have the disease and how that construct of the HBM is determined by Type 2 diabetes knowledge and participation in healthy behaviors. In another study, the HBM was used to (a) assess the influence of knowledge and understanding of family history of Type 2 diabetes on positive health behavior changes and (b) to identify barriers to lifestyle changes (Ard et al., 2020).

The HBM constructs related to the current study were perceived susceptibility, cues to action, and self-efficacy (Skinner et al., 2015). In this study, I addressed the perception of personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students in relation to their perceived peer susceptibility, family history, actual Type 2 diabetes risk, and self-efficacy. I assessed these constructs through questions on a survey that I developed for this study. I tested the study hypotheses to clarify the influence of perceived susceptibility, cues to action, and self-efficacy of Type 2 diabetes on health behavior.

## Literature Review Related to Key Variables and/or Concepts

### Diabetes

Diabetes is one of the top leading causes of death in the United States (CDC, 2020a). In 2018, 34 million Americans (10% of the U.S. population) had diabetes. Of those cases, 92% were from Type 2 diabetes (CDC, 2020b), making it the most common form of diabetes (NIDDK, 2017). Type 2 diabetes typically impacts middle to older adults over the age of 45 (CDC, 2020b), and it has been historically known as adult-onset diabetes. However, recent trends have shown that Type 2 diabetes is not only a problem

in the adult population, but it has become an issue for youth and young adults, as the incidence of early-onset Type 2 diabetes in these populations have been on the rise (Mayer-Davis et al., 2017). Data from the Search for Diabetes in Youth study shows a 4.8% annual increase in the incidence of Type 2 diabetes among youth ages 10-19 years from 2002–2015. These trends were observed across all ages and ethnic groups, but the rate of increase was higher in African Americans and other ethnic minority youth than it was in White youth (Divers et al., 2020). This finding indicates that there are also racial / ethnic health disparities in the incidence of Type 2 diabetes among the youth and young adult population. Such disparities highlight the importance of targeting minority groups such as African Americans in Type 2 diabetes-related research.

### *Overview of Diabetes and Associated Complications*

Insulin and glucose (sugar) play major roles in the onset of diabetes. Glucose is the body's main source of energy and insulin is a hormone made by the pancreas which serves as the gateway for glucose to enter the body's cells to be used for energy (NIDDK, 2017). With type 2 diabetes the body either does not make enough insulin or does not use insulin well enough to get glucose into the cells. Therefore, glucose stays in the blood at a high level (NIDDK, 2017), causing hyperglycemia. This can cause chronic conditions such as heart disease and other life-threatening complications as it impacts major body organs and interferes with normal body processes (AHA, 2015b), making this disease of great concern. Complications from type 2 diabetes can cause conditions of the eyes, kidneys, lower extremities, and the heart. Retinopathy, chronic kidney disease, and neuropathy are serious disorders that affect these organs and can lead to more serious

debilitating conditions like permanent nerve damage, limb amputations and blindness. These conditions can make activities of daily living difficult and can even cause death (International Diabetes Federation, 2020).

Heart disease is one comorbidity that can develop because of hyperglycemia and other heart-related conditions such as high cholesterol, which are also risk factors for type 2 diabetes (International Diabetes Federation, 2020). Heart disease is also the top leading cause of death in the United States (CDC, 2020a). To show this relationship, Effoe et al. (2017) studied the association between ideal cardiovascular health measures of blood glucose, physical activity, diet, smoking, and BMI with the incidence of type 2 diabetes in a cohort of Black participants from the Jackson Heart Study. Researchers found a 37% reduction in type 2 diabetes risk among those who participated in at least 3 of the healthy cardiovascular behaviors, and a 17% reduction in risk for each additional healthy behavior (Effoe et al., 2017). This shows that the risks for type 2 diabetes and cardiovascular disease are related, and the reduction in risk for cardiovascular disease can also decrease the risk for type 2 diabetes, or vice versa.

Other diabetes-related complications are of a great concern, especially among African Americans as they not only experience type 2 diabetes at higher rates (CDC, 2020b), they are also more likely to experience diabetes-related complications than other groups. African Americans suffered diabetes-related complications such as end stage renal (kidney) disease, visual impairments (Haw et al., 2021; United States Diabetes Surveillance System, n.d.), lower extremity amputations, and death at higher rates than Whites and other racial / ethnic groups (Haw et al., 2021). A study by Clements et al.

(2019), has shown evidence of this trend of higher diabetes-related comorbidities and death among African Americans when compared to Whites. They looked at the influence of race and other demographics on mortality and the combination of diabetes and chronic co-morbidities that are also leading causes of death. Using a cohort of diabetes patients with Medicare, results revealed that Blacks were at an increased risk of death and had greater odds of having multiple chronic conditions than their White counterparts (Clements et al., 2019). The racial / ethnic disparities associated with type 2 diabetes complications provide evidence that the African American population should be targeted in this diabetes-related study.

### *Diabetes Risk Factors*

There are modifiable and non-modifiable risk factors that increase the likelihood of developing type 2 diabetes. Modifiable risk factors are those that are based on individual lifestyle choices and can be changed or controlled. Lifestyle choices such as poor diet and inactivity are modifiable risk factors that lead to serious biological risk factors for type 2 diabetes such as obesity, MetS (low HDL cholesterol, hypertension, abnormal blood glucose), and pre-diabetes (AHA, 2015a; NIDDK, 2016). Non-modifiable risk factors are those that cannot be controlled or changed. They include family history of type 2 diabetes, age, and race/ethnicity (AHA, 2015a). Both modifiable and non-modifiable factors are important to consider for prevention of type 2 diabetes and looking at how the knowledge of these risk factors, and personal risks are associated with the perception of diabetes susceptibility. These health risks can also help to

understand some of the age-related and racial/ethnic health disparities that exists among type 2 diabetes incidence and prevalence.

In a young adult population of Native Americans, ages 19-29, risk factors for type 2 diabetes looked slightly different than the general population. Parental history of type 2 diabetes, obesity, alcohol drinking, and fasting blood glucose were shown to be significant risk factors in the development of pre-diabetes and diabetes (Yan et al., 2016). Yet, among African Americans, a study showed that family history is not a significant independent risk factor unless there are 3 or more members of the family that have type 2 diabetes (Kral et al., 2019). This suggests there are other more important factors that may contribute to the disease within this population (Kral et al., 2019).

Other important risk factors were seen in a cohort of men and women ages 18-30 years old who were subjects in the Coronary Artery Risk Development in Young Adults study and were followed for a period of 30 years. The existence of modifiable biological risk factors for type 2 diabetes such as Body Mass Index (BMI; used to measure overweight/ obesity) and fasting blood glucose in young adulthood were shown to be important risk factors. They contributed to the racial disparities that existed in type 2 diabetes incidence between Black and White men and women in middle adulthood. These disparities were associated with differences in the biological risk factors among the racial groups. They were prominent because there were no significant differences found between races when modifiable neighborhood, psychosocial, socioeconomic, and behavioral risk factors were considered. Both Black men and women had greater odds of developing type 2 diabetes from young adulthood to middle adulthood than their White

counterparts, but Black women had even greater odds over their White counterparts than Black men (Bancks et al., 2017). The exploration of risk perception is appropriate due to the increased risk factors that exist among Black women.

**Dietary Behaviors.** Poor dietary behaviors are another risk factor associated with an increased risk of type 2 diabetes and other chronic diseases. Dietary guidelines from the United States Department of Agriculture (USDA) include overall healthy eating patterns that incorporate a variety of nutrient dense foods, eating within certain calorie limits, increased fruit and vegetable intake, healthier beverages, and low intake of saturated fats, sodium, sugar, and processed foods. These guidelines are given as a method to improve diet quality and combat cardiometabolic diseases such as type 2 diabetes, associated complications, and death (U.S. Department of Health and Human Services [HHS] & USDA, 2015). Improvements in diet quality are specifically related to a decrease in type 2 diabetes risk, while decreases in dietary quality increase the risk (Ley et al., 2016). Demonstrating the importance of guidelines for diet quality, Micha et al. (2017) conducted a study that examined data from a nationally representative population sample in the United States. The data revealed that type 2 diabetes-related deaths were associated with poor diet such as high intake of processed meat, high intake of beverages sweetened with added sugar, and a low intake of whole grains (Micha et al., 2017). These are all dietary habits that fall outside of the USDA dietary guidelines. The researchers also found that 64.2% of cardiometabolic deaths among younger adults ages 25-34 years, and 51% among Blacks, were associated with a suboptimal intake of 10 dietary factors. Noting health disparities that also exist among youth and minorities for type 2 diabetes

risks and complications. Suboptimal intake was measured by too little intake of fruits, vegetables, nuts/seeds, whole grains, polyunsaturated fats, Omega-3 fats, and too much intake of unprocessed red meats, processed meats, sugar sweetened beverages, and sodium (Micha et al., 2017).

Food insecurity and problematic eating are two diet related behaviors that lead to suboptimal intake of nutritious foods, increasing the likelihood of chronic disease such as type 2 diabetes. Food insecurity is measured by limited access to healthy foods due to a lack of money or other resources. This limited access causes unhealthy eating patterns, including reduced food intake (Coleman-Jensen et al., 2017). As of 2016, 12.3% of households in the United States experienced food insecurity, with Blacks having the highest rates compared to other racial/ethnic groups (Coleman-Jensen et al., 2017). The concern with food insecurity is its association with chronic disease. Researchers examined data from the National Health Interview Survey, 2011-2015 to find a relationship between food insecurity and the 10 CDC targeted chronic diseases, which includes diabetes. The study cohort were adults ages19-64 with incomes at or below 200% of the federal poverty line. They found that adults who live in a food insecure household were more likely to have a chronic disease, and the more food insecure a household, there is an increase in the likelihood of chronic disease. Interestingly they also found that food insecurity had a significant relationship with all 10 chronic diseases, while income had a significant relationship with only three of the chronic diseases, denoting that food insecurity has a stronger relationship to chronic disease than income (Coleman-Jensen et al., 2017). Similarly, another study addressed food insecurity as a

poor dietary factor, showing that those with food insecurity were at greater odds of developing pre-diabetes (Murillo et al., 2017), which is a risk factor for type 2 diabetes.

Problematic eating behavior and attitudes toward food is identified as a problematic relationship to eating and food. In a study by Yoon et al. (2018), a problematic relationship to eating and food was measured by behaviors and attitudes such as food anxiety, avoiding weight gain, episodic overeating, overeating followed by a sense of a loss of control, being upset for overeating, being upset for losing control, shape, and weight concerns, and spending a lot of time dieting to lose weight. All behaviors, except for shape and weight concerns, were positively associated with BMI. Those who exhibited other problematic relationship to eating and food behaviors had a higher BMI than those who did not (Yoon et al., 2018). Problematic eating has also been associated with risk for MetS and type 2 diabetes, as those with problematic eating behavior are at a greater risk for both conditions (Yoon et al., 2019). Behaviors such as problematic eating and food insecurity are risky as they lead to poor dietary quality and increase the chances of developing type 2 diabetes and other associated risk factors such as obesity, MetS, and pre-diabetes. College students are a population that may be at risk of food insecurity and problematic eating, therefore health behavior is a factor that is being considered in this study.

**Physical Activity.** A sedentary lifestyle involves little to no physical activity (inactivity). There are specific physical activity guidelines for Americans that recommend at least 150 – 300 minutes of moderate cardiovascular exercise each week, and least 2 days each week of muscular strength activities for all major muscle groups

(HHS, 2018). These recommendations are important as several studies show that inactivity, or sedentary behavior is associated with an increased risk of type 2 diabetes and other chronic conditions (Larsen et al., 2015; van der Velde et al., 2018). Although research has shown this relationship, 80% of adults do not adhere to the recommended guidelines for cardiovascular and muscular strength activity (HHS, 2018), and over 80% of adolescents are not performing the recommended amount of daily cardiovascular activity (HHS, n.d.). This could explain the increases in type 2 diabetes rates among youth. Not meeting the recommended physical activity guidelines is not only associated with an increased risk of type 2 diabetes but is also related to higher medical costs for the disease. The 2012/2013 Behavioral Risk Factor Surveillance System data showed that as of 2012, the medical costs associated with type 2 diabetes was almost four times higher in those that did not meet the physical activity guidelines than those that did (Shah et al., 2017).

Physical activity guidelines can be accomplished through leisure activities such as planned exercise or by other lifestyle factors such as occupation, and active modes of transportation. For instance, there are some people who work in manual labor jobs, rather than jobs where they are primarily seated at a desk, and there are some people who walk or bike as their mode of transportation, rather than driving.

Using a sample of adults 20 and older from the National Health and Nutrition Examination Survey (NHANES), Divney et al. (2019) examined the association of diabetes prevalence with the different types of physical activity (leisure-time, occupation-based, transportation-based) and total physical activity, as well as the differences in

variables among racial/ethnic groups (Hispanic, Black, White). The researchers found that when adjusting for socio-demographics, the performance of physical activity guidelines by any type of physical activity was associated with low rates of diabetes. However, there were racial/ethnic disparities shown as Whites achieved physical activity guidelines across all types at higher rates than other groups, except for transportation. Blacks achieved guidelines at lower rates than both Whites and Hispanics. Those not meeting the physical activity guidelines had a higher prevalence of diabetes, and those rates were greatest among Blacks (Divney et al., 2019).

The results of a similar study showed that less than 100 minutes per week of leisure time activity increased the risk of type 2 diabetes by 28%, and as leisure-time activity increased, diabetes risk decreased. The relationship between occupational physical activity and type 2 diabetes was also inverse, but it was different from the previous study in that, the relationship was weak, and the domestic type of physical activity was associated with an increase in the risk of type 2 diabetes (Mutie et al., 2020). The lack of physical activity and the increased risk of type 2 diabetes among Blacks highlight the importance of determining factors that influence risk perception and healthy type 2 diabetes related behavior.

**Obesity/Overweight.** Overweight and obesity are measured as a calculation of weight and height that is higher than normal and are typically defined by BMI. A BMI of 25.0 – 29.9 is categorized as overweight, and a BMI of greater than 30 is categorized as obesity (CDC, 2020c). The prevalence of obesity has been on the rise in recent years. Data from the NHANES 2017-2018 study showed that 42% of adults and 40% of young

adults ages 20-39 in the United States were obese. Almost 12% higher than in 1999-2000 (Hales et al., 2020). This increase in obesity rates poses a great problem as overweight and obesity are known risk factors for type 2 diabetes. Higher BMI and fat mass cause insulin resistance (Malone & Hansen, 2019). Between 2013 and 2016, 89% of those diagnosed with type 2 diabetes were also overweight or obese (CDC, 2020b). When examining trends in diabetes prevalence across BMI categories, increases in diabetes rates were only among obese categories (Menke et al., 2015). This implies that increases in type 2 diabetes prevalence could be a result of increases in obesity prevalence (Bhupathiraju & Hu, 2016).

**Prediabetes and Metabolic Syndrome.** Prediabetes and MetS are risk factors for type 2 diabetes (do Vale Moreira et al., 2016; Glauber et al., 2018; Marott et al., 2016; Moore et al., 2017; Yokota et al., 2017). Pre-diabetes occurs when blood sugar levels in the body are higher than what is considered normal, but not as high as blood sugar levels for type 2 diabetes (CDC, 2020d). This condition is diagnosed by a measurement of the amount or percentage of sugar in the blood according to values such as the hemoglobin A1C (5.7-6.4%), fasting blood sugar (100-125mg/dL), or glucose tolerance (140-199mg/dL) (CDC, 2019c). Pre-diabetes has become a growing problem in the United States as rates have increased from 29% to 36% from 2002-2010. As of 2012, the prevalence of pre-diabetes was about 37%, with the highest rates in White and Black Americans (Menke et al., 2015).

Pre-diabetes is a condition that is likely to develop into type 2 diabetes unless certain lifestyle and biological changes, such as diet and weight loss, are made to

decrease the risk (CDC, 2020d). Studies have shown the risk of diabetes development in those with pre-diabetes (Glauber et al., 2018; Yokota et al., 2017). In a study of a population of U.S. adults 18 years of age and older, Glauber et al. (2018) created an algorithm for estimating 2-year susceptibility to diabetes development among those with pre-diabetes at different levels of risk. Results showed that those with high risk had an 18% probability. Those with a moderate risk had an 8.2% probability, and those with a low risk had a 1.6% probability of diabetes development (Glauber et al., 2018). Yokota et al. (2017), in a similar study, analyzed how pre-diabetes naturally developed into diabetes, the risk factors associated with the conversion, and the relationship with weight reduction. In a retrospective longitudinal study on the general population in Japan, the researchers observed that within 4.7 years, 11.9% of those with pre-diabetes developed diabetes, and the associated risk factors were family history, being male, higher blood pressure, and higher blood sugar. It was also noted that weight reduction was associated with lower diabetes incidence (Yokota et al., 2017). These studies show that pre-diabetes is associated with the risk of diabetes development.

MetS is the existence of a group of biological conditions such as abdominal obesity, high blood pressure, hyperglycemia, low HDL cholesterol and high triglycerides. A person with 3 or more of these conditions may be diagnosed with MetS and have an increased likelihood of developing type 2 diabetes or cardiovascular disease (Moore et al., 2017; Zimmet et al., 2005). As of 2012, the prevalence of MetS in the United States was 34.2%, with the highest rates among Blacks and those with low socioeconomic status (Moore et al., 2017). Studies have shown increased type 2 diabetes incidence and/ or

prevalence in populations with MetS (do Vale Moreira et al., 2020; Marott et al., 2016). In a recent study of a sample population of Brazilian men and women ages 25 years and older, do Vale Moreira et al. (2020), compared the prevalence of MetS in those with pre-diabetes, type 2 diabetes, and cardiovascular disease risk. The researchers found that the prevalence of MetS among the population was 36%. Among those with MetS, more than half had pre-diabetes, about 76% had type 2 diabetes, and 57% were at risk for cardiovascular disease (do Vale Moreira et al., 2020), showing that MetS is highly associated with these conditions. As do Vale Moreira et al. (2020), researched the risk of type 2 diabetes in those with MetS as a whole, Morott et al. (2016), studied the association between individual components of the MetS with type 2 diabetes risk, and the influence of genetics. They found that with every 1cm increase in waist circumference, there is a 5% higher risk and a 5% causal genetic risk of type 2 diabetes. The other MetS factor that was found to have an observational and genetic risk was glucose level. For every 1mmol/L increase in glucose, it was associated with a 32% higher risk and an 82% causal genetic risk of type 2 diabetes (Marrot et al., 2016). This shows that genetics or family history is an important factor to consider when associating pre-diabetes and MetS with type 2 diabetes.

**Family History.** Type 2 diabetes is a chronic disease that occurs in families; therefore, family history is considered a very important risk factor (ADA, n.d.-b). Those who have a positive family history among immediate family members such as mother, father, or sibling, are at a higher risk for type 2 diabetes than those without a family history, especially if there is a history in both parents (The InterAct Consortium, 2013).

This is due to shared genes, lifestyle behaviors, and environments (ADA, n.d.-b). Although the risk for diabetes is increased with any family history, the more family members someone has with type 2 diabetes, the higher the risk (Kral et al., 2019; The InterAct Consortium, 2013). Kral et al., (2019) compared family history risk among African Americans and European Americans. They found that any family history of type 2 diabetes among European Americans put them at an increased risk. However, in African Americans, it was found that family history was only a significant risk factor when 3 or more family members had type 2 diabetes (Kral et al., 2019). Not only is family history associated with an increased risk of type 2 diabetes, but it is also associated with an increased risk of mortality (4%), independent of other factors such as BMI, lifestyle, and other biological risk factors (Leong, 2016).

The knowledge of family history of type 2 diabetes is significant as it can help people to be more aware of their susceptibility and transfer that awareness into the practice of preventive health behaviors. Several studies show that those with a family history of type 2 diabetes have a more realistic perception of their personal risk (Amuta, Crosslin, et al., 2016; Merzah, 2016; Skøt et al., 2018), while other studies show the association between known family history and health behavior (Ard et al., 2020; Choi et al., 2019). Using the HBM as the framework for their qualitative study, Ard et al. (2020) discovered that family history influenced the practice of preventive health behaviors such as weight management, healthy diet, and cardiovascular activities among a sample of African American women ages 18 years and older. Similarly, in a sample of Korean men and women ages 40-69 years, those with a family history of diabetes were more likely to

practice healthy behaviors such as regular exercise and healthy diet but did not have normal body composition (Choi et al., 2019). The association between family history and healthy behaviors were strengthened among different characteristics of family history, such as the family member with diabetes was a sibling, age at onset was younger than 50 years old, and an increased number of affected family members (Choi et al., 2019). Amuta et al. (2017) analyzed similar familial characteristics among affected family members to determine an association between family history and preventive health behaviors in a population of college students. After controlling for demographics, the results were similar to Choi et al. (2019). They observed that an increased number of family members with type 2 diabetes, a closer genetic relationship (first-degree relative), and having a family member with severe diabetes were significantly associated with physical activity and eating vegetables (Amuta et al., 2017).

Although the previous studies found a positive association between family history and preventive health behaviors, there are other studies that conflict this notion (Amuta & Barry, 2015; Seaborn et al., 2016). Seaborn et al. (2016) found that that knowledge of family history of type 2 diabetes did not increase the likelihood of engaging in preventive health behaviors in a population of African Americans ages 18-79 years. A similar result occurred among a population of college students who although researchers found an association between type 2 diabetes family history and being conscious of calorie intake, there was no significant relationship found between family history and eating healthy foods such as fruits and vegetables (Amuta & Barry, 2015). As a result of these

conflicting studies, more education may need to happen regarding the impact of family history on personal susceptibility and methods for prevention, especially diet.

## Diabetes Susceptibility in Different Populations

There are populations or groups of people that are more susceptible to health conditions than others due to disadvantages among social, economic, and environmental factors, resulting in differences in health. These differences are commonly called health disparities (Office of Disease Prevention and Health Promotion, 2020). Health disparities among persons of different race / ethnicity, age, and socioeconomic status are prevalent in the United States. Health disparities exist with populations such as African Americans, African American women, and college students. Disparities exist in the risk and development of chronic conditions such as type 2 diabetes among these populations when compared to other groups.

### *African Americans*

African Americans are a minority population in the United States that experiences many health disparities, including having higher susceptibility, incidence, and prevalence of type 2 diabetes (CDC, 2020b). As of 2018, African Americans were 1.6 times more likely to have type 2 diabetes than Whites (HHS, Office of Minority Health, 2019). This is due to the presence of a disproportionate prevalence of diabetes risk factors in this population. One such risk factors is obesity. Between 2017 and 2018, the prevalence of obesity among the African American population was about 50%, which was higher than any other racial/ethnic group (Hales et al., 2020).

Several researchers have examined this health disparity by analyzing differences in the prevalence and incidence of type 2 diabetes among different racial/ ethnic groups (Kulick et al., 2016; Piccolo et al., 2016; Zhu et al., 2019). Among a cohort of 11-20-year-old participants, Zamora-Kapoor et al. (2018), measured the association between traditional type 2 diabetes risk factors and the prevalence of pre-diabetes and diabetes among different racial/ethnic groups. The results showed that White participants had the highest rates of physical activity and healthy BMI, while Black participants had higher rates of obesity, television time, parental type 2 diabetes history, and the second highest prevalence of fast-food consumption of all groups. At the last wave of the study, they were also found to have the highest rate of pre-diabetes and diabetes development (Zamora-Kapoor et al., 2018). Even though lifestyle behaviors are contributing factors in the development of type 2 diabetes, there are additional factors such as socioeconomics and racial disparities that impact the prevalence in African Americans, and the health disparities that exist among different groups.

While assessing how factors such as socioeconomic, lifestyle, environment, psychosocial, biophysiological and genetics contribute to the racial and ethnic disparities associated with type 2 diabetes, Piccolo et al. (2016), found that lifestyle factors predicted type 2 diabetes more than any other domain. However, racial/ethnic disparities were best predicted by socioeconomic factors. Similarly, Gebreab et al. (2016), examined the association of type 2 diabetes with neighborhood physical and social environments, favorable grocery food stores, and lifestyle factors (diet, physical activity) in African Americans. While individual lifestyle factors were significant, those who had and

developed type 2 diabetes were more likely to live in neighborhoods saturated with unfavorable grocery food stores and low social cohesion, even independent of individual lifestyle factors (Gereab et al., 2016). This discovery is like another study previously mentioned, where researchers concluded that there were more important factors , such as the built (physical) environment, that contribute to type 2 diabetes outside of genetics or family history (Kral et al., 2019).

An additional study found that ethnic minorities experience diabetes at higher rates, but with much lower BMI measurements than Whites (Zhu et al., 2019). Supporting this finding, Blacks and Hispanics were shown to be at a higher risk for developing type 2 diabetes based on sociodemographic and cardiovascular risk factors, even though the rates of traditional risk factors such as BMI and smoking were higher in Whites (Kulick et al., 2016). On the contrary, Bancks et al. (2017), suggest that biological factors such as BMI contributed to racial disparities, but factors such as socioeconomic conditions were not significant (Bancks et al., 2017). These studies show that African Americans have higher rates of type 2 diabetes, as well as higher rates of risky lifestyle factors (Bancks et al., 2017; Kulick et al., 2016; Zhu et al., 2019), however the discrepancies among studies show factors such as neighborhood environment, social cohesion, accessibility, and socioeconomic status, in addition to lifestyle factors contribute to African American's increased susceptibility to type 2 diabetes.

**African American (Black) Women.** African American women also experience health disparities in terms of race/ethnicity and gender. They are susceptible to chronic disease at higher rates than African American men and other groups of women (Hales et

al., 2020; Hardy, 2019; Luo et al., 2019). They have a higher prevalence and incidence rate for chronic diseases such as type 2 diabetes. As of 2018, the rates for type 2 diabetes among African American women were 1.7 times higher than White women (HHS, Office of Minority Health, 2019). However, African American women are just as likely to develop gestational diabetes during pregnancy as White women (Bower et al., 2019). They are also more likely to be screened for type 2 diabetes than other groups but experience higher rates of pre-diabetes and diabetes development after having gestational diabetes (Bower et al, 2019).

There are lifestyle factors such as inactivity, and biological risk factors such as obesity that contribute to their increased risk (Armstrong et al., 2018; Hales et al., 2020; Luo et al., 2019). African American women have been shown to have lower rates of physical activity than men and other women (Armstrong et al., 2018; Williams et al., 2018). Examining the NHANES 2007-2016 data, Armstrong et al. (2018) discovered that Black females ages 18-24 years were less likely than any other groups of males or females to participate in any physical activity. They also reported the shortest duration of physical activity compared to other groups of males and females (Armstrong et al., 2018). Similar trends were shown in a study examining the physical activity behavior in Blacks using data from four different U.S. national health surveys. Black men met physical activity guidelines at higher rates than Black women. Although both men and women had declines in physical activity as they aged, the declines were higher in women (Williams et al., 2018). Results also showed that as Black women increased in weight (normal,

obese, severely obese), there were significant declines in meeting physical activity guidelines (34%, 29%, 24%, respectively) (Williams et al., 2018).

Black women experience obesity at higher rates than Black men and women of other racial/ ethnic groups (Hales et al., 2020). Utilizing data from the Women's Health Initiative study, Luo et al. (2019), explored this difference by examining the variance in diabetes risk among women of different race / ethnicity according to anthropometric factors such as BMI, waist circumference, and waist-to-hip ratio. Although the researchers found a positive association with anthropometric measurements and diabetes risk among all groups, Black women had a higher incidence of diabetes. They also had higher anthropometric measurements such as total fat mass, BMI, waist circumference, and leg fat than other women. Data also showed that they did have lower trunk to leg fat ratios than other groups, which the researchers concluded could be a better biomarker for assessing diabetes risk among Black women (Luo et al., 2019). Likewise, Hardy et al. (2019), conducted a study to determine the strongest anthropometric values associated with type 2 diabetes incidence among White and Black adults. Just as in the Luo et al. (2019) study, Hardy et al. (2019), discovered that Black women had higher anthropometric measurements than White women and had the highest type 2 diabetes incidence after an 11-year follow-up. They also developed type 2 diabetes faster than Black and White males, and White females (Hardy, 2019). While Hardy et al. (2019), found that waist to hip ratio was the best anthropometric predictor of incident diabetes among Black women, Luo et al. (2019), discovered that waist circumference was the better predictor. As BMI is traditionally used for diabetes risk assessment, both studies

challenge its effectiveness in being the best predictor of type 2 diabetes incidence, especially for Black women.

Other life factors such as stress from racism and discrimination put African American women at higher risk for type 2 diabetes (Bacon et al., 2017; Dormire, 2016; Shin et al., 2017). Analyzing a convenience sample of postmenopausal women, the researcher hypothesized that the stress faced by Black women due to discrimination would lead to differences in glucose metabolism than other women of different racial/groups (Dormire, 2016). Findings showed that Black women perceived that they experienced higher levels of discrimination than White women, had higher levels of stress, and higher levels of fasting blood glucose, putting them at an increased risk for pre-diabetes and type 2 diabetes (Dormire, 2016). Like results were found in a research study of minority women (African American and Latina) where researchers examined the association between racial discrimination and stress with cardiometabolic risk factors such as BMI and % body fat. The study results showed a positive relationship between racial discrimination and stress; stress and blood pressure; and both racial discrimination and stress with % body fat (Shin et al., 2017). When compared with Latina women, African American women reported higher levels of racial discrimination and systolic blood pressure (Shin et al., 2017). The association of stress with type 2 diabetes was even shown among a cohort of Black women from the Black Women's Health Study. Although a little over half of the cases of type 2 diabetes incidence was explained by BMI, those who reported having experienced a higher exposure to racism over a lifetime had a higher incidence of type 2 diabetes than those who reported not being exposed to

racism (Bacon et al., 2017). In addition to traditional lifestyle and biological factors, the experiences of stress and racism should be considered in the treatment and prevention of type 2 diabetes among African American women.

### *College Students*

College students engage in many risky health behaviors, especially traditional college students who are considered emerging adults. Emerging adulthood is a period in life that marks important lifestyle changes and health habits (Arnett, 2000) that can be likely to sustain after college, and into full adulthood. Many of these changes result in unhealthy behaviors such as unhealthy eating patterns, and biological factors such as overweight/obesity, that are considered risks for cardiometabolic diseases like type 2 diabetes and heart disease. As a result, college students are a critical population to explore regarding susceptibility to type 2 diabetes.

The American College Health Association (ACHA) (2020) explored lifestyle behaviors and biological factors of undergraduate college students in the National College Health Assessment (NCHA) III. Survey data showed that 36.4% of college students in the United States were overweight or obese (ACHA, 2020). These rates are reflective of the obesity rates in the general U.S. population for ages 20-39 (Hales et al., 2020). College students also reported behaviors such as diet and food insecurity in the NCHA III survey. About 31% reported eating the recommended vegetable intake, and only 18.3% reported eating the recommended fruit intake within the last 7 days. Consistent with these results, Granillo et al. (2015), reported that even college student vegetarians are not eating the recommended fruit and vegetable intake. A diet consisting

of high calorie intake has been associated with a decreased level of insulin sensitivity and higher beta cell functioning in overweight or obese young adults, increasing the risk of pre-diabetes and diabetes, especially among African Americans (Cha et al., 2018).

The NCHA III survey also found that food insecurity was prevalent among this population as 43.5% stated that they had low to very low food security (ACHA, 2020), which is much higher than the U.S. household food insecurity rate for the general population (Coleman-Jensen et al., 2016). Studies have shown that food insecurity is a growing problem among U.S. college students and is associated with adverse health outcomes (Bruening et al., 2018; Payne-Sturges et al., 2018; Zein et al., 2019). In a study of 237 undergraduate college students, Payne-Sturges et al. (2018), discovered that 15% of the participants were food insecure and 16% were at risk. A similar study showed that 19% of college students from 8 different Universities in the United States were food insecure, and 25% were at risk (Zein et al., 2019). Knol et al. (2017), showed much higher rates of food insecurity among students who lived off campus as 37.6% had low and very low food security. Although rates may vary between studies, they show that students who were found to be food insecure, and at risk for food insecurity reported higher rates of fair and poor health, lower energy (Knol et al., 2017; Payne-Sturges et al., 2018), higher perceived stress, and higher rates of disordered eating than students who were food secure (Bruening et al., 2018; Zein et al., 2019). Food insecurity was also inversely associated with healthy campus physical activity (Bruening et al., 2018). Additionally, food insecure students were more likely to be African American (Payne-

Sturges et al., 2018; Zein et al., 2019), which displays a health disparity consistent with U.S. household food insecurity data (Coleman-Jensen et al., 2016).

College students face risks for MetS, which is another important risk factor for type 2 diabetes. In a sample of undergraduate young adult college students, Hsiao et al. (2015) discovered that 44% of the population had 2 or more risk factors for MetS, 12.5% had 3 or more, and 1.3% met the criteria. Comparably, Olfert et al. (2018), reported a 15% prevalence of MetS in a population of 18-24-year old's attending West Virginia University. However, among a cohort of seemingly healthy non-obese college students, Williams et al. (2019) found much higher rates and differences among males and females. The researchers reported that 71% of females and 80.9% of males met one or more MetS criteria, and 7% of females and 14.9% of males met three or more (Williams et al., 2019). Amongst the studies, the most prevalent MetS risk factors were low HDL (Williams et al., 2018; Hsiao et al., 2015), high fasting blood glucose (Olfert et al., 2018), and elevated blood pressure among males (Williams et al., 2018).

Considering college students' susceptibility to type 2 diabetes based on lifestyle and biological factors, not all are being informed of their actual risks by their health care providers, even when known risk factors, such as overweight or obesity are present (Saylor et al., 2018). Although these risk factors are present, only 2% of the college population in the NCHA III study had a diabetes or pre-diabetes diagnosis (ACHA, 2020), but only 69% of those diagnosed have visited their health care provider within the last year (ACHA, 2020). Those who do not seek out health care are at a higher risk for diabetes complications.

## Perception of Type 2 Diabetes Susceptibility

The perception of type 2 diabetes susceptibility is dependent upon several factors such as knowledge of diabetes and associated risks, personal health behavior, and family history (Yang et al., 2018). The perception of peer risk of type 2 diabetes could also impact someone's personal susceptibility, as people's thoughts and behaviors are oftentimes influenced by their peers (Amuta et al., 2017). Knowledge of type 2 diabetes is important for recognizing early warning signs and symptoms. Early diagnosis is key in disease control and prevention of diabetic complications and death (ADA, n.d.-a). Health behavior theories such as the HBM suggest that understanding associated risk factors can influence personal perceived susceptibility, therefore influencing behavior that is likely to prevent disease onset (Skinner et al., 2015). The uptake of healthier behaviors can result in decreased personal susceptibility (Yang et al., 2018).

### *Perceived Personal Susceptibility to Type 2 Diabetes*

According to the HBM, perceived susceptibility and perceived threat of a disease can cause individuals to make behavior changes to reduce the threat (Skinner et al., 2015). In a qualitative inquiry, O'Brien et al. (2016), explored the diabetes risk perception of adults with pre-diabetes, and their preference for the type of treatment associated with risk reduction. They discovered that most of the participants overestimated their susceptibility to diabetes as they figured that a diagnosis of pre-diabetes would automatically develop into diabetes (O'Brien et al., 2016). The researchers also found that there was a lack of knowledge about available treatments that would reduce their risk, and once participants were made aware of those treatments, they

were motivated to take action (O'Brien et al., 2016). On the contrary, in a population of African American female college students ages 18-26 years, most of the participants were aware that diabetes was a severe threat, but there was no significant association between threat appraisal and increases in physical activity or healthy diet (Corliss et al., 2016). Contrasting the results of other studies, those with a healthier diet perceived diabetes to be more of a threat than those who had more risky dietary behaviors such as the consumption of a high number of sodas per week (Corliss et al., 2016). The studies show that there are conflicts regarding the perception of disease susceptibility and the likelihood of participation in preventive health behaviors.

**Self-Efficacy.** The HBM construct self-efficacy is the perception of control that someone has over a disease (Skinner et al., 2015). Typically, those that have a sense of control are more likely to change their behavior and engage in preventive health actions (Skubisz, 2014). In addition to the HBM, the Risk Perception Attitude (RPA) Framework is another health behavior theory that considers the role of risk perception and self-efficacy in protective health actions. The RPA theory states that those with a high-risk perception and a high self-efficacy will be motivated as they believe they are capable of acting against the threat. However, those with a low-risk perception and a low self-efficacy will not engage in any preventive behaviors because they do not believe they are at risk or capable of making any changes (Skubisz, 2014).

Corliss et al. (2016) as a part of their study on the protection motivational factors of diabetes, focused on self-efficacy in a population of African American female college students. In their research inquiry, they asked if there was an association between coping

appraisal and diabetes self-efficacy. They found that self-efficacy was significantly associated with the perception that healthy eating and physical activity are useful in the prevention of type 2 diabetes (Corliss et al., 2016), increasing likelihood that they will participate in those actions. This was also the result of a study that investigated the factors that determined diabetes prevention behaviors such as physical activity. This study conducted by Mirzaei-Alavijeh et al. (2019), on a population of Iranian men and women, showed that self-efficacy, perceived susceptibility, and other socio-cognitive factors related to the performance of diabetes prevention were responsible for 40% of the variation in those behaviors, and self-efficacy was one of the most significant factors (Mirzaei-Alavijeh et al., 2019). However, in another study, self-efficacy and other Social Cognitive Theory constructs only contributed to 16% of the variance in preventive health screening behavior among a population of diabetics (Cooper et al., 2016). Self-efficacy was also significant in a qualitative study of Aboriginal people in Australia. Seear et al. (2019) wanted to know how this population made behavioral changes to improve their health and decrease their risk of diabetes or complications from diabetes. The researchers discovered that participants were motivated to make healthy behavior changes by their perception of the risk of diabetes-related health consequences, self-efficacy, and belief that behavior change can prevent consequences (Seear et al., 2019).

Self-efficacy has been a significant determining factor for healthy behavior, even when risk perception was not. This was shown in the results of a study where researchers were trying to find if the different constructs of the Health Action Process Model explained participation in healthy diets among a sample of Iranian adults with type 2

diabetes (Rohani et al., 2018). Although risk perception was not associated with an intent to participate in healthy behavior, it was found that different levels of self-efficacy (action, maintenance, recovery) did predict healthy dietary behavior (Rohani et al., 2018). There are instances where researchers have found, unlike other studies, that risk perception nor self-efficacy were found to be predictors of diabetes knowledge or diet and exercise behaviors (Simonds et al., 2017). Although some of the studies on the association of self-efficacy and participation in healthy behavior are conflicting, it is still a worthy concept to explore in diabetes studies and programming.

**Perceived and Actual Risk.** It is ideal for those with an actual risk of disease to perceive its severity and their susceptibility so that it increases their threat appraisal and preventive behavior (Skinner et al., 2015). However, studies suggest that those with an actual risk of type 2 diabetes may not always correctly perceive their risk (Heidemann, 2019; Joiner et al., 2022; Yang et al., 2018), thereby decreasing the likelihood that they will act against the threat. For example, Joiner et al. (2022) studied the difference in diabetes risk perception between a population of U.S. adults of different race / ethnicity who were over the age of 20 with undiagnosed pre-diabetes. There results showed that almost 72% of participants did not perceive any diabetes risk, and Blacks were more likely to perceive no risk than Whites (Joiner et al., 2022).

Heidemann et al. (2019) studied the relationship between perceived risk and actual risk of type 2 diabetes, and the contributing factors among the German adult population. There was inconsistency with the perception of risk versus the actual risk. Among participants that were at high risk for type 2 diabetes, only 33% perceived that

they had almost no risk, and 53% perceived that they were in good health (Heidemann, 2019). Another example is found in the study by Yang et al. (2018) as they also researched the relationship between perceived risk and actual risk of type 2 diabetes but among different race / ethnicity. Like the previous study, it was found that participants underestimated their risk, as there were 39% that had actual risk, but only 28% perceived they were high risk. Also, among those with no risk, 26% perceived that they were at risk (Yang et al, 2018). In the Heidemann et al. (2019) study, the factors significantly associated with an increased perception of risk were lower age, family history, and being informed of risk by the doctor. The factors significantly associated with a decreased perception of risk was having no opinion on disease severity (Heidemann, 2019). Similarly, Yang et al. (2018) found that family history was also a factor that participants perceived was a risk for type 2 diabetes, in addition to being overweight, and poor diet.

Differences in perception of type 2 diabetes susceptibility can also differ among different races and ethnicities. Yang et al. (2018) found that Black and Hispanics reported higher rates of type 2 diabetes perception than other races / ethnicities and that perception was associated with poor diet. This perception was accurate as the rates of diabetes, pre-diabetes, and family history were the highest among Blacks, and the rates of physical activity were lowest among this ethnic group, showing that they had an actual risk (Yang et al., 2018). Other differences in risk perception have been shown among different races/ethnicities living in different geographic locations inside (Georgia) and outside (Nevada) of an area called the diabetes belt, due to the high rate and susceptibility to diabetes (Ledford et al., 2019). Among a population of type 2 diabetes patients, racial and

ethnic differences showed that Whites perceived a longer course of disease than Asians and Black Americans. Additionally, patients that lived within the diabetes belt perceived a lesser disease severity than those that lived outside of the diabetes belt (Ledford et al., 2019), even though they were at a higher risk. Contrary to the previous studies mentioned, Owei et al. (2019), conducted a 5.5-year longitudinal study that looked at the normal course of pre-diabetes in a population of Black and White adults ages 18-65 with a parental history of diabetes, but not personally diagnosed with diabetes. They compared pre and post biometric measures to identify those who had developed pre-diabetes during the study period. Twenty-nine percent of participants developed pre-diabetes, and although the researchers did not offer an intervention, participants were notified of their pre-diabetes incidence. 18 months after notification, researchers gathered biometric measures again for all study participants. They found that both Black and White participants who were informed they had developed pre-diabetes showed glycemic and weight decreases, improved glucose tolerance, improved diet, and increased physical activity levels (Owei et al., 2019). This denotes that the knowledge of actual risk of diabetes could potentially cause a change in health behavior.

### *Type 2 Diabetes Knowledge and Perceived Personal Susceptibility*

The lack of knowledge of type 2 diabetes is associated with personal risk and behavior, especially among college students. For example, in a multicultural sample of college students from three City University of New York schools, Mongiello et al. (2016a) discovered that overall knowledge of diabetes was low, with Blacks and Hispanics having the lowest scores. Most students knew that obesity and inactivity were

risk factors for type 2 diabetes, but family history was not a commonly known risk factor among the group, and those that had less knowledge of diabetes were the ones who underestimated their personal risk (Mongiello et al., 2016a).

Khlaifat et al. (2020) explored the knowledge, risk perception, and practice of diabetes prevention behaviors among college students from Universities in Jordan. This study showed that there was very low knowledge of diabetes and risk perception, but the practice of diabetes prevention behaviors was a little higher. This study differs from Mongiello et al. (2016a) because having a family history of diabetes was associated with diabetes knowledge, however diabetes risk perception was influenced by not having a family history and caring for a relative with diabetes. Although diabetes knowledge was low, it was a predictor of diabetes prevention practices (Khlaifat et al., 2020). Similarly, Amankwah-Poku (2019) found that a population of undergraduate students in Ghana had little knowledge of diabetes overall. However, they had more knowledge of treatment than they had about symptoms and complications. Students who had a family history of diabetes, ate healthy, and engaged in physical activity had more general knowledge of diabetes than those who did not (Amankwah-Poku, 2019).

On the contrary, some studies show that although knowledge of type 2 diabetes has increased, personal risk perception is still low (Piccinino et al., 2015), even among those that have actual risks (Heidemann et al, 2019; Mongiello et al., 2016b). Kowall et al. (2017) studied this concept using data from the German KORA FF4 population-based study. They assessed the perceived likelihood of having diabetes among those with undiagnosed diabetes, and perceived personal susceptibility of diabetes among those with

pre-diabetes. It was found that 74% of those with undiagnosed diabetes perceived that their likelihood of having diabetes was low, and 72% of those with pre-diabetes perceived that they had no risk. The authors concluded that those with diabetes and pre-diabetes underestimated their possibility of having or developing diabetes (Kowall et al., 2017).

### *Perceived Peer Susceptibility and Personal Susceptibility*

Despite current personal health behaviors and knowledge of risk factors, studies show that college students tend to underestimate their risk for type 2 diabetes when comparing themselves to their peers (Amuta, Jacobs, et al., 2016; Mongiello et al., 2016b; Reyes-Velazquez & Sealey-Potts, 2015). They also underestimate the role that individual behavior plays in their risk (Amuta et al., 2015). The results of a study conducted by Amuta et al. (2015) showed that among a population of overweight/ obese college students at risk for type 2 diabetes, the only factors that were associated with a higher risk compared to their peers was being female, having a family history, and a higher BMI. Lifestyle behavior was not a significant factor in risk perception, which can decrease the likelihood of participation in behaviors that will reduce the risk of diabetes (Amuta et al., 2015). Mongiello et al. (2016b), assessed personal risk perception in a multiracial college student population that had several diabetes risk factors. Like the Amuta et al. (2015) study, there were several high-risk students that underestimated their risk compared to their peers. The researchers reported that of the students who were at high risk for diabetes, 39% perceived a lesser risk than that of their peers. Those who

correctly perceived their risk were more likely to be female, have a family history, be born in the United States, and be Black (Mongiello et al., 2016b).

Amuta, Jacobs, et al. (2016) in their study assessing the differences in type 2 diabetes risk perception, attitude, and preventive behavior among different genders, showed that only 29% of college student participants had an accurate perception of a higher risk than their peers. Consistent with other research, females were more likely to perceive they were at risk for type 2 diabetes development. Another very similar study reported the unrealistic optimism of college students' perception of their type 2 diabetes susceptibility (Reyes-Velazquez & Sealey-Potts, 2015). Like the previous studies, the perception of being at high risk was associated with family history and being African American and Hispanic. The majority of those that had a low-risk perception reported four days of exercise per week, but only consumed one serving of fruits and vegetable per day (Reyes-Velazquez & Sealey-Potts, 2015). These results are like Amuta, Jacobs, et al. (2016), where males who were less likely to perceive risk reported higher moderate or vigorous physical activity. Yet, females who were more likely to perceive risk, reported higher fruit and vegetable consumption. They are also like the results of Amuta et al. (2015), where lifestyle factors such as unhealthy diet and lack of exercise were not seen as risk factors.

### *Peer Influence/Peer Support*

Peers are influential in driving individual health related behavior. Young adults make health related decisions based on the perceptions and behaviors of their peers or what is socially acceptable. Studies show that societal factors such as peer and family

influence, social support, as well as social and cultural norms determine physical activity and dietary behaviors among young adults (Jakub et al., 2018; Kabir et al., 2018). Amuta et al. (2017) investigated how the advice of peers, family, and health care providers impacted participation in physical activity among a population of overweight/obese college students. It was discovered that the advice from friends was significantly associated with the performance of physical activity, but not the advice of family or health care providers (Amuta et al., 2017). Peer relationships among athletic teammates can also have a great impact on individual behavior. Scott et al. (2019) discovered that these peer relationships had positive and negative influences on health behavior in a study among athletes 15 years and older. The strongest predictors of high levels of exercise and lower levels of unhealthy eating patterns were supportive teammate friendships. The negative influences teammates' disordered eating and perceived pressure from teammates to lose weight or change body shape most strongly predicted higher levels of disordered eating, with stronger negative influences among females (Scott et al., 2019). However, among Black college-aged females 18-30 years old (similar to the sample population in this study) social support was not associated with leisure-time physical activity (Martin, 2018). Therefore, health prevention behaviors may or may not be influenced by peers in the sample population for this study.

## Summary and Conclusions

In this literature review I examined several studies that addressed the susceptibility of type 2 diabetes among African American female college students, and the associated factors. I explored the Type 2 diabetes prevalence in the United States

among African Americans and young adults, along with associated risk factors such as family history, diet, physical activity, obesity, MetS, knowledge of type 2 diabetes, self-efficacy, and perception of diabetes susceptibility. The literature showed that diabetes is the seventh leading cause of death in the United States (CDC, 2020a), with rising incidence among the youth and young adult populations (Mayer-Davis et al., 2017). The issue is that diabetes is associated with many severe complications that are more likely to occur in someone with early-onset diabetes, and are more prevalent among African Americans (CDC, 2020b). In this literature review, I also analyzed studies on the modifiable and non-modifiable diabetes risk factors and explored those that were prevalent among African American women and college students, such as food insecurity (Coleman-Jensen et al., 2017), obesity (Hales et al., 2020) and physical inactivity (Armstrong et al., 2018). I also discovered in the literature that college students tend to underestimate their risk for type 2 diabetes (Heidenmann et al., 2019), and that perceived susceptibility of type 2 diabetes does not always associate with self-efficacy and health related behavior (Corliss et al., 2016), regardless of peer influence (Martin, 2018).

In this literature review, I also discussed research studies that have utilized the HBM as the theoretical framework, and addressed the constructs perception of susceptibility, self-efficacy, and cues to action, which are three constructs of the HBM. In this review I discovered the HBM was utilized as the basis for several other similar studies that assessed perception of disease risk to predict behavior (Ard et al., 2020). Although I performed an extensive review, there continues to be a gap in the research that

examines the perceived susceptibility of type 2 diabetes among African American female college students, and how their health behaviors are shaped by that perception.

As a result of this gap in the research, in this study I examined the perception of personal susceptibility to type 2 diabetes and type 2 diabetes-related health behavior among African American female college students in relation to their perceived peer susceptibility, family history, actual type 2 diabetes risk, and self-efficacy. In the following chapter, I discuss the research methodology, including the design and rationale, population sample, setting, recruitment strategy and data collection procedures, data analysis, and ethical considerations.

# Chapter 3: Research Method

## Introduction

In this study I examined the perception of personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students in relation to their perceived peer susceptibility, family history, actual Type 2 diabetes risk, and self-efficacy. The disproportionate rates of chronic disease among the African American population (Bancks et al., 2017; Bower et al., 2019; CDC, 2019b, Office of Minority Health , 2019) and the lack of research concerning Type 2 diabetes in African American female college students (Corliss, 2016) justify the need for this study. In this chapter, I discuss the research design and rationale and describe the population sample, selection criteria, and procedures. This chapter also includes a description of the survey instruments, data collection procedures, and methods for data analysis. Finally, I discuss the RQs, threats to validity, and ethical considerations for the protection of the participants.

## Research Design and Rationale

The research method and design I used for this study was a quantitative, nonexperimental correlational survey design. I used this type of design because it allowed me to study a sample of a population to quantitatively describe the existing characteristics, attitudes, and opinions that exist within that population (Babbie, 2011; Creswell & Creswell, 2017). Use of a quantitative correlational design helps a researcher to identify a relationship between the predictor (independent) and outcome (dependent) variables (Creswell & Creswell, 2017) that are relevant within the population of interest.

I chose this research design because it related to the study purpose and the RQs. The purpose of this study was to identify the association between the predictor variables (perceived peer susceptibility of Type 2 diabetes, family history of diabetes, actual Type 2 diabetes risk, and self-efficacy of controlling Type 2 diabetes risk) and outcome variables (perceived personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health risk behavior). In this study, I addressed the target population's perception of their susceptibility to Type 2 diabetes and current health behavior based on several different variables. Numerous researchers have used a quantitative correlational survey research design to address factors related to perceived Type 2 diabetes susceptibility and health behavior among college students (Amuta, Crosslin, et al., 2016; Amuta, Jacobs, et al., 2016; Solomon et al., 2016; Merzah, 2016; Mongiello et al., 2016b; Reyes-Velazquez & Scott et al., 2018; Sealey-Potts, 2015).

To collect data, I administered a cross-sectional survey. This is the best method of collecting data from a sample of a larger population (Babbie, 2011) at one point in time (Creswell & Creswell, 2017). The survey was in the form of a self-administered paper questionnaire. The target population was 100 African American female undergraduate college students ages 18-24 years, which is the average age of undergraduate college students (National Center for Education Statistics, 2018).

## Methodology

### Population

The target population for this study was 100 African American female undergraduate college students attending a Historically Black College/ University. The

population was between the ages of 18-24 years old and had not been previously diagnosed with type 2 diabetes.

**Sampling and Sampling Procedures**

For this study, I utilized a nonprobability, homogenous convenience sample of African American female college students. Convenience samples are commonly used in research studies. Participants in convenience samples are chosen because they are easily accessible and available (Creswell & Creswell, 2017). A homogenous convenience sample is one where participants are selected based on specific sociodemographic characteristics (Ravitch & Carl, 2016). Researchers typically use homogenous samples when the target population is a subgroup of a larger population with specific sociodemographic characteristics (Jager et al., 2017). Convenience samples that are homogenous in nature are more likely to represent the target population than a conventional convenience sample (Jager et al., 2017). This convenience sample was homogenous because I focused on three specific sociodemographic characteristics related to ethnicity, gender, and educational status (i.e., African American, female, college student).

In the sample, I included participants who were enrolled in the target university, were 18–24 years of age, and identified as African American/Black and female. Participants had not been told by a physician that they had Type 2 diabetes or prediabetes. I excluded from the sample any participants who identified as an ethnicity other than African American/Black, who were outside of the target age rage, and who had

been diagnosed with Type 2 diabetes or prediabetes. I included those participants who identified as multiracial by choosing African American/Black and another ethnicity.

I conducted a power analysis to determine the appropriate sample size for this study. I used G*Power 3.1 (Faul et al., 2009) and the Hierarchical Multiple Regression Sample Size Calculator (Analytics Calculator, n.d.) and entered estimated values for effect size, alpha, and power to conduct the power analysis. The effect size, which is the degree of association between two variables (Ellis, 2010), makes the presence of the statistical significance of a study meaningful. In this study, the effect size (Cohen's f2) was estimated at .15, which according to Cohen (1988), is a medium effect size. In research studies, the desired power levels for statistical tests are typically set at .80 (Cohen, 1988). In this study, power was estimated at .80, which means that there is an 80% chance that a test will find statistical significance when it is present, therefore leaving a 10% chance of creating a Type II error by accepting the null hypothesis when it should be rejected. I set the alpha level at 0.05 which allows a 5% risk of making a Type I error by rejecting the null hypothesis when it is true (Frankfort-Nachmias & Leon-Guerrero, 2018). The power analysis estimated the sample size to be at least 85 for both G*Power 3.1 and the Hierarchical Multiple Regression Sample Size Calculator. Therefore, there is an 80.1% chance that the R-squared value will significantly differ from zero with 85 participants. In this study, I recruited 116 participants.

**Procedures for Recruitment, Participation, and Data Collection**

I collected data for this study through a self-administered paper survey. I sought permission to recruit from the university through the university IRB. Once the IRB

approved the study, I sent out recruitment email messages asking for participation through university professors to the female students in their classes, university campus announcements, Blackboard announcements, and student group emails. The messages stated the purpose of the survey, criteria for participation, and the available times and location to participate (see Appendix A). I also sought assistance from the university marketing department to access university digital marketing platforms to recruit for this study. Participants self-reported demographic information such as age, sex, gender, and race/ethnicity. I gave them a statement of informed consent and had to be read prior to beginning the survey. Consent was implied from those participants that read the consent and proceeded with the survey. Once participants completed the survey, they put them into a folder and left the data collection site. It took a lot of resources such as time and energy to recruit 100 participants and to complete pen and paper surveys. I had to find appropriate space and rely on campus advertisement, emails, and word of mouth to recruit participants. There were times where only 1 or 2 participants showed, and sometimes none, thus extending my data collection period.

**Instrumentation and Operationalization of Constructs**

During a literature search, I found no one valid instrument that included an item for each of the variables in this study. The combination of several different items would have made the instrument very long, making it less desirable for students to take, and would have included a lot of unnecessary data. As a result, I compiled two instruments into one survey and used them to gather data for each study variable. The first instrument

was the American Diabetes Association Diabetes Risk Test (ADADRT), and the second instrument was one I developed. It was a self-report survey that included demographics.

### *Published Instrument*

The ADA developed the self-screening tool the American Diabetes Association Diabetes Risk Test (ADADRT) in 2019 to identify undiagnosed individuals who may have or are at risk for Type 2 diabetes (see Appendix B). I used this survey to collect data on family history of diabetes, and actual type 2 diabetes risk. Permission to utilize the ADADRT for educational purposes was given under the copyright and usage section in the online article (ADA, 2019). The instrument is licensed under Creative Commons which allows for use, copying and distribution of work that is copyrighted (Creative Commons, n.d.). The ADA adapted the diabetes screening instrument from Bang et al. (2009) and included gestational diabetes as a survey item. I used the form adapted by the NIDDK (n.d.).

Bang et al. (2009) developed the diabetes risk screening tool using the 1999 – 2004 NHANES data. Standard validation measures for the instrument were established using data from three national studies, of which included the 2005-2006 NHANES study, the Atherosclerosis Risk in Communities study, and the Cardiovascular Health Study. The data included from the 2005-2006 NHANES were from participants 20 years and older with results from a fasting plasma glucose test. The data included from the Atherosclerosis Risk in Communities study involved participants ages 45-64, and data from the Cardiovascular Health Study involved participants ages 65 and older, with increased minority participation (Bang et al., 2009). Bang et al. (2009), established

validity of the instrument by testing NHANES data alone, and the Atherosclerosis Risk in Communities and Cardiovascular Health Study data combined for sensitivity (79%, 72%), specificity (67%, 62%), positive predictive value (10%, 10%), negative predictive value (99%, 98%), and area under curve values (0.83, 0.74) with a cut-point value of 5 (Bang et al., 2009). These values determine the ability of the instrument to discriminate between those who present with a disease, and those who do not. A test/ instrument with an area under curve (AUC) of 0.7 to 0.8 is an acceptable discriminator, and 0.8 to 0.9 is an excellent discriminator (Mandrekar, 2010).

Several other researchers have established discrimination and validity of the ADADRT in different populations (Asgari et al., 2020; Poltavskiy et al., 2016; Woo et al., 2017). Poltavskiy et al. (2016) did a comparison of the diabetes and pre-diabetes risk tests from the ADA and CDC utilizing the NHANES data from 2009-2010 and 2011-2012. The researchers included participants that were adults 20 years of age and older that have not been previously diagnosed with diabetes or on diabetes medication. Both the ADA and the CDC instruments were found to be valid predictors of diabetes. It was reported that in the population, the ADADRT with a cut point of 5 had significant values for AUC (77%), sensitivity (0.83%), specificity (57%), Positive Predictive Value (PPV) (12%), and Negative Predictive Value (NPV) (98%) (Poltvaskiy et al., 2016). Woo et al. (2017) tested the validity of the ADADRT in an aging Chinese population. The study participants were from the fourth Hong King Cardiovascular Risk Factors Prevalence Study (CRISPS4) 2010-2012. Participants that were included had no diabetes diagnosis from the previous assessment (CRISPS3), and the average age was 58 years (Woo et al.,

2017). Results showed significant values for AUC (0.72), specificity (0.57), sensitivity (0.80), PPV (12%), and NPV (98%) (Woo et al., 2017). A similar study conducted by Asgari et al. (2020), tested the ADADRT for discrimination and validity on the Iranian general population. The population sample was taken from the fourth wave of the WHO STEPwise approach to Surveillance (STEPS 2011) and included participants who were ages 20 years and older, were not previously diagnosed with diabetes, and were not pregnant. The values reported with a cut point of 5 were AUC (73.7%), sensitivity (51.6%), specificity (82.4%), PPV (7.9%), and NPV (98.3%) (Asgari et al., 2020). These studies reported similar values for the validity of the ADART even among different populations.

### *Researcher-Developed Instrument*

The instrument I developed for this study is titled, "Diabetes Risk Perception and Health Behavior Survey for African American Female College Students" (see Appendix C). I developed the survey questions based on the current diabetes literature and other instruments that are used to gather data on the study variables. The existing literature about perception of diabetes risk or susceptibility gathers demographic information based on race/ethnicity, diabetes history, actual type 2 diabetes risk, perception of diabetes risk, factors associated with risk perception (Gallivan et al., 2009; Khan et al., 2022; Walker et al., 2003), and perception of peer risk (Mongiello et al., 2016a).

I created this survey with four subscales, one for each of the 4 variables (perception of peer susceptibility, self-efficacy, personal susceptibility, health behavior) that are being explored in this survey. To establish survey items for predictor variables

such as perception of peer susceptibility and self-efficacy, I considered studies such as Mongiello et al. (2016a), and Walker et al. (2003). Both studies used items that identified optimistic bias (peer and personal risk perception) and personal control (self-efficacy). Mongiello et al. (2016a), studying a racial and ethnically diverse population of college students, identified optimistic bias through comparative judgement statements such as "compared to other people my same age, I am less likely than they are to get diabetes" (p. 82), and identified personal control by a survey item stating, "If I am going to get diabetes, there is not much I can do about it" (p.83). Walker et al. (2003), using similar statements of optimistic bias and personal control, found that optimistic bias and a greater perception of other health risks predicted diabetes risk perception more than the actual risk for diabetes (Walker et al., 2003). Therefore, the survey I developed for this study consists of items such as "I believe that my current health habits will keep me in control of my risk for type 2 diabetes, if I improve my current health habits, I will have better control over my risk for type 2 diabetes", to identify self-efficacy (personal control) of developing type 2 diabetes. The survey also consists of items such as "I have better control over my risk for type 2 diabetes than my peers", and "I am less likely to develop type 2 diabetes than my peers", to identify peer diabetes risk perception.

To establish survey items for outcome variables such as personal risk perception and diabetes type 2 diabetes-related health risk behavior, I considered studies conducted by Gallivan et al (2009), and Khan et al. (2022). Gallivan et al. (2009), determined the factors that predict perception of diabetes risk in a U.S. population sample of adults ages 45 years and older. The researchers, through a survey item that asked, "Do you feel you

could be at risk for diabetes?" and "Why do you feel you are at risk for diabetes?" (p. 165) found that the participants' perceived susceptibility was determined by family history, being overweight, and poor dietary habits (Gallivan et al., 2009). Like these findings, Khan et al. (2022), in their study on a population of college students, asked in a survey what is your "perceived future risk of developing diabetes" (p. 1805)? Results showed that diabetes knowledge, BMI, family history, self-rated health, and food label reading were predictors of diabetes risk perception among this population (Khan et al., 2022). As a result of these two studies, in the survey developed for this study, I included items such as "I believe that I am currently at risk for type 2 diabetes, I am concerned that I will develop diabetes while I am in college, I am concerned that I will develop diabetes in my lifetime", to identify risk perception. Also acknowledging that health risk behavior was associated with risk perception in both studies (Gallivan et al., 2009; Khan et al., 2022), several items regarding health behavior are included in the survey.

The specific content included in the survey items for type 2 diabetes-related health risk behavior were based on dietary and physical activity guidelines for Americans (HHS, 2018; HHS & USDA, 2015), and other studies that show the association between health risk behavior, and type 2 diabetes (Chow et al., 2016; Joseph et al., 2016; Larsen et al., 2014), as well as the association between proper health care and type 2 diabetes (Saylor et al., 2018). As a result, the survey I developed for this study includes items such as how often participants eat the recommended servings of fruits, vegetables, whole grains, meat with saturated fats, lean meats, fruit juice and sugar sweetened beverages. Other items address how often participants are performing recommended daily physical

activity, and how often they see their health care provider regularly and if blood pressure and blood sugar values are being checked during those visits, all to establish health risks for type 2 diabetes.

The survey was viewed by two content experts to establish content validity and I made revisions according to their recommendations. I piloted the survey with a small portion (10%) of the sample population to collect demographic data, diabetes history, and other study variables such as perceived peer susceptibility to type 2 diabetes, perceived personal susceptibility to type 2 diabetes, self-efficacy of controlling type 2 diabetes risk, and related risk behavior, to establish reliability. The pilot data was not included in the final study.

**Validity and Reliability**. I established validity of the developed instrument through content validity. Content validity occurs when items on a survey instrument measures all aspects of the content that it was intended to measure. Content validity can be assessed and established by two or more subject matter experts in the field of study (Markus & Smith, 2012). Two subject matter experts reviewed the developed instrument and revisions were made based on their recommendation. Once piloted, I established reliability of the instrument through Cronbach's alpha. According to Trobia (2011), "Cronbach's alpha is a statistic that measures internal consistency among a set of survey items" (p. 2). A Cronbach's alpha value of .70 or above denotes an instrument with good internal consistency/ reliability (Trobia et al., 2011).

### *Operational Definitions*

There are several terms in this study that need to be defined. Those terms and their operational definitions as they relate to the study are as follows:

*Actual type 2 diabetes risk*: participants actual type 2 diabetes risk based on existing risk factors as outlined in the ADA Diabetes Risk Test (ADA, 2019). A score of 5 or above denote an increased level of type 2 diabetes risk, and a score below 5 denote a lower level of risk. The ADA Diabetes Risk Test states that even with a score below 5, the participant could be at risk for having pre-diabetes (ADA, 2019), which is a risk factor diabetes. Therefore, lower scores were considered a lower level of risk. Results were scored as 0= risk score 0 (no risk), 1= risk score one, 2 = risk score two, 3= risk score three, 4 = risk score four, and 5 = risk score five (actual risk) and will be measured as a continuous scale variable.

*Family history of diabetes*: the presence of diabetes in family members that share the same genetic and environmental factors, used to identify disease susceptibility in individuals (Yoon et al., 2002). This variable was measured by the ADA Diabetes Risk Test survey item #5, “Do you have a mother, father, sister, or brother with diabetes?”, and will be scored as Yes (1 point) or No (0 points) (ADA, 2019), and was measured as a dichotomous variable.

*Outcome variable*: a variable that is influenced by a predictor variable (Creswell & Creswell, 2017). The outcome variables being tested in this study are perceived personal susceptibility to type 2 diabetes and type 2 diabetes-related health risk behavior. Their operational definitions are as follows:

*Perceived personal susceptibility to type 2 diabetes:* participant opinion of their risk for type 2 diabetes. This outcome variable will be measured by survey items in the developed survey, Perception of Diabetes Susceptibility Among African American Female College Students, Risk Perception and Health Behavior Survey. The survey items are:

1. I believe that I am currently at risk for type 2 diabetes.

2. I am concerned that I will develop diabetes while I am in college.

3. I am concerned that I will develop diabetes in my lifetime.

4. The survey items will be scored as Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1), and measured as continuous scale variables. Items were calculated into a perception of personal susceptibility score that ranges from 3-12, with higher scores closer to 12 representing low perception of personal susceptibility, and lower scores closer to 3 representing high perception of personal susceptibility.

*Perceived peer susceptibility to type 2 diabetes:* participant opinion of how likely their peers were to develop diabetes compared to themselves (Skinner et al., 2015). This predictor variable was measured by survey items in the developed survey, Perception of Diabetes Susceptibility Among African American Female College Students, Risk Perception and Health Behavior Survey. The survey items were:

1. I have better control over my risk for type 2 diabetes than my peers.

2. I am less likely to develop type 2 diabetes than my peers.

3. The survey items were scored as Strongly Agree (1), Agree (2), Disagree (3), Strongly Disagree (4), and were measured as a continuous scale variable. They were

grouped as the peer-susceptibility subscale. Items were calculated into a total perception of peer-susceptibility score that ranged from 2-8, with higher scores closer to 8 representing high perception of peer-susceptibility, and lower scores closer to 2 representing low perception of peer-susceptibility.

*Pre-diabetes:* a condition in which a person has high blood sugar but not high enough to be considered type 2 diabetes (CDC, 2020d). It is detected at a Hemoglobin A1C of 5.7 – 6.4%, a fasting blood sugar of 100 – 125mg/dL or a glucose tolerance of 140-199mg/dL (CDC, 2019c).

*Predictor variable:* used in survey methods to predict specific outcomes that may occur when this variable is present (Creswell & Creswell, 2017). The predictor variables tested in this study were perceived peer susceptibility to type 2 diabetes, family history of diabetes, actual type 2 diabetes risk, and self-efficacy of controlling type 2 diabetes risk. Their operational definitions are as follows:

*Self-efficacy of controlling type 2 diabetes risk:* feelings of self-control over health habits (Bandura, 2004) that will decrease the risk of type 2 diabetes. This predictor variable will be measured by survey items in the developed survey, Perception of Diabetes Susceptibility Among African American Female College Students, Risk Perception and Health Behavior Survey. The survey items are:

1. I believe that I do not have much control over my type 2 diabetes risk.
2. I believe that my current health habits will keep me in control of my risk for type 2 diabetes.

3. If I improve my current health habits, I will have better control over my risk for type 2 diabetes.

4. Controlling my risk for type 2 diabetes will make me less likely to develop the disease.

The survey items were scored as Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1), and measured as continuous scale variables. Items were calculated into a total self-efficacy score that ranged from 4 – 16, with higher scores closer to 16 representing high self-efficacy, and lower scores closer to 4 representing low self-efficacy.

*Type 2 diabetes:* a disease that occurs when the body does not make enough insulin or use it well enough to control the levels of sugar (glucose) in the blood, resulting in hyperglycemia (high blood sugar) (NIDDK, 2017).

*Type 2 diabetes-related health risk behavior*: participant engagement in health risk behaviors that increase the risk of type 2 diabetes (nutrition, physical activity, health care) (ADA, 2017; Siegel et al., 2018). This outcome variable will be measured by survey items in the developed survey, Perception of Diabetes Susceptibility Among African American Female College Students, Risk Perception and Health Behavior Survey. The survey items are:

1. On average, how often do you eat the recommended serving of 2 ½ cups of vegetables each day?

2. On average, how often do you eat the recommended serving of 2 cups of fruits each day?

3. On average, how often does half of your daily grain intake come from whole grains (e.g. brown rice, oats, quinoa)?

4. On average, how often do you eat meat high in saturated fat and sodium (e.g. hotdogs, hamburgers, lunch/deli meat)?

5. On average, how often do you eat lean meat and other sources of protein (e.g. skinless chicken breast, top sirloin, pork loin, salmon, beans, peas, soy products)?

6. How often is the juice you drink 100% fruit juice?

7. On average, how often do you drink sugar sweetened beverages (e.g. soda, juice drinks with added sugars, sweet tea, lemonade)?

8. How often do you eat unhealthy snacks from the vending machine (e.g. cake, cookies, donuts, potato chips, candy)?

9. How often do you eat healthy snacks from the vending machine (e.g. crackers, granola bar, fruit snacks)?

10. How often do you read food labels when making food choices?

11. On a weekly average, how often do you perform at least 150 minutes of moderate physical activity (e.g. 30 minutes of brisk walking/ day) or 75 minutes of vigorous physical activity (e.g. 15 minutes of running or swimming/ day)?

12. How often do you have a yearly visit with your health care provider?

13. When you visit your health care provider for a yearly checkup, how often is your blood sugar checked?

14. When you visit your health care provider for a yearly checkup, how often is your blood pressure checked?

The survey items are scored as Never (1), Sometimes (2), Usually (3), Always (4). There are 14 items each with the lowest score of 1 (Never) highest score of 4 (Always). Items were calculated into a total type 2 diabetes-related health risk behavior score that range from 14 – 70 and were measured as a continuous scale. A score closer to 70 denotes higher participation in healthy behaviors, and a score closer to 14 denotes lower participation in healthy behaviors.

## Data Analysis Plan

SPSS 28 was the statistical software used for data analysis. I collected the survey data and input them into SPSS. I performed a data cleaning process in which I reviewed the data for any inconsistencies such as errors, incorrect spelling, incomplete data fields, or coding inconsistencies (Willes, 2018). I removed and corrected data with missing variables, corrected errors from data entry, corrected illegal values, removed duplicate information, and made sure all codes or abbreviations used in the data were standardized (Willes, 2018).

### *Research Questions and Hypotheses*

RQ1: Is there a relationship between perceived peer susceptibility to Type 2 diabetes and perceived personal susceptibility to Type 2 diabetes among African American female college students?

$H_0$1: There is no statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and perceived personal susceptibility to Type 2 diabetes among African American female college students.

$H_A1$: There is a statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and perceived personal susceptibility to Type 2 diabetes among African American female college students.

RQ2: Is there a relationship between self-efficacy of controlling Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students?

$H_02$: There is no statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

$H_A2$: There is a statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

RQ3: Is there a relationship between actual Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students?

$H_03$: There is no statistically significant relationship between actual Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

$H_A3$: There is a statistically significant relationship between actual Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

RQ4: Is there a statistically significant difference in perceived personal susceptibility to Type 2 diabetes between African American female college students with and without a family history of Type 2 diabetes?

$H_0$4: There is no statistically significant difference in perceived personal susceptibility to Type 2 diabetes between African American female college students with and without a family history of Type 2 diabetes.

$H_A$4: There is a statistically significant difference in perceived personal susceptibility to Type 2 diabetes between African American female college students with and without a family history of Type 2 diabetes.

RQ5: Is there a relationship between perceived peer susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students?

$H_0$5: There is no statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students.

$H_A$5: There is a statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students.

RQ6: Is there a relationship between self-efficacy of controlling Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students?

$H_0$6: There is no statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

$H_A$6: There is a statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

RQ7: Is there a relationship between actual Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students?

$H_0$7: There is no statistically significant relationship between actual Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

$H_A$7: There is a statistically significant relationship between actual Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

RQ8: Is there a difference in Type 2 diabetes-related health behavior among African American female college students with and without a family history of Type 2 diabetes?

$H_0$8: There is no statistically significant difference in Type 2 diabetes-related health behavior between African American female college students with and without a family history of Type 2 diabetes.

$H_A8$: There is a statistically significant difference in Type 2 diabetes-related health behavior between African American female college students with and without a family history of Type 2 diabetes.

***Data Analysis***

The analysis performed was a quantitative analysis. I described the sample population by age, academic classification, race/ ethnicity, and residence. Descriptive statistics was determined by reporting the mean, standard deviation, standard error, frequency, minimum and maximum of the independent and dependent variables. To examine research questions 1-3, I conducted a simple linear regression to test the relationship between perception of peer susceptibility to diabetes and perception of personal susceptibility to type 2 diabetes; self-efficacy of controlling type 2 diabetes risk and personal susceptibility to type 2 diabetes; actual risk of diabetes and perception of personal susceptibility to type 2 diabetes. To examine research question 4, I conducted an independent sample t-test to see if there was a difference in perception of personal susceptibility to type 2 diabetes between those with and without a family history of type 2 diabetes. To examine research questions 5-7, I conducted another simple linear regression to test for a relationship between perception of peer susceptibility and type 2 diabetes-related health behavior; self-efficacy of controlling type 2 diabetes risk and type 2-diabetes-related health behavior; actual type 2 diabetes risk and type 2 diabetes-related health behavior. To examine research question 8, I conducted another independent sample t-test see if there was a difference in type 2 diabetes-related health behavior between those with and without a family history of type 2 diabetes.

To conduct a simple linear regression, the following regression equation is used to determine a relationship between the independent and dependent variable: y = a + b(X) ; where Y = dependent variable, a = the intercept (constant), b = slope, x = independent variable (Frankfort-Nachmias & Leon Guerrero, 2018). To conduct an independent sample t-test, the following equation is used to determine differences in the mean of two groups when equal variances are assumed:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where $x_1$ = mean of sample 1 (no family history), $x_2$ = mean of sample 2 (family history), $n_1$ = size of sample 1, $n_2$ = size of sample 2, $s_p$ = pooled standard deviation (Kent State University, 2022).

To perform the simple linear regression the data needed to have met several assumptions. The first assumption was that the dependent (outcome) variable must be a continuous variable (Laerd Statistics, 2015a). In RQs 1-3 the dependent variable (perception of personal susceptibility to type 2 diabetes) which had an ordinal measurement (Strongly Disagree, Disagree, Agree, Strongly Agree), was converted to a continuous scale by assigning numbers 1-4 to each level in the Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree). In RQs 5-7, the dependent variable (type 2 diabetes-related health risk behavior) also had an ordinal measurement (Never, Sometimes, Usually, Always), and was converted to a continuous scale measurement by assigning numbers to each level in the Likert scale (1 = Never, 2 = Disagree, 3 = Agree, 4 = Always). Therefore, assumption one was met.

The second assumption was that the independent (predictor) variable was also continuous (Laerd Statistics, 2015a). The independent variable in RQs 1 and 5 (perception of peer susceptibility to Type 2 diabetes) had an ordinal measurement (Never, Sometimes, Usually, Always), and was converted to a continuous scale measurement by assigning numbers to each level in the Likert scale (1 = Never, 2 = Disagree, 3 = Agree, 4 = Always). Likewise, the independent variable in RQs 2 and 6 (self-efficacy in controlling type 2 diabetes risk) had an ordinal measurement (Never, Sometimes, Usually, Always), and was converted to a continuous scale measurement by assigning numbers to each level in the Likert scale (1 = Never, 2 = Disagree, 3 = Agree, 4 = Always). The independent variable in RQs 3 and 7 (actual type 2 diabetes risk) was on a continuous scale (0= risk score 0 (no risk), 1= risk score one, 2 = risk score two, 3= risk score three, 4 = risk score four, and 5 = risk score five (actual risk). Therefore, the second assumption was met.

Next, I ran the simple linear regression in SPSS and used the output to test for assumptions 3-7 (there is a linear relationship, independence of observations, no significant outliers, homoscedasticity, normal distribution of residuals (Laerd Statistics, 2015a).

I reported the results of the simple linear regression using an alpha level ($p$ value) set at 0.05, which determined if perception of peer susceptibility, self-efficacy or actual risk had a statistically significant relationship with perception of personal susceptibility (outcome variable 1) or diabetes-related health behavior (outcome variable 2). Then I reported the Pearson's multiple correlation coefficient (R) to determine the strength of the

relationship between the outcome and predictor variables. The multiple correlation coefficient of determination ($R^2$ and Adjusted $R^2$) was reported by stating the amount of variance in the outcome variable that was explained by the predictor variables. The regression coefficient B was then reported by stating the amount of increase that occurred in the dependent (outcome) variable with each 1-point increase in the independent (predictor) variable. The associated 95% confidence interval and *p* value were also reported to determine statistical significance of the relationship.

To perform the independent sample t-test for RQ's 4 and 8, several assumptions needed to be met. The first assumption was that there was one continuous dependent variable (Laerd Statistics, 2015b). In RQ4 and 8, the dependent variable (perception of personal susceptibility to type 2 diabetes) had an ordinal measurement (Never, Sometimes, Usually, Always), and was converted to a continuous scale measurement by assigning numbers to each level in the Likert scale (1 = Never, 2 = Disagree, 3 = Agree, 4 = Always). Therefore, assumption one was met. The second assumption was that there was one dichotomous independent variable (Laerd Statistics, 2015b). In RQs 4 and 8, the independent variable (family history of type 2 diabetes), was dichotomous (Yes, No). Therefore, assumption two was met. Then I conducted the explore procedure to test for assumptions 3-6 (independence of observations, no significant outliers in the 2 independent groups, the dependent variable is normally distributed for each group of the independent variable, there is homogeneity of variance) (Laerd Statistics, 2015b).

Then I reported the results of the independent sample t-test using descriptive statistics to identify the number of participants who had a family history of type 2

diabetes and those who did not have a family history of type 2 diabetes. Also, I reported the mean score and standard deviation for both perceived personal susceptibility to type 2 diabetes, and type 2 diabetes-related health behavior for both groups. Since there was homogeneity of variances tested with the Levene's test for equality of variances, I reported the t statistic and the standard deviation under the equal variances assumed row from the independent samples t-test output box. The next results I reported were the mean difference in the scores for each group, the 95% confidence interval, the statistical significance of the mean difference using an alpha level (*p* value) set at 0.05, and the strength of the relationship using Cohen's d (Laerd Statistics, 2015b).

## Threats to Validity

In research, the internal validity of a study allows for a researcher to make firm inferences about an existing relationship between variables (Leighton, 2012a), and the external validity allows for generalization of the study results to the larger population, and not unique to the sample population (Leighton, 2012b).

Threats to internal validity exist when there are multiple reasons for the relationship that exists between variables (Leighton, 2012a). One of the threats that could have existed in this study was the threat of self-selection. This occurs when participants are in a group based on their interest or due to life circumstances. In this study, the relationship between variables such as perception of peer Type 2 diabetes risk and Type 2 diabetes-related health risk behavior could have been impacted by the housing environment of the student. For instance, students living at home with guardians or in their own apartment off campus may not have an idea of the type 2 diabetes risk of their

peers because they may not see their peers' health behavior habits outside of class periods. Thus, their health habits may not be influenced by that perception. To account for this threat, I included a survey item that addressed the participants housing. Another example of a threat to internal validity exists in the relationship between self-efficacy and perception of personal risk of type 2 diabetes. A previous type 2 diabetes or pre-diabetes diagnosis or taking diabetes medication could influence self-efficacy of controlling type 2 diabetes and perception of personal susceptibility, thereby threatening the influence of self-efficacy and other predictive variables on perception of personal susceptibility. To eliminate this threat, participants who had been diagnosed with type 2 diabetes or were taking diabetes medication were excluded from the study.

Threats to external validity occur when there is a statistical interaction between variables that cause a change in the effect of the predictor variable across different levels of the outcome variable (Leighton, 2012b). One threat in this study was within participant selection. To have the ability to generalize the results of the study to the larger population of which the sample is a part of participants should be recruited unbiasedly (Leighton, 2012b). In this study, the threat to external validity through participant selection could have been raised if participants were only recruited from the discipline in which I teach as those students are easily accessible. However, to eliminate this threat I recruited participants from all different disciplines within the university.

**Ethical Procedures**

In this study I utilized human subjects for research, and it was carried out in an ethical manner. I recruited study participants from an HBCU. I obtained permission to

access the study participants from the institutions IRB (see Appendix D). I also obtained permission to conduct the study from the Walden University IRB (approval no. 12-15-21-0298663). I submitted the HBCU and Walden University human subjects IRB forms along with supporting documents such as a description of the research study and methodology, the plan to protect human subjects, the letter/ announcement of invitation, the informed consent to participate document, and the survey.

I recruited study participants for the pilot and final study through an online invitation to participate, campus digital advertisements, and through announcements from university professors, instructors and advisors to their students and student groups. Through these messages, students were informed of days, times, and locations where they could visit to complete the survey. I asked permission of colleagues to set up a data collection area near their classes. With this recruitment process there were ethical concerns about informed consent and coercion. These concerns were addressed by providing detailed information about the study in the invitation to participate, including the study purpose and information about the researcher, why the researcher was conducting the study, the qualifications for participation, and that the survey required no personal identifying information (Rudestam, 2014). During data collection, I gave participants an informed consent document that consisted of information about the study, a statement of their right to decline participation without the fear of harm, retaliation, penalty, punishment, or any impact to grades in any course were included. This addressed the ethical concern of coercion. The informed consent also consisted of the number of questions and the length of time it should take them to complete the survey and specified

what the participant may gain from participating in the study, if there will be any risks associated with their participation, and if so to what magnitude (Rudestam, 2014). Additional information was included regarding how the information will be used, who they can contact for questions or concerns, the contact information for the researcher, and how all documents will be kept confidential (Rudestam, 2014). To participate in the survey, participants read the informed consent, and continued to complete the survey if they chose to. They kept the consent form for their records.

Data was collected through a survey instrument. The survey was confidential and did not require any personal identifying information to be recorded. The completed surveys are being kept completely confidential in my home office in a locked cabinet of which I only have access. Documents will be shredded after 5 years.

I recruited participants at the institution where I am a faculty member. To address any ethical considerations with coercion and conflict of interest, I did not administer the survey in my own classes. Students that were in my classes and wanted to participate were able to do so by their own decision based on advertisement. There were no rewards or incentives offered to the students for their participation.

## Summary

This chapter presented an overview of the research design and methodology for this study. The research study design is a quantitative, non-experimental, correlational survey design that will attempt to describe the attitudes and opinions of the sample population. A non-probability homogenous convenience sample of African American college student females was the sample I recruited from an HBCU. Participants

completed a cross-sectional survey that consisted of the ADA Diabetes Risk Test, and the Diabetes Risk Perception and Health Behavior Survey for African American Female College Students, that I developed. The ADA Diabetes Risk Test was used so that I could collect data on the predictor variables; type 2 diabetes family history and actual risk. Using the instrument I developed, I was able to collect data on both predictor (perception of peer type 2 diabetes susceptibility, self-efficacy of controlling type 2 diabetes) and outcome variables (perception of personal type 2 diabetes susceptibility, type 2 diabetes-related health risk behavior). The relationship of these variables was considered in eight hypotheses. To test these hypotheses, I input and analyzed data through SPSS 28 using a simple linear regression test, and an independent sample t-test. I addressed threats to internal validity of the research study by specific survey items, and elimination of participants with pre-existing diagnoses of either diabetes or pre-diabetes. Threats to external validity was also addressed by unbiased recruitment and selection of participants from the sample population. I gained access to the participants through the institutions IRB. Recruitment of the participants involved campus announcements, professor emails to students, and digital marketing flyers. Lastly, I identified ethical considerations such as informed consent, coercion, and conflict of interest. In the next chapter I present the results of the study through data analyses.

# Chapter 4: Results

## Introduction

The purpose of this study was to examine the perception of personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students in relation to their perceived peer susceptibility, family history, actual Type 2 diabetes risk, and self-efficacy. The eight RQs and hypotheses explored in this study were:

RQ1: Is there a relationship between perceived peer susceptibility to Type 2 diabetes and perceived personal susceptibility to Type 2 diabetes among African American female college students?

$H_0$1: There is no statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and perceived personal susceptibility to Type 2 diabetes among African American female college students.

$H_A$1: There is a statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and perceived personal susceptibility to Type 2 diabetes among African American female college students.

RQ2: Is there a relationship between self-efficacy of controlling Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students?

$H_0$2: There is no statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

$H_A2$: There is a statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

RQ3: Is there a relationship between actual Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students?

$H_03$: There is no statistically significant relationship between actual Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

$H_A3$: There is a statistically significant relationship between actual Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

RQ4: Is there a statistically significant difference in perceived personal susceptibility to Type 2 diabetes between African American female college students with and without a family history of Type 2 diabetes?

$H_04$: There is no statistically significant difference in perceived personal susceptibility to Type 2 diabetes between African American female college students with and without a family history of Type 2 diabetes.

$H_A4$: There is a statistically significant difference in perceived personal susceptibility to Type 2 diabetes between African American female college students with and without a family history of Type 2 diabetes.

RQ5: Is there a relationship between perceived peer susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students?

$H_0$5: There is no statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students.

$H_A$5: There is a statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students.

RQ6: Is there a relationship between self-efficacy of controlling Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students?

$H_0$6: There is no statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

$H_A$6: There is a statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

RQ7: Is there a relationship between actual Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students?

$H_0$7: There is no statistically significant relationship between actual Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

$H_A$7: There is a statistically significant relationship between actual Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

RQ8: Is there a difference in Type 2 diabetes-related health behavior among African American female college students with and without a family history of Type 2 diabetes?

$H_0$8: There is no statistically significant difference in Type 2 diabetes-related health behavior between African American female college students with and without a family history of Type 2 diabetes.

$H_A$8: There is a statistically significant difference in Type 2 diabetes-related health behavior between African American female college students with and without a family history of Type 2 diabetes.

In this chapter I will discuss the results of the pilot study, describe the data collection process and results, and provide descriptive characteristics of both the pilot sample and the final study sample. I will also explore the statistical analyses and findings from the simple linear regression and the independent sample t-test to answer the eight RQs and hypotheses. First, the pilot study process and results will be discussed. Next, the data collection process for the larger study will be presented along with the description of

the study population and its representation of the larger population. Finally, the results of the simple linear regression and independent sample t-test will be presented.

## Pilot Study

The purpose of the pilot study was to establish internal consistency (reliability) of the survey instrument that I developed. I recruited the sample (see the invitation letter in Appendix E). Participants completed the survey, which consisted of questions requesting feedback about the content, formatting, length, and level of difficulty of the survey (see Appendix F). There was also space for participants to write in suggestions. There were no responses that suggested any changes needed to be made to the survey. During the process of pilot data collection, there was nothing to indicate that any changes were needed. Also, the survey took no more than about 10 minutes for completion, whereas the consent form and survey stated that it would take 20 minutes. I decided not to change the 20-minute time frame because I surmised that there might be some participants in the larger study who might take longer.

All participants in the pilot sample were African American female college students with one participant identifying as African American and Hispanic. Thirteen individuals completed the pilot survey; two of the 13 were ineligible to participate and were not included in the data set. One of the participants had been previously diagnosed with type 2 diabetes, and the other participant was above the targeted age range. The mean age of the 11 participants in the sample was 21 years; 54% were undergraduate seniors, and 62% lived on campus.

**Pilot Study Results**

To establish the reliability of the instrument, I used Cronbach's alpha, which measures internal consistency of the survey questions (Trobia et al., 2011). The survey instrument consisted of 30-items, seven of which were questions about demographics and were not included in the test for reliability. Therefore, I included 23 items in the reliability test. The instrument had high reliability (α = .88). A Cronbach's alpha value of .70 or above denotes an instrument with good internal consistency/reliability (Trobia et al., 2011). The results are presented in Table 1.

**Table 1**

*Pilot Survey Reliability*

| Cronbach's alpha | Cronbach's alpha based on standardized items | No. of items |
|---|---|---|
| .880 | .894 | 23 |

In addition, I tested each subscale for internal consistency. The perception of peer susceptibility to type 2 diabetes subscale consisted of 2 items (α = .66); the self-efficacy of controlling type 2 diabetes subscale consisted of 4 items (α = .37); the perception of personal susceptibility to type 2 diabetes subscale consisted of 3 items (α = .85); the type 2 diabetes-related health behavior subscale consisted of 14 items (α = .81). Based on the Cronbach's alpha values, the subscales perception of personal susceptibility and health behavior had high reliability. The subscale perception of peer susceptibility had moderate reliability, while self-efficacy had little to no reliability (See Table 2).

**Table 2**

*Pilot Survey Reliability of Subscales*

| Subscale | Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | # of items |
|---|---|---|---|
| Perception of Peer Susceptibility | .667 | .681 | 2 |
| Self-Efficacy | .370 | .441 | 4 |
| Perception of Personal Susceptibility | .855 | .858 | 3 |
| Health Behavior | .813 | .822 | 14 |

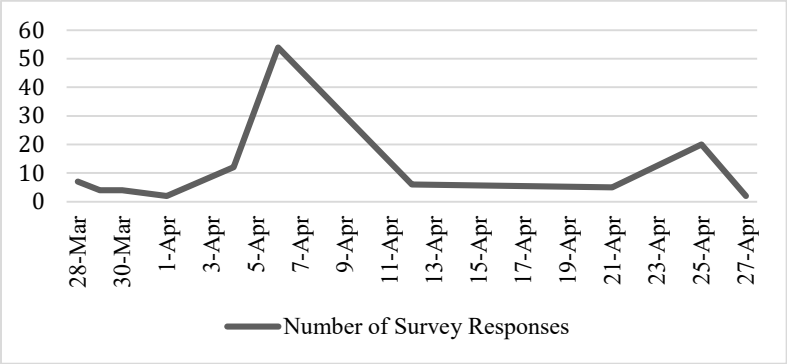
## Data Collection

For the final study, I began data collection on March 24, 2022. Data collection was done in person by pen and paper survey. To recruit participants, I sent out a flier through the campus announcements, and an email to university professors, student group advisors and student group members requesting that they share the flier with the female students in their classes and student groups. I set up data collection sites in convenient locations such as academic buildings and the student center. Participants attended one of the various data collection locations and times listed on the flier. Other students were recruited at the data collection sites by the researcher asking if they would like to participate. Data collection ended on April 27, 2022, as the sample size was reached. The data collection process took 5 weeks, and there was a total of 116 completed surveys (See Figure 2). There were 104 surveys that I was able to include in the final study. 12 of the surveys were excluded due to missing demographic information, an incomplete diabetes risk test, and participants who did not meet the inclusion criteria. Data was entered into an excel spreadsheet and downloaded into SPSS 28, coded, and went through data

cleaning. Also, I reverse coded survey items so that negative questions were transformed into positive questions, and there was consistency with the scores. A high score transformed into a corresponding low score for consistency.

**Figure 2**

*Daily Survey Completion*



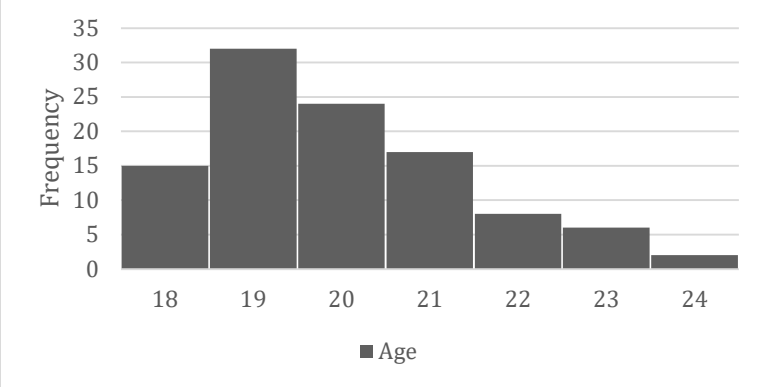

**Descriptive Characteristics of Sample**

The sample was a non-probability, homogenous convenience sample of African American female college students at one university located in the southeast. The demographic variables that I explored in the study were age, academic classification (freshman, sophomore, junior, senior), ethnicity (Hispanic or Latino/a/x; Not Hispanic or Latino/a/x), race (American Indian/ American Native, Asian, Black/African American, Hawaiian/Pacific Islander, White, Other), current residence (campus/residence hall, home with parents/ guardians/ relative, off campus apartment, do not have permanent housing), diagnosed with pre-diabetes (yes, no), and told you were at risk for type 2 diabetes or pre-diabetes (yes, no).

The minimum and maximum ages were 18, and 24, respectively. The mean age of the sample was 19 years, which represented 30.8% of the sample population (See Figure 3).

**Figure 3**

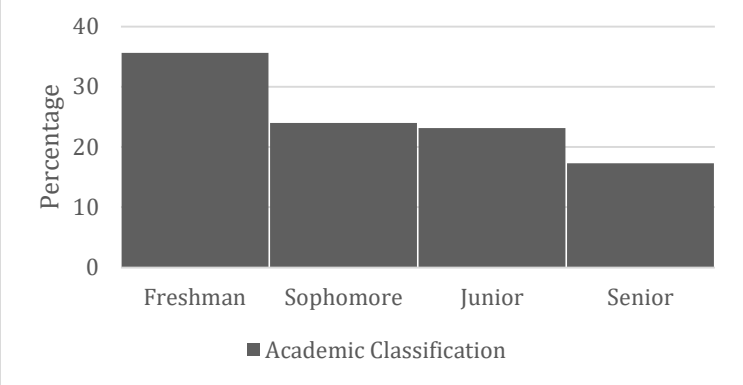
*Sample Population Age*




Most of the sample were Freshmen and made up 35.6%, 24% were sophomores, 23.1% were juniors, and 17.3% were seniors (See Figure 4).

**Figure 4**

*Sample Population Academic Classification*




Only 4% of the sample identified as Hispanic/Latino/a/x, and 96% identified as non-Hispanic/Latino/a/x. One hundred percent of the sample identified as Black/ African

American. Participants that reported more than one race were also American Indian/ American Native (2.9%), Hawaiian/ Pacific Islander (1%), White (1.9%), Other (1%) (See Table 3).

**Table 3**

*Sample Population Race and Ethnicity*

| | **Ethnicity** | |
|---|---|---|
| Race/ Ethnicity | Frequency | Percentage (%) |
| Hispanic | 4 | 3.8 |
| Not Hispanic | 96 | 92.3 |
| | **Race** | |
| | Frequency | Percentage (%) |
| Black/ African American | 104 | 100 |
| American Indian | 3 | 2.9 |
| Hawaiian/ Pacific Islander | 1 | 1 |
| White | 2 | 1.9 |
| Other | 1 | 1 |

Almost 84% of the population lived in campus residence halls/ student housing, 8.7% lived at home, and about 8% lived in an off-campus apartment. There were no participants without permanent housing (See Table 4).

**Table 4**

*Sample Population Residence*

| | Frequency | Percentage (%) |
|---|---|---|
| Campus Residence Hall | 87 | 83.7 |
| Home with parents | 9 | 8.7 |
| Off campus apartment | 8 | 7.7 |

Almost 5% of the sample had been previously diagnosed with pre-diabetes by their health care profession, while 95.2% had not been previously diagnosed. 10.6% were told by their health care professional that they were at risk for type 2 diabetes or pre-diabetes, and 89.4% have not ever been told they were at risk (see Table 5).

**Table 5**

*Sample Population Diabetes History*

| Have you ever been diagnosed with pre-diabetes by a healthcare professional? | Frequency | Percentage (%) |
|---|---|---|
| Yes | 5 | 4.8 |
| No | 99 | 99.2 |
| | Frequency | Percentage (%) |
| Has a healthcare professional ever told you that you were at risk for type 2 diabetes or pre-diabetes? | | |
| Yes | 11 | 10.6 |
| No | 93 | 89.4 |

The average age of undergraduate college students is 18-24 (National Center for Education Statistics, 2018). This sample was representative of undergraduate college students with a participant age range of 18 to 24 years of age.

## Results

The results of the study were determined by conducting quantitative data analyses. The first analysis consisted of descriptive statistics to characterize the sample according to the independent and dependent variables. The second analysis was a simple linear regression to determine the statistically significant relationship between variables (self-efficacy and perception of personal susceptibility; perception of peer susceptibility and perception of personal susceptibility; actual diabetes risk and perception of personal susceptibility; self-efficacy and type 2 diabetes-related health behavior; perception of peer susceptibility and type 2 diabetes-related health behavior; actual type 2 diabetes risk and type 2 diabetes-related health risk behavior). The independent sample t-test was the third analysis to determine the statistically significant difference between variables (perception of personal susceptibility of type 2 diabetes and those with and without a family history of type 2 diabetes, type 2 diabetes-related health behavior and those with and without a family history of type 2 diabetes).

### Descriptive Statistics

Descriptive statistics were determined by calculating the mean, standard deviation, standard error, frequency, minimum and maximum of the independent (family history of type 2 diabetes, actual type 2 diabetes risk, perception of peer-susceptibility to type 2 diabetes, self-efficacy of controlling type 2 diabetes risk) and dependent variables (perception of personal susceptibility to type 2 diabetes, type 2 diabetes-related health behavior). They results are presented in Table 6 and Table 7.

**Table 6**

*Descriptive Statistics for Independent and Dependent Variables*

| | Mean | Minimum | Maximum | Standard Deviation | Standard Error |
|---|---|---|---|---|---|
| Self-Efficacy | 12.79 | 10.00 | 16.00 | 1.33 | .237 |
| Peer Susceptibility | 5.11 | 2.00 | 8.00 | 1.07 | .237 |
| Personal Susceptibility | 5.60 | 3.00 | 11.00 | 2.01 | .237 |
| Health Behavior | 37.03 | 20.00 | 48.00 | 5.17 | .251 |
| Actual Type 2 Diabetes Risk | 1.61 | 0 | 5.00 | 1.092 | .107 |

**Table 7**

*Descriptive Statistics for Family History*

| | Frequency | Percentage (%) |
|---|---|---|
| Yes | 30 | 28.8 |
| No | 74 | 71.2 |

### *Self-Efficacy of Controlling Type 2 Diabetes Risk*

To measure the variable self-efficacy of controlling Type 2 diabetes risk, I used four items from the survey instrument (see Appendix C). The participants responses were either strongly disagree, disagree, agree, and strongly agree.

For the first item, "I believe that I do not have much control over developing diabetes", many of the participants (51%) disagreed that they did not have much control over their type 2 diabetes risk, 26% strongly disagreed, but 23.1% agreed. The second

item, “I believe that my current health habits will keep me in control of my risk for type 2 diabetes”, most of the participants agreed that their current health habits will keep them in control of their risk for type 2 diabetes, 14.4% strongly agreed, 26% and 1.9% disagreed and strongly disagreed. For the third item, “if I improve my health habits, I will have better control over type 2 diabetes risk”, 67 (64.4%) participants strongly agreed that improving their health habits will give them better control over their type 2 diabetes risk, 36 (34.6%) agreed, 1 (1%) disagreed, but no one strongly disagreed. There were 58.7% and 34.6% that agreed and strongly agreed to the fourth item, “controlling my risk for type 2 diabetes will make me less likely to develop the disease” (see Table 8).

**Table 8**

*Self-Efficacy for Controlling Type 2 Diabetes Risk*

| I believe that I do not have much control over developing diabetes. | Frequency | Percentage (%) |
|---|---|---|
| Strongly Agree | 0 | 0 |
| Agree | 24 | 23.1 |
| Disagree | 53 | 51 |
| Strongly Disagree | 27 | 26 |
| I believe that my current health habits will keep me in control of my risk for type 2 diabetes. | Frequency | Percentage (%) |
| Strongly Agree | 15 | 14.4 |
| Agree | 60 | 57.7 |
| Disagree | 27 | 26 |
| Strongly Disagree | 2 | 1.9 |
| If I improve my current health habits, I will have better control over my risk for type 2 diabetes. | Frequency | Percentage (%) |
| Strongly Agree | 67 | 64.4 |
| Agree | 36 | 34.6 |
| Disagree | 1 | 1 |
| Strongly Disagree | 0 | 0 |
| Controlling my risk for type 2 diabetes will make me less likely to develop the disease. | Frequency | Percentage (%) |
| Strongly Agree | 36 | 34.6 |
| Agree | 61 | 58.7 |
| Disagree | 7 | 6.7 |
| Strongly Disagree | 0 | 0 |

### *Perception of Peer Susceptibility to Type 2 Diabetes*

The variable perception of peer susceptibility to type 2 diabetes was measured by 2 survey items from the Diabetes Risk Perception and Health Behavior Survey for African American Female College Students. The participants responses were either

strongly disagree, disagree, agree, and strongly agree. For the first item "I have better control over my risk for type 2 diabetes than my peers", 61 (58.5%) participants stated they either agree (51.9%) or strongly agree (6.6%), while 43 (41.4%) of the participants stated that they either disagree (40.4%) or strongly disagree (1%) that they have better control over their type 2 diabetes risk than their peers. The second item was "I am less likely to develop type 2 diabetes than my peers". Fifty participants (48.1%) stated that they either agree (45.2%) or strongly agree (2.9%), and 54 participants (51.9%) stated that they either disagree (48.1%) or strongly disagree (3.8%) that they were less likely to develop type 2 diabetes than their peers. (See Table 9)

**Table 9**

*Perception of Peer Susceptibility to Type 2 Diabetes*

| I have better control over my risk for type 2 diabetes than my peers. | Frequency | Percentage (%) |
|---|---|---|
| Strongly Agree | 7 | 6.7 |
| Agree | 54 | 51.9 |
| Disagree | 42 | 40.4 |
| Strongly Disagree | 1 | 1 |
| **I am less likely to develop type 2 diabetes than my peers.** | **Frequency** | **Percentage (%)** |
| Strongly Agree | 3 | 2.9 |
| Agree | 47 | 45.2 |
| Disagree | 50 | 48.1 |
| Strongly Disagree | 4 | 3.8 |

### *Perception of Personal Susceptibility to Type 2 Diabetes*

To measure the variable perception of personal susceptibility to Type 2 diabetes, I used 3 items from the survey instrument. The participants responses were either strongly disagree, disagree, agree, and strongly agree. In response to the first item “I believe that I am currently at risk for type 2 diabetes”, almost half of the participants (47.1%) responded strongly disagree, 37.5% responded disagree, 11.5% responded agree, and 3.8% responded strongly agree. In response to the second item “I am concerned that I will develop diabetes while I am in college”, half of the participants responded strongly disagree (50%), 37.5% responded disagree, 11.5% responded agree, and 1% responded strongly agree. In response to the third item “I am concerned that I will develop diabetes in my lifetime”, 38.5% responded disagree, 21.2% responded strongly disagree, 34.6 responded agree, and 5.8% responded strongly agree (see Table 10).

**Table 10**

*Perception of Personal Susceptibility to Type 2 Diabetes*

| I believe that I am currently at risk for type 2 diabetes. | Frequency | Percentage (%) |
|---|---|---|
| Strongly Agree | 4 | 3.8 |
| Agree | 12 | 11.5 |
| Disagree | 39 | 37.5 |
| Strongly Disagree | 49 | 47.1 |
| **I am concerned that I will develop diabetes while I am in college.** | **Frequency** | **Percentage (%)** |
| Strongly Agree | 1 | 1 |
| Agree | 12 | 11.5 |
| Disagree | 39 | 37.5 |
| Strongly Disagree | 52 | 50 |
| **I am concerned that I will develop diabetes in my lifetime.** | **Frequency** | **Percentage (%)** |
| Strongly Agree | 6 | 5.8 |
| Agree | 36 | 34.6 |
| Disagree | 40 | 38.5 |
| Strongly Disagree | 22 | 21.2 |

### *Type 2 Diabetes-Related Health Behavior*

To measure the variable Type 2 diabetes-related health behavior, I used 14 survey items from the survey instrument. The first 10 items were concerning diet, one item was about physical activity, and the last three items were about health care visits. The participants responses were never, sometimes, usually, always. In the health care item, participants also responded N/A if they did not have a health care provider. The first item

asked, “on average, how often do you eat at least 2 ½ cups of vegetable each day?”. More than half (55.8%) sometimes eats at least 2 ½ cups of vegetables each day, 16.3% never does, 24% usually does, and 3.8% always eats the recommended number of vegetables each day. The second item asked, “how often do you eat at least 2 cups of fruit each day?”. Forty-seven percent of the participants sometimes eats at least 2 cups of fruit each day, 31.7% usually does, 8.7% always does, and 12.5% never does. The third item asked, “how often does half of your daily grain intake come from whole grains?”. Almost half of the participants responded sometimes (49%), 29.8% responded usually, 7.7% responded always, and 13.5% responded that their daily grain intake is never from whole grains. The fourth item asked, “on average, how often do you eat meat high in saturated fat and sodium?”. Most of the participants (48.1%) stated that they usually eat meat high in saturated fat and sodium, 28.8% stated sometimes, 7.7% stated never, while 15.4% stated that they always eat meat high in saturated fat and sodium. The fifth item asked, “how often do you eat lean meat and other sources of protein?”, and 43.3% of participants responded usually. An equal number of participants responded sometimes (26.9%) and always (26.9%), while 2.9% stated that they never eat lean meat and other sources of protein. “How often is the juice you drink 100% fruit juice?” was the next item. Nearly half (49%) of the participants stated sometimes, 26.9% stated usually, 19.2 stated always, and 4.8% stated that they never drink 100% fruit juice.

Participants responded to the next item “on average, how often do you drink sugar sweetened beverages?” sometimes (47.1%), usually (26.9%), always (22.1%), and never (3.8%). In response to the item “how often do you eat unhealthy snacks from the vending

machine?", participants sometimes (40.4%) ate unhealthy snacks, 32.7% usually ate unhealthy snacks, 17.3% always ate unhealthy snacks, while 9.6% never ate unhealthy snack from the vending machine. The next item asked, "how often do you eat healthy snack from the vending machine?". Participants responded sometimes (49%), usually (27.9%), always (4.8%), and never (18.3%). The last question about diet, "how often do you read food labels when making food choices?", 40 participants (38.5%) sometimes read food labels, 19 (18.3%) usually read them, 11 (10.6%) always read them, while 34 (32.7%) never read food labels.

The one physical activity item asked, "on a weekly average, how often do you perform at least 150 minutes of moderate physical activity?", 39.4% of participants usually performed the recommended amount of physical activity each week, 26.9% sometimes performed, 27.9% always performed, while 5.8% never performed at least 150 minutes of moderate physical activity per week.

The next item was "how often do you have a yearly visit with your health care provider?". Almost half (46.2%) of the participants always have a yearly visit with their health care provider, 25% usually have a visit, 19.2% sometimes have a visit, 1.9% never have a visit, while 7.7% did not have a health care provider. Participant responses for the next item, "when you visit your healthcare provider for a yearly checkup, how often is your blood sugar checked?" were always (32.7%), usually (17.3%), sometimes (24%), never (14.4%), and 11.5% who did not respond. The final item in the survey was "when you visit your healthcare provider for a yearly checkup, how often is your blood pressure checked?". There were 64.4% that always have their blood pressure checked, 14.4%

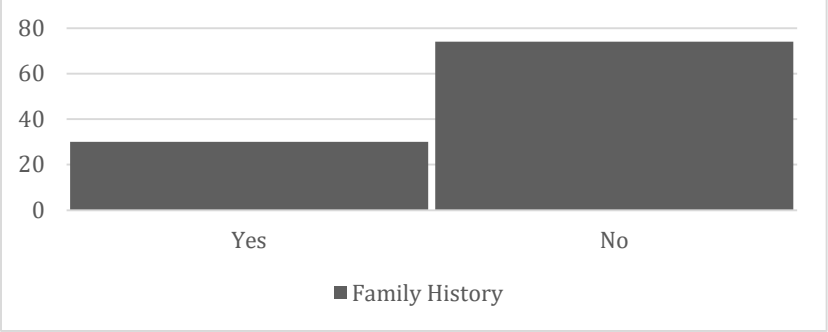
usually have it checked, 8.7% sometimes have it checked, 1% never have it checked, and 11.5% did not respond.

### *Family History of Type 2 Diabetes*

The variable family history of type 2 diabetes was measured using one survey item from the "American Diabetes Association Diabetes Risk Test", "do you have a mother, father, sister, or brother with diabetes?". The responses were yes or no. Most of the sample (71.2%) did not have a family history of type 2 diabetes, while 28.8% did have a family history of type 2 diabetes (see figure 5).

**Figure 5**

*Family History of Type 2 Diabetes*

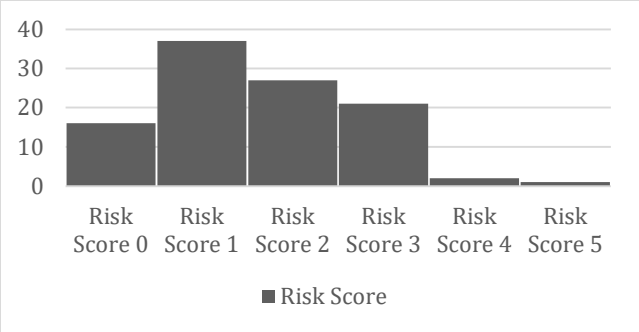



### *Actual Type 2 Diabetes Risk*

The variable family history of type 2 diabetes was measured using the "American Diabetes Association Diabetes Risk Test". Responses from the 7 items were totaled into a diabetes risk score. Most of the sample had risk scores of 1 (35.6%), 2 (26%), and 3 (20.2%). 1.9% had a risk score of 4, 1% of the sample had a risk score of 5, and 15.4% had a risk score of 0 (see Figure 6).

**Figure 6**

*Actual Type 2 Diabetes Risk*




## Assumptions

There were several assumptions that the data had to meet to use the simple linear regression and the independent sample t-test to answer the RQs.

### *Research Question 1 Assumptions*

A simple linear regression was used to test the assumptions of the data. Linearity was established through visual inspection of a scatterplot of perceived peer susceptibility to type 2 diabetes and perceived personal susceptibility to type 2 diabetes (see Figure 7). There was independence of residuals as assessed by a Durbin-Watson statistic of 1.986. There were no outliers observed, and there was homoscedasticity as assessed by visual inspection of a plot of standardized predicted values. This was confirmed by a Levene's Test for Equality of Variance's, which was not statistically significant ($p > 0.05$), indicating that equal variances are assumed as (See Table 11). Residuals were normally distributed by visual inspection of a normal probability plot, (see Figure 8).

**Figure 7**

*Scatterplot of Personal Susceptibility by Peer Susceptibility*

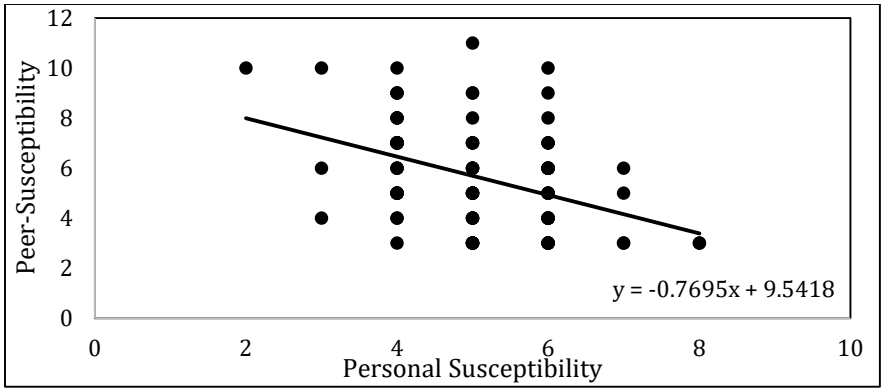



**Table 11**

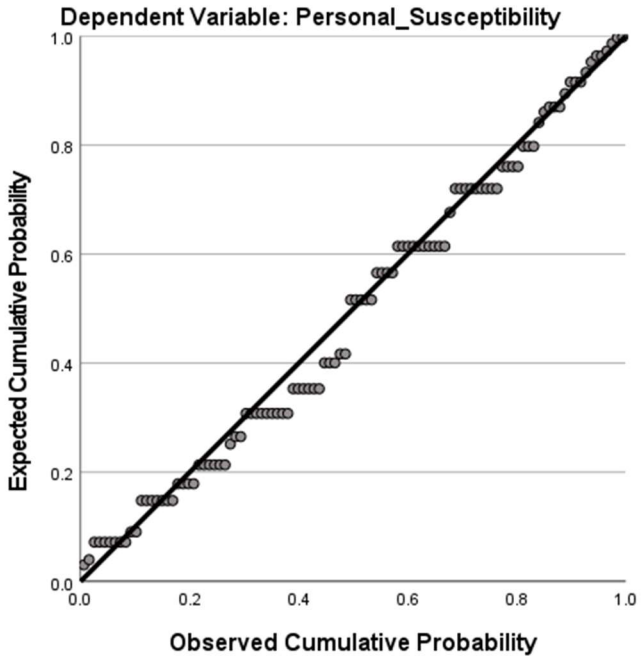
*RQ1 Levene's Test for Equality of Variances*

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Personal Susceptibility | Based on Mean | 1.440 | 5 | 97 | .217 |

Tests the null hypothesis that the error variance of the dependent variable is equal across groups
a. Dependent variable: Personal Susceptibility
b. Design: Intercept + Peer Susceptibility

**Figure 8**

*RQ.1 Normal Probability Plot of Regression Standardized Residual*




Note. Independent Variable: Perception of Peer Susceptibility

### *Research Question 2 Assumptions*

A simple linear regression was used to test the assumptions of the data. Linearity was established through visual inspection of a scatterplot of self-efficacy of controlling type 2 diabetes risk and perceived personal susceptibility to type 2 diabetes as shown in Figure 9. There was independence of residuals as assessed by a Durbin-Watson statistic of 1.904. There were no outliers observed, and there was homoscedasticity as assessed by visual inspection of a plot of standardized predicted values and confirmed by a Levene's Test for Equality of Variance's, which was not statistically significant ($p > 0.05$), indicating that equal variances are assumed (See Table 12). Residuals were normally distributed by visual inspection of a normal probability plot (see Figure 10).

**Figure 9**

*Scatterplot of Personal Susceptibility by Self-Efficacy*

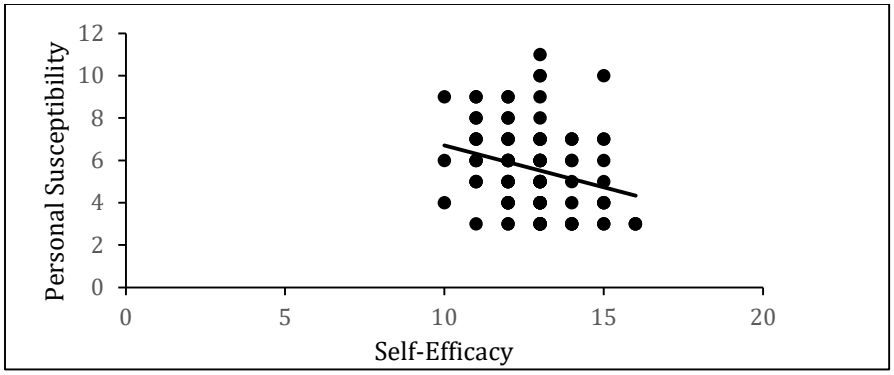



**Table 12**

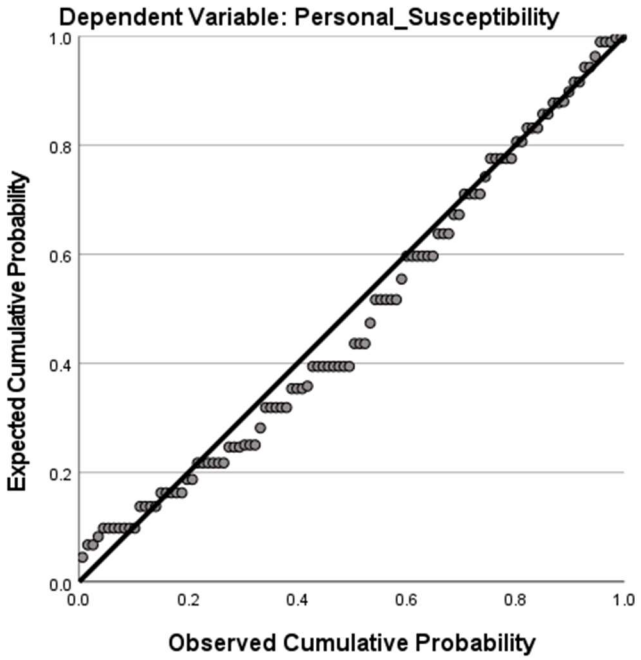
*RQ.2 Levene's Test for Equality of Variances*

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Personal Susceptibility | Based on Mean | 1.416 | 6 | 97 | .216 |

Tests the null hypothesis that the error variance of the dependent variable is equal across groups
a. Dependent variable: Personal Susceptibility
b. Design: Intercept + Self-Efficacy

**Figure 10**

*RQ.2 Normal Probability Plot of Regression Standardized Residual*




Note. Independent variable: Self-efficacy of controlling type 2 diabetes risk

### *Research Question 3 Assumptions*

A simple linear regression was run to test the assumptions of the data and answer the research question. Linearity was established through visual inspection of a scatterplot of actual type 2 diabetes risk and perceived personal susceptibility to type 2 diabetes (see Figure 11). There was independence of residuals as assessed by a Durbin-Watson statistic of 1.905. There were no outliers observed, and there was homoscedasticity as assessed by visual inspection of a plot of standardized predicted values. This was confirmed by a Levene's Test for Equality of Variance's, which was not statistically significant ($p >$ 0.05), indicating that equal variances are assumed (see Table 13). Residuals were normally distributed by visual inspection of a normal probability plot (see Figure 12).

**Figure 11**

*Scatterplot of Personal Susceptibility by Actual Type 2 Diabetes Risk*

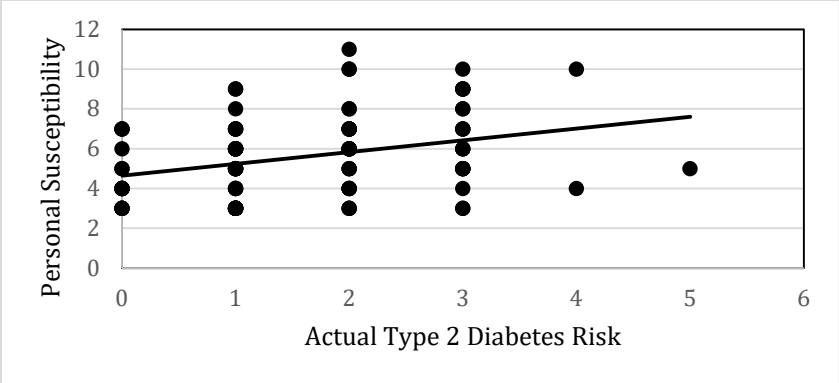



**Table 13**

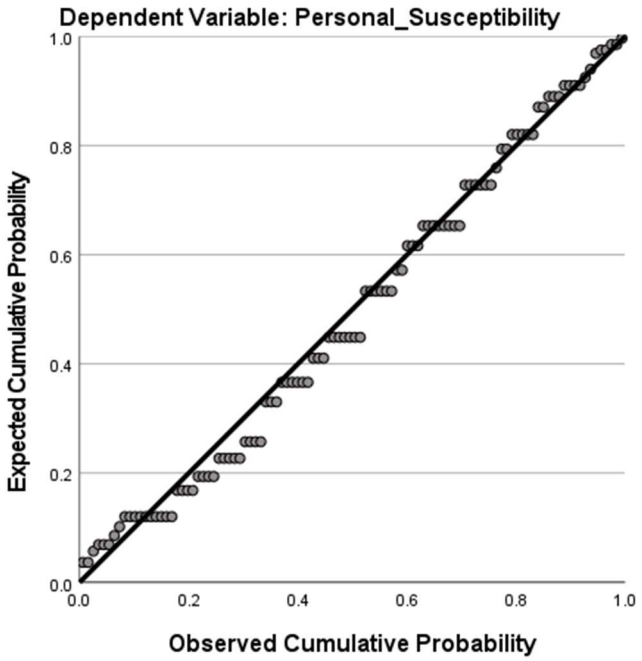
*RQ.3 Levene's Test for Equality of Variances*

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Personal Susceptibility | Based on Mean | 1.611 | 4 | 98 | .178 |

Tests the null hypothesis that the error variance of the dependent variable is equal across groups
a. Dependent variable: Personal Susceptibility
b. Design: Intercept + Actual Risk

**Figure 12**

*RQ.3 Normal Probability Plot of Regression Standardized Residuals*




Note. Independent variable: Actual Type 2 Diabetes Risk

### *Research Question 4 Assumptions*

An explore procedure and independent t-test was run to test the assumptions. There was independence of observation as there was no relationship between the participants in each group. There were no outliers in the data as assessed by the inspection of a boxplot (see Figure 13). The perceived personal susceptibility scores for those with a family history of type 2 diabetes was normally distributed as assessed by a Shapiro-Wilks test ($p > 0.05$) (see Table 14). The scores for those without a family history of type 2 diabetes were not normally distributed ($p < 0.05$) (see Table 14). I decided to proceed with the simple linear regression as non-normality does not affect the

type I error rate greatly (Laerd, 2015b). There was homogeneity of variance as assessed by Levene's Test for equality of variances ($p < 0.05$) (see Table 15).

**Figure 13**

*RQ.4 Boxplot Check for Outliers*

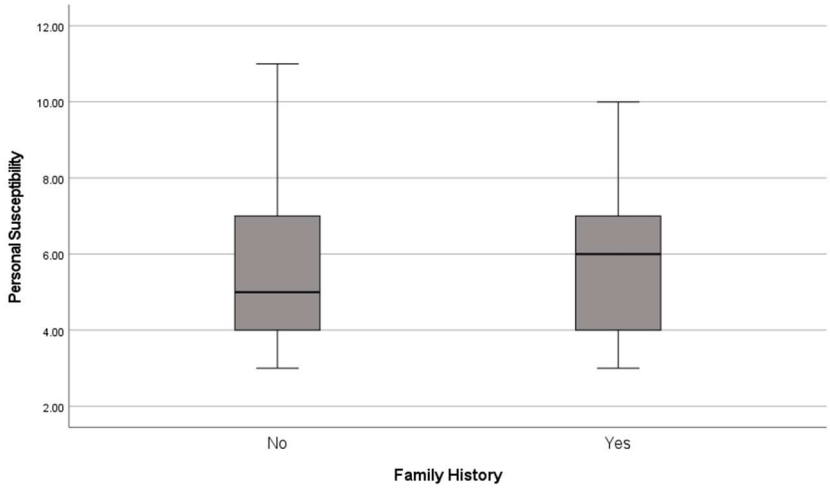



**Table 14**

*RQ.4 Shapiro-Wilk Test for Normality*

| | Family[b] History | Statistic | df | Sig. |
|---|---|---|---|---|
| Personal Susceptibility[a] | No | .924 | 74 | < .001 |
| | Yes | .934 | 30 | .064 |

Note. a. Dependent variable – perception of personal susceptibility to type 2 diabetes,
b. Independent variable – family history of type 2 diabetes

**Table 15**

*RQ.4 Levene's Test for Equality of Variances*

| | | F | Sig. | t | df |
|---|---|---|---|---|---|
| Personal Susceptibility | Equal Variances Assumed | .023 | .879 | -1.058 | 102 |

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups, Dependent variable: Perception of personal susceptibility to type 2 diabetes, b. Design: Intercept + Family History of type 2 diabetes

### *Research Question 5 Assumptions*

A simple linear regression was run to test the assumptions of the data. Linearity was established through visual inspection of a scatterplot of perceived peer susceptibility to type 2 diabetes and type 2 diabetes-related health behavior (see Figure 14). There was independence of residuals as assessed by a Durbin-Watson statistic of 1.962. No outliers were observed, and there was homoscedasticity as assessed by visual inspection of a plot of standardized predicted values. This was confirmed by using a Levene's Test for Equality of Variance's, which was not statistically significant ($p > 0.05$), indicating that equal variances are assumed (see Table 16). Residuals were normally distributed by visual inspection of a normal probability plot (see Figure 15).

**Figure 14**

*Scatterplot of Perceived Peer Susceptibility by Health Behavior*

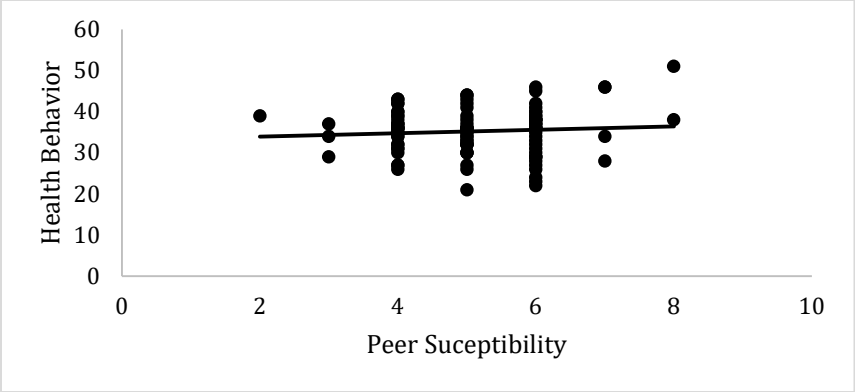



**Table 16**

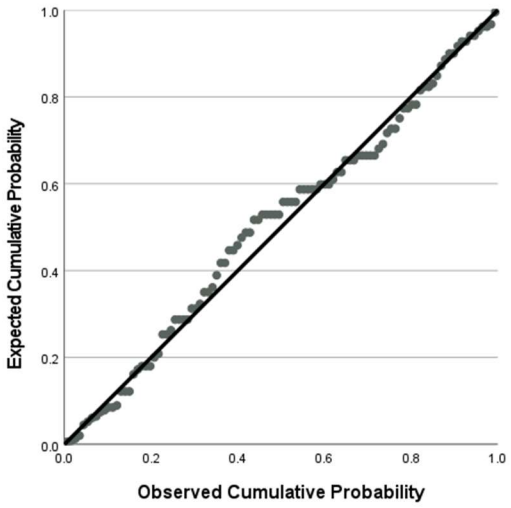
*RQ.5 Levene's Test for Equality of Variances*

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Health Behavior | Based on Mean | 1.626 | 5 | 97 | .160 |

Tests the null hypothesis that the error variance of the dependent variable is equal across groups
a. Dependent variable: Health Behavior
b. Design: Intercept + Peer Susceptibility

**Figure 15**

*RQ.5 Normal Probability Plot of Regression Standardized Residuals*




Note. Dependent variable: health behavior, independent variable: perceived peer susceptibility

### *Research Question 6 Assumptions*

A simple linear regression was run to test the assumptions of the data. Linearity was established through visual inspection of a scatterplot of self-efficacy and type 2 diabetes-related health behavior (see Figure 16). There was independence of residuals as assessed by a Durbin-Watson statistic of 1.894. There were no outliers observed and there was homoscedasticity as assessed by visual inspection of a plot of standardized predicted values. This was confirmed by Levene's Test for Equality of Variance's, which was not statistically significant ($p > 0.05$), indicating that equal variances are assumed (see Table 17). Residuals were normally distributed by visual inspection of a normal probability plot (see Figure 17).

**Figure 16**

*Scatterplot of Self-Efficacy by Health Behavior*


**Table 17**

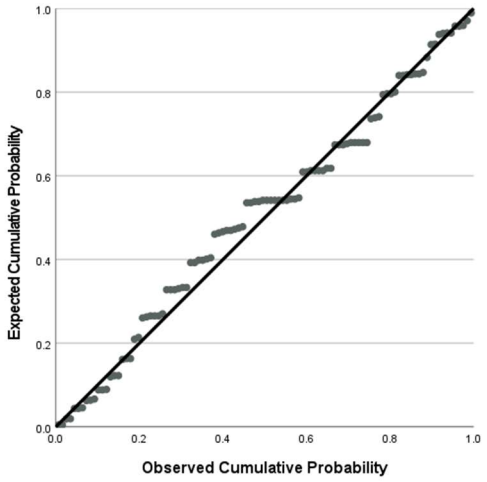
*RQ.6 Levene's Test for Equality of Variances*

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Health Behavior | Based on Mean | .949 | 6 | 97 | .464 |

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups, Dependent variable: Health Behavior, Independent variable: Self Efficacy

**Figure 17**

*RQ.6 Normal Probability Plot of Regression Standardized Residuals*




Note. Dependent variable: health behavior, Independent variable: self-efficacy

### *Research Question 7 Assumptions*

A simple linear regression was run to test the assumptions of the data. Linearity was established through visual inspection of a scatterplot of actual type 2 diabetes risk and type 2 diabetes-related health behavior (see Figure 18). There was independence of residuals as assessed by a Durbin-Watson statistic of 1.947. There were no outliers observed. There was homoscedasticity as assessed by visual inspection of a plot of standardized predicted values and was confirmed by using a Levene's Test for Equality of Variance's, which was not statistically significant ($p > 0.05$), indicating that equal variances are assumed (see Table 18). Residuals were normally distributed by visual inspection of a normal probability plot (see Figure 19).

**Figure 18**

*Scatterplot of Actual Type 2 Diabetes Risk by Health Behavior*

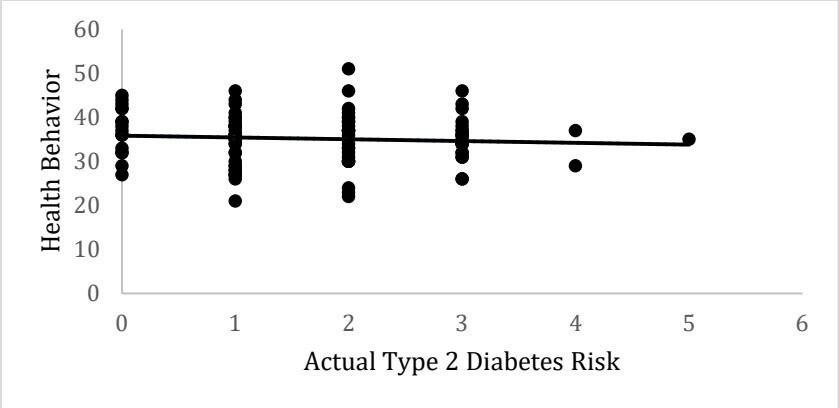



**Table 18**

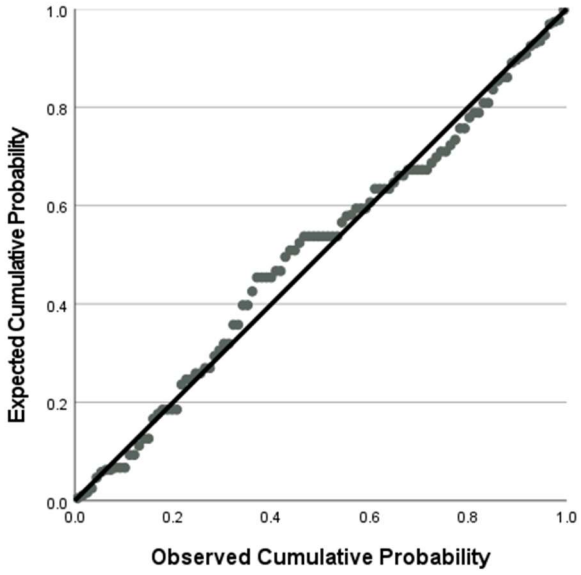
*RQ.7 Levene's Test for Equality of Variances*

| | | Levene Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Health Behavior | Based on Mean | .553 | 4 | 98 | .697 |

Note. Tests the null hypothesis that the error variance of the dependent variable is equal across groups, Dependent variable: Health Behavior, Independent variable: Actual Type 2 Diabetes Risk

**Figure 19**

*RQ.7 Normal Probability Plot of Regression Standardized Residuals*



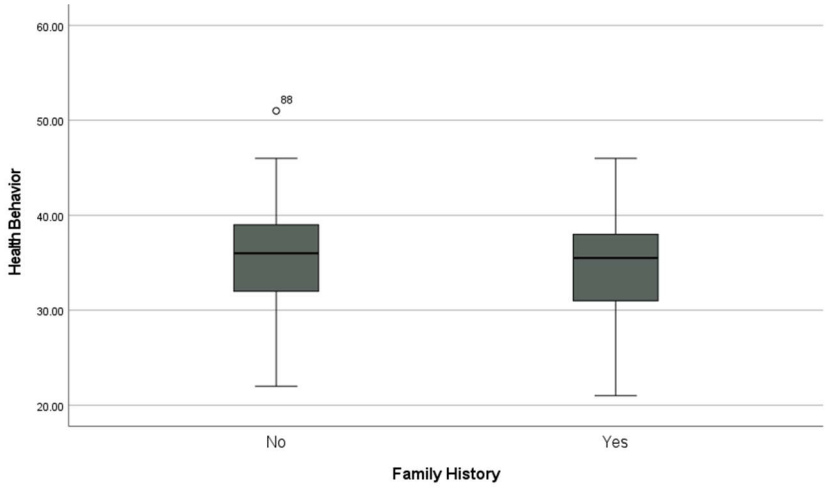

Note: Dependent variable: health behavior, Independent variable; actual type 2 diabetes risk

### *Research Question 8 Assumptions*

An explore procedure and independent t-test was run to test the assumptions. There was independence of observation as there was no relationship between the participants in each group. There was one outlier in the data as assessed by the inspection of a boxplot (see Figure 20). I made the decision to keep the outlier in the data set. The health behavior scores for those with ($p > 0.05$) and without ($p > 0.05$) a family history of type 2 diabetes was normally distributed as assessed by a Shapiro-Wilks test (see Table 19). There was homogeneity of variance as assessed by Levene's Test for equality of variances ($p < 0.05$) (see Table 20).

**Figure 20**

*RQ. 8 Boxplot Check for Outliers*




Note. One outlier in the dataset, entry #88

**Table 19**

*RQ.8 Shapiro-Wilk Test for Normality*

| | Family[b] History | Statistic | df | Sig. |
|---|---|---|---|---|
| Health Behavior[a] | No | .986 | 74 | .591 |
| | Yes | .980 | 30 | .819 |

*Note. a. Dependent variable –type 2 diabetes-related health behavior,*
*b. Independent variable – family history of type 2 diabetes*

**Table 20**

*RQ.8 Levene's Test for Equality of Variances*

| | | F | Sig. | t | df |
|---|---|---|---|---|---|
| Personal Susceptibility | Equal Variances Assumed | .009 | .923 | .177 | 102 |

*Note. a. Dependent variable – perception of personal susceptibility to type 2 diabetes*
*b. Independent variable – family history of type 2 diabetes*

**Statistical Analysis and Findings**

Quantitative data analysis was used to answer each of the 8 research questions. The results of the simple linear regression, I reported using an alpha level (*p* value) set at 0.05. I reported the Pearson's multiple correlation coefficient (R) to determine the strength of the relationship between the outcome and predictor variables. The multiple correlation coefficient of determination ($R^2$ and Adjusted $R^2$), I reported by stating the amount of variance in the outcome variable that was explained by the predictor variables. Then, I reported the regression coefficient B by stating the amount of increase that occurred in the dependent (outcome) variable with each 1-point increase in the independent (predictor) variable. Also, I reported the associated 95% confidence interval and *p* value to determine statistical significance of the relationship.

The results of the independent sample t-test, I reported using descriptive statistics to identify the number of participants who had a family history of type 2 diabetes and those who did not have a family history of type 2 diabetes. Also reported was the mean score and standard deviation. The t-statistic and the standard deviation under the equal variances assumed row, I reported from the independent samples t-test output box. Next, I reported the mean difference in the scores for each group, the 95% confidence interval, the statistical significance of the mean difference using an alpha level (*p* value) set at 0.05, and the strength of the relationship using Cohen's d.

***Research Question 1***

I performed a simple linear regression to answer RQ1, which was, Is there a relationship between perceived peer susceptibility to Type 2 diabetes and perceived

personal susceptibility to Type 2 diabetes among African American female college students? The corresponding hypotheses were as follows:

$H_0$1: There is no statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and perceived personal susceptibility to Type 2 diabetes among African American female college students.

$H_A$1: There is a statistically significant relationship between perceived peer susceptibility to type 2 diabetes and perceived personal susceptibility to type 2 diabetes among African American female college students.

The results of the simple linear regression show that there is a statistically significant relationship between perceived peer susceptibility to type 2 diabetes and perceived personal susceptibility to type 2 diabetes, $F(1,102) = 20.667$, $p < .001$, with perceived peer susceptibility accounting for 16% of the variation in perceived personal susceptibility with adjusted $R^2 = 0.160$, which is a large effect size. For every 1 unit increase in the perception of peer susceptibility score, there is a 0.769 (95% CI, -1.105 to -0.434) decrease in the perception of personal susceptibility score and is statistically significant ($p < .001$). The null hypothesis was rejected, and the alternative hypothesis was retained.

***Research Question 2***

I performed a simple linear regression to answer RQ2, which was, Is there a relationship between self-efficacy of controlling Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students? The corresponding hypotheses were as follows:

$H_0$2: There is no statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

$H_A$2: There is a statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

The results of the simple linear regression show that there is a statistically significant relationship between self-efficacy of controlling type 2 diabetes and perceived personal susceptibility to type 2 diabetes, $F(1,102) = 7.437$, $p < 0.05$, with self-efficacy accounting for 5.9% of the variation in perceived personal susceptibility with adjusted $R^2 = 0.05$, which is a small effect size. For every 1 unit increase in the self-efficacy score, there is a 0.395 (95% CI, -0.683 to -0.108) decrease in the perception of personal susceptibility score and is statistically significant ($p < .001$). The null hypothesis was rejected, and the alternative hypothesis was retained.

***Research Question 3***

I performed a simple linear regression to answer RQ3, which was, Is there a relationship between actual Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students? The corresponding hypotheses were as follows:

$H_0$3: There is no statistically significant relationship between actual Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

$H_A3$: There is a statistically significant relationship between actual Type 2 diabetes risk and perceived personal susceptibility to Type 2 diabetes among African American female college students.

The results of the simple linear regression show that there was a statistically significant relationship between actual type 2 diabetes risk and perceived personal susceptibility to type 2 diabetes, $F(1,102) = 11.790$, $p < .001$, actual type 2 diabetes risk accounted for 9.5% of the variation in perceived personal susceptibility with adjusted $R^2 = 0.095$, which is a small effect size. For every 1 unit increase in the actual type 2 diabetes risk score, there is a 0.593 (95% CI, 0.250 to 0.935) increase in the perception of personal susceptibility score and is statistically significant ($p < .001$). The null hypothesis was rejected, and the alternative hypothesis was retained.

***Research Question 4***

I ran an independent samples t-test to answer RQ4, which was, Is there a statistically significant difference in perceived personal susceptibility to Type 2 diabetes between African American female college students with and without a family history of Type 2 diabetes? The corresponding hypotheses were as follows:

$H_0$4: There is no statistically significant difference in perceived personal susceptibility to Type 2 diabetes between African American female college students with and without a family history of Type 2 diabetes.

$H_A$4: There is a statistically significant difference in perceived personal susceptibility to Type 2 diabetes between African American female college students with and without a family history of Type 2 diabetes.

The results of the independent samples t-test showed that there were 74 participants with no family history of type 2 diabetes, and there were 30 with a family history. Data are mean ± standard deviation, unless otherwise stated. The mean personal susceptibility score for those without a family history of type 2 diabetes (5.4 ± 1.9) was lower than those with a family history (5.9 ± 2.0), a difference of 0.46 but not statistically significant (95% CI, -1.3 to 0.40), $t(-1.058) = 102$, $p = 0.879$, $d = -0.23$ a small effect size . The null hypothesis was retained.

***Research Question 5***

I performed a simple linear regression to answer RQ5, which was, Is there a relationship between perceived peer susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students? The corresponding hypotheses were as follows:

$H_0$5: There is no statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students.

$H_A$5: There is a statistically significant relationship between perceived peer susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students.

The results of the simple linear regression show that there is no statistically significant relationship between perceived peer susceptibility to type 2 diabetes and type 2 diabetes-related health behavior, $F(1,102) = 0.642$, $p > .05$. Perceived peer susceptibility did not account for any of the variation in health behavior with $R^2 = 0.006$

and adjusted $R^2$ = -0.003 which is insignificant. For every 1 unit increase in the perception of peer susceptibility score, there was a 0.416 (95% CI, -0.613 to 1.446) increase in the health behavior score but was not statistically significant ($p > 0.05$). The null hypothesis was retained, and the alternative hypothesis was rejected.

***Research Question 6***

I performed a simple linear regression to answer RQ6, which was, Is there a relationship between self-efficacy of controlling Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students? The corresponding hypotheses were as follows:

$H_0$6: There is no statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

$H_A$6: There is a statistically significant relationship between self-efficacy of controlling Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

The results of the simple linear regression show that there is a statistically significant relationship between self-efficacy and type 2 diabetes-related health behavior, $F(1,102) = 5.461$, $p < 0.05$. Self-efficacy accounted for 4.2% of the variation in health behavior, with adjusted $R^2 = 0.042$, which is a small effect size. For every 1 unit increase in the self-efficacy score, there is a 0.959 (95% CI, -1.105 to -0.434) increase in the type 2 diabetes-related health behavior score and is statistically significant ($p < 0.05$). The null hypothesis was rejected, and the alternative hypothesis was retained.

***Research Question 7***

I performed a simple linear regression test to answer RQ7, which was, Is there a relationship between actual Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students? The corresponding hypotheses were as follows:

$H_0$7: There is no statistically significant relationship between actual Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

$H_A$7: There is a statistically significant relationship between actual Type 2 diabetes risk and Type 2 diabetes-related health behavior among African American female college students.

The results of the simple linear regression show that there is no statistically significant relationship between perceived peer susceptibility to type 2 diabetes and type 2 diabetes-related health behavior, $F(1,102) = 0.635$, $p > 0.05$. Actual type 2 diabetes risk did not account for any of the variation in health behavior with $R^2 = 0.006$ and adjusted $R^2 = -0.004$ which is insignificant. For every 1 unit increase in the actual type 2 diabetes risk score, there was a 0.406 (95% CI, -1.418 to 0.605) decrease in the health behavior score but was not statistically significant ($p > 0.05$). The null hypothesis was retained, and the alternative hypothesis was rejected.

***Research Question 8***

I ran an independent samples t-test to answer RQ8, which was, Is there a difference in Type 2 diabetes-related health behavior among African American female

college students with and without a family history of Type 2 diabetes? The corresponding hypotheses were as follows:

> $H_0$8: There is no statistically significant difference in Type 2 diabetes-related health behavior between African American female college students with and without a family history of Type 2 diabetes.
>
> $H_A$8: There is a statistically significant difference in Type 2 diabetes-related health behavior between African American female college students with and without a family history of Type 2 diabetes.

The results of the independent samples t-test showed that there were 74 participants without a family history of type 2 diabetes, and there were 30 participants with a family history of type 2 diabetes. Data are mean ± standard deviation, unless otherwise stated. The mean health behavior score for those without a family history of type 2 diabetes (35.28 ± 15.6) was 0.217 points higher than those with a family history (35.06 ± 5.7). The mean difference was not statistically significant (95% CI, -2.21 to 2.65), $t(0.177) = 102$, $p = 0.860$, $d = 0.038$, which is a very small effect size. The null hypothesis was retained.

## Summary

In this chapter I presented the results of the study based on quantitative analysis. I discussed the results of the pilot study, which showed that the survey instrument developed for this study had high reliability. Perception of personal susceptibility and Type 2 diabetes-related health behavior were the subscales in the instrument with high reliability.

The sample population consisted of participants with an age range of 18-24. Most of the sample was 19 years of age and were freshmen. One hundred percent of the population identified as African American, with about 5% reporting one other race. The descriptive statistics for the independent and dependent variables were reported. Thirty (28.8%) of the participants had a family history of type 2 diabetes, while 74 (71.2%) did not. Mean scores for the independent and dependent variables showed that most of the sample population had moderate self-efficacy for controlling type 2 diabetes (12.79 out of 10.00-16.00 score range), moderate perception of peer susceptibility to type 2 diabetes (5.11 out of 2.00-8.00 score rage), low perception of personal susceptibility to type 2 diabetes (5.60 out of 3.00-11.00 score range), moderate health behavior (37.03 out of 20.00-48.00 score range), and little to no actual risk for type 2 diabetes (1.61 out of 0.00-5.00 score range). A simple linear regression and an independent sample t-test was used to answer the research questions. The results showed that as participants perceived their peers were at risk for type 2 diabetes, there was a decrease in the perception of personal susceptibility. This was a statistically significant relationship. Self-efficacy of controlling type 2 diabetes risk, and perception of personal susceptibility had a statistically significant relationship, as self-efficacy increased, personal susceptibility decreased.

Actual type 2 diabetes risk and perception of personal susceptibility had a statistically significant relationship. As actual type 2 diabetes increased, so did perception of personal susceptibility. The results also showed a difference in the mean perception of personal susceptibility score as the score for those without a family history of type 2 diabetes were lower than those with a family history, although the difference was not

statistically significant. There was no statistically significant relationship found between perception of peer susceptibility and health behavior, nor actual type 2 diabetes risk and health behavior, although when perception of peer susceptibility and increased, so did health behavior, but when actual type 2 diabetes risk increased, health behavior decreased.

The relationship between self-efficacy and health behavior was statistically significant, and as self-efficacy increased, so did health behavior. The results showed that there was a difference in the mean health behavior score, which was higher in those without a family history of type 2 diabetes, than those without a family history, but it was not statistically significant. In the next chapter I will present the findings from the results and discuss how they relate to the current literature, and to the constructs presented in the HBM. Implications for social change and recommendations for further study will also be addressed.

# Chapter 5: Discussion, Conclusions, and Recommendations

## Introduction

The purpose of this quantitative cross-sectional, correlational study was to examine the perception of personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students in relation to their perceived peer susceptibility, family history, actual Type 2 diabetes risk, and self-efficacy. I administered a self-report survey to a non-probability homogenous convenience sample of African American female college students attending an HBCU. This study was conducted to address the gap in knowledge concerning Type 2 diabetes in college students, particularly African American female college students. This information is lacking in the literature despite rising rates of type 2 diabetes in youth, particularly African American youth (CDC, 2019b). In reviewing the literature, I found few studies of diabetes in African American female college students exclusively (Corliss et al., 2016), although this group is impacted by the increasing trends of Type 2 diabetes rates among the youth population, as well as the high rates of Type 2 diabetes and associated risk factors among African American adult women (Bancks et al., 2017; Bower et al., 2019; Office of Minority Health, 2019).

For data collection, I combined the research instrument that I developed and the American Diabetes Association Diabetes Risk Test instrument that the ADA (2019) developed into one survey. Pilot testing for the Diabetes Risk Perception and Health Behavior Survey for African American Female College Students established reliability with a Cronbach's alpha test for internal consistency. The results showed that the

instrument had high reliability (α = 0.880), and personal susceptibility to Type 2 diabetes (α = 0.855) and Type 2 diabetes-related health behavior (α = 0.813) had high reliability.

In conducting this study, I sought to identify the factors associated with perceived personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior among African American female college students. Using the HBM as a theoretical framework, I wanted to understand the factors that were associated with this population's perceived risk for Type 2 diabetes and their health behavior. The results of this study may inform the creation of Type 2 diabetes intervention programs for African American female college students.

The dependent variables explored in this study were perceived personal susceptibility to Type 2 diabetes and Type 2 diabetes-related health behavior. The independent variables were perceived peer susceptibility to Type 2 diabetes, self-efficacy of controlling Type 2 diabetes risk, actual Type 2 diabetes risk, and family history. I used descriptive statistics to identify the characteristics of the sample population, a linear regression to answer RQs 1-3 and 4-7, and an independent t-test to answer RQs 4 and 8.

The overall results of this study included the mean scores for the independent and dependent variables. The sample had moderate self-efficacy for controlling Type 2 diabetes with a mean score of 12.79 (10.00 -16.00 score range), moderate perception of peer susceptibility to Type 2 diabetes with a mean score of 5.11 (2.00-8.00 score rage), low perception of personal susceptibility to Type 2 diabetes with a mean score of 5.60 (3.00-11.00 score range), moderate health behavior with a mean score of 37.03 (20.00-48.00 score range), and little to no actual risk for Type 2 diabetes with a mean score of

1.61 (0.00-5.00 score range). The results also answered the RQs by identifying which independent variables had a significant relationship to each of the dependent variables and indicating whether there was any difference among those with and without a family history of Type 2 diabetes. The findings showed that perceived peer susceptibility and self-efficacy had an inverse relationship with personal susceptibility. Actual Type 2 diabetes risk had a positive relationship with perceived personal risk. Self-efficacy was the only variable that had a statistically significant relationship with health behavior, and it was positive. There were also no significant differences in perceived personal susceptibility and health behavior between those with and without a family history of Type 2 diabetes.

## Interpretation of the Findings

The findings of this study extend the existing body of knowledge but also address a gap in the literature on current research on diabetes perception in the African American female college student population. The results of this study are similar to existing studies but conflict with other studies that have looked at similar relationships between perceived personal susceptibility and factors such as self-efficacy. The results of this study also challenge the premise of the HBM in that personal susceptibility to a health threat can lead to action against that threat.

### Peer Susceptibility and Personal Susceptibility

The results of the simple linear regression showed that perception of peer susceptibility of Type 2 diabetes and perception of personal susceptibility to Type 2 diabetes had a statistically significant inverse relationship, whereas participants who

perceived their peers were at risk for Type 2 diabetes had a decreased perception of personal susceptibility. These findings are similar to those of Amuta, Jacobs, et al. (2016) and Mongiello et al. (2016b), who found that college students, even those who have personal risk factors for the disease, who perceive that their peers are at risk for Type 2 diabetes underestimate their personal risk. However, other studies did find those who were female, Black (Amuta. Jacobs, et al., 2016; Mongiello et al., 2016b), and had a family history (Mongiello et al., 2016b) of diabetes had a more accurate perception of their diabetes risk. This conflicts with the findings of my study as the sample of Black female college students did not accurately perceive their diabetes risk, even those with a family history of type 2 diabetes. The relationship between perceived peer susceptibility of Type 2 diabetes and perceived personal susceptibility should be further explored.

**Self- Efficacy and Personal Susceptibility**

The results of the simple linear regression showed that self-efficacy of controlling type 2 diabetes and perception of personal susceptibility to type 2 diabetes had a statistically significant inverse relationship. As self-efficacy increased, perception of personal susceptibility decreased. This implies that a lower personal risk perception could be caused by the perception of control one has over their risk, thereby impacting health behavior. This was shown in a study of South African men and women ages 20-29 as researchers looked at the mediating effects of self-efficacy on the relationship between perceived susceptibility to chronic disease and health behavior (Tshuma et al., 2017). They found that perceived susceptibility had a significant relationship with health behavior only when associated with self-efficacy (Tshuma et al., 2017). The findings of

my study extend the body of knowledge on the relationship between self-efficacy and diabetes susceptibility. Other studies that explore self-efficacy and diabetes typically look solely at the role of self-efficacy on health behavior (Corliss et al., 2016; Moise et al., 2017), without considering the perception of risk. The relationship between self-efficacy and personal susceptibility to diabetes can imply healthier behaviors. More studies are needed to better understand how self-efficacy impacts personal susceptibility, and the impact on health behavior. The findings from these studies can provide evidence that self-efficacy and personal susceptibility can be targets for diabetes interventions that seek to improve health behavior.

**Actual Type 2 Diabetes Risk and Personal Susceptibility**

The results of the linear regression identified a statistically significant positive relationship between actual type 2 diabetes risk and perception of personal susceptibility to type 2 diabetes. As the level of risk increased, so did personal susceptibility, meaning participants who had higher levels of actual type 2 diabetes risk had a higher perception of personal risk. These findings contradict studies such as those by Joiner et al., 2022, Heidemann (2019) and Yang et al. (2018), where those with an actual risk for type 2 diabetes underestimated their own risk. Similarly, Spears et al. (2018) researched the association between diabetes knowledge and risk perception among a sample of majority African American females of middle class and found no significance between actual risk and risk perception. The results of these studies could differ from mine due to the differences in the populations that were studied. Joiner et al. (2022) and Yang (2018) used data from national surveys on U.S. adults, and Heideman (2019) used data from a

national study on German adults. My study was specific to African American female college students attending an HBCU, so the smaller sample size differed greatly from these studies as well. Spears et al. (2018) used a population of African American women in their study, it differed in that it was a snowball sample of middle class African American women. The sample I used was a convenience sample. Different populations may have different knowledge of and experiences with diabetes that cause differences in opinions about risk perception. For example, a study on a population of college students from West Virginia University showed that factors such as knowledge, family history of diabetes, self-rated good health, and reading food labels were significant predictors of future diabetes risk (Khan et al., 2022). The study highlighted that those with extremely high or extremely high-risk perception had higher diabetes knowledge (Khan et al, 2022). Even though Yang et al. (2018) had a sample of adults of different race/ethnicity, they did find that Blacks and Hispanics reported a higher type 2 diabetes perception than other races, which does relate to my study as the African American female college student sample did properly perceive their risk in relation to their actual risk. On the contrary, another study by Ledford et al. (2019), showed that among a sample of type 2 diabetes patients, White Americans perceived a longer disease course than Black Americans and Asians, showing that these groups have underestimated their risk of potential comorbidities and complications due to diabetes. Although my study contradicted the research presented here, and were similar to others, there is still a lack of research that identifies the relationship between the actual diabetes risk and risk perception among African American female college students (Sealey-Potts & Reyes-Velazquez, 2014).

More studies are needed to identify if knowledge of actual risk leads to higher risk perception in the African American college student population. This is important as a high-risk perception can increase healthier behavior, as shown in the Khan et al. (2022) study.

**Family History and Personal Susceptibility**

The independent samples t-test showed that the mean score of perception of personal susceptibility to type 2 diabetes was higher for those with a family history of type 2 diabetes, but the difference in scores was not statistically significant. Although significance was not established, the results relate to other studies with populations similar to mine. Studies such as that of Amuta, Crosslin, et al. (2016) and Reyes-Velazquez & Sealy-Potts (2015), found that being female and having a family history of type 2 diabetes was associated with an increased type 2 diabetes threat appraisal (Amuta, Crosslin, et al., 2016) and higher perception of risk (Reyes-Velazquez & Sealey-Potts, 2015), even among a population of overweight/ obese college students (Amuta, Jacobs, et al., 2016). Trends of the influence of family history on risk perception have been shown in more recent studies, such as those of Skøt et al. (2018) and Khan et al. (2022), which found that students with a family history of type 2 diabetes were more likely to have a high perception of risk, and family history was one of the predictors of perceived future diabetes risk (Khan, 2022). Family history was also a factor in risk perception among an African American adult population ages 18-79 (Seaborn et al., 2016). Although these studies show that family history increases risk perception, it does not always transfer into meaningful protective behaviors against type 2 diabetes. This was also explored in this

study by looking at the relationship between family history and health behavior. Future studies should research potential mediators that may exist between family history, risk perception, and health behavior.

**Peer Susceptibility and Health Behavior**

The simple linear regression test revealed that as the perception of peer susceptibility score increased, so did the score for health behavior, meaning that participants who perceived their peers were at risk had healthier type 2 diabetes risk behaviors. Although this was not a statistically significant finding, it is related to studies like Amuta et al. (2017), and Scott et al. (2019) where peer influences were found to be strong predictors of health behavior. Studies by Cha et al. (2016) and Sogari et al. (2018), were also similar in that the researchers found that emerging adults/college students believed that friends with similar diet and exercise goals, and who offered support motivated them to have healthy habits. However, a study conducted by Martin (2018) does not support the results of my study as social support was not found to be a predictor of physical activity, which is a type 2 diabetes-related health behavior. There is a need for additional studies that explore the relationship between perception of peer susceptibility to type 2 diabetes and health behavior among African American female college students (Sogari et al., 2018).

**Self-Efficacy and Health Behavior**

Self-efficacy was the only variable in my study that was associated with type 2 diabetes-related health behavior. I used a simple linear regression to test the relationship between self-efficacy of controlling type 2 diabetes and health behavior, and it showed a

statistically significant positive relationship between the two variables. As the self-efficacy score increased, so did the health behavior score, meaning that participants that had a high self-efficacy had healthier type 2 diabetes-related health behaviors. Similar studies that focused on self-efficacy and diabetes are those of Mirzaei-Alavijeh et al. (2019), and Corliss et al. (2016) which have found self-efficacy to be a factor in diabetes prevention behaviors such as healthy eating and physical activity, even among African American female college students (Corliss et al., 2016). More recent studies are needed to fully assess the relationship between self-efficacy and health behavior to better understand how African American female college students' perception of control over diabetes contributes to their health behavior (Tshuma et al., 2017). This is important to study as it could provide evidence for interventions to target individual self-efficacy to improve diabetes-related health behavior.

**Actual Type 2 Diabetes Risk and Health Behavior**

The results of the simple linear regression showed an inverse relationship between actual type 2 diabetes risk and type 2 diabetes-related health behavior. As participants actual risk level increased, the health behavior score decreased, meaning that those with higher levels of actual type 2 diabetes risk had less healthy behaviors. This was not a statistically significant finding. These findings are consistent with another study by Corliss et al. (2016) that did not find significance between risk knowledge, physical activity, and diet. However, Santos et al. (2017), found a similar result of poor health behavior among an at-risk population of Latino college students. The results of these studies may indicate that those with unhealthy behavior have increased risk for diabetes

as a result. However, another study showed that the knowledge of actual risk of diabetes could potentially cause a change in health behavior (Owei et al., 2019). Owei et al. (2019), found that participants who were informed they developed pre-diabetes (actual type 2 diabetes risk) over the course of the study period, made improvements in their diet and increased their physical activity. However, a conflicting study found that there was no significant effect on the adoption of type 2 diabetes preventive behaviors among African Americans (Seaborn et al., 2016). The variation in the results of these studies could be because of the differences in the type of study design. Owei et al. (2019) used a longitudinal design where participants were able to see their risk develop over time. This could be an indicator for future studies and health programming. The association between these variables should be further studied to establish significance between actual type 2 diabetes risk and health behavior of African American female college students. Results of further studies are important to understand if those who are at risk for type 2 diabetes will change their behavior if they were aware of their risk. If this is the case, prevention programs can be tailored to make sure this population is tested for risk factors and educated on how those risk factors lead to diabetes onset.

**Family History and Health Behavior**

The results of the independent samples-test showed that the mean type 2 diabetes-related health behavior score was higher in those without a family history of type 2 diabetes than those without a family history, but the difference was not significant. These results are different than studies that show family history is a predictor of healthy behavior, such as those of Amuta et al. (2017), and Ard et al. (2020). One study showed

that college students with more family members with type 2 diabetes, especially first-degree relatives and relatives with severe diabetes had increased physical activity and vegetable intake (Amuta et al., 2017). The other study found that family history influenced health behaviors such as weight management, cardiovascular activities, and a healthy diet among African American women 18 and older (Ard et al., 2020). There are other studies similar to mine that also found that family history does not cause healthier behavior among college students (Seaborn, 2016; Amuta & Barry, 2015). Knowledge of type 2 diabetes family history did not increase the likelihood of college students engaging in protective health behaviors (Seaborn, 2016), and although an association was found between family history of type 2 diabetes and being conscious of calorie intake in college students, it did not transfer into healthy behavior such as vegetable intake (Amuta & Barry, 2015). Studies that attempt to understand why college students, particularly African American females with a family history, do not have better preventive health behaviors should be explored. This will enhance the current literature by helping us to understand existing barriers to preventive health behavior among this population.

**Health Belief Model**

The purpose of the HBM was to identify factors that predicted participation in preventive behavior (Becker et al., 1974). The premise of the HBM suggests that an individual is more likely to act against a health threat if they perceive they are at risk (Hochbaum, 1958; Rosenstock, 1974; Skinner et al., 2015). This was the major premise for my study as well. I wanted to know what factors such as self-efficacy was associated with African American female college students' perception of their diabetes

susceptibility. I also wanted to know which of those factors were associated with their health behavior. Therefore, I explored the HBM constructs perceived personal susceptibility, self-efficacy, and cues to action in my study. Although self-efficacy was not a part of the original theory, the idea was that for an individual to act against a threat, they must believe they are capable of taking action (Rosenstock et al.,1988). I wanted to know if this was the case in this population. The cues to action that were considered were perception of peer susceptibility, family history, and actual type 2 diabetes risk.

### *Perceived Susceptibility*

Many authors have used the HBM as a theoretical framework for studies that focus on the factors associated with perceived susceptibility. Many have found that perceived susceptibility might play an important role in the use of preventive health services, or practices (Paige et al., 2018), especially among females (Amuta, Jacobs et al., 2016; Luquis & Kessinger, 2019). My study contradicts these research articles as I found low personal risk perception and moderate health behavior among the African American female college student population. The difference could be that other factors such as knowledge and family history could've impacted these results. Only 30% of the sample had a family history and type 2 diabetes knowledge was not explored, although, family history and health behavior did not have a statistically significant association in this study. Other studies show that family history positively influences a college students' level of diabetes knowledge (Khlaifat et al., 2020), but those with lower knowledge of diabetes underestimate their diabetes risk (Mongiello et al., 2016a; Merzeh, 2016). This is shown in this study's population as there was a low rate of family history of diabetes.

This could indicate that there was little diabetes knowledge among the study participants, negatively affecting personal susceptibility, and in turn negatively impacting preventive health behaviors such as seeking out medical care. Other studies are needed to identify if an increase in diabetes knowledge could increase personal susceptibility and potentially impact health behavior.

### *Self-Efficacy*

Self-efficacy is the perception of control that someone has over a disease (Skinner et al., 2015). Those that have a sense of control are more likely to change their behavior and engage in preventive health actions (Skubisz, 2014). In my study I found that those with high self-efficacy had better health behavior, and this was a significant finding. Corliss et al. (2016) had the same conclusion on a similar population, when they found that self-efficacy was significantly associated with the perception that healthy eating and physical activity helped with type 2 diabetes prevention. These trends have been found in other populations as well. In a study conducted by Mirzaei-Alavijeh et al. (2019) on a population of Iranian men and women, they found that self-efficacy was one of the most significant factors responsible for the variation in health behaviors such as physical activity. There are other studies where self-efficacy was not shown to be a significant factor in type 2 diabetes-related health behavior. A study conducted by Antwi et al. (2020) showed that among a sample of college students, only about 30% of the participants reported low self-efficacy of controlling type 2 diabetes, but physical inactivity was one of the main risk factors presented in the sample (61.4%). The conflicts in these studies could be due to factors such as sample characteristics, actual diabetes

risk, family history, and other barriers to participation in healthy behavior. Although there are conflicting studies, self-efficacy is still an important factor to consider when predicting type 2 diabetes-related health behavior, especially among African American college students (Corliss et al., 2016).

### *Cues to Action*

According to the HBM, cues to action are those factors such as personal illness, illness of family or friend, or media campaigns that bring awareness and motivates people to make changes in their behavior (Rosenstock, 1974; Skinner et al., 2015). The cues to action explored in this study were perception of peer susceptibility to type 2 diabetes, family history of type 2 diabetes and actual type 2 diabetes risk. The results of this study did show that as perception of peer susceptibility increased, so did healthy behavior, however, this was not a significant finding. Related to this, Amuta et al. (2017) used the HBM as a theoretical framework and concluded that peer influence was a powerful cue to action towards physical activity. Regarding family history, another study using the HBM as a framework has shown the positive association between family history and health behavior (Ard et al., 2020). In other studies, although the HBM was not the theoretical basis, they have shown that family history is not associated with the practice of healthy behavior (Amuta et al., 2016; Seaborn et al., 2016), especially among women (Beckles et al., 2019). The results of my study also found that family history had no significant association with healthy behavior, which is contrary to the HBM. Other cues to action such as actual type 2 diabetes risk were also not significantly associated with healthy behavior in my study. Other authors like Antwi et al. (2020), who used the HBM theoretical framework for their study, also disproved the theory as the results did not find an association with physical activity among college students with an actual type 2 diabetes risk.

The conflicts among these studies could be due to researchers overlooking how the six constructs of the HBM are relative to one another and how that relationship may impact health behavior. For instance, Jones et al. (2015) considered three different models of variable ordering using the HBM constructs. Parallel mediation was the first model in which all the constructs predict health behavior without having an impact on one another (Jones et al., 2015). This is the model that was used in my study as it looked at the impact that each construct had on the dependent variables. The second model, serial mediation, the constructs act as a chain of influence on each other, and that causal chain predicts health behavior. The third model, moderated mediation implies that there is one HBM construct that moderates the influence that the other constructs have on health behavior (Jones et al., 2015). Despite the conflicting results regarding the constructs of the HBM and their association to preventive health behaviors, it is still a valid theory which should be further explored in the context of type 2 diabetes among the African American female college student population. The HBM can help researchers to understand the factors that may predict changes in health behavior among this population. It can help to identify those constructs that need to be reinforced in this population, and each of those constructs can be a target area for intervention. Researchers can also use the HBM to further explore other factors such as the relationship between the construct variables and how those relationships contribute to predicting health behavior.

## Limitations of the Study

Several limitations were noted after conducting the study and could affect the ability to generalize the results for the entire African American female college student

population. Such limitations are those regarding the type of sample, sample size and characteristics of the sample. The population was a non-probability homogenous, convenience sample of African American female college students from one HBCU. There were 104 participants in the sample, and although it met the recommendations of the sample size from the power analysis, it was still a rather low sample size compared to similar studies such as those of Mongiello et al. (2016a) who used a sample of 1,579 college students, Reyes-Velazquez & Sealey-Potts (2015) who studied a sample of 660 college students, and Corliss et al. (2016), who studied a sample of 128 college students. The sample consisted of students ages 18-24, however about 30% of the sample was 19 years of age, and 35.6% were Freshman. The majority (about 84%) of the sample population lived on campus.

There were also limitations regarding family history. The question regarding family history of type 2 diabetes on the ADADRT was limited to immediate family members. This was a study limitation as Kral et al. (2018) found that family history is not a significant risk factor for African Americans unless there are 3 or more family members with diabetes. Participants may have had other family members outside of their immediate family that could have been diagnosed with diabetes but were unable to report them due to the limitation of the questionnaire. The self-report of family history of type 2 diabetes is also a limitation as statistics show out of all diabetes cases in U.S. adults ages 18 and older, 23% are undiagnosed. Specifically, among African Americans, 4.7% of the population has undiagnosed diabetes (CDC, 2021). As a result, there were an unequal number of participants in each family history group. There were a small number of

participants that reported a family history (30), and the majority (74) of the sample reported no family history. Participants could very well have family members with undiagnosed diabetes, therefore could be unaware of their actual family history. This could have impacted the reliability of the study.

## Recommendations

The results of this study showed that there are several factors such as perceived peer susceptibility, self-efficacy, and actual type 2 diabetes risk that are associated with perception of personal susceptibility to type 2 diabetes. However, family history was the only variable that was not significantly associated with personal susceptibility among the African American female college student population. Recent studies that have researched the impact of family history on type 2 diabetes-related behavior is conflicting but have not focused on this population specifically. Further study is recommended to identify if the impact of family history of type 2 diabetes on personal susceptibility transfers into more protective health behaviors in this population. Further study using a larger sample size of African American female college students that have a family history of type 2 diabetes, recruited across several colleges/ universities might yield results that show family history as a significant factor of personal risk perception. This type of study could make a significant contribution to the literature to determine what influences diabetes risk perception in this population.

There was also a lack in the research literature concerning personal risk perception among this population, especially in more current research. As the rates of type 2 diabetes among African American youth are rising (CDC, 2019b), and the African

American adult female population suffer type 2 diabetes at higher rates than Whites (HHS, Office of Minority Health, 2019), African American female college students at higher risk. Therefore, it is recommended that factors that determine personal susceptibility to type 2 diabetes be further explored in a larger sample of this population, and across several different colleges/ universities. Exploring personal susceptibility to type 2 diabetes among this population is recommended because the HBM suggests that personal susceptibility will cause a change in health behavior (Skinner, 2015). Therefore, identifying those factors that enhance personal susceptibility could provide insight into the development of type 2 diabetes prevention programming.

Since self-efficacy of controlling type 2 diabetes risk was the only variable associated with type 2 diabetes-related health behavior in this study, it is recommended that factors that determine protective behaviors against type 2 diabetes risk be further explored in this population. Further investigation is needed on the relationship between perception of personal susceptibility to type 2 diabetes and health behavior. Although this was not addressed in this study, it has been investigated in previous studies (Murillo et al., 2019; Owei et al., 2019), but was not specific to African American female college student population. Another recommendation, as it was not seen in the existing literature, is to study the actual rates of type 2 diabetes in the college student population by screening for type 2 diabetes using hemoglobin A1C testing, and to follow-up with the students after 6 months to identify any changes in health behavior. Lastly, since this was a quantitative study, participants completed a pre-existing survey to identify perception and were not able to explain why they answered the way they did. A qualitative design

would be more appropriate to understand how the participants process and understand their risk. This provides the opportunity to elaborate on feelings of susceptibility and discuss why lifestyle choices are made. For example, a participant can discuss why although they may have a high type 2 diabetes risk level, why they do not eat healthier foods or participate in physical activity. They can provide reasons for why they believe their peers are more susceptible to type 2 diabetes than they are, and what they feel are the reasons for their self-efficacy of controlling type 2 diabetes. The results of a qualitative study can provide recommendations to help identify effective strategies and solutions for type 2 diabetes risk in the African American female college student population.

## Implications

The results of this study may impact social change by informing intervention programs tailored to address the factors associated with type 2 diabetes risk perception and type 2 diabetes-related health behavior among the population of interest. This study can guide the development of health education programming that emphasizes individual and peer diabetes susceptibility, as well as modifiable, and non-modifiable risk factors of type 2 diabetes (Gruss et al., 2019) that are relevant to the African American female college student. It can promote awareness of type 2 diabetes risk factors and increase perceived type 2 diabetes susceptibility leading to early type 2 diabetes screening and early detection (Antwi et al., 2020; Paige et al., 2018). Thereby, decreasing the risk of diabetes onset or diabetes-related complications later in life (ADA, n.d.-a). The results of this study can also promote a cultural and social shift in type 2 diabetes-related

knowledge, behavior, and self-efficacy in African American females who attend HBCU's. They can enhance their confidence in their ability to control their type 2 diabetes risk (San Diego & Merz, 2020). This study can inform HBCU's on the rising rates of type 2 diabetes in African American youth and young adults (CDC, 2019b), and stress the importance of type 2 diabetes prevention. HBCU's are in a unique position to create culturally specific opportunities for chronic disease education, awareness, and screening among African American female college students (Jones et al., 2019). They are also able to create environments that promote healthy eating and physical activity on campus. These opportunities can also enhance this population's self-efficacy in advocating for proper type 2 diabetes screening by their health care provider (Saylor et al., 2018). These considerations can increase knowledge, healthy behavior, and confidence of African American female college students, which in turn can improve health outcomes, thereby mobilizing social change.

## Conclusion

Type 2 diabetes is a chronic condition that is the fifth leading cause of death among African American women ages 20-44 (CDC, 2019a). The rise of type 2 diabetes in youth, specifically ages 10-19 years have been shown in minority populations, as African American youth had the second-highest prevalence (CDC, 2019b). College students are known to engage in many risky health behaviors as unhealthy eating patterns, and biological factors such as overweight/obesity put them at risk for type 2 diabetes. This is especially true of those of the traditional college age/ emerging adulthood, that period in life that marks important lifestyle changes and health habits

(Arnett, 2000) sustained after college, and into full adulthood. As a result, African American females of college student age (18-24) are at high risk as they fall into each one of these groups and are a critical population to explore regarding susceptibility to type 2 diabetes.

College and university health programs are at an advantage for identifying at risk students, and for developing strategies to assist students with accessing the necessary education and tools needed to become aware of their harmful health behaviors, the associated risks, and the strategies needed to make healthy behavior changes toward a healthy lifestyle (Jones et al., 2019). These changes can in turn alter the rising rates of type 2 diabetes in African American communities, especially among the youth and emerging adult population (CDC, 2019b). This will help to create a future that consists of individuals who are knowledgeable and aware of their risks and who engage in behaviors that are conducive to decreasing their disease risk.

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Appendix A: Final Study Invitation to Participate

**Type 2 Diabetes study seeks African American/ Black Female undergraduate students ages 18-24 to participate in a survey**

There is a new study called *"Perceived Diabetes Susceptibility Among African American Female College Students"* that could prove insight into the type 2 diabetes risk of young African American females. For this study, you are invited to share your thoughts on your type 2 diabetes susceptibility and your current health habits. This survey is part of the doctoral study for Khaliah Wilson, a Ph.D. student at Walden University.

**Participation Procedures:**

- Read the consent form to participate
- Complete a 15-20-minute paper survey
- To protect your privacy, you will not be asked to put your name on the survey or consent form

**Volunteers must meet these requirements:**

- African American/ Black Female
- Undergraduate college student at [University name redacted]
- 18 – 24 years old

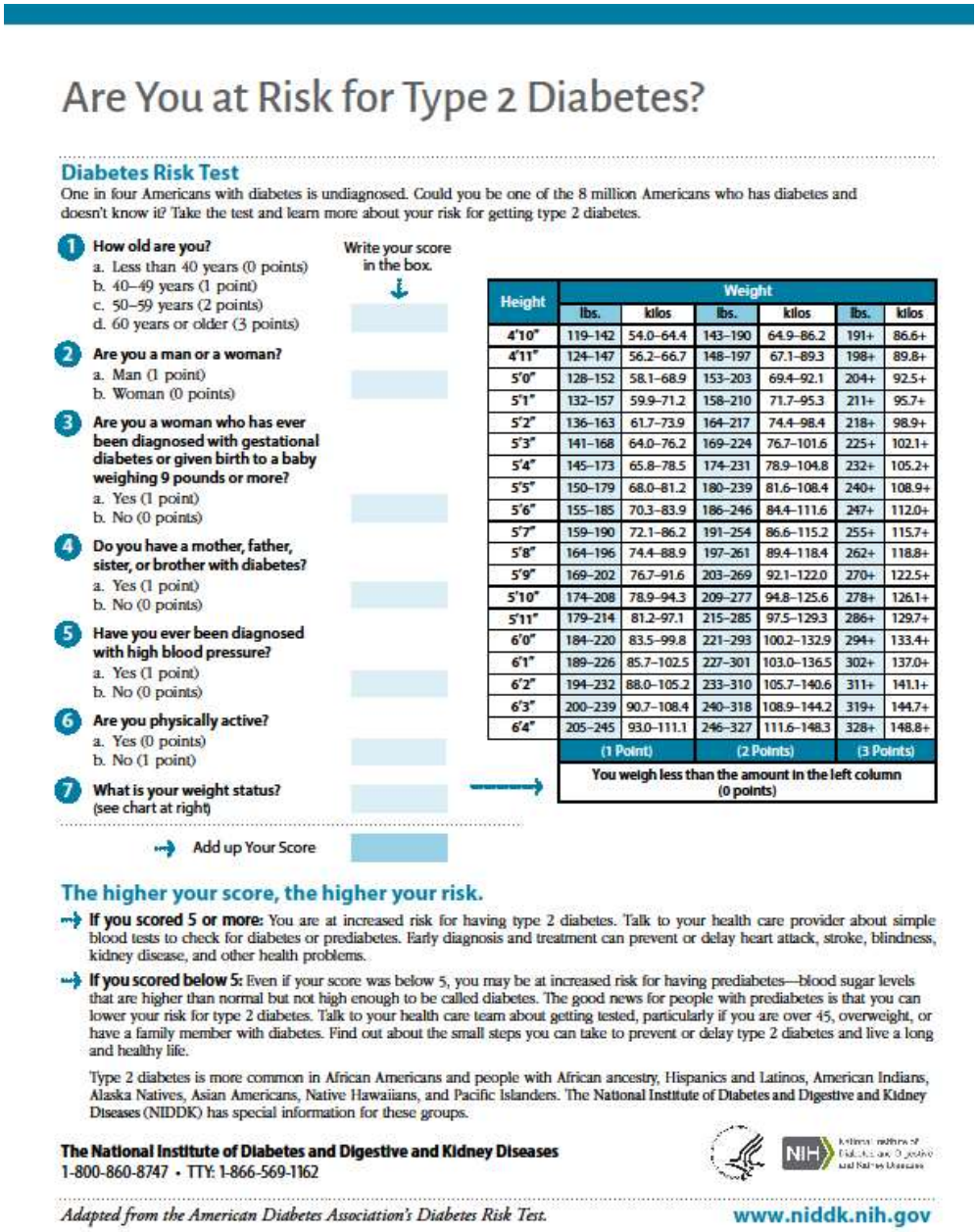
**Surveys are being administered on the following dates, times, and locations:**

| Date | Time | Location |
|---|---|---|

**If other dates/times are needed, contact:**
**Khaliah Wilson at**
**[telephone address redacted]**
**OR**
[email address redacted]

Appendix B: American Diabetes Association Diabetes Risk Test

The ADA developed a self-screening tool in 2019 to identify undiagnosed individuals who may have or are at risk for Type 2 diabetes.



# Are You at Risk for Type 2 Diabetes?

## Diabetes Risk Test

One in four Americans with diabetes is undiagnosed. Could you be one of the 8 million Americans who has diabetes and doesn't know it? Take the test and learn more about your risk for getting type 2 diabetes.

Write your score in the box.

1. **How old are you?**
   a. Less than 40 years (0 points)
   b. 40–49 years (1 point)
   c. 50–59 years (2 points)
   d. 60 years or older (3 points)
2. **Are you a man or a woman?**
   a. Man (1 point)
   b. Woman (0 points)
3. **Are you a woman who has ever been diagnosed with gestational diabetes or given birth to a baby weighing 9 pounds or more?**
   a. Yes (1 point)
   b. No (0 points)
4. **Do you have a mother, father, sister, or brother with diabetes?**
   a. Yes (1 point)
   b. No (0 points)
5. **Have you ever been diagnosed with high blood pressure?**
   a. Yes (1 point)
   b. No (0 points)
6. **Are you physically active?**
   a. Yes (0 points)
   b. No (1 point)
7. **What is your weight status?** (see chart at right)

→ Add up Your Score

| Height | Weight | | | | | |
|---|---|---|---|---|---|---|
| | lbs. | kilos | lbs. | kilos | lbs. | kilos |
| 4'10" | 119–142 | 54.0–64.4 | 143–190 | 64.9–86.2 | 191+ | 86.6+ |
| 4'11" | 124–147 | 56.2–66.7 | 148–197 | 67.1–89.3 | 198+ | 89.8+ |
| 5'0" | 128–152 | 58.1–68.9 | 153–203 | 69.4–92.1 | 204+ | 92.5+ |
| 5'1" | 132–157 | 59.9–71.2 | 158–210 | 71.7–95.3 | 211+ | 95.7+ |
| 5'2" | 136–163 | 61.7–73.9 | 164–217 | 74.4–98.4 | 218+ | 98.9+ |
| 5'3" | 141–168 | 64.0–76.2 | 169–224 | 76.7–101.6 | 225+ | 102.1+ |
| 5'4" | 145–173 | 65.8–78.5 | 174–231 | 78.9–104.8 | 232+ | 105.2+ |
| 5'5" | 150–179 | 68.0–81.2 | 180–239 | 81.6–108.4 | 240+ | 108.9+ |
| 5'6" | 155–185 | 70.3–83.9 | 186–246 | 84.4–111.6 | 247+ | 112.0+ |
| 5'7" | 159–190 | 72.1–86.2 | 191–254 | 86.6–115.2 | 255+ | 115.7+ |
| 5'8" | 164–196 | 74.4–88.9 | 197–261 | 89.4–118.4 | 262+ | 118.8+ |
| 5'9" | 169–202 | 76.7–91.6 | 203–269 | 92.1–122.0 | 270+ | 122.5+ |
| 5'10" | 174–208 | 78.9–94.3 | 209–277 | 94.8–125.6 | 278+ | 126.1+ |
| 5'11" | 179–214 | 81.2–97.1 | 215–285 | 97.5–129.3 | 286+ | 129.7+ |
| 6'0" | 184–220 | 83.5–99.8 | 221–293 | 100.2–132.9 | 294+ | 133.4+ |
| 6'1" | 189–226 | 85.7–102.5 | 227–301 | 103.0–136.5 | 302+ | 137.0+ |
| 6'2" | 194–232 | 88.0–105.2 | 233–310 | 105.7–140.6 | 311+ | 141.1+ |
| 6'3" | 200–239 | 90.7–108.4 | 240–318 | 108.9–144.2 | 319+ | 144.7+ |
| 6'4" | 205–245 | 93.0–111.1 | 246–327 | 111.6–148.3 | 328+ | 148.8+ |
| | (1 Point) | | (2 Points) | | (3 Points) | |
| | You weigh less than the amount in the left column (0 points) | | | | | |

## The higher your score, the higher your risk.

→ **If you scored 5 or more:** You are at increased risk for having type 2 diabetes. Talk to your health care provider about simple blood tests to check for diabetes or prediabetes. Early diagnosis and treatment can prevent or delay heart attack, stroke, blindness, kidney disease, and other health problems.

→ **If you scored below 5:** Even if your score was below 5, you may be at increased risk for having prediabetes—blood sugar levels that are higher than normal but not high enough to be called diabetes. The good news for people with prediabetes is that you can lower your risk for type 2 diabetes. Talk to your health care team about getting tested, particularly if you are over 45, overweight, or have a family member with diabetes. Find out about the small steps you can take to prevent or delay type 2 diabetes and live a long and healthy life.

Type 2 diabetes is more common in African Americans and people with African ancestry, Hispanics and Latinos, American Indians, Alaska Natives, Asian Americans, Native Hawaiians, and Pacific Islanders. The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) has special information for these groups.

**The National Institute of Diabetes and Digestive and Kidney Diseases**
1-800-860-8747 • TTY: 1-866-569-1162

*Adapted from the American Diabetes Association's Diabetes Risk Test.*

**www.niddk.nih.gov**

Appendix C: Survey Instrument

**Diabetes Risk Perception and Health Behavior Survey for African American Female College Students**

**Purpose:** This survey will be used to gather information about your perception (opinion) of your personal risk and your peers' risk for developing type 2 diabetes, as well as your current health behaviors.

**Key Terms Defined:**

*Type 2 diabetes* - a disease that occurs when the body does not make enough insulin or use it well enough to control the levels of sugar (glucose) in the blood, resulting in hyperglycemia (high blood sugar).

*Pre-diabetes* - a condition in which a person has high blood sugar (hyperglycemia) but not high enough to be considered type 2 diabetes. It is a risk factor for type 2 diabetes.

*Peer* – persons of the same age group and demographics (African American/ Black female college students 18-24 years old).

*Risk* – how likely someone is to develop type 2 diabetes.

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## Demographic Information

1. What is your age in years? _____

For each of the following questions, fill in the circle that best describes you.

2. What is your academic classification?

O Freshman
O Sophomore
O Junior
O Senior

3. What is your race/ ethnicity?

**Ethnicity: *Check One***

O Hispanic or Latino/a/Latinx
O Not Hispanic or Latino/a/Latinx

**Race: *Check all that apply***

O American Indian or Alaska Native
O Asian
O Black or African American
O Native Hawaiian or Other Pacific Islander
O White
O Other

4. Where is your current residence?

O Campus residence hall/ Student housing
O Home with parent/s, guardian/s, or relative/s

O Off campus apartment
O Do not have permanent housing

## Diabetes History

For each of the following questions, circle either **Yes** or **No**.

5. Have you ever been diagnosed with type 2 diabetes by a healthcare professional?
   Yes No
6. Have you ever been diagnosed with pre-diabetes by a healthcare professional?
   Yes No
7. Has a healthcare professional ever told you that you were at risk for type 2 diabetes or pre-diabetes?
   Yes No

## Perception of Risk

For each of the following statements, circle the answer that describes your opinion the most.

8. I believe that I do not have much control over developing diabetes.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

9. I believe that my current health habits will keep me in control of my risk for type 2 diabetes.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

10. If I improve my current health habits, I will have better control over my risk for type 2 diabetes.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

11. Controlling my risk for type 2 diabetes will make me less likely to develop the disease.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

12. I have better control over my risk for type 2 diabetes than my peers.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

13. I am less likely to develop type 2 diabetes than my peers.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

14. I believe that I am currently at risk for type 2 diabetes.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

15. I am concerned that I will develop diabetes while I am in college.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

16. I am concerned that I will develop diabetes in my lifetime.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

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## Health Behaviors

For each of the following questions, circle the answer that describes your health behaviors most.

17. On average, how often do you eat at least 2 ½ cups of vegetables each day?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

18. On average, how often do you eat at least 2 cups of fruits each day?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

19. On average, how often does half of your daily grain intake come from whole grains (e.g. brown rice, oats, quinoa)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

20. On average, how often do you eat meat high in saturated fat and sodium (e.g. hotdogs, hamburgers, lunch/deli meat)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

21. On average, how often do you eat lean meat and other sources of protein (e.g. skinless chicken breast, top sirloin, pork loin, salmon, beans, peas, soy products)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

22. How often is the juice you drink 100% fruit juice?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

23. On average, how often do you drink sugar sweetened beverages (e.g. soda, juice drinks with added sugars, sweet tea, lemonade)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

24. How often do you eat unhealthy snacks from the vending machine (e.g. cake, cookies, donuts, potato chips, candy)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

25. How often do you eat healthy snacks from the vending machine (e.g. crackers, granola bar, fruit snacks)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

26. How often do you read food labels when making food choices?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

27. On a weekly average, how often do you perform at least 150 minutes of moderate physical activity (e.g. 30 minutes of brisk walking/ day) or 75 minutes of vigorous physical activity (e.g. 15 minutes of running or swimming/ day)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

28. How often do you have a yearly visit with your healthcare provider? If you do not have a healthcare provider circle N/A for Not Applicable.

| Never | Sometimes | Usually | Always | N/A |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 0 |

**If you answered N/A to question #28 you do not need to answer questions #29 and #30.**

29. When you visit your healthcare provider for a yearly checkup, how often is your blood sugar checked?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

30. When you visit your healthcare provider for a yearly checkup, how often is your blood pressure checked?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

Appendix D: Pilot Invitation to Participate

**Type 2 Diabetes study seeks African American/ Black Female undergraduate students ages 18-24 to volunteer for a pilot survey**

There is a new study called *"Perceived Diabetes Susceptibility Among African American Female College Students"* that could prove insight into the type 2 diabetes risk of young African American females. Volunteers are needed to participate in piloting (testing) the survey that will be used in this study and to provide feedback about their experience.

This pilot survey is part of the doctoral study for Khaliah Wilson, a Ph.D. student at Walden University. The results of this pilot will be used to establish the reliability or appropriateness of the survey for the larger study.

**Participation Procedures:**

- Read the consent form to participate
- Complete a 15-20-minute paper survey
- To protect your privacy, you will not be asked to put your name on the survey or consent form
- At the conclusion of the survey, complete a 10- minute feedback questionnaire about the survey experience

**Volunteers must meet these requirements:**

- African American/ Black Female
- Undergraduate college student at Norfolk State University
- 18 – 24 years old

**Pilot surveys are being administered on the following dates, times, and locations:**

| Date | Time | Location |
|---|---|---|

**If other dates/times are needed, contact:**
**Khaliah Wilson at**
**[email address redacted]**
**OR**
[telephone address redacted]

Appendix E: Pilot Survey

**Diabetes Risk Perception and Health Behavior Survey for African American Female College Students**
**Pilot Survey**

**Purpose:** This survey will be used to gather information about your perception (opinion) of your personal risk and your peers' risk for developing type 2 diabetes, as well as your current health behaviors.

**Key Terms Defined:**

*Type 2 diabetes* - a disease that occurs when the body does not make enough insulin or use it well enough to control the levels of sugar (glucose) in the blood, resulting in hyperglycemia (high blood sugar).

*Pre-diabetes* - a condition in which a person has high blood sugar (hyperglycemia) but not high enough to be considered type 2 diabetes. It is a risk factor for type 2 diabetes.

*Peer* – persons of the same age group and demographics (African American/ Black female college students 18-24 years old).

*Risk* – how likely someone is to develop type 2 diabetes.

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## Demographic Information

1. What is your age in years? _____

For each of the following questions, fill in the circle that best describes you.

2. What is your academic classification?

O Freshman
O Sophomore
O Junior
O Senior

3. What is your race/ ethnicity?

**Ethnicity:** ***Check One***

O Hispanic or Latino/a/Latinx
O Not Hispanic or Latino/a/Latinx

**Race:** ***Check all that apply***

O American Indian or Alaska Native
O Asian
O Black or African American
O Native Hawaiian or Other Pacific Islander
O White
O Other

4. Where is your current residence?

O Campus residence hall/ Student housing

- Home with parent/s, guardian/s, or relative/s
- Off campus apartment
- Do not have permanent housing

## Diabetes History

For each of the following questions, circle either **Yes** or **No**.

5. Have you ever been diagnosed with type 2 diabetes by a healthcare professional?
   Yes No
6. Have you ever been diagnosed with pre-diabetes by a healthcare professional?
   Yes No
7. Has a healthcare professional ever told you that you were at risk for type 2 diabetes or pre-diabetes?
   Yes No

## Perception of Risk

For each of the following statements, circle the answer that describes your opinion the most.

8. I believe that I do not have much control over developing diabetes.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

9. I believe that my current health habits will keep me in control of my risk for type 2 diabetes.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

10. If I improve my current health habits, I will have better control over my risk for type 2 diabetes.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

11. Controlling my risk for type 2 diabetes will make me less likely to develop the disease.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

12. I have better control over my risk for type 2 diabetes than my peers.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

13. I am less likely to develop type 2 diabetes than my peers.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

14. I believe that I am currently at risk for type 2 diabetes.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

15. I am concerned that I will develop diabetes while I am in college.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

16. I am concerned that I will develop diabetes in my lifetime.

| Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

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## Health Behaviors

For each of the following questions, circle the answer that describes your health behaviors most.

17. On average, how often do you eat at least 2 ½ cups of vegetables each day?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

18. On average, how often do you eat at least 2 cups of fruits each day?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

19. On average, how often does half of your daily grain intake come from whole grains (e.g. brown rice, oats, quinoa)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

20. On average, how often do you eat meat high in saturated fat and sodium (e.g. hotdogs, hamburgers, lunch/deli meat)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

21. On average, how often do you eat lean meat and other sources of protein (e.g. skinless chicken breast, top sirloin, pork loin, salmon, beans, peas, soy products)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

22. How often is the juice you drink 100% fruit juice?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

23. On average, how often do you drink sugar sweetened beverages (e.g. soda, juice drinks with added sugars, sweet tea, lemonade)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

24. How often do you eat unhealthy snacks from the vending machine (e.g. cake, cookies, donuts, potato chips, candy)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

25. How often do you eat healthy snacks from the vending machine (e.g. crackers, granola bar, fruit snacks)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

26. How often do you read food labels when making food choices?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

27. On a weekly average, how often do you perform at least 150 minutes of moderate physical activity (e.g. 30 minutes of brisk walking/ day) or 75 minutes of vigorous physical activity (e.g. 15 minutes of running or swimming/ day)?

| Never | Sometimes | Usually | Always |
|---|---|---|---|

1 2 3 4

28. How often do you have a yearly visit with your healthcare provider? If you do not have a healthcare provider circle N/A for Not Applicable.

| Never | Sometimes | Usually | Always | N/A |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 0 |

**If you answered N/A to question #28 you do not need to answer questions #29 and #30.**

29. When you visit your healthcare provider for a yearly checkup, how often is your blood sugar checked?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

30. When you visit your healthcare provider for a yearly checkup, how often is your blood pressure checked?

| Never | Sometimes | Usually | Always |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

**Diabetes Risk Perception and Health Behavior Survey for African American Female College Students**
**Pilot Study Feedback**

**Purpose:** In this section you will provide feedback about your experience with completing the survey. We value your opinion and will take into consideration your feedback to improve the survey for the larger study.

For each of the following questions, circle the answer that best describes your opinion of the survey, and please provide feedback if appropriate.

1. Were any of the survey questions unclear?
   a. Yes
   b. No

If yes, please list the number to the question/s that were unclear and state the reason.

2. Were any of the survey response options not appropriate or relevant?
   a. Yes
   b. No

If yes, please list the number to the question/s where the response options were not appropriate or relevant and state the reason.

3. Were any of the words on the survey unfamiliar and need further explanation?
    a. Yes
    b. No

    If yes, please state the words.

4. Are the instructions for completing each section of the survey clear?
    a. Yes
    b. No

    If no, please specify which instructions were not clear.

5. Did it take you longer than 20 minutes to complete the survey?
    a. Yes
    b. No

    If yes, how long did it take you, and do you think that is too long?

6. Is the survey well designed and easy to use?
    a. Yes
    b. No

    If no, please state the reason and provide suggestions to improve the design.

7. Please provide any additional feedback and/or recommendations that would improve this survey for the final study.

Thank you for your time and valuable feedback.