“I put diabetes on the shelf”:

African-American Women’s Perceptions of Risk for Diabetes Complications

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Abstract

The purpose of this study was to describe the perceptions of African American (AA) women with Type 2 diabetes mellitus (T2DM) about developing diabetes mellitus (DM) complications and explore how their perceived risk influenced DM self-management. Ten (N=10) AA women participated in the qualitative description study through semi-structured interviews. Thematic analysis informed by the Health Belief Model and Risk Perception Conceptual Model revealed the perceived probability of DM complications by AA women with T2DM and how they made judgments regarding the seriousness, extent, or severity of complications. Those with high levels of DM knowledge perceived themselves at high risk of developing DM complications and those with low DM knowledge perceived themselves at low risk of DM complications. Risk perceptions and health literacy also influenced DM self-management behaviors.

Keywords: Risk perceptions, Self-management, Diabetes complications, African American Women, Type 2 diabetes mellitus

"I Put Diabetes on the Shelf": African American Women's Perceptions of Risk for Diabetes Complications

Globally 422 million individuals (8.5%) had diabetes (DM) in 2014 (WHO, 2016). In the United States (US), 34.2 million individuals (10.5%) were estimated to have DM in 2017 (Center for Disease Control and prevention, 2020). It is estimated that one in every three people in the US will have DM by the year 2050 if the trend continues (American Diabetes Association, 2014). The rate of DM prevalence among AA women is 13.2% as compared to Hispanic/Latina women at 11.7%, Asian women at 7.3% and non-Hispanic white (NHW) women at 6.8 % (Centers for Disease Control and Prevention, 2017). DM causes several complications in many parts of the body including cardiovascular disease (CVD), stroke, microvascular complications that lead to lower limb amputations, and kidney failure which may lead to premature death (World Health Organization, 2016). AA adults were 4.2 times more likely to be diagnosed with end-stage renal disease in 2015, 3.5 times more likely to be hospitalized for lower limb amputations in 2012, and twice as likely to die from DM in 2013 as compared to NHW women (United States Department of Health and Human Services (USDHHS), 2019).

Background

The disproportionately higher prevalence of T2DM and its related complications among AA women compared to that of Latina and NHW women is substantial (Centers for Disease Control and Prevention, 2017; Sumlin, 2017). The prevalence of visual impairment per 100 adults with DM was 21.4 in non–Hispanic black women as compared to 18.3 NHW women in 2011; end-stage renal disease related to DM per 100,000 diabetic populations was 340.2 in non-Hispanic black as compared to 175.3 NHW individuals in 2015 (USDHHS).

Research findings estimates that by the year 2050, diabetes will increase by 107% in AA women of all ages, and AA women 75 years and above diabetes cases will increase by 606%. About 50% of all AA women will develop diabetes and face the risk of dying from diabetes related complications compared to other racial/ethnic groups in the US (Sumlin., 2017). AA women face health disparities due to limited access to health care, risk for diseases, genetics, cultural practices, health behaviors, lack of research among this population, and risk perceptions, among other factors (National Institute of Allergy and Infectious Diseases, 2013; Ochieng & Crist, 2020). AA women are disproportionately diagnosed with T2DM and its associated complications (Migliore et al. 2015). A study of risk perceptions among AA women with T2DM revealed that AA women did not perceive themselves to be at risk for developing DM complications unless a provider told them that they had the complication (Migliore et al.). Generally African Americans suffer

disproportionate CVD as compared to their NHW counterparts. AA women with T2DM are at higher risk for developing CVD which could be complicated if their diabetes is not well controlled (Sims, 2020; Tabesh, 2018).

The first author's personal experience as a clinician with AA women was a factor that motivated the current inquiry: "During a three-month clinical residency at a community health center, I encountered AA patients with T2DM who were not willing to admit that they had DM or discuss the issue during their visit. A number of AA women with T2DM would shy away from discussing their DM management and say, *"That is not what brought me in today"'* It was also noticed that some AA women had lapsed or missed visits for their DM routine follow-up appointment, and still did not want to address their diagnosis. When asked why she did not want to talk about her DM, one particular AA woman said, *'I did not want to talk about it because I don't feel sick.'*

From these experiences, I learned that AA women's concept of DM as a disease was incongruent with AA women's actual experiences. A number of AA women with T2DM remained in denial and were not willing to discuss the issue and begin therapy. Even those who had a known personal and family history of DM were sometimes reluctant to discuss their DM." Therefore, the purpose of this study was to explore and describe how AA women with T2DM perceived their risk of developing DM complications, and how their risk perceptions of developing DM complications influenced their DM self-management.

Conceptual Framework

The conceptual framework for this study is based on the definition of risk perception and the Health Belief Model (HBM). Risk perception is a judgment about the seriousness, extent, or severity of a threatening situation and its probability of occurrence (Ayub et al. 2016; Brown, 2014). In health care, risk perception is the way an individual or a group of individuals regard the potential dangers and the possibility of developing complications from a disease and the need to seek health care services (Ayub et al; Brown). Risk perception, therefore, is assumed to determine the pattern of health behavior and the likelihood of a person or a group of individuals to seek health care services or necessary precautions to counter the potential threats of a disease or disease complications. Because risk perception is an essential factor in health behavior changes, understanding factors influencing risk perceptions of developing DM complications among AA women with T2DM is key to changing their health behavior and reducing their risks for developing DM complications. Understanding factors influencing risk perceptions for developing DM complications in AA women with T2DM is, therefore, important for healthcare providers in developing appropriate interventions to improve positive health behavior and reduce T2DM complications in this population.

The HBM was used as the theoretical framework for this narrative inquiry into factors influencing risk perceptions. According to the HBM, health behavior is influenced by an individual's perceptions of disease and the approaches available to minimize its incidence (Hochbaum et al., 1952; Rawlett, 2011; Zhang et al., 2013). The HBM posits that health behavior changes occur when an individual recognizes or perceives susceptibility, severity, and threat of a disease, as well as barriers and benefits of behavior changes (Zhang et al.). In this study, two concepts of HBM were applicable: Perceived Severity and Perceived Benefit.

Perceived Severity is the extent to which an individual perceives the seriousness of a disease and its potential complications (Rawlett, 2011). **Perceived Benefit** is the judgment of the usefulness or importance of a new health behavior intended to minimize the perceived risk of developing disease complications (Rawlett). Perceived Benefit, therefore, determines whether an individual experiencing illness seeks healthcare attention and engages in disease self-management behaviors that minimize the perceived risks of developing disease complications. These two components of the HBM Theory shaped the research study goal. The research questions were: (1) How do AA women with T2DM perceive their risk of developing DM-related complications? (2) How does perceived risk of developing DM-related complications influence DM self-management among AA women with T2DM?

Methodology

Qualitative description (QD) methodology (Sandelowski, 2010) was used to describe how AA women with T2DM perceived their risks for developing DM complications and the factors that influenced their perceptions. QD includes direct reporting with minimal interpretation from participants' narratives (Sandelowski), for example, about their risk perceptions.

Sample and Setting

Participants met inclusion criteria if they were: AA adult women diagnosed with T2DM for at least one year, able to speak, read, and understand English, residing in rural Pinal county in Arizona, and willing to voluntarily participate in the study and provide information pertinent to answering the research questions.

All 10 participants were recruited in rural Arizona in Pinal county in small cities of Casa Grande, Coolidge, and Eloy via referral and snowballing. Community leaders, friends, and family members of participants were used to identify potential participants through referrals. The final sample size was determined by data saturation, when findings became redundant (Horne et al., 2014).

Data Collection

Interviews were scheduled with potential participants once they were identified. Participants who met the criteria signed consent forms and provided personal information by completing the demographic questionnaire before beginning the interviews. The demographic questionnaire was comprised of descriptors, including age, marital status, level of education, employment status, insurance status, having a primary care provider, and whether or not the woman participated in annual screenings for health promotion and disease prevention.

Interviews were conducted at participants' homes or a location of choice to ensure that privacy and confidentiality were maintained. The principal investigator (PI) (first author) scheduled semi-structured interviews lasting 60-90 minutes. The HBM guided interview questions. The PI used open-ended questions and subsequent prompts to clarify participants' responses (Table 1).

TABLE 1. Interview Guide

Research Question	Interview Questions and Prompts
How do AA women with T2DM perceive their risk of developing DM-related complications?	*Tell me a little bit about your health?* *When were you diagnosed with diabetes? Was there anything going on in your life at the time. Can you talk about when you were diagnosed with diabetes?* *Did you receive information /education from your provider bout diabetes? How helpful was the information you received? Did you feel comfortable asking your provider questions regarding your care?* *What are some of the possible diabetes complications that you know of? Are you or your family members or friends are suffering from these complications.* *Would you consider yourself at risk of developing diabetes complications? a). If you do, tell me more? b). How much do you think you are at risk of developing these diabetes complications? (Low or High risk? On a scale of 0-5, how would you rate your risk?) What makes you think so? (Tell me more). Have you discussed your concerns with your Provider or family and friends? What steps are you taking to address these concerns? c). How does that affect how you take care of your diabetes?*
How does perceived risk of developing diabetes-related complications influence DM self-management among AA women with T2DM?	*Do you manage your diabetes with food or medication or shots? (Tell me more). Were you given any type of education on diabetes, please tell me more about it? Who did the teaching? How much did the teaching help you in understanding diabetes? Why or Why not? Please tell me more.*

	How do you take care of yourself? What do you consider the right way of taking care of yourself? a). Are you taking medication? What type of medication are you taking? Do you have insurance? Who pays for your medication and supplies? Are you able to afford your medication?) *Other than medication, what other ways do you use to manage your diabetes? a). Do you feel like you have what you need to manage your diabetes? How is the way you were brought up affect the way you take care of yourself?*

Data Management and Data Analysis

Individual interviews were audiotaped and transcribed in Word documents. Field notes were recorded to assist in data analysis. The software Atlas.ti version 7.1.8 was used to manage the data (Creswell, 2013; Miles et al., 2014). Tables were used to display data to assist the researchers to clearly visualize the data, get the sense of every participant's line of story, and draw overall conclusions about the themes that emerged from the categories and codes (Miles et al., 2014; Sandelowski, 2009).

Descriptive statistics were used to analyze the sample's demographic data. Thematic analysis was used to analyze the interview data, focusing on the participants' naturally occurring events and meanings (Miles et al., 2014). The categories reported in the findings were developed through open coding in three steps: (1) reading through the data several times and identifying words, phrases, or sentences, i.e., codes, that summarized what was seen happening (not based on existing theory but on the meaning that emerged from the data). The researchers used in vivo coding to prioritize or honor participants' voices. This involved using participants' own words or short phrases from the participants' own language in the recorded data (Miles et al.). The words or phrases, which may have been culturally specific or indigenous to the participants, were placed in italics in the text and in tables to distinguish them from the codes' interpretation generated by the researchers (Miles et al.). Words or phrases that appeared repeatedly in the participants' responses, whether similar or implied, were named as codes. An in vivo code which supported a dominant theme led to the first phrase in the title of this paper, *"I put diabetes on the shelf."*

(2) Theoretical coding was the process in which the researchers identified codes according to the existing HBM conceptualization and based on the PI's clinical evidence described above, then categorized according to the two HBM-based research questions. (3) Thematic coding included classifying theoretical codes into themes to draw final conclusions.

Ethics and trustworthiness: Human subjects' protection approval was obtained through the university's Institutional Review Board (IRB). All information was kept confidential. The PI assigned identification codes to the participants' transcripts to conceal participants' actual identities. Recorded interviews were transcribed into electronic documents on the PI's password-protected computer in her locked office.

Lincoln and Guba's (1985) trustworthiness criteria, credibility, dependability, conformability, and transferability, were applied to ensure a quality research report. The researchers met regularly during data collection, to conduct peer debriefing after the interviews to ensure meeting the first three criteria. The researcher ensured transferability by using purposive sampling. The researchers used maximum variation in education, geographical locality, gender and socioeconomic status to capture a wide range of population characteristics (Horne et al., 2014). This ensured transferability because the findings were inclusive of other factors and may be used in similar situations. Reflexivity was also applied during data collection and data analysis to ensure trustworthiness. The PI reflected on possible biases after each interview. Writing reflective notes of relevant information discussed during the interviews and data analysis meetings helped the PI acknowledge and minimize her pre-understandings' potential influence on findings (Jootun et al., 2009).

Findings

The sample consisted of 10 AA women with T2DM aged between 26 and 70 years, as presented in Table 2. Demographic data are presented to provide specific background information such as age, marital status, level of education, employment status, insurance status of the participants.

TABLE 2. Demographic Profile of the Sample

Characteristic	Total N=10
Age	
Mean	51.2
Range	26-70
Marital Status, No, (%)	
Single	2 (20%)
Married	5 (50%)
Separated/divorced	3 (30%)
Living Status, No, (%)	
Lives alone	2 (20%)
Lives with family/spouse	8 (80%)
Employment status No, %	
Full time	6 (60%)
Part-time	2 (20%)
Other (Retired/disabled)	2 (20%)
Annual Income	
$0- $15,000	0
$16,000- $30,000	2
$31,000- $45,000	3
$46,000- $60,000	0
$61,000 and above	3
Other	0
Insured No, (%)	
Yes	10 (100%)
No	0 (0%)
Primary Care Provider	
Yes	9 (90%)
No	1 (10%)
Health Screening	
Yes	9 (90%)
No	1 (10%)

(*Note: 10 participants participated in this study.)*

A number of factors were found that influenced risk perceptions for developing DM complications in AA women with T2DM. The findings, identified as fitting under either Category (1) or Category (2), were organized based on the two research questions.

Category (1): Participants with Higher Knowledge of T2DM and its Complications Reported higher Perceptions of Risk

Two themes emerged within this category (Table 3). They were "Higher Knowledge of DM Increases Perceptions of Risk" and "Participants with Little Knowledge of Diabetes Reported Lower Perceptions of Risk."

Theme (1): Higher Knowledge of DM Increases Perceptions of Risk

Participants who reported knowledge of T2DM and its related complications considered themselves to be at high risk for developing these complications. Six of the participants reported that once they were diagnosed with T2DM, they were at a loss and felt that they needed to know more about the diagnosis. The education provided to them by their provider was very basic, mostly regarding medications and a minimum of information about foods to avoid. Some participants decided to take proactive measures to find out how to learn more about DM.

Although recruitment activities did not focus on healthcare professionals, five of the six participants who reported taking action to educate themselves were nurses and one was a respiratory technician. Despite being in the healthcare field**,** these six participants reported feeling unequipped to take care of their own DM. The six participants reported doing online research and attending classes on DM care and management whenever possible. One of the five nurses reported attending conferences on DM, which were work-related, but gaining knowledge that was useful in her own DM self-management. Among the other four participants that had no healthcare background, one participant reported that she attended a class on DM, completing the course, and earning a certificate of attendance. This participant attended classes on DM management including meal preparation and glucose monitoring and completed the series after referral by her provider. This participant attributed her motivation to attend the classes to her past experience with a family member with DM, whom she watched progress in their disease process to death.

Seven of the participants reported advocating for themselves in order to learn how to take medications or gain more knowledge about T2DM. None of the participants reported receiving adequate education from their provider to motivate them to learn more about DM. For example, a participant reported that when she went for a follow-up appointment, she had to ask her provider about the correct time to take the medication after experiencing symptoms of low blood glucose (hypoglycemia) every night.

TABLE 3. Themes within Research Question/Category (1): Knowledge of T2DM Influences Risk Perception of Developing T2DM Complications.

Themes	**Selected-Excerpts**
Higher knowledge of DM increases perceptions of risk.	"*I know that if I have a wound and it doesn't heal, I know I need to get it checked, it is not something that I play around with, because I know that I still have been diagnosed even though I will feel like I really don't have everyday symptoms per se, but I'm still very conscious of it. I know it's been diagnosed and so I just watch it. I'm just very conscious of it. I'm cautious"* (CLG1). *"My parents, especially my dad, the end wasn't too good. He ended up being blind. I know there are many complications if I don't take care of it, myself"* (CG1).
Little knowledge of DM decreases the level of risk perceptions of risk.	"*the doctor told me…take this much at this time, and I remember thinking oh here is the pill. I will take it, and it will fix the problem. So over the next few years, when it didn't fix the problem, that is when my frustration set in"* (MCP1). "*…diabetes is going to win anyway" "Yeah, because they say it's going to kill us anyway…I don't know, I guess you can prolong it, but in the end…this is why a lot of people look at diabetes the way they do because, like me, they told me, that's what they said it's going to get me anyway"* (ELY1). "*…I know I read that if you don't control it, you'll get cataracts, you know, I don't know. Someone told me, you eventually are going to get cataracts anyhow."(ELY1).*

Another participant stated that her provider discontinued one of her medications. Because she felt that the medication was helpful in controlling her blood glucose, she asked more questions about the medication and requested the provider prescribe it for her again.

A significant number of the participants reported that their acquired knowledge of T2DM and its related complications increased their risk perceptions of developing DM complications. For example, a participant reported that she understood that by having DM, she was at a higher risk of developing complications from a simple wound as compared to someone without DM.

> *I know that if I have a wound and it doesn't heal, I know I need to get it checked, it is not something that I play around with, because I know that I have been diagnosed with diabetes even though I—feel like I really don't have everyday symptoms per se, but I'm still very conscious of it—I know it has been diagnosed and so I watch it. I am very conscious of it. I am conscientious.*

Theme (2): Participants with Little Knowledge of Diabetes Reported Lower Perceptions of Risk

Participants described what they thought DM treatment consisted of, and their expectations of a prognosis after taking their prescribed medications. Two of the participants acknowledged little knowledge of DM, especially during the initial stages of the diagnosis. For example, one participant reported that she thought that DM was an acute problem and that once she finished the dose of the medication, she would be cured. Therefore, she did not go back to see her provider until after six months. Both participants attributed their lack of knowledge to misleading information received from family members. Participants reported that information passed from one person to the other regarding DM and related complications influenced their perceptions. One of the participants believed that nothing could be done to control DM and its related complications. Expressing her risk perceptions of developing DM complications, the participant stated, *"Diabetes is going to win anyway."* In her description of her perceptions, she reported; "*No matter how much you try to control diabetes, it is not possible, because you end up with complications"*

Based on the data received in Category (1) regarding reported high and low risk perception of developing DM complications based on the participants' knowledge of DM, the researcher moved on to the next step to identify how these risk perceptions influenced DM self-management in Category (2)

Category (2): Risk Perceptions for Developing T2DM Complications Influences Diabetes Self-Management

There was evidence in participants' narratives that risk perceptions for developing DM complications influenced DM self-management among AA women with T2DM. Participants reported that they either took or did not take appropriate actions to prevent or delay the onset of developing T2DM complications based on how they described their perceived risk. Those participants that perceived themselves to be at high risk of developing DM complications reported taking steps to adhere to medication regimens and prescribed dietary and behavioral modifications to manage their DM. Those that perceived themselves to be at low risk of developing DM complications had lapses in follow-up appointments with their providers and did not adhere to treatment regimen. Two themes emerged within this category (Table 4). They were "Higher Risk Perception Positively Influenced T2DM Self-Management" and "Lower Risk Perception Negatively Influenced T2DM Self-Management."

TABLE 4. Themes within Research Question/Category (2): Risk Perceptions for Developing T2DM Complications Influences T2DM Self-Management.

Themes	Selected-Excerpts
Higher risk perceptions positively influenced T2DM self-management	"*I had my cardiologist, and I see him once a year, he did the stress tests in January everything is negative*" (CG6). "*Well, I am particular about what I eat and when I eat…I don't take sweet drinks, and I eat a minimal amount of carbohydrates during the day because the spikes are hard to deal with. It's just part of who I am. I don't do sugar at all. I don't do white sugar, maybe on the rare occasion like dessert and I don't do carbohydrates, I don't eat bread or pasta because it's just hard to stay on top of it. I have found for me, 'cause' I am lazy, that not eating it is the solution*" (MCP1). "*I'm working on ensuring that my glucose is under control. Umm, I do my yearly checkups to make sure that everything goes, I check my feet when I take my shoes off; I make sure I wear socks when I have tennis shoes on. Umm…if I'm going outside, I make sure I have something on my feet so that I don't step on something"* (CG6) "*In the emergency room, it is a big reality check for me. I don't think I took it seriously before that"* (MCP1). Another participant also stated, *"...I work in the hospital, which reminds me of my obligations to myself as a nurse because as much as I see patients in hospital who are diabetic, I see myself in that position so it always reminds me of what the complications will be if I neglected myself"* (GC1).
Lower risk perceptions negatively influenced T2DM self-management	*"...the lady at the reception, told my daughter, "'I want you to know something, I am not trying to scare you, but your mom is having a stroke'...my blood sugar was so bad that it made sludge, and he said, nothing can get through sludge"* (ELY1). "*I have a lot of issues…I have kidney problems, high blood pressure, yeah, it's probably easy to name what I don't have…"* (GC3).

	"*…after my heart attack, my doctor told me to sleep nine hours a night…one of my arteries was more than 90% closed" (*CG4. "*…I was already having problems. I don't think it is related to diabetes. Heart, you know"* (CG3). "*I put diabetes on the shelf…And so then I came here, and I really didn't have any symptoms, so I just thought you know what, maybe it's gone again. So, I chose not to look into it, not go to the doctor again. I thought it was gone again"* (ELY1).

Theme (1): Higher Risk Perception Positively Influenced T2DM Self-Management

Participants who reported higher risk perceptions also demonstrated knowledge of T2DM complications from past experience with relatives and friends. These past experiences of others were described by participants as significant sources of concern for developing T2DM complications themselves. Some participants described the fear of developing T2DM complications as the motivating factor for better T2DM self-management behaviors:

I mostly see their feet, leg, and stuff, and they just don't function anymore, they are on disability, and their families are taking care of them, and they still don't take care of it. I am terrified of that… of not taking care of myself.

The participants who reported that they had witnessed their family members suffer the consequences of DM complications believed they were not exceptions and that they too could be in the same situation if they did not make changes. As well, perceiving an overall benefit of preventing or delaying the onset of DM complications seemed to be another motivating factor. These participants understood that following recommended treatments and appropriate DM self-management behaviors would be beneficial and would prevent or delay the onset on DM complications, hence improving their wellbeing.

Theme (2): Lower Risk Perception Negatively Influenced T2DM Self-Management

Lower risk perceptions of developing T2DM complications were consistent with multiple DM complications. Participants who reported lower risk perception also reported experiencing multiple complications, including kidney failure, peripheral neuropathy, visual problems, myocardial infarction, and stroke, among others. Two participants who demonstrated lower risk perceptions of

developing DM complications also reported inconsistencies in T2DM self-management: One of the participants reported that she was put on medication, but she decided not to follow up with the provider after she completed the medication she was given:

> *I put diabetes on the shelf…And so then I came here, and I did not have any symptoms, so I just thought, "You know what, maybe it has gone again." So I chose not to look into it, not go to the doctor. I thought it was gone again.*

Another participant reported myocardial infarction at a young age and being on dialysis due to end-stage renal failure. This participant did not believe that the stroke, heart attack, or renal failure were related to DM. "*I had heart attack-----they said it was diabetes, but I don't think it was."* Because this participant did not believe that she was at risk for developing T2DM complications, she did not practice appropriate T2DM self-management behaviors. In her statement, she reported that she was discouraged from drinking dark soda, but that is what she liked and so continued to drink dark soda.

Discussion

Knowledge of T2DM had a reported profound effect on risk perceptions of developing DM complications in AA women with T2DM. Participants who reported more knowledge of T2DM had a better understanding of their risks of developing complications related to T2DM than those with less knowledge of T2DM. These findings are consistent with the concept of perceived benefits in the Health Belief Model, i.e., an individual's positive health behavior is promoted by the perceived or expected benefits of the health behavior. The desirability of practicing the directed behavior in order to minimize or delay the risk of developing disease complications is motivated by perceived benefits (Rovner et al., 2014). The participants who reported more knowledge of DM and increased risk perceptions had at least a junior college education or were health care professionals (n=5). This trend is consistent with other research reports that people with less education are likely to report lower or higher severity of risk perceptions (Rovner et al.)

Limited knowledge of T2DM negatively influenced risk perceptions of developing T2DM complications among AA women with T2DM. Several participants reported a distorted understanding of T2DM, treatment, and prognosis expectations after having taken their medications for a while. The idea of taking T2DM medication and getting the problem "fixed" was common among some participants during the initial stages of their diagnosis of T2DM. However, it is essential to note that Rovner and colleagues reported that lower education levels may lead to either underestimation or overestimation of risk perceptions. In the current study, 20% of participants who exaggerated their perceptions of risks for developing T2DM complications also reported lower knowledge of T2DM and its potential complications.

Participants reported that DM was an uncontrollable disease, hence the sense of frustration and powerlessness among AA women with T2DM. Lack of education and knowledge can be misleading due to cultural beliefs and sharing of information within the social environment. The sense of trust within the AA community among loved ones and distrust of the healthcare industry is a major cause of misleading information especially among uneducated AA individuals. This may explain why some preventable diseases are common in some of these communities. Breaking the barrier and being able to bring in new information may be a way of targeting this population from the inside rather than from outside. The belief that nothing could be done to control T2DM or to avoid potential complications reflected participants' sense of powerlessness and despair among these participants. This sense of powerlessness may be related to AA women's cultural practices, experiencing stigma or discrimination, socio-economic status, historical experiences, and geographical locations. Similarly, other studies supported the possibility that limited knowledge or education might lead to both overestimation and underestimation of risks for disease and disease complications due to mistaken assessment of health status (Rovner et al., 2014).

Transcultural nursing requires that specific cultural groups' values be addressed in planning nursing interventions (Andrews, Boyle, & Collins, 2019). Since AA women's risk perception and diabetes self-management are influenced by culture, it is important to tailor their plan of care with cultural beliefs and practices in mind and incorporate them into their diabetes education to improve their risk perception and achieve a positive outcome. For example, a qualitative systematic review of cultural tailored community based interventional studies among minority groups with T2DM showed improvement in health outcomes of participants. Participants received diabetes self-management education regarding glucose monitoring, diet and exercise while incorporating specific populations' cultural values and practices, and the results showed improvement in their overall health and their diabetes self-management behaviors (Joo, 2019).

In a systematic review on perceptions of risks for DM-related complications, optimistic biases based on specific diabetic-related complications were reported. For example, Korean women reported perceptions of high risk for CVD complications (Rouyard et al., 2017). Similar to the current study, the findings in the systematic review also reported that people with low levels of education reported low risk perception and that there was a clear lack of awareness about risk for DM related complications, especially among minority groups. A significant number of people with T2DM were not even aware that they were at risk for CVD complications and only a small number of people had a vague idea about DM-related complications (Rouyard et al.).

Although health literacy was not measured explicitly, 50% of the participants demonstrated indications of lower levels of health literacy, irrespective of their levels of education. Indications included reporting, for example, that DM was a disease that could be cured after a dose of metformin; or having had a heart attack and other complications, denying that they were related to DM. Some participants reported that their providers did not offer guidance on what to do after they were diagnosed, so they had to attend classes or search online to find out more information about DM. These findings support other studies' reporting low levels of health literacy among ethnic minorities and people with low incomes (Sayah et al., 2015). Health literacy is generally lower among people with DM, estimated to be between 15-40% (Cavanaugh, 2011). Another study showed that there was low risk perception of developing DM complications among AA with T2DM, which was incongruent with risk indicators (Calvin et al., 2011).

The participants in the current study reported that their high-risk perceptions improved their DM self-management. The study indicates that education could improve risk perception which in turn improves DM self-management. Participants identified education needs in this population and how education may impact their DM health behavior changes that could potentially improve the outcome. These study findings are consistent with the literature. For example, in one study, individuals with high perceptions of severity of DM complications engaged in better DM self-management behavior, while those with low perceptions of severity had poor DM self-management behaviors (Adejoh, 2014**).** Other studies have revealed that risk perceptions influenced health promotion and self-care behaviors (Nie et al., 2018; Siaki et al., 2012). Tawfic and Mohammed (2016) reported that individuals who understood their risks engaged in healthful life styles and improved DM self-management to prevent DM-related CVD complications.

Calvin et al. found that about 38% of participants reported being in good health despite having blood pressure readings above normal range and having A1C levels that were above those recommended for patients with DM, which was attributed to low risk perception. About 50% of participants did not perceive themselves to be at moderate or high risk of developing DM complications except visual problems, high blood pressure and heart attack (Calvin et al., 2011). Participants in the current study did reflect on important factors that appear in the HBM, which was used as a framework in this study. People are more likely to make changes when they perceive that their current situation may lead to a severe disease or complications especially if they know the consequences.

Implications

The findings of this study provide nurses and other health care providers valuable insights for healthcare coaching of AA women with T2DM. The findings indicate the need for providers to listen to their patients' health care needs, concerns, values, and

preferences in their health and healthcare management (Epstein & Street, 2011). These findings call for providers to discuss the risk factors of developing T2DM complications including obesity, age over 65, diet, medication compliance, and inactivity with AA women once they are diagnosed (Chew, 2013; Tabesh et al., 2018). Also, this would require that each AA women diagnosed with T2DM be referred to diabetic education program to help them understand the risks of complications and how to delay onset or prevent them from happening. Further, the findings call for providers to deliver individualized education to their AA women patients to help them develop a stronger risk perception of developing T2DM complications once they have been diagnosed. By developing high-risk perceptions of developing T2DM complications, patients will be more likely to understand the consequences of not managing their disease appropriately and make informed decisions about steps to take towards improving their own health outcomes.

Because health literacy is independently associated with worse glycemic control and a higher rate of retinopathy among patients with T2DM (Bailey et al., 2014), healthcare providers have a significant role in assessing indications for low health literacy among their patients with T2DM and tailoring their instructions at understandable levels. The findings of this study also demonstrate the need for providers to refer their patients to community-based programs addressing risk perceptions that influence T2DM self-management, and population-specific T2DM education programs that address the needs of AA women with T2DM.

The topic of risk perceptions among AA women needs further study to more definitively describe relationships among health literacy, risk perceptions, and T2DM self-management. Also needed is quantitative exploration of associations among risk perception, and AA women's cultural practices and experiences, including stigma and discrimination, socio-economic status, historical experiences, and geographical locations.

Limitations

The study was conducted in a rural area of southern Arizona and similar results may not be found in urban centers or other national regions. The sample consisting of women in a rural area with five of the participants being nurses could have influenced the outcome. Further study with wider sample variation is needed to further inform current knowledge on this topic.

Conclusions

Risk perception is an essential factor in determining behavioral changes, especially when people anticipate that a behavioral change could benefit them. Understanding risk perceptions of developing T2DM complications among AA women with T2DM is key to changing health behaviors and reducing health risks related to T2DM complications. Knowing AA women's risk perceptions for

developing T2DM complications is a powerful tool for health care providers to help AA women with T2DM improve their T2DM self-management. Providing population-specific education that targets their healthcare needs, including T2DM education, will increase the knowledge of AA women with T2DM and improve their risk perceptions. Once AA women with T2DM develop higher-risk perceptions of developing T2DM complications, they may take a more active role in T2DM self-management and improve their health outcomes, hence reducing health disparities among this population.

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