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ABSTRACT

Diabetes places a tremendous burden of health inequity on African-American women in the United States. Behavioral risk factors for diabetes underscore the importance of determining to what extent African-American college students are motivated to adhere to protective behaviors that may decrease the likelihood of diabetes onset. The purpose of this study was to evaluate threat and coping appraisal of diabetes among African-American women enrolled in college, using the Protection Motivation Theory (PMT) as a theoretical framework. Questionnaires were administered to 128 African-American women between the ages of 18 and 25 who were enrolled at Florida A & M University, the nation's largest historically Black university. Bivariate correlations were performed to determine associations involving protection motivation factors (coping and threat appraisals), diabetes knowledge, and demographic characteristics. Statistically significant associations were found between the demographic and knowledge of diabetes variables, and the coping appraisal process. Significant associations were not found with the threat appraisal variables. Furthermore, there was a significant relationship for the maladaptive response of the PMT model between dietary intake levels and perceived severe diabetes threat. For this sample of African-American female students, efforts that articulate active coping strategies may be more effective than those that focus on threat perception. Culturally competent and age appropriate nutrition, physical activity and diabetes education should be increased, given the high percentage of misconceptions about health protection behaviors among study participants. Continuous health education interventions and research focusing on African-American women of college age are needed.

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BACKGROUND

In 2012, the total prevalence of diabetes (diagnosed and undiagnosed) in the United States was 29.1 million, which is approximately 9% of the population (Centers for Disease Control and Prevention [CDC], 2014). Over the next 50 years, the highest percentage increases in the prevalence of diabetes have been projected for minorities and the elderly (Boyle et al., 2001).

Second to American Indians/Alaska Natives, African Americans have the highest burden of diabetes (CDC, 2014). In fact, 4.8 million or 13.2% of all non-Hispanic Blacks have diabetes, and one-third of them do not know they have it (CDC, 2014). If we were to adjust for population age differences, non-Hispanic Blacks are 1.7 times as likely to have diabetes as non-Hispanic Whites (CDC, 2014). The disproportionate amount of prevalence and complications in African Americans with diabetes can be due to obesity, lack of physical activity, hypertension, poor diet, access to healthcare, and socioeconomic status, to name a few.

Disease prevalence and mortality from dietary-related diseases are disproportionately high among African-American women. African-American women also have a disproportionate diabetes burden (Miller, Akohoue & Brooks, 2014) Dietary intake has been strongly associated with diabetic conditions for many years (Flegal, Carroll, Ogden, & Curtin, 2010). The daily diet can be greatly influenced by culture. In fact, previous dietary studies have found that African Americans eat higher levels of fried and high-fat foods and regularly drink more sugar-sweetened sodas than persons of other races and ethnicities (Friday, 2012; Judd, Letter, Shikany, Roth & Newby, 2015). Only 8% of black women met national recommendations of fruit intake of more than 2 servings a day. Moreover, only 16% of black women met national recommendations of vegetables intake of more than 3 servings a day (Gary et al., 2004). A mere 27% of black women met or exceeded the recommended number of daily fruit and vegetable consumption (five or more), the lowest among women of any racial and ethnic group

(Kruger,Yore Solera, & Moeti, 2007). Physical inactivity is also associated with increased risk for diabetes. Levels of physical activity are lower among black women compared with other populations in the United States (Pekmezi, Marcus, Meneses, & Baskin, 2013). Furthermore, black women's physical activities have steadily declined over the past years. In fact, in 1994 45.7% of black women were physically active, 33.9% in 2004 and only 31% of Black women were physically active in 2010 (American Cancer Society [ACS], 2013).

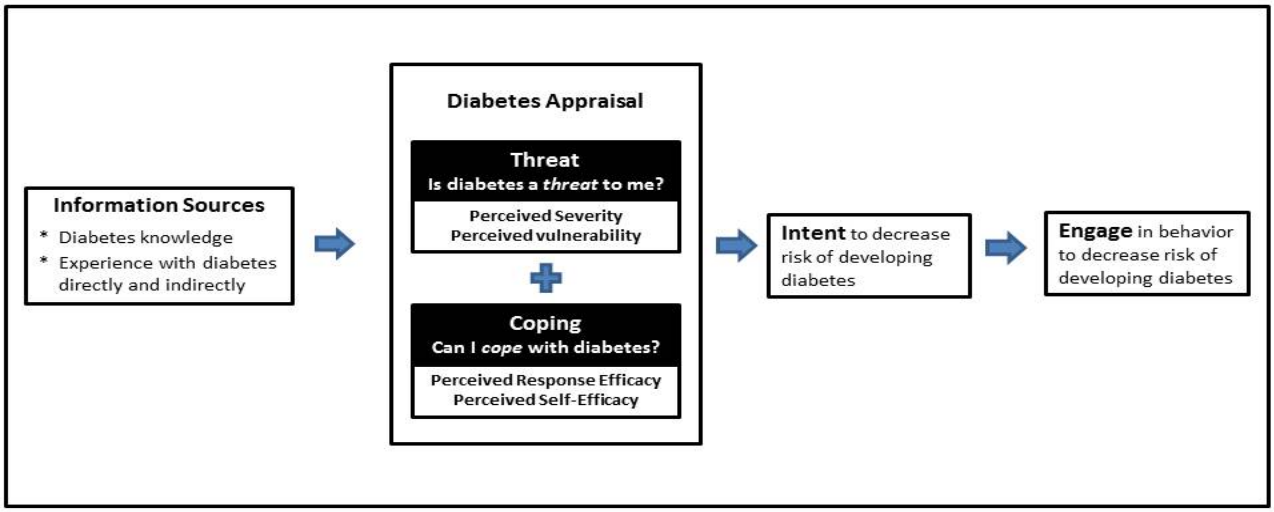
Among African-American women age 20 and above, the high prevalence of obesity and obesity-related conditions are factors reported to contribute to their high death rate from diabetes. For women, the black (non-Hispanic) population has the highest prevalence of overweight and obesity, 25.4% and 56.5% respectively (Ogden, Carroll, Kit, & Flegal, 2014). Overweight affects African-American women across all SES levels; however, minority women with low income appear to have the greatest likelihood of being overweight. African-American women of all ages report participating in less regular exercise than white women, 64% compared to 50% reported being insufficiently active or inactive (ACS, 2013; Kruger et al., 2007).

Research has established that increasing physical activity and modifying dietary intakes can lower the risk of diabetes (Kokinos, 2012; Muraki, Imamura, Manson, & Hu, 2013; Diabetes Prevention Program Research Group, 2002). Credible health promotion and education aimed at the reduction of health disparities in diabetes must address behavioral risk factors but also behavioral protection motivation. Relatively few studies have aimed to identify protection motivational factors affecting African Americans, and more specifically, African-American women enrolled in college.

Theoretical Framework

This study was guided by the Protection Motivation Theory (PMT). The PMT presents a theoretical framework that can be used to explore African Americans' relationship with sources of diabetes information, their individual responses and coping modes. The theoretical components of the PMT are outlined in Figure 1. Based upon PMT, coping with

Figure 1. Conceptual PMT Framework



a health threat, in this case diabetes, is a result of two appraisal processes: adaptive and maladaptive coping. According to Boer and Seydel (1996), there are behavioral options that can weaken the health threat being evaluated through the processes of threat and coping appraisal.

Study Participants

The study population consisted of 128 female African-American students of Florida A&M University, Tallahassee campus. The study setting is a historically black university campus and is located on the south side of Tallahassee, Florida. To participate in the study, persons had to be female, a student of FAMU, and between the ages of 18 to 26 years of age. A 39-item questionnaire was given to the participants to complete, after obtaining their informed consent. The FAMU Institutional Review Board (IRB) approved the study's protocol.

Study Aims and Research Questions

This study aimed to use the PMT theoretical framework to gain an understanding of the protection motivational factors of diabetes, calling attention to the importance of determining to what extent African-American college students are motivated to adhere to behavior risk factors that decrease the likelihood of diabetes. To accomplish these goals, the following research questions were developed.

- Research Question 1: What are the perceived behavioral risk factors for diabetes among African-American women in college?
- Research Question 2: Is there an association between threat appraisal (perceived diabetes risk) and levels of physical activity and dietary intake?
- Research Question 3: Is there an association between coping appraisal and response efficacy and self-efficacy?

Hypothesis. Guided by the PMT theoretical framework which states that the protection motivation variables, threat and coping appraisal, will mediate the relationship between interpersonal motives and high risk associations with diabetes, we hypothesize that lower threat and coping appraisals will be associated with lower levels of physical activity and deficient dietary intake.

RESULTS

Of the 128 participants in this study, 75.8% (97) had a grandparent, parent, sibling, friend or other close family member who had complications or death due to diabetes. Whereas a majority of the participants were upperclassmen, a large group of the participants fell between the age ranges of 21 through 23 years of age. Table 1 gives an overview of the sample's characteristics.

Table 1. Sample characteristics*

Age	**Frequency**	**Percent**
18-20	37	28.9
21-23	58	45.3
24-26	30	23.4
Classification		
Freshman	17	13.3
Sophomore	32	25.6
Junior	42	33.6
Senior	33	26.4
Graduate	1	0.8
Hometown		
Southeast	43	35.0
Northeast	9	7.3
Southwest	25	20.3
Midwest	28	22.8
West	18	14.6

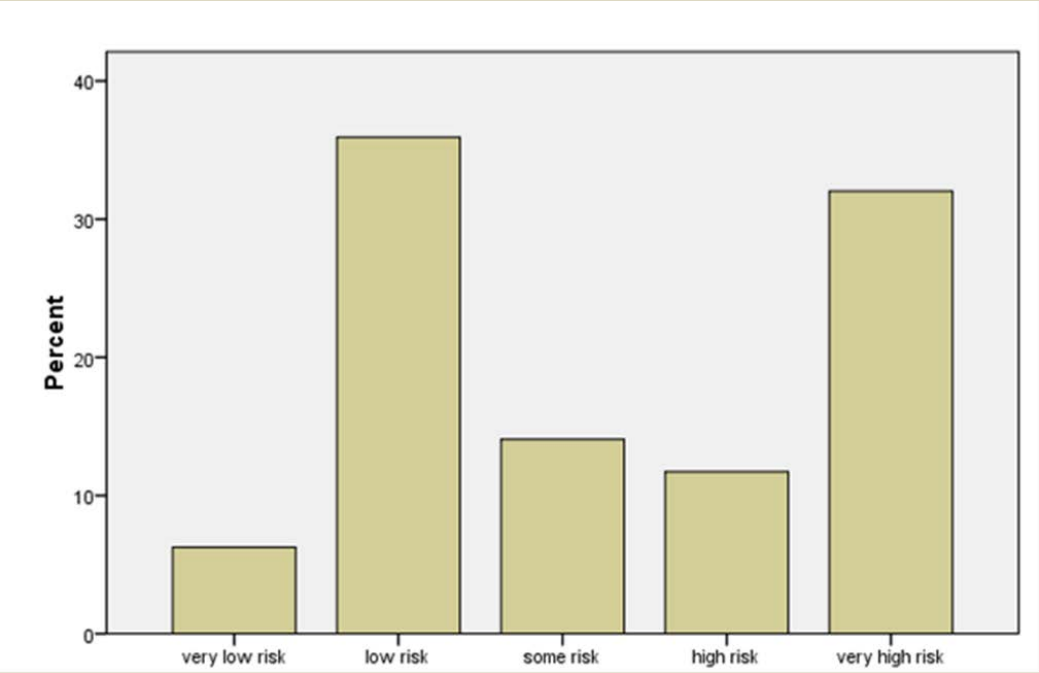
*Excluding non-responses

Research Question 1

Although the majority of this sample (59.3%) was not sure if they could see themselves learning about diabetes in the near future, 33.6% preferred to learn more about diabetes online as opposed to other forms of media. When dealing with on- campus venues of education about diabetes, 29.7% would like an increase of diabetes-related articles in the *Famuan* (the collegiate newspaper) and 28.1% preferred pamphlets and/or brochures (Table 2).

The majority of participants strongly agreed that obesity, high blood pressure, and lack of physical activity were risk factors for diabetes. There was no consensus among the participants as to whether or not alcohol, coffee, and smoking are considered risk factors (Figures 2-4).

Figure 2. Excessive alcohol as a risk for diabetes



Research Question 2

The bivariate correlations between perceived diabetes risk and various physical activity and dietary intake questions appear in Table 3. Eating less food in the past 30 days and weekly soda intake were significantly correlated with diabetes threat appraisal. Participants who indicated that they had eaten less food, fewer calories, or foods low in fat within the previous 30 days were more likely to perceive diabetes as a severe threat to their health and life. In contrast, participants who reported a higher number of sodas consumed weekly (maladaptive behavior) were less likely to perceive diabetes as a severe threat.

Research Question 3

The bivariate correlations between the coping appraisal variable and the response and self-efficacy variables appear in Table 4. Of these variables, only the self-efficacy variables were significantly correlated, each strongly associated with the perception that eating healthily and physical activity is effective.

DISCUSSION

Overall this study gives insight into protection motivation variables surrounding diabetes among AA female college students. Despite an overwhelming majority of the sample population having been exposed to diabetes, more than half of the population was not sure if they wanted to learn more about diabetes. Nevertheless, more than half of the population felt that diabetes was a severe threat to their lives. This disconnection is worthy of further exploration: *students in this sample felt that diabetes may be a severe threat to their lives without it creating a fear or arousal that the PMT model suggests would play an integral role in influencing behavior*.

Figure 3. Smoking as a risk for diabetes

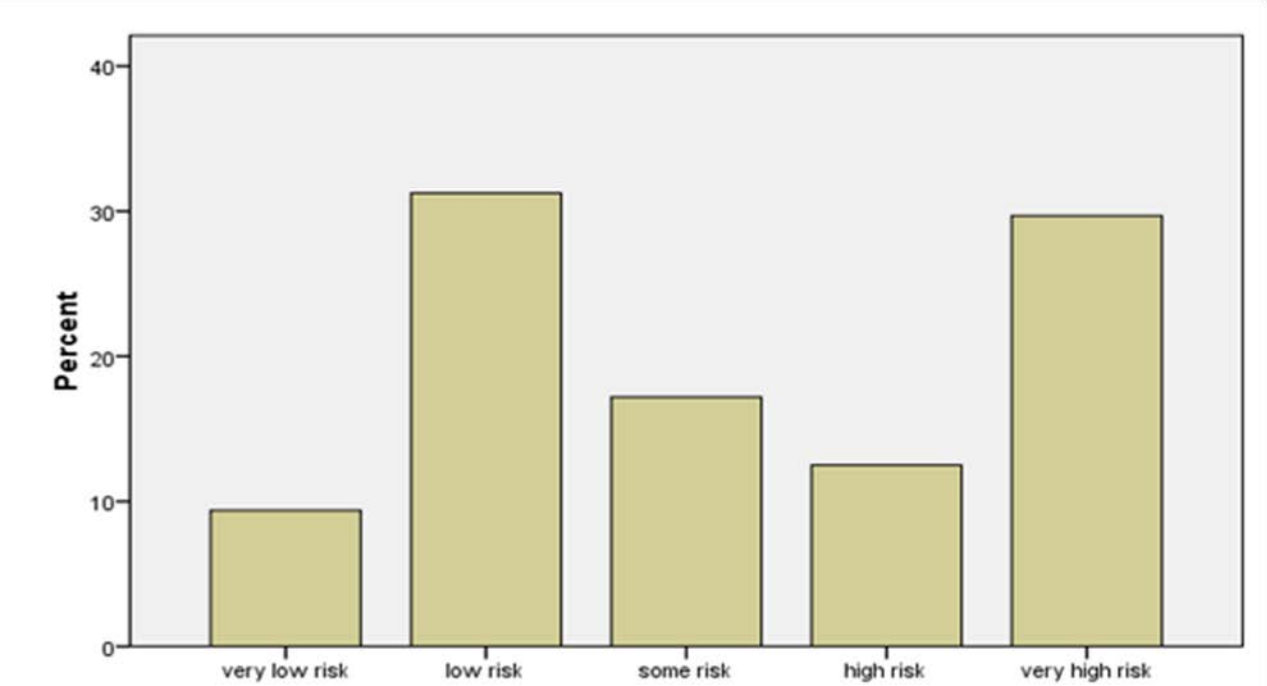


Figure 4. Heavy coffee consumption as a risk for diabetes

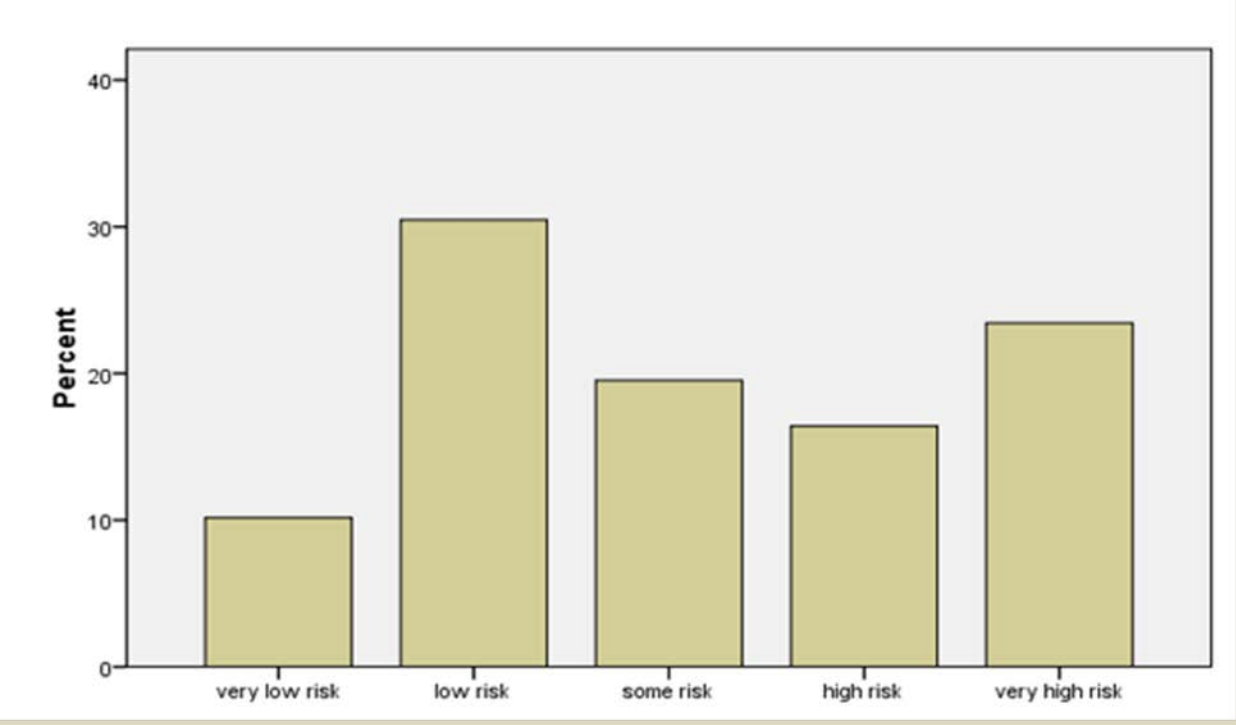


Table 2. Preferred method of diabetes education

Do you want to learn more about diabetes?	Frequency*	Percent
Yes	15	11.7
No	35	27.3
Not Sure	73	57.0
Media		
Newspapers/Magazines	20	15.7
Radio	22	17.3
TV	40	31.5
Online	43	33.9
Other	2	1.6
On-Campus		
Seminar/Workshop	14	11.5
Guest Speakers	29	23.8
Famuan	38	31.1
Pamphlets/Brochures	36	29.5
Other	5	4.1

*Excluding nonresponses

When exploring the maladaptive responses, although the majority of those sampled felt that diabetes was a severe threat to their lives and health, it was not associated with an increase in physical activity or healthy dietary intake habits. One would have assumed that those persons that felt diabetes is a threat for their lives, may in turn begin to develop behaviors that decreased the likelihood of having complications with that disease. This was not the case in this study.

Analysis of the adaptive response (which included response efficacy, self-efficacy, and response cost) yielded intriguing associations that suggest this component of the cognitive mediating process of the PMT model may prove more predictive among college aged women. Although we did not explore the response cost in our analysis due to the financial limitations of our sample population, we found that there is an association between thinking that exercising and eating healthy is effective and individual self-efficacy in physical activity and dietary intake.

Conclusions

Messages to reach this population should be primarily online, through social media, or through university-specific publications. These messages must include education about diabetes risk factors (including alcohol, smoking, and coffee), as well as each African-American women's ability to protect themselves from the threat of diabetes.

Limitations

This study was limited by several factors. Reliability analysis was not performed on the questionnaire items. The study is also limited by relying on self-reported data. Also, the sample did not represent the total population because the study took place at only one university and was taken from a historically black college and university (HBCU).

Table 3. Correlations using the dependent variable: "I feel that diabetes is a severe threat to my health and life"

Independent Variables	Correlation Coefficient	p-Value
During the past 30 days, did you exercise to lose or maintain your weight	-.114	0.216
During the past 30 days, did you eat less food, fewer calories or foods low in Fat	.193	0.035*
Weekly fruit Intake	.078	0.399
Weekly vegetables intake	.034	0.715
Weekly soda intake	-.257	.004*
Weekly milk intake	-.117	0.202
Weekly snack intake	-.113	0.225

*Correlation is significant at the p = .05 level (2-tailed).

Table 4. Correlations Using Dependent Variable: "I feel like eating healthfully and physical activity is effective"

Independent Variables	Correlation Coefficient	p-Value
I have time to exercise	.050	0.578
I have time to eat healthy	-.03	0.974
I'm confident that I can eat healthy	.372	.000*
I'm confident that I can exercise	.341	.000*
I'm financially able to eat healthy	.091	0.315
I'm financially able to be involved in physical activities	.022	0.807

*Correlation is significant at the p = .05 level (2-tailed).

Recommendations for Future Research

We recommend that future studies explore the relationships between chronic diseases and the college-aged population because the risk for African Americans begins early in the life spectrum. The college setting is ideal for timely interventions. African Americans experience the highest burden of health disparities. Chronic diseases, most importantly diabetes, are related to lifestyle behaviors. Lifestyle behaviors such as physical activity and smoking begin or are reinforced during adolescence and college ages. Moreover, future studies should focus on creating a cognitive mediating process for the college-aged population. The issues facing this population are unique and require unique messages and interventions for an engaged population.

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