

Health Insurance Status and Diabetes Management Practices Among Black Adults in the U.S.

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HEALTH INSURANCE STATUS AND DIABETES MANAGEMENT
PRACTICES AMONG
BLACK ADULTS IN THE U.S.

by

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A thesis submitted in partial fulfillment of the requirements
for the Honors in the Major Program in Health Sciences
in the College of Health and Public Affairs
and in the Burnett Honors College
at the University of Central Florida
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ABSTRACT

The purpose of this study was to investigate the relationship between health insurance status and diabetes management (in terms of medication adherence and physical activity levels) in Black adults based on socioeconomic factors. Data were harvested from the Sample Adult Questionnaires of the National Health Interview Survey (NHIS) between the years of 2010 and 2016. The survey questions that were collected included information about the participants' income, education level, insurance status, diabetes diagnosis, medication therapy and physical activity levels. This study employed the most recent version of the Statistical Package for Social Sciences (SPSS) software. The association between diabetes management and socioeconomic factors were analyzed using chi-square analysis. It was hypothesized that Black adults who were uninsured, lower income, and less-educated would report lower adherence to medication and lower physical activity participation when compared to their insured, higher income, and higher-educated counterparts. However, there was no statistically significant relationship between health insurance status and diabetes management in people of different socioeconomic status. Too few people met the weekly recommendations for moderate exercise thus chi-square outcomes for physical activity were invalid. This study will be beneficial for future research as it has provided more generalizable information on this topic due to the use of a national dataset. This study also highlighted the importance of adequate physical activity interventions for this population and can be used for further research on Black adults with diabetes.

Keywords: Blacks, diabetes, health insurance status, physical activity, medication adherence, socioeconomic status

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CHAPTER 1: INTRODUCTION

Diabetes has continued to be a public health concern, as approximately 30.3 million Americans were living with diabetes in 2015. Type 2 diabetes currently accounts for 90-95% of diabetes cases (Centers for Disease Control and Prevention, 2017). African-American adults, herein referred to as Blacks, are disproportionately affected by diabetes compared to non-Hispanic White adults. In fact, Blacks were two times more likely to die to diabetes and had a higher likelihood of suffering from secondary kidney disease, visual impairment and lower extremity amputation compared to Whites in 2015 (Office of Minority Health, 2016). The diabetes prevalence rate among Blacks was the second highest of any ethnic group (12.7%), only lower than the rate among American Indians/Alaska Natives (15.1%) yet almost double the prevalence rate among Whites (7.4%) in 2015. The incidence rate of diabetes diagnosed in American adults was (6.7 per 1,000 persons) with the highest incidence (9.0 per 1,000 persons) found among Blacks in 2015 (Centers for Disease Control and Prevention, 2017). Furthermore, diabetes is currently the seventh leading cause of death overall in the United States, yet it is the fourth leading of cause of death in Black adults (Blackmon, Laham, Taylor, & Kemppainen, 2016).

Various socioeconomic factors can be associated with the disparities observed among people of different races who have diabetes. These factors include education, income and insurance status. There are also various behavioral factors that are pertinent to a discussion on diabetes management, including physical activity (PA), diet and medication adherence.

1.1 Education

Disparities in diabetes outcomes can be attributed to people's differing levels of education, such as whether they have attained a high school education compared to those having post-secondary education. Recent statistics show that adults with less than a high school education had a higher diabetes prevalence (12.6%) than adults with a high school education (9.5%), and adults with education beyond high school (7.2%). In addition, the new cases of diabetes among people with less than a high school education was twice that of those with more than a high school education (Bureau of Labor Statistics, 2017). Although 84.4% of Blacks have attained a high school education, Black adults have been less likely to attain a degree beyond high school compared to white adults; 20.2% and 34.2% respectively (Office of Minority Health, 2017). These differences in educational attainment often predict future job profitability where disparities between races continue to exist.

1.2 Income

The U.S. median income per household in 2015 was \$56,516. Making \$36,898, Blacks made the lowest household income trailing behind Hispanics, non-Hispanic Whites and Asians (Proctor, Semega, Kollar, & A., 2016). These differences are significant because having adequate income is often associated with the likelihood of a person having health insurance.

1.3 Insurance Status

With the enactment of the Patient Protection and Affordable Care Act (ACA) in 2010, there has been an increase in the number of people with health insurance (1.3% between 2014 and 2015). In 2015, most Americans who had health insurance had a private health insurance plan (67.2%) rather than a government health plan (37.1%) (Barnett & Vornovitsky, 2016). Private health insurance includes plans purchased through an employer (i.e., Blue Cross Blue Shield and Humana). Due to the number of people who obtain health insurance from their employer it is necessary to highlight differences in unemployment rates between races. The total civilian unemployment rate in 2016 was 4.9%. However, Blacks had the highest unemployment rate of any race at 8.4%, while Whites had an unemployment rate closer to the national rate at 4.3% (Bureau of Labor Statistics, 2017). Government insurance plans include Medicaid, Medicare, and military health plans, and the highest rate of government insurance coverage was found among Blacks at 44.1%. Still, 20.9 million Americans remained entirely uninsured, with the uninsured rate at 11.1% in Blacks and 6.7% in Whites (Barnett & Vornovitsky, 2016).

1.4 Physical Activity

Of adults who were diagnosed with diabetes, 40.8% of them were physically inactive. This means they performed less than 10 minutes of moderate or vigorous PA a week by working, leisure and transportation. According to BMI, 87.5% of diabetic adults were either overweight or

obese (Centers for Disease Control and Prevention, 2017). Furthermore, Black adults were 20% less likely than Whites to be physically active and were 1.4 times more likely to be considered obese (Office of Minority Health, 2017). In combination with adequate PA, a healthy diet is essential to proper diabetes treatment.

1.5 Diet

Individuals with diabetes must carefully monitor their diet to ensure proper balance of essential food groups including fruits, vegetables, meats, dairy and carbs. These special diets require access to certain food options. Minorities often reside in areas with less access to healthy foods and this ultimately makes it more challenging for these people to maintain a proper diet (Golden, et al., 2012).

1.6 Medication Adherence

People with diabetes are prescribed various medications such as insulin and pills to manage the condition. The number of people taking any diabetes medication (insulin, pills or both) in 2011 totaled to 17.1 million, and more people were taking pills (50.3%) rather than insulin (17.8%). Blacks also used medications more than Whites and Hispanics; 82.1%, 80.2% and 78.5% respectively (National Center for Chronic Disease Prevention and Health Promotion, 2013). Despite the substantial number of people who are prescribed diabetes medications, people

differ in their use of the medications. This study will focus on these differences in medication use, and the aforementioned factors to draw the appropriate relationships between them all.

CHAPTER 2: PURPOSE OF THE STUDY

The purpose of this study was to investigate the relationship between insurance coverage and type of diabetes control (i.e., medication adherence [treatment/secondary prevention] and physical activity participation [behavioral/primary prevention]) among Black adults based on socioeconomic factors. The following aims guided the study's analysis:

Aim 1: Determine the relationship between insurance status and diabetes control among Black men and women.

Aim 2: Compare descriptive statistics between those with and without insurance by the following factors: a) medication adherence; b) PA participation; c) education; d) income level; and e) work status.

The next section of this document will detail past studies that support the need for the present study.

CHAPTER 3: LITERATURE REVIEW

The body of knowledge surrounding diabetes has greatly expanded since its first discovery. Although ancient physicians were able to identify common symptoms of diabetes such as excessive urination and abnormal weight loss, they could not adequately describe the mechanism of the disease nor predict the global impact that it would have today (Polonsky, 2012). Since 1958, the prevalence of diabetes in the U.S. has increased tremendously. Approximately 1.6 million people were diagnosed with diabetes in 1958 compared to 23.4 million people in 2015 (Division of Diabetes Translation, 2017). Throughout the last several decades, various interventions have been implemented to ameliorate the diabetes epidemic in the U.S. The most common interventions include efforts to modify PA levels, medication adherence, health access and dietary habits in people with diabetes.

PA is a vital part of diabetes management for improving blood sugar levels and preventing diabetes complications. Despite this, many people live sedentary lifestyles and research studies have been employed to determine how lack of exercise relates to diabetes control. Sigal and colleagues (2007) conducted a study involving adults ages 39 to 70 with Type 2 diabetes to determine the effects of aerobic exercise and resistance training on glycemic control. The study included 251 participants who either participated in aerobic training, resistance training, both types of training or neither training. The purpose of the study was to determine how each type of exercise would affect hemoglobin A1C levels, a commonly used blood test that provides an average of blood sugar levels over several months. It was demonstrated that aerobic training and resistance training alone improved glycemic control,

however the combination of both trainings had the greatest improvement. These results highlight the benefits of regular exercise in disease management.

People can also choose to participate in leisure-time activities such as walking or biking to prevent a sedentary lifestyle. A study of urban African-Americans in a diabetes program was conducted to determine their preferred leisure-time activity and their frequency of exercise. The study demonstrated that people participated in their preferred leisure-time activity for an average of 3.5 days a week for approximately 45 minutes per session. However, over half of the participants (52%) claimed that they had a barrier to regular exercise. Among the barriers to PA reported were lack of motivation, not knowing what kind of exercise to do, and having no convenient place to exercise (Wanko, et al., 2004). The current study aims to investigate PA patterns in Black adults to determine how their exercise, or lack thereof, relates to socioeconomic factors.

Most adults with Type 2 diabetes are currently taking prescription medications, which are essential to proper glucose control and treatment of secondary illnesses. Unfortunately, there are factors that impede people's ability and willingness to follow their medication regimens. Kirkman et al (2015) investigated the various determinants of diabetes medication adherence using data harvested from a large pharmacy database for over 200,000 patients. The study aimed to categorize determinants of adherence according to patient factors, prescription factors, and prescriber factors, and analyzed patients by age, sex, education, income and the presence of comorbidities. It was demonstrated that higher adherence was associated with higher income and education level, being older, being male and having other chronic conditions. Additional studies went further and analyzed medication adherence among Blacks. In a study of Black adults in

rural North Carolina, study participants who were rated with a low level of adherence were more likely to report that the lack of adherence was due to financial reasons. Having health insurance was also associated with the level of adherence. Overall, it was determined that people may choose not to take their medication regimen as instructed for several reasons such as finances or personal perceptions of medication use (Blackmon, Laham, Taylor, & Kemppainen, 2016).

Tseng et al (2008) investigated the relationship between race/ethnicity and SES in cost-related medication underuse. Their sample included 5,086 insured adults with diabetes who may or may not have had drug benefits as part of their health insurance plan. One out of 7 participants admitted to cost-related medication underuse. However, Blacks had a higher rate of cost-related medication underuse than Whites; 17% and 13% respectively. Other predictors for medication underuse included lack of prescription drug coverage, lower income, and having to pay more out-of-pocket expenses for medications. Although the study investigated medication underuse in insured populations who may or may not have had drug coverage, there is still a need to study and draw comparisons among people who are completely uninsured.

Although healthy eating is known to have an impact on the management of diabetes, the present study did not investigate this variable because the NHIS does not include an adequate number of questions that pertain to diet. Overall, the current literature demonstrates a meaningful relationship between medication therapy and PA on diabetes control. The present study addresses a gap in the literature by using a larger sample size from a national survey to generate more generalizable results that pertains to Black adults.

CHAPTER 4: METHODS

4.1 Research Questions

The overarching research question for the present study was: What is the relationship between insurance coverage and type of diabetes control (i.e., medication adherence versus physical activity participation) among Black adults based on socioeconomic factors? Questions from the NHIS were used to select appropriate variables for this study. The survey questions that were selected included information about the participants' income, education level, insurance status, diabetes diagnosis, medication therapy and physical activity levels. The data collected from the NHIS were used to address the following questions:

1.1. Is there an association between insurance status and overall type of diabetes management (medication adherence and physical activity levels) in Black adults?

1.2. Is there a relationship between socioeconomic factors (income, education and occupational status) and type of diabetes management in Black adults?

4.2 Hypothesis

It was hypothesized that Black adults who were uninsured, lower income, and less-educated would report lower adherence to medication and lower physical activity participation, compared to their insured, higher income, and higher-educated counterparts.

4.3 Participants

The NHIS collects information from U.S. citizens on a range of topics pertaining to health. These topics include disease prevalence, health care use, medication use, and physical activity, among other things. The surveys have been distributed yearly since 1957 and have been used by the CDC to gather information about the trends of diabetes (Centers for Disease Control and Prevention, 2017). These data trends can then be used to create future objectives and to monitor the effectiveness of interventions that were previously implemented. The NHIS is particularly relevant to this study because data regarding socioeconomic factors and diabetes management, determined by medication adherence and physical activity, were collected to accomplish the aims of this study.

The annual NHIS sample size (completed interviews) is approximately 35,000 households containing about 87,500 persons (Centers for Disease Control and Prevention, 2017). Although the NHIS has collected data since 1957, this study specifically investigated the Sample Adult Questionnaires from the years 2010 to 2016. Data collected from these years are the most recently available after the enactment of the ACA in 2010. Since there is evidence of individuals' behaviors pre-ACA, the present study has the potential to highlight changes in diabetes management related to improvements in people's health insurance status after its enactment.

The inclusion criteria for this study were as follows:

- Self-reports as Black/African-American;

- 18 years of age or older; and
- Has had diabetes for at least 12 months.

Participants were excluded if they chose additional racial or ethnic groups in response to the item asking, “What race or races do you consider yourself to be?”. Those who responded with only “Black/African American” were included in the study sample. Age was determined by the question “How old are you?”. Participants who responded with being at least 18 years of age were included in the study. Diabetes diagnosis was determined by the following NHIS question: How long have you had diabetes? Participants who responded with having diabetes during the past 12 months or longer were included in this study.

This study also investigated a subsample of individuals who reported having either public insurance, private insurance, or none. Data regarding use of diabetes medication, and type and frequency of exercise were also analyzed. The method of analysis of data from the NHIS will be described in the following section.

4.4 Procedures

This study analyzed data from the Sample Adult NHIS Questionnaires between 2010 and 2016 for participants who met the inclusion criteria described above. Diabetes medication usage (whether the participant was taking medication), physical activity level (intensity of the physical activity that the participant engaged in, if any, and the frequency) and socioeconomic factors (insurance status, education, employment and income) were also analyzed.

This study employed the most recent version of Statistical Package for Social Sciences (SPSS) software for data analysis. Descriptive statistics were reported for all demographic variables. The association between diabetes management and socioeconomic factors were analyzed using chi-square analysis.

4.5 Institutional Review Board

Due to the use of unidentifiable, secondary data from a publicly available data set which anyone can utilize, Institutional Review Board approval was not necessary for this analysis.

CHAPTER 5: RESULTS

The sample size of Black adults who reported having diabetes for at least 12 months was N=803. Select demographics for the sample are noted below in Table 1. Chi-square tests demonstrate that among both the uninsured (n=57) and insured (n=688) individuals in the sample, there was no statistically significant association between current diabetes medication use and education, income, or employment status (see Table 2).

Table 5-1 *Demographics characteristics of sample, N=803*

Variable	n	%
Age <i>M</i> = 62.49, <i>SD</i> = 12.412		
18- 44	56	7
45- 54	143	17.8
55- 64	262	32.6
65- 74	192	23.9
75+	150	18.7
Total	803	100
Sex		
Male	272	33.9
Female	531	66.1
Total	803	100
Education		
HS and lower	479	59.7
Some college, college degree	237	29.5
Graduate degree (Master's/PhD)	26	3.2
Missing	61	7.8
Total	803	100
Income		
\$0-49,999	597	74.3
\$50K +	109	13.6
Missing	97	12.1

Variable	n	%
Total	803	100
Employment Status		
Working or self- employed	113	14.1
Unemployed	689	85.8
Missing	1	0.1
Total	802	99.9
Now taking diabetic pills		
Yes	554	69
No	248	30.9
Don't know	1	0.1
Total	803	100
Couldn't afford prescription medicine, past 12 m		
Yes	196	24.4
No	598	74.5
Refused	1	0.1
Missing	6	0.7
IDK	2	0.2
Total	803	100
Insurance Status		
Uninsured	57	7.1
Insured	688	85.7
IDK	5	0.6
Missing	53	6.6
Total	803	100
Marital Status		
Married	193	24
Widowed	156	19.4
Divorced	156	19.4
Separated	60	7.5
Never married	165	20.5
Living with partner	18	2.2
Unknown status	2	0.2
Missing	53	6.6
Total	803	100
Meets moderate PA recommendations		
No	162	20.2
Yes	72	9
Missing	569	70.9

Table 5-2 Summary of cross-tabulation results

	Uninsured (n=57)			Insured (n=688)		
	Taking meds	Not taking meds	Total	Taking meds	Not taking meds	Total
Education						
No HS and lower	22 (38.6%)	13 (22.8%)	35 (61.4%)	305 (44.3%)	137 (19.9%)	442 (64.2%)
College/grad	11 (19.3%)	8 (14.1%)	19 (33.3%)	146 (21.2%)	69 (10.0%)	215 (31.3%)
Grad school	2 (3.5%)	0	2 (3.5%)	21 (3.1%)	3 (0.44%)	24 (3.49%)
Missing	1 (1.8%)	0	1 (1.8%)	4 (0.58%)	3 (0.44%)	7 (1.02%)
Total	36 (63.2%)	21 (39.6%)	57 (100%)	476 (69.2%)	212 (30.8%)	688 (100%)
Income*						
0-49,999	31 (58.5%)	20 (37.7%)	51 (96.2%)	351 (58.8%)	145 (24.3%)	496 (83.1%)
50K+	1 (1.9%)	1 (1.9%)	2 (3.8%)	67 (11.2%)	34 (5.7%)	101 (16.9%)
Total	32 (60.4%)	21 (39.6%)	53 (100%)	418 (70.0%)	179 (33%)	597 (100%)
Employment Status						
Working or self-employed	10 (17.5%)	5 (8.8%)	15 (26.3%)	72 (10.5%)	19 (2.8%)	91 (13.2%)
Unemployed	26 (45.6%)	16 (28.1%)	42 (73.7%)	403 (58.7%)	193 (28.1%)	596 (86.8%)
Total	36 (63.2%)	21 (39.6%)	57 (100%)	475 (69.1%)	212 (30.9%)	687 (100%)
*Note. Total rows do not all add to (n=57, uninsured; and n=688, insured) due to missing observations. Total n for uninsured and insured does not equal 803 due to missing observations.						

Several chi-square tests of independence were performed to determine the relationship between employment status, household income, highest education and taking diabetes medication among insured and uninsured individuals.

5.1 Education

A chi-square test of independence was performed to examine the relationship between highest education and taking diabetes medication. Among uninsured individuals in the sample, the relationship between highest education level and taking diabetes medication was not statistically significant, $X^2(3, N = 57) = 1.978, p > .05$. This relationship was also of no significance among insured individuals, $X^1(8, N = 620) = 5.053, p > .05$.

5.2 Household income

A chi-square test of independence was performed to examine the relationship between household income and taking diabetes medication. Among uninsured individuals in the sample, there was no statistically significant relationship between employment status and taking diabetes medication, $X^3(1, N = 53) = .094, p > .05$. There was also no significance in this relationship among insured individuals, $X^3(2, N = 597) = 1.042, p > .05$.

5.3 Employment

A chi-square test of independence was performed to examine the relationship between employment status and taking diabetes medication. Among uninsured individuals in the sample, there was no statistically significant relationship between employment status and taking diabetes medication, $X^2(1, N = 57) = .108, p > .05$. This relationship was also of no significance among insured individuals, $X^2(2, N = 687) = 4.967, p > .05$.

CHAPTER 6: DISCUSSION

Despite no statistical significance between the variables of interest, several differences are worth noting. Research demonstrates that people with lower SES, such as income and educational level, have more barriers to managing their diabetes (Golden, et al., 2012). This is noteworthy considering that the majority of the sample (74.3%) had household incomes at less than \$49,000 and had only a high school education or lower (59.7%). Interestingly, these factors had no effect on the study participants' use of diabetes medications (whether or not they were taking medications). Furthermore, although most of the participants were unemployed (85.8%), most of them still had insurance (85.7%). This may be due to the older age of the sample ($M = 62.49$, $SD = 12.412$) since individuals over the age of 65 often qualify for Medicare. In fact, 43% of the population reported having Medicare coverage, which most likely covered their prescription costs. In fact, 74.5% of the participants reported that they could still afford prescription medicine during the past 12 months, despite the low income of this sample. Since all of the study participants had diabetes for at least one year, they may have been well informed about the importance of taking prescription medications to manage their diabetes. This could also explain why they were still taking their medications regardless of insurance status, employment status, education level, and income.

Comparatively speaking, the sample population was relatively similar to the larger population of Black Americans. According to national statistics, approximately 34.2% of Black adults nationwide and 32.7% percent of this sample had some education beyond high school. In addition, the household income of Blacks nationally was \$36,898 and the majority of this sample (65.3%) had incomes between \$0-34,999. National statistics also demonstrate that 44.1% of

Blacks had some form of public health insurance such as Medicare and Medicaid. As aforementioned, 43% of this study sample had Medicare coverage. 11.1% of Blacks nationally remain uninsured while 7.1% of the sample also reported having no insurance coverage. Interestingly, the unemployment rate in this sample (85.8%) was significantly higher than the national unemployment rate among Blacks (8.4%). Again this could attributed to the older age of the sample. Since most of the participants were at retirement age (age 65 and older), they would be more likely to be unemployed and low income at the time of NHIS interview.

PA was originally a variable of interest because adequate PA is needed to properly manage diabetes. Moderate and vigorous PA requirements are defined as 150 or 300 minutes of moderate exercise per week, respectively. Unfortunately, only about one-third of the sample responded to the item analyzed for PA, and further, only 9% reported meeting the moderate or vigorous PA recommendations. Thus, chi-square outcomes for this variable were invalid and are not reported here.

6.1 Research Implications

Future studies should use matched data from secondary sources that explore diabetes and diabetes-related behaviors to analyze change over time. This could highlight the effects of changes in policy and economic conditions that impact SES and insurance status. Future research should also target younger adults with diabetes to determine which variables affect their diabetes management. Researchers could also explore this population's compliance with diabetes medications. This study only determined whether the participants were taking medication but

was not able to determine if their medication use followed the regimen prescribed by their healthcare provider.

The study participants had low education levels overall, yet this did not affect their medication use. Future studies should focus on health literacy levels in this population as education level and health literacy are not synonymous terms. Perhaps this population had a low education level but high health literacy. More sophisticated analyses could also be employed as this was beyond the range of capabilities and time constraints of this investigator.

6.2 Clinical Implications

Considering the low PA participation of this sample, clinicians have the opportunity to promote behavior modification plans for Black adults with diabetes. Past research demonstrates that interventions focused on promoting healthy diets and exercise in Black adults have proven effective for reducing the risk of chronic disease (Lemacks, Wells, Ilich, & Ralston, 2013). Black women report less PA participation than men and most of the participants in these health interventions were women. Therefore, more interventions need to be targeted for Black males (Whitt-Glover, et al., 2014). Additional research is needed to identify barriers among this population to develop culturally appropriate PA programming.

Clinicians should also consider the education levels of Black adults with diabetes when creating diabetes education and health promotion materials. Education level has the potential to affect a person's health literacy. This ultimately affects a person's health outcomes by impacting

their ability to understand their health care needs and take medications properly, both of which are needed to properly manage diabetes (Zimmerman, Woolf, & Haley, 2015).

6.3 Strengths and Weaknesses

A strength of this study is that it is the first of its kind to use the NHIS database to explore this association. This study highlights topics that are predominant in health literature related to Black adults. This research is also timely considering recent healthcare legislation and its effects on people's insurance status. The enactment of the ACA in 2010 led to an increase in the number of people with health insurance coverage. These changes in insurance status are important because they have the potential to impact patients' access to healthcare.

A weakness of this study is that it is not generalizable to the U.S. population because it only considered Black adults who participated in the NHIS from 2010-2016. Therefore, the results were not matched data and included responses from individuals within that time frame. This study did not explore individual variability by year and could only provide a snapshot of the data. This research study was also limited because most of the sample was over the age of 60 (42.6%). This can be attributed to the nature of the condition being examined, diabetes, which is predominately found in older adults. These factors made it difficult to create generalizable results that could be applied to all Black adults with diabetes.

CHAPTER 7: CONCLUSION

This study demonstrated the difficulty of determining the underlying variables that affect diabetes management. Since older adults are more likely to have diabetes and have Medicare coverage, they may still be willing to take their diabetes medications regardless of their employment status, income and education level. This refutes the author's original hypothesis that those who were uninsured, lower income, and less-educated would report lower adherence to medication and lower physical activity participation, compared to their insured, higher income, and higher-educated counterparts. This could also highlight the quality of diabetes education that the participants had received. The study participants were likely made aware of the importance of taking diabetes medication to manage their condition. However, there does appear to be a lack of education regarding the importance of adequate PA to manage diabetes. Perhaps barriers to PA exist in this population, such as lack of access to safe places to exercise. This highlights the importance of future health interventions to promote exercise in this population. This includes efforts to promote exercise without the use of a gym or other recreational facilities.

Overall, Black adults are disproportionately affected by chronic disease and this study demonstrates the need to develop health interventions for vulnerable populations. Clinicians and researchers need to focus more on programs that educate patients on how to properly manage diabetes, and only then can disparities in healthcare be eliminated.

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