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Investigating Denominational and Church Attendance Differences in Obesity and Diabetes in Black Christian Men and Women

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Abstract

Prior investigations of the relationships between religious denomination and diabetes and obesity do not consider the nuance within black faith traditions. This study used data from the National Survey of American Life ($n = 4344$) to identify denominational and religious attendance differences in obesity and diabetes among black Christian men and women. Key findings indicated that black Catholics and Presbyterians had lower odds of diabetes than Baptists. Black men that attended church almost daily were nearly twice as likely to be obese than those that never attend services. These results indicate that denomination and gender should inform faith-based and placed health promotion approaches.

Keywords Denomination · Obesity · Diabetes · African Americans · Religion

Introduction

Obesity affects nearly one-third of men and women in the USA (Flegal et al. 2016). Recent examination of obesity prevalence from the National Health and Nutrition Examination Survey (NHANES) indicates that African Americans (blacks) are disproportionately affected—almost half are obese (48.4%) (Flegal et al. 2016).

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Furthermore, compared to other racial and ethnic groups, blacks have the highest prevalence of class 3 (severe) obesity indicated by a body mass index (BMI) ≥ 40 (Flegal et al. 2016).

Obesity increases the risk of developing chronic diseases like cardiovascular disease and diabetes (American Diabetes Association 2007; Knowler et al. 2003). It is the primary reason for the above average diabetes risk in blacks, and is attributed to almost 50% of that increased risk (Brancati et al. 2000; Chatterjee et al. 2013; Hu et al. 2001). Diabetes is most prevalent among blacks (Centers for Disease Control and Prevention 2017a). Nationally diabetes is the seventh leading cause of death (Centers for Disease Control and Prevention 2017a), but among blacks alone, it is the fifth (Heron 2018). The current study investigates obesity and diabetes and the relationship with religious denomination among black adults in the USA.

Religion, Obesity and Diabetes

Religion and its practice can shape the overarching moral and more minute choices in daily life. Though spiritual and moral righteousness may be a central facet of religion, physical health is also influenced. Obesity and diabetes represent major health outcomes where religion plays a role. Religious engagement has a varied relationship with BMI in the literature. Religious participation, which includes attendance among other variables, has been associated with greater BMI among a sample of men and women combined (Bruce et al. 2007). However, when examined by race and gender group, black women emerged as the sole race-gender group where the religious participation–BMI association was significant (Bruce et al. 2007). Thus, gender and race may be important factors when discussing the impact of religion on weight. The distribution of body weight also becomes important in this discussion as abdominally centralized body fat increases the risk of cardiovascular disease (Czernichow et al. 2011; Dalton et al. 2003; Zhu et al. 2005), but studies of domestic and international samples indicate no relationship between waist circumference nor waist-to-hip ratio and religious service attendance (Das and Nairn 2016; Hill et al. 2017).

Prior investigations have also shown religious denomination to be related to weight (Cline and Ferraro 2006; Ferraro 1998; Kim et al. 2003; Yeary et al. 2017). In the USA, states with a greater proportion of individuals who claimed a denomination had higher rate of obesity, and this was especially true for those who affiliated with the Baptist faith tradition (Ferraro 1998). Denominational differences in obesity rates have appeared throughout the literature (Kim et al. 2003; Yeary et al. 2017). Conservative Protestants had a BMI 1.1 times higher than individuals who did not claim a denomination when only religious denomination was considered (Kim et al. 2003). Although this relationship did not hold when other health behaviors and religious practice variables were included in the model (Kim et al. 2003), denomination may play a role in weight status. Using national data, Cline and Ferraro (2006) investigated the relationship between religion and the prevalence of obesity. Across multiple Christian and non-Christian denominations, authors found the prevalence of obesity to be highest among Baptists (Cline and Ferraro 2006).

Further, they observed that blacks were more likely to be obese and more likely to be affiliated with the Baptist denomination than whites (Cline and Ferraro 2006).

While Cline et al. indicated that being Baptist was related to greater obesity prevalence, and that race is an important factor in that finding, their study does not establish how obesity rates differ across denominations for blacks specifically. A recent systematic review of the literature concerning religion and weight found that Seventh-Day Adventists (Adventists), compared to non-Adventists, had the lowest body weight (Yeary et al. 2017). Studies of health outcomes among Adventists, a Protestant denomination whose doctrine mandates abstinence from alcohol, tobacco and pork consumption and prescribes a vegetarian diet, reveal links between religion and health.

A longitudinal study of members of the Seventh-Day Adventist Church examined the relationship between the varied adherence to a vegetarian diet and the development of chronic diseases (Fraser 1999). At baseline, obesity was higher among Adventists who ate meat (semi-vegetarian or non-vegetarian dietary pattern) (Fraser 1999). The Adventist Health Study-2, which included a sample of black Adventists sufficient to draw statistical conclusions, found obesity to be more prevalent among blacks compared to whites (Montgomery et al. 2007). This may be due to blacks entry into the Adventist faith later in life than whites, leading to later adoption of the dietary pre- and proscriptions and later intergenerational uptake of Adventist practices (Montgomery et al. 2007).

Similar to obesity, diabetes also appears to bear a relationship to religious affiliation. A longitudinal study of California Adventists found diabetes prevalence was almost two times greater in non-vegetarians versus vegetarians (Fraser 1999). The Adventist Health Study-2 also found diabetes to be more prevalent among blacks relative to whites, again attributing this finding to late uptake of the Adventist faith, similar to obesity outcomes (Montgomery et al. 2007). However, black Adventist outcomes were better than black non-Adventists (Montgomery et al. 2007). When considering religious participation, including attendance, studies that used the diabetes biomarker hemoglobin A1c (HbA1c) as an outcome found no relationship to participation (Hill et al. 2017; Hill et al. 2014), a finding seen in other literature (Das and Nairn 2016). Much of the work in this area included multiracial and ethnic samples predominantly composed of non-Hispanic whites, thus providing little insight on the role of religion on obesity and diabetes in black Christians.

Religion and Health in Blacks

Blacks are the most highly religious group in the USA, being more likely to believe in God, consider religion important, attend church almost weekly and engage in prayer and scripture reading than other racial and ethnic groups (Pew Research Center 2014). In black American life, the black church serves many functions, representing a central institution, regarded as "having no challenges in the cultural womb of the Black community" (Lincoln et al. 1990). The black church provides a site for the practice and determination of worship, faith and morality, but it also engages in the provision of community and social needs, including various social services,

education, as well as acting as a political and financial center (Billingsley and Cleopatra 1991). Matters of health also fall under the purview of the black church; the black church has engaged in the delivery of community medicine and primary care and has participated in health promotion and disease prevention efforts (Levin 1984; Lincoln et al. 1990).

Researchers have long understood the centrality of religion and spirituality in black life and have sought to reach the black community through the church for the purpose of health promotion (Campbell et al. 2007). The black church has been the location of several health behavior interventions targeting fruit and vegetable intake, reduced diabetes risk through obesity treatment and increased physical activity (Dodani et al. 2009; McNabb et al. 1997; Resnicow et al. 2004).

While these studies utilized a community-based approach to partner with churches to improve health, they did not distinguish between denominations in their design, nor account for denominational specificity in their findings (Dodani et al. 2009; McNabb et al. 1997; Resnicow et al. 2004). Religious dietary pre- and pro-scriptions are acknowledged (Campbell et al. 2007), but denomination is not factored into health promotion approaches. While religious denomination might influence the occurrence of obesity and diabetes, it remains an understudied factor in black health.

The Current Study

Considering the role of religion in health and black life, and the consistent involvement of the black church in health promotion, we sought to fill the evidence gap concerning health differences by denomination. Data from the National Survey of American Life (NSAL) (Jackson et al. 2004) present an opportunity to examine denominational differences in disease outcomes among black Christians. The NSAL includes a nationally representative sample of blacks in the USA, which facilitates a nuanced examination of black health. Using data from the NSAL, we examine denominational and religious service attendance differences in obesity and diabetes among blacks, while also considering the influence of sociodemographic factors.

Methods

Data

The National Survey of American Life (NSAL) is a cross-sectional study purposed to understand intra- and inter-group racial and ethnic differences in a wide spectrum of health outcomes. Data on health, religion and social conditions were collected in the NSAL, which was administered by the Program for Research on Black Americans by the Institute for Social Research at the University of Michigan from 2001 to 2003. This data set is appropriate for our investigation because the NSAL includes a nationally representative sample of blacks, which enables

examination of the role of religion in the lives and health of this subpopulation—important given their high religiosity.

In sum, the NSAL data include 3570 African Americans, 1438 Afro-Caribbeans, 891 non-Hispanic Whites (Jackson et al. 2004). Most data were collected through in-home interviews by trained study personnel, with about 14% conducted either entirely or partially by telephone (Jackson et al. 2004). Given the focus of the present study, to investigate religion and health among blacks in the USA, we included only non-Hispanic African Americans and Afro-Caribbeans from the NSAL sample. See Table 1 for detailed demographic information on the participants.

Measures

Religious Denomination

Denomination was identified via self-report. Participants were asked, "What is your current religion?" Investigators who originally administered the NSAL recoded participant responses in fourteen categories, out of which we included only Christians and recoded into six categories: Baptist, Methodist, Pentecostal, Presbyterian, Protestant (other) and Catholic. The Lutheran category was not included in analyses due to the small sample size. Originally, NSAL investigators captured three categories of Catholic traditions (Roman Catholic, Catholic (other) and Catholic (no denomination mentioned)). Due to the small sample size of Catholic (other) and the common thread of Catholicism between the three original categories, they were collapsed into one Catholic category. Non-Christian denominations were not distinctly categorized in the original fourteen categories in the NSAL and may have been grouped in the "Other" response option. We excluded respondents who selected no religion, agnostic/atheist or no religious preference. These categories did not allow us to distinguish between respondents who were non-denominational or non-organizational and thus did not align with our central aim to identify differences between denominations.

Religious Service Attendance

The frequency of religious service attendance indicated varying degrees of religious participation among study participants. Response options for the frequency of religious service attendance originally administered the NSAL were: (1) nearly everyday (≥ 4 days/week), (2) at least once a week (1–3 times/week), (3) a few times a month (1–3 times/month), (4) a few times a year and (5) less than once a year. We included individuals who never attend service and combined them with the original category of "less than once a year." Thus, the frequency of religious service covariate had four categories for analysis: (1) never attend—less than once a year, (2) a few times a year, (3) at least once a week (1–3 times/week)—a few times a month (1–3 times/month) and (4) nearly everyday (≥ 4 days/week).

Table 1 Sociodemographic characteristics of the sample

Variable	Total n=4344	Women n=2852	Men n=1492
	n (%)	n (%)	n (%)
Denomination			
Baptist	2119 (48.8)	1424 (49.9)	695 (46.6)
Methodist	276 (6.4)	176 (6.2)	100 (6.7)
Pentecostal	282 (6.5)	215 (7.5)	67 (4.5)
Presbyterian	41 (0.9)	31 (1.1)	10 (0.7)
Protestant (other)	1121 (25.8)	688 (24.1)	433 (29.0)
Catholic	505 (11.6)	318 (11.2)	187 (12.5)
Religious service attendance			
Never or < once/year	569 (13.1)	195 (6.8)	71 (4.8)
A few times/year	821 (18.9)	1183 (41.5)	443 (29.7)
A few times/month	1062 (24.5)	705 (24.7)	357 (23.9)
At least once/week	1626 (37.4)	461 (16.2)	360 (24.1)
Nearly everyday	266 (6.1)	308 (10.8)	261 (17.5)
Age (mean, SD)	43.5 (16.2)	43.4 (16.2)	43.6 (16.2)
Household income (mean, SD)	34,258.10 (29,957.2)	30,955.37 (27,624.16)	40,571.33 (33,078.14)
Education (years)			
0–11	1026 (23.6)	674 (23.6)	352 (23.6)
12	1548 (35.6)	1000 (35.1)	548 (36.7)
13–15	1054 (24.3)	697 (24.4)	357 (23.9)
16 or greater	716 (16.5)	481 (16.9)	235 (15.8)
Employment status			
Employed	2923 (67.4)	1857 (65.1)	1066 (71.5)
Unemployed	415 (9.6)	300 (10.5)	115 (7.7)
Not in labor force	997 (23.0)	691 (24.2)	306 (20.5)
Ethnicity			
African American	3134 (72.2)	2077 (72.8)	1057 (70.8)
Afro-Caribbean	1210 (27.9)	775 (27.2)	435 (29.2)
Geographic region			
Northeast	1157 (26.63)	773 (27.1)	384 (25.7)
Midwest	513 (11.81)	344 (12.1)	169 (11.3)
South	2462 (56.68)	1603 (56.2)	859 (57.6)
West	212 (4.88)	132 (4.6)	80 (5.4)
Obesity (BMI ≥ 30)	1395 (34.2)	1030 (36.1)	365 (24.5)
Diabetes	483 (11.5)	340 (11.9)	1,43 (9.6)

SD standard deviation

Obesity

Obesity was one outcome of interest for this study. It was determined by BMI, which was calculated by dividing self-reported weight and height. A participant

with a BMI ≥ 30 kg/m^2 was considered obese in accordance with categories defined by the Centers for Disease Control and Prevention (Centers for Disease Control and Prevention 2016). In the current study, the obesity variable was dichotomized, and respondents were categorized as either obese (BMI ≥ 30 kg/m^2) or non-obese (BMI < 30 kg/m^2).

Diabetes

Diabetes, also an outcome variable, was determined by self-report. Participants responded "yes" or "no" when asked if a health care professional ever said they had diabetes.

Covariates

Demographic covariates included race/ancestry (Afro-Caribbean or African American), the US born (yes/no), gender (male or female) and age (years). Socioeconomic covariates included household income (thousands), employment status (employed, unemployed or not in labor force) and education level (high school diploma or equivalent, less than high school diploma, some college or college degree). The four geographical regions of the USA included the northeast, midwest, south and west.

Statistical Analyses

Logistic regressions were used to evaluate obesity and diabetes separately. Denomination was the independent variable. Race/ethnicity, demographic, socioeconomic and religious service attendance variables were used as the covariates in each model for obesity and diabetes. Whether born in the USA or not was a covariate only in the obesity model. For the diabetes outcome, geographic region was not included. In a final model, we tested the interaction between gender and religious service attendance to determine whether the association between attendance and obesity varied by gender in the diabetes and obesity models.

The statistical analyses were conducted using Stata 15.1. Due to the multistage area probability sample designs for household surveys, probability weights were used in the regression analyses. Additionally, standard error estimates corrected for the sample's complex design (i.e., clustering and stratification). The syntax used in Stata was: svyset SECLUSTR [pweight = NSALWTPN], strata(SESTRAT).

Results

Table 2 displays our obesity results, where no denominational differences were observed when compared to Baptists. The Baptist denomination was the largest in our sample (48.8%) and so was used as the denominational reference group in the logistic regressions. Detailed demographic characteristics of the sample are shown in Table 1. No denominational differences in obesity were observed, but an

Table 2 Relationship between denomination and obesity by gender

	Male		Female	
	Odds ratio	95% CI	Odds ratio	95% CI
Denomination[a]				
Methodist	0.59	0.25–1.38	0.78	0.51–1.21
Pentecostal	1.07	0.46–2.49	1.39	0.92–2.09
Presbyterian	0.19	0.03–1.38	1.48	0.77–2.84
Protestant (other)	0.99	0.62–1.57	0.96	0.72–1.28
Catholic	1.11	0.75–1.65	0.95	0.61–1.48
Religious service attendance[b]				
A few times/year	1.31	0.79–2.19	0.76	0.47–1.23
A few times/month	0.86	0.58–1.27	0.86	0.53–1.39
A few times/week	1.14	0.71–1.85	0.91	0.57–1.44
Nearly everyday	2.99***	1.63–5.48	1.23	0.73–2.07
Age	1.01	0.99–1.02	1.00	0.99–1.01
Household income	1.00	1.00–1.00	1.00	1.00–1.00
Education[c]				
0–11 years	1.22	0.83–1.79	1.15	0.89–1.48
13–15 years	1.29	0.87–1.92	0.76*	0.57–1.00
16 or more years	1.43	0.82–2.48	0.57**	0.38–0.85
Employment status[d]				
Unemployed	0.72	0.34–1.53	0.86	0.61–1.24
Not in labor force	0.66	0.40–1.09	0.92	0.71–1.19
Ethnicity[e]				
Afro-Caribbean	0.66	0.34–1.27	1.50	0.98–2.28
Country of birth[f]				
The US born	2.66*	1.03–6.87	3.99***	2.28–6.97
The US geographic region[g]				
Midwest	0.62	0.33–1.16	1.32*	1.04–1.67
South	0.70	0.45–1.08	1.01	0.79–1.31
West	0.39	0.15–1.01	0.62***	0.48–0.80

CI confidence interval

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

[a]Reference category: Baptist, [b]Reference category: never or < 1/year, [c]Reference category: 12 years, [d]Reference category: employed, [e]Reference category: African American, [f]Reference category: Not the US born, [g]Reference category: northeast

interaction between gender and frequency of religious service attendance was seen. To more clearly denote the effect of gender in the obesity model, men and women were analyzed separately. Among black men, those who attended religious service nearly everyday had nearly three times greater odds of obesity compared to black men who never attended (OR 2.99, CI 1.63, 5.48). No differences in the odds of obesity by religious service attendances appeared among black women.

We did observe denominational differences with regard to diabetes. The diabetes model (Table 3) showed that Presbyterians had 87% lower odds of having diabetes (OR 0.13, CI 0.03, 0.56) and Catholics had 45% lower odds of having diabetes (OR 0.55, CI 0.35, 0.86) in comparison with Baptists in a model that controlled for the effects of race/ethnicity, gender, age, employment status, years of education and

Table 3 Relationship between denomination and diabetes

| | Model: diabetes | |
	Odds ratio	95% CI
Denomination[a]		
Methodist	0.61	0.34–1.11
Pentecostal	1.16	0.75–1.82
Presbyterian	0.13**	0.03–0.58
Protestant (other)	1.15	0.81–1.64
Catholic	0.55**	0.34–0.90
Religious service attendance[b]		
A few times/year	1.21	0.77–1.89
A few times/month	1.35	0.87–2.08
At least once/week	1.73*	1.11–2.70
Nearly everyday	1.19	0.63–2.25
Age	1.04***	1.03–1.05
Gender[c]		
Male	0.81	0.60–1.09
Household income	1.00	1.00–1.00
Education[d]		
0–11 years	1.62**	1.16–2.25
13–15 years	0.90	0.59–1.36
16 or more years	0.91	0.60–1.37
Employment status[e]		
Unemployed	0.99	0.56–1.76
Not in labor force	1.39	0.95–2.04
Ethnicity[f]		
Afro-Caribbean	1.42	0.89–2.27
Country of birth[g]		
The US born	1.75	0.77–3.96
The US geographic region[h]		
Midwest	1.19	0.74–1.93
South	0.84	0.56–1.25
West	1.22	0.77–1.94

CI confidence interval

$*p<0.05; **p<0.01; ***p<0.001$

[a]Reference category: Baptist, [b]Reference category: never or < 1/year, [c]Reference category: female, [d]Reference category: 12 years, [e]Reference category: employed, [f]Reference category: African American, [g]Not the US born, [h]Northeast

frequency of religious service attendance. We also investigated whether an interaction was present between gender and religious service attendance, but none was observed.

Discussion

Identifying denominational differences in the cardiovascular disease risk factors of obesity and diabetes in black adults is an important addition to the literature. Presently, the evidence to inform our understanding of these risk factors includes samples predominantly composed of whites, limiting our knowledge in other racial and ethnic groups, namely blacks. However, to improve health promotion and disease prevention approaches and derive a deeper understanding of the connection between religion and black health, variation among black church denominations must be examined.

In this study, we investigated whether the likelihood of obesity and diabetes differed by denomination in a national sample of blacks. Our analysis of NSAL data found no denominational differences in obesity, but did observe an interaction between gender and the frequency of religious service attendance that greatly increased the likelihood of obesity in men, but not women. Thus, church engagement is an important factor in obesity for black men. Concerning diabetes, lower odds emerged among Presbyterians and Catholics compared to Baptists. No interaction between gender and religious service attendance was observed for this outcome. This finding indicates that the odds of diabetes do vary between denominations within the black church and communicate the importance of considering denomination in health promotion and prevention efforts that target Blacks.

While we observed no denominational differences in obesity, we found an interaction between male gender and frequent service attendance where black men presented with high odds of obesity. In contrast to our results, previous investigations found no relationship between attendance and obesity among men (Cline and Ferraro 2006; Godbolt et al. 2018). When Cline and Ferraro evaluated the role of gender among Baptists, the subset of their sample with the highest obesity prevalence, no attendance–obesity relationship was observed in men (Cline and Ferraro 2006). Similar findings were observed in a more recent study that compared church attendance and BMI in blacks and whites, where no relationship was observed among men regardless of race (Godbolt et al. 2018).

The present study's findings among black men may reflect social networks differences between men who are and are not highly engaged in church, which can impact obesity development. Social networks reflect a "web" of relationships among individuals (Glanz et al. 2015). A longitudinal study of the spread of obesity by Christakis and Fowlers demonstrated that over 32 years that obesity can be transferred among individuals (Christakis and Fowler 2007). Developing obesity was seen among siblings and spouses if one person became obese. Among friends, if one became obese, the other had a 57% increased chance of also becoming obese. Male same-gender friendships showed an increased chance of becoming obese when one friend enters that weight group, but same-gender obesity spread was not significant

for women. The influence of same-gender connections also seemed important for siblings (Christakis and Fowler 2007). Black men attending church nearly daily, and interacting with other black men, may facilitate the transfer of obesity through the norm-setting and other functions of social networks (Glanz et al. 2015) present in the church.

Although social network spread of obesity may be relevant for black men in our study, other factors may explain the absence of an obesity–attendance relationship among black women. Similar to our results, Cline and Ferraro found no attendance–obesity relationship among black women, but did find an inverse relationship between church attendance and obesity for white women (Cline and Ferraro 2006). Contrasting our findings and the previous work, no attendance–BMI relationship was seen in white women, but a positive direct relationship was seen in black women (Godbolt et al. 2018). This indicated a detrimental effect of more frequent church attendance (Godbolt et al. 2018). Given the mixed evidence base, further study into the gendered aspects of church attendance and its impact on obesity is warranted to deepen our understanding of the relationship across genders.

The absence of an attendance–obesity relationship among black women in our study may relate to the lack of a significant effect of same-sex social network influence on the spread of obesity among women that was seen in men, specifically among friends (Christakis and Fowler 2007). Perhaps the same-gender networks or the mechanism of obesity's spread operates differently by gender. Study of the religious social network and obesity may inform the gender differences. Further, national obesity rates in black women (57.2%) supersede that of all other race and gender groups (Flegal et al. 2016). Whether black women are or are not engaged in the church daily, the majority live with obesity. Our results may reflect the current state of obesity for black women in the USA, considering that the majority of black women not black men, attend religious services weekly (Cox 2018). Importantly, black men are still regarded as a highly religious group (Cox 2018). In the present study, black men who were engaged in the church nearly daily may represent a unique subset of church attendees. Gender requires further examination to expand upon our findings by understanding church social networks, their contexts and weight-related behaviors.

Gendered roles within the church social context may influence obesity in black men and women. Leadership in the black church has historically been male (Barnes 2006; Lincoln et al. 1990). Distinct church roles may also encompass distinct, taxing responsibilities for black men and women within and outside of the church. Perhaps a factor in our findings is the superwoman role, a liability and asset-laden phenomenon describing black women's stress-coping response and its connection to adverse health outcomes like obesity (Woods-Giscombé 2010). In the superwoman role, the challenge of being both black and a woman can lead to overwhelm, stress-related behaviors and deprioritization of self-care. Religion and spirituality are inherent in the superwoman role as black women draw strength and resilience from religion and spirituality—a central facet of their lives (Woods-Giscombé 2010). In our sample, the black men who have obesity and frequently engaged in the church may embody a "superman role," experiencing overwhelm from church and other social contexts that undermine self-care, promote obesity and other adverse health outcomes.

Despite similar outcomes, the characteristics and mechanisms of these roles may differ by gender. Investigating the role of gendered church context on dietary pattern, eating and physical activity behaviors and sedentary time may inform our understanding of obesity and diabetes in black adults. Exploration of self-efficacy, social support, motivation and other psychosocial variables related to these behaviors may provide depth to our comprehension of these health outcomes.

We observed a lower likelihood of diabetes among Presbyterians and Catholics in comparison with Baptists in all models. Prior evidence comparing the presence of diabetes across Christian denominations' is sparse, thus limiting our ability to make comparisons with existing findings. However, the identification of only Presbyterians and Catholics was unexpected, given that obesity is a primary risk factor for diabetes (Centers for Disease Control and Prevention 2017b), and we found no denominational differences in the likelihood of obesity. While high odds of obesity were seen among black men with frequent attendance, regardless of denomination, no sex–attendance relationship was observed for the diabetes outcome. Lack of an attendance–diabetes relationship has been reported in the extant literature even when independently assessed HbA1c is used as an outcome, instead of self-reported diabetes (Das and Nairn 2016; Hill et al. 2014, 2017). Prospective study designs and HbA1c measurement may advance our understanding of diabetes and attendance among black Christians in future research.

In addition to attendance, age may partially explain the reduced odds of diabetes in Presbyterians and Catholics. Older age is a risk factor for diabetes, specifically being 45 years old and above, according to the Centers for Disease Control and Prevention (Centers for Disease Control and Prevention 2017b). Perhaps the mean age of 43.5 ± 16.2 years old in our sample contributed to our observations of lower diabetes risk. Other risk factors for diabetes, including the presence of prediabetes, having a parent or sibling with diabetes, a history of gestational diabetes, and being active less than three times per week, were not examined in this study. Future investigations may seek to examine the role of these risk factors to understand more completely the denominational differences in diabetes we identified.

Differences in denominational orientations toward health also may inform our diabetes results. Among Presbyterians, Ellison et al. (2009) conducted a survey in a predominantly white sample regarding their beliefs and exercise and found an orientation toward treating the body as a temple. Miller (2017) reached a similar conclusion in their discussion of weight and health promotion programs, and they add that the body is also treated as a vessel through which members serve God. Catholics may also share a similar perspective between their faith and health.

In a qualitative study that included only white faith leaders, almost half of the Catholic participants held a holistic view of health that included spiritual, mental, social and physical wellness (Webb et al. 2013). While the finding reflects the view of Catholic leadership, these beliefs may be communicated to or also represent that of their parishioners. The literature on religion and health has revealed that some denominations have prescriptions that influence health behaviors such as diet, or proscriptions to avoid alcohol, drugs and other "sinful" behaviors (Brathwaite et al. 2003; Faries et al. 2017; Fraser 1999; Holt and McClure 2006; Miller 2017). The beliefs specific to denominations may guide individual health behaviors. More

research is necessary to understand our diabetes findings among Presbyterians and Catholics, and particularly among blacks in these and other denominations.

Strengths and Limitations

Results from this study should be considered in the context of its limitations and strengths. The secondary data used in this investigation included only self-reported measures of height, weight and diabetes status. The type of diabetes, type 1 or 2, could not be determined in this data set. This distinction is important since type 2 diabetes, the type present in 90–95% of cases (Centers for Disease Control and Prevention 2017a), can be managed behaviorally through dietary and physical activity changes. Also, the cross-sectional nature of the NSAL data set means conclusions about the causality between denomination and obesity and diabetes cannot be drawn. Considering the type of data collected, we cannot infer that frequent attendance causes obesity in black men, or if black men with obesity attend daily. We also cannot disentangle causality between diabetes and denomination in our sample. Longitudinal data are necessary to understand the influence of denomination and religious engagement through attendance on health across the life span.

While our aim was to understand disease differences between Christian denominations, identifying any differences among non-Christian denominations or non-religious persons (agnostic/atheist) in the black population would be an important addition to the literature on religion and health. Non-Christian denominations may be examined to fully assess disease risk across the full range of faith groups to which blacks belong. Importantly, variation in the definition and collection of religious denominations often differs across studies, which limits the possibility for effective between-study comparison. We were limited in our own classifications, considering the secondary data set already defined categories of religious denomination. Despite these limitations, our study contributes to the understudied area of race, religion and health. The NSAL data set provided a national sample of blacks in the USA, thus allowing us to draw statistical conclusions. Though the black church is often approached as a monolithic religious entity in health promotion, we provide evidence that sometimes denomination matters in the health of black adults.

Future Directions

Further study is necessary to advance the understanding of denominational differences in obesity and diabetes among blacks in the USA. This area of research is understudied, but requires in-depth investigations to understand the association between religion and health in blacks who experience higher rates of obesity and diabetes. Given the incongruence between our obesity and diabetes findings, subsequent research may need to compare diabetes risk factors, including, but not limited to, obesity, across denominations to understand drivers of the increased risk. Objective, independently assessed outcomes like HbA1c should be included to strengthen study conclusions. Comparison of church health doctrine by denomination may also inform opportunities to address diabetes.

The present study applied a quantitative approach, and considering the novelty of the question at hand, more mixed methods research will be required to add breadth and depth to our knowledge of this topic. Analysis of longitudinal data and conducting prospective studies are stronger, more conclusive study designs that may infer causality. Qualitative studies are equally essential as they can provide context for quantitative findings. A mixed methods approach can serve as a mechanism to comprehend denominational differences in the health behaviors, psychosocial processes and other factors related to our observations.

Conclusions

The difference in the likelihood of diabetes between denominations we observed can guide future health promotion and intervention activities that may target blacks through the black church. A singular faith-based or faith-placed approach applied to blacks across denominations may not be appropriate for research or intervention protocols. Denomination tailored strategies may be more appropriate and should be investigated to determine their effectiveness in reducing diabetes among blacks in the USA.

Compliance with Ethical Standards

Conflict of interest The authors have no conflicts of interest to declare.

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