Published in final edited form as:
J Relig Health. 2012 June ; 51(2): 310–322. doi:10.1007/s10943-010-9346-7.

The Interrelationship Between Hypertension and Blood Pressure, Attendance at Religious Services, and Race/Ethnicity

Caryn N. Bell,
Hopkins Center for Health Disparities Solutions, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205, USA

Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205, USA

Janice V. Bowie, and
Hopkins Center for Health Disparities Solutions, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205, USA

Department of Health, Behavior & Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205, USA

Roland J. Thorpe Jr.
Hopkins Center for Health Disparities Solutions, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205, USA

Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD 21205, USA

Abstract

The relationships between race/ethnicity and hypertension or blood pressure (BP), as well as frequency of religious services attendance and hypertension/BP are well documented. However, the association between these three factors is poorly understood. Using national data, this interrelationship was assessed in non-Hispanic whites and blacks, and Mexican-Americans (n = 12,488). Compared to those who never attended services, whites who attended services weekly had lower odds of hypertension, as did blacks who attended more than weekly. There was no relationship between attendance and hyper-tension among Mexican-Americans. Attendance was inversely related to systolic BP for all groups, but more so for whites and blacks compared to Mexican-Americans. These results further demonstrate the benefits of increased attendance at religious services on hyper-tension/BP, but suggest that these benefits were not as advantageous for all.

Keywords

Race/ethnicity; Religiosity; Hypertension; Blood pressure

Correspondence to: Caryn N. Bell.
cbell@jhsph.edu.

Introduction

Hypertension affects more than 30% of the US population (National Center for Health Statistics 2009) and is a known risk factor for cardiovascular disease, the leading cause of death in the United States (Fields et al. 2004; Staessen et al. 2003). A number of studies have found that many psychosocial factors are associated with lower odds of hypertension and lower blood pressures (Anderson et al. 1989; James 1987; Levenstein et al. 2001; Peters 2004; Raikkonen et al. 2001); included among these is religiosity (Buck et al. 2009; Gillum and Ingram 2006; Graham et al. 1978; Hixson et al. 1998; Koenig et al. 1998, 2001; Larson et al. 1989; Levin et al. 1994; Livingston et al. 1991; Steffen et al. 2001; Walsh 1998). Higher levels of religiousness (Hixson et al. 1998; Larson et al. 1989; Levin et al. 1994; Walsh 1998), spirituality (Buck et al. 2009) and religious coping (Hixson et al. 1998; Steffen et al. 2001) have been found to positively affect hypertension prevalence and blood pressures. Certain religious behaviors (Buck et al. 2009; Koenig et al. 1998), specifically frequency of attendance to religious services, have been found to be inversely related to the odds of hypertension (Gillum and Ingram 2006; Graham et al. 1978; Livingston et al. 1991).

Though religiosity has been associated with hypertension and many other health outcomes, the extent of religiosity is not uniform but tends to vary by a number of factors, including race and ethnicity. Studies have shown blacks and Hispanics to be generally more religious than whites and to participate more frequently in religious activities (Chatters et al. 2008; Ferraro and Koch 1994; Levin et al. 1994; Pargament 1997; Tabak and Mickelson 2009; Taylor et al. 1996, 2007, 2009). Also, religion is thought to be more useful to minorities and other socially disadvantaged groups (Pargament 2002). Given this, it is plausible that the beneficial effects of religious service attendance observed among all-white populations, or populations in which race/ethnicity is not differentiated, will be greater among blacks and Hispanics. This theory is reasonable in the case of Mexican-Americans, who experience lower odds of hypertension compared to whites (National Center for Health Statistics 2009). However, this is not intuitive in the case of blacks, who have almost twice the odds of hypertension as whites (National Center for Health Statistics 2009; Ong et al. 2007).

Knowledge of possible differences in the relationship between religious services attendance and hypertension or blood pressure may assist in understanding the higher prevalence of hypertension among blacks and the lower prevalence among Hispanics (National Center for Health Statistics 2009). Indeed, psychosocial factors have been cited as explanations for the deficit in prevalence of hypertension experienced by Hispanics (Finch and Vega 2003). Moreover, determination of whether the association between religious service attendance and hypertension or blood pressure varies by race/ethnicity may encourage further interventions to lower the prevalence of hypertension among all groups. Therefore, this study will determine whether the association between frequency of attendance at religious services and hypertension or blood pressure differs by race/ethnicity. Because in relation to health, religiosity has been found to be useful (Buck et al. 2009; Gillum and Ingram 2006; Graham et al. 1978; Hixson et al. 1998; Koenig et al. 1998, 2001; Larson et al. 1989; Levin et al. 1994; Livingston et al. 1991; Steffen et al. 2001; Walsh 1998), it is hypothesized that as the frequency of attendance at religious services increases, the odds of hypertension will decrease and blood pressures will decrease for all groups; however, this relationship will be stronger among blacks and Hispanics (specifically Mexican-Americans here) when compared to whites.

Methods

NHANES III is a stratified multistage probability sample of the civilian non-institutionalized US population that was conducted in two phases; the first phase, 1988–1991, and the second

phase, 1991–1994 (National Center for Health Statistics 1994). First, respondents participated in a home interview, and at the conclusion, they were invited to participate in a medical examination. Detailed information regarding procedures and protocols has been described elsewhere (Ezzati et al. 1992; National Center for Health Statistics 1994). The total number of participants aged 20 or older was 18,825, and the following persons were excluded from analyses: pregnant women (n = 288), persons who reported having had a heart attack (n = 936), congestive heart failure (n = 753), or a stroke (n = 648). Additionally, persons for whom there was no response, blank responses or “don't know” as a response for any analytical variable (n = 5,484) were excluded from analyses, resulting in 12,488 persons for the present analysis.

Blood pressures were measured up to three times in both the home and medical examination interview for a maximum of 6 blood pressure measurements. NHANES III data contain mean blood pressure variables that average all blood pressure measurements from the home and medical interview, and these variables were used in analysis. Hyper-tension was defined as having mean systolic blood pressure (SBP) ≥ 140 mm Hg, mean diastolic blood pressure (DBP) ≥ 90 mm Hg, or if currently taking antihypertensive medications. The same criteria were used for both diabetic and non-diabetic participants.

Attendance at religious services was determined by response to the question “How often do you attend church or religious services?” and quantified by the number of times services were attended per year. Persons who reported attending services more than 365 times per year were re-coded to missing (n = 4) (Gillum and Ingram 2006). Attendance at religious services was categorized as follows: never (0 times per year), less than weekly (1–51 times per year), weekly (52 times per year), and more than weekly (>52 times per year) (Gillum and Ingram 2006).

Additional covariates included demographics such as race/ethnicity (white, black, Mexican-American), age (years), sex (female, male), marital status (yes/no), metropolitan residence (yes/no), region (Northeast, Midwest, South, West), nativity (US-born, foreign-born), language spoken at home (English, other than English), poverty-to-income ratio (PIR), and education (0 = not a high school graduate, 1 = high school graduate). Health-related characteristics included health insurance status (yes/no), diabetes (yes/no), fair/poor health (yes/no), obesity (yes/no), physically inactive (yes/no), current smoking status (yes/no), and current drinking status (yes/no).

Statistical Analysis

The mean and proportional differences by religious service attendance for demographic, socioeconomic status (SES), and health-related characteristics were evaluated using Student's t-test for continuous variables and chi-square tests for categorical variables. In Model 1, the association between hypertension and attendance at services was assessed by logistic regression models that controlled for demographics, SES, and health-related characteristics. In Model 2, analyses additionally adjusted for race/ethnicity. These analyses were repeated where SBP and DBP were the dependent variables. The possibility of race/ethnicity modifying the effect of attendance on hypertension, SBP, and DBP was assessed using multiplicative interaction terms. Because women are more likely to attend religious services than men (Levin et al. 1994; Pargament 2002; Taylor et al. 2007), possible gender differences in the relationship between religious service attendance and hypertension or blood pressure were tested within race/ethnic groups. If interaction was detected, analyses to assess the association between frequency of attendance and hyper-tension, SBP, and DBP were stratified by race/ethnicity and gender.

Following the procedure recommended by the National Center for Health Statistics, all analyses used Taylor-linearization procedures for the complex multistage sampling design (National Center for Health Statistics, and Centers for Disease Control and Prevention 1997). *P*-values less than or equal to 0.05 were considered statistically significant, and all *t*-tests were two-sided. All statistical procedures were performed using STATA statistical software, version 10 (StataCorp LP, College Station, TX).

Results

Table 1 displays the distribution of select demographic, SES, and health-related characteristics by frequency of attendance at religious services. The proportion of persons living in the Midwest did not differ by attendance at religious services, nor did DBP. Compared to people who never attended services, those who attended services more than weekly were less likely to be white, older, less likely to be male, more likely to be married, less likely to live in a metropolitan area, and live in the Northeast. The most frequent attendees were more likely to be a high school graduate, insured, obese, less likely to be a current smoker or drinker, and more likely to be hypertensive.

Table 2 presents the association between attendance at religious services, race/ethnicity, and hypertension and blood pressure controlling for demographic, SES, and health-related characteristics. In Model 1, persons who attended services weekly had lower odds of hypertension than those who never attended religious services (OR = 0.83, 95% CI = 0.72–0.96). After controlling for race/ethnicity in Model 2, blacks had greater odds of hypertension (OR = 1.86, 95% CI = 1.57–2.19) than whites, while the odds ratio for Mexican-Americans was not significant (OR = 0.97, 95% CI = 0.70–1.34). Attendance at religious services was inversely related to SBP in Model 1, and in Model 2, blacks had higher SBP than whites ($\beta = 2.68$, $P \leq 0.001$). In Model 1 for DBP, persons who attended religious services weekly had lower DBP than those who never attended services ($\beta = -0.95$, *P*-value = 0.001), and in Model 2, blacks had higher DBP than whites ($\beta = 2.04$, *P*-value ≤ 0.001).

Table 3 presents the interaction between race/ethnicity and attendance to religious services on the odds of hypertension and on SBP and DBP. Black race did not modify the effect of religious service attendance on the odds of hypertension, or on SBP or DBP. The interaction between Mexican-American ethnicity and weekly attendance to religious services was significant where hypertension (OR = 1.57, 95% CI = 1.03–2.39), SBP ($\beta = 1.91$, $P = 0.002$), or DBP ($\beta = 2.07$, $P = 0.003$) was the dependent variable. For SBP, the interaction between Mexican-American ethnicity and less than weekly service attendance was significant ($\beta = 1.87$, $P = 0.014$).

Table 4 displays the interaction between sex and attendance stratified by race/ethnicity. Among blacks, the interaction between male sex and more than weekly attendance was significant where hypertension was the dependent variable (OR = 1.97, 95% CI = 1.06–3.65). The interaction between male sex and less than weekly attendance was significant among Mexican-Americans for hypertension (OR = 1.86, 95% CI = 1.02–3.40). No interaction between sex and attendance was determined where SBP and DBP were the dependent variables.

Table 5 presents the association between attendance at religious services and hypertension and blood pressure, stratified by race/ethnicity. Whites who attended services weekly had lower odds of hypertension than whites who never attended services (OR = 0.75, 95% CI = 0.62–0.91), while blacks who attended services more than weekly had lower odds of hypertension than blacks who never attended services (OR = 0.66, 95% CI = 0.45–0.97).

There was no relationship between attendance at religious services and hypertension among Mexican-Americans. There was an inverse relationship between attendance and SBP among all groups. Whites who attended services weekly ($\beta = -1.33$, $P = 0.004$) and more than weekly ($\beta = -2.57$, $P = 0.002$) had lower SBP than whites who never attended services. Blacks ($\beta = -2.18$, $P = 0.030$) and Mexican-Americans ($\beta = -1.77$, $P = 0.026$) who attended services more than weekly had lower SBP than their counterparts who never attended services. Attendance at religious services was related to DBP in whites only, such that whites who attended services weekly had lower DBP than those who never attended ($\beta = -1.10$, $P = 0.001$).

In Table 6, the odds of hypertension relative to attendance are examined by race/ ethnicity and sex. In accordance with the interaction analysis, black females who attended services more than weekly had lower odds of hypertension than black females who never attended services (OR = 0.46, 95% CI = 0.26–0.80). There were no significant relationships among black males. Among Mexican-American males, those who attended services less than weekly had higher odds of hypertension than those who never attended services (OR = 1.63, 95% CI = 1.00–2.66). Among Mexican-American women, no significant odds were observed.

Discussion

Studies of the relationship between frequency of attendance at religious services and hypertension/BP have been inconsistent. Of the studies that do find an inverse relationship (Gillum and Ingram 2006; Graham et al. 1978; Livingston et al. 1991), they have not determined whether this relationship is true for all race/ethnic groups, which should be examined particularly because of variation in frequency of attendance and the prevalence of hypertension by race/ethnicity. It was hypothesized that the relationship between attendance at religious services and hypertension/BP would be stronger among blacks and Mexican-Americans. However, the results of this study find that there was no difference in this relationship between blacks and whites, and although there was significant interaction between Mexican-American ethnicity and attendance on hypertension and blood pressure, this was due to the inverse relationship observed among whites and not among Mexican-Americans. Further, sex did not modify the relationship between attendance and hypertension or blood pressure among whites. Sex did modify the relationship between attendance and hypertension among blacks and Mexican-Americans, such that the inverse relationship between attendance and hypertension was observed among black women and not black men; Mexican-American men who attended infrequently had higher odds of hypertension.

Few studies have included blacks, whites, and Mexican-Americans (Koenig et al. 1998; Steffen et al. 2001), and if so, these race/ethnic groups were not differentiated in analyses (Gillum and Ingram 2006). Of the studies that examined the relationship between religiosity and blood pressure separately for blacks and whites, using the religious coping measure of religiosity, they did find the attendance–blood pressure relationship was stronger for blacks (Koenig et al. 1998) or non-existent for whites (Steffen et al. 2001). This relationship was not found in the present study. Similarly, the results observed in the present study on Mexican-Americans were found to be similar with a previous study (Levin and Markides 1985). In this study including older Mexican-Americans, there was a positive relationship between self-rated religiosity and odds of hypertension. These results parallel those of the present study, such that only Mexican-American men who were infrequent attendees had greater odds of hypertension. Though few studies have found no relationship between attendance and hypertension (Buck et al. 2009), the results of this study are consistent with similar studies that find an inverse relationship between religiosity and hypertension/BP

(Graham et al. 1978; Hixson et al. 1998; Koenig et al. 1998, 2001; Larson et al. 1989; Livingston et al. 1991; Walsh 1998).

The results of the present study and previous research (Levin and Markides 1985) suggest that the beneficial effects of religious service attendance on hypertension are not observed among Mexican-Americans as in non-Hispanic whites and blacks. The results also suggest that attendance is likely unrelated to the lower prevalence of hypertension among Mexican-Americans. Similarly, it is unlikely that the inverse relationship between attendance and hypertension/BP is related to differences in hypertension/BP between blacks and whites, because there was no interaction between race and attendance.

It is unclear why attendance at religious services would be related to decreased odds of hypertension among blacks and whites, but not Mexican-Americans. A number of factors have been hypothesized to contribute to the beneficial effects of religiosity on hypertension/BP, including psychosocial benefits (Levin and Vanderpool 1989). Other studies that have hypothesized that there are ethnic differences in the use of psychosocial benefits, such as attendance of religious services, may help explain these results (Pargament 2002). Studies have found that Hispanics are more likely than whites to obtain social support from family rather than friends (Almeida et al. 2009). It is plausible that the beneficial effects of social support are obtained from family rather than from increased exposure to friends as attendance at religious services increases among Mexican-Americans; thus, there would be no relationship between attendance and hypertension/BP among Mexican-Americans.

Further, after stratification by sex, Mexican-American men who attended religious services less than weekly had greater odds of hypertension than those who never attended services. Previous work found a higher prevalence of hypertension among the most religious Mexican-Americans, which is consistent with the theory that increased religiosity may be associated with greater odds of stress-related disease (Kaplan 1976; Levin and Markides 1985). However, inconsistent with this theory, the results of this study find that infrequent attendees, not the most frequent attendees, have greater odds of hypertension among Mexican-American men. The finding of an inverse relationship between attendance and hypertension among black women, but not black men, is consistent with previous studies that find black women are more religious/spiritual than black men (Taylor et al. 2009).

Moreover, the results of the present study (no relationship between attendance and hypertension among Mexican-Americans, and no difference in these relationships between blacks and whites) may be due to the measure of religiosity used in this study. Frequency of attendance at religious services is often used to measure religiosity but many of the studies that did find an association between religiosity and hypertension/BP used measures such as religious coping (Steffen et al. 2001) or extent to which one considers themselves to be religious (Levin and Markides 1985). It is possible that the benefits of these measures of religiosity on hypertension/BP are not captured in attendance at religious services. Furthermore, this suggests that the other mechanisms by which religiosity has been hypothesized to affect health (i.e. influence on health behaviors and psychodynamics) (Levin and Vanderpool 1989), instead of increased social support from increased attendance, should be considered in future research.

Strengths and Limitations

NHANES III is a nationally representative data set that contains data on a highly cited measure of religiosity, attendance at religious services. NHANES III oversampled blacks and Mexican-Americans; therefore, a multi-ethnic study sample with sufficient numbers of minority participants is available. Acculturation has been found to both positively (Crespo et al. 2001) and negatively (Gordon-Larsen et al. 2003; Neuhouser et al. 2004) affect health,

and as such, this study included measures of acculturation as covariates. With these strengths are some limitations. The data in NHANES III were collected from 1988–1994; thus, it is unknown whether these results can be generalized to recent times. While recent NHANES data do include the same measure of religiosity as NHANES III, this measure is assessed only in persons older than 40 years of age. Also, there may be possible bias due to selection in that those who were excluded differed from the study sample on a number of variables, including ethnicity. Though attendance at religious services is often used as a single measure of religiosity, there are other measures that may capture different spheres of religiosity that may be influential to hypertension and blood pressure such as religious coping and self-rated religiosity or spirituality.

Conclusions

This study demonstrates that the association between frequency of attendance at religious services and hypertension or blood pressure is not uniform for all race/ethnic groups. Contrary to the hypothesis, this relationship in blacks did not differ from that in whites. There was no relationship between frequency of attendance and hypertension among Mexican-Americans as a whole, and the relationship between attendance and blood pressure was weaker among Mexican-Americans than among whites and blacks. However, when stratified by sex, Mexican-American men who attended services less than weekly had greater odds of hypertension. Determination of the causes of these results is merited and may be found in elucidation of race/ethnic differences in the meaning of religious services attendance or examining different measures of religiosity. Additionally, the inclusion of multiple domains of religiosity may yield a more comprehensive measure and thus a better understanding of the relationship between religion and blood pressure.

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Table 1

Select demographic, SES, and health-related characteristics by attendance, NHANES III

	Attendance to religious services (times per year)			
	Never *n* = 4,062	**1–51 *n* = 3,571**	**52 *n* = 3,610**	**>52 *n* = 1,245**
Race/ethnicity, %				
Non-Hispanic white	86.6	77.5*	81.6*	79.0*
Non-Hispanic black	8.7	16.1*	11.7*	16.0*
Mexican-American	4.7	6.4*	6.7*	5.0
Age, mean ± SE	40.4 ± 0.6	39.0 ± 0.5*	46.6 ± 0.5*	46.6 ± 0.8*
Male, %	54.9	48.5*	40.4*	41.0*
Married, %	60.2	62.2	65.0*	67.0*
Metropolitan residence, %	50.5	51.9	47.0	42.0*
Region, %				
Northeast	22.9	20.2	21.3	11.2*
Midwest	23.9	22.7	27.1	21.2
South	29.7	35.1*	34.2	50.3*
West	23.5	22.0	17.4*	17.3
Foreign-born, %	11.6	10.2	14.6*	11.3
Language other than English spoken at home, %	9.1	8.7	14.1*	9.8
Poverty-to-income ratio (PIR), mean ± SE	3.0 ± 0.1	3.3 ± 0.1*	3.1 ± 0.1	2.9 ± 0.1
High school graduate, %	70.5	79.2*	75.6*	76.7*
Insured, %	82.2	88.2*	91.9*	88.8*
Diabetic, %	3.6	3.7	5.6*	4.9
Fair/poor health, %	15.2	11.1*	13.3	13.5
Obese, %	20.0	20.6	22.6*	24.3*
Physically inactive, %	28.1	19.1*	23.7*	26.5
Current smoker, %	38.5	30.9*	17.3*	9.9*
Current drinker, %	63.0	63.1	46.5*	25.3*
Hypertensive, %	20.0	17.3*	24.7*	24.7*
Systolic BP (mm Hg), mean ± SE	121.0 ± 0.5	119.5 ± 0.4*	122.9 ± 0.5*	121.9 ± 0.7
Diastolic BP (mm Hg), mean ± SE	74.0 ± 0.2	73.9 ± 0.3	73.5 ± 0.2	74.3 ± 0.4

"Never" is the reference group

*$P \leq 0.05$

Table 2

Regression of ethnicity and frequency of attendance to religious services on hypertension, systolic BP and diastolic BP, NHANES III

	Hypertension				Systolic BP				Diastolic BP			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	OR	95% CI	OR	95% CI	*β*	*P*-value	*β*	*P*-value	*β*	*P*-value	*β*	*P*-value
Attendance (times per year)												
Never	1.00		1.00		–		–		–		–	
1–51	0.91	0.74–1.12	0.87	0.70–1.09	–0.51	0.211	–0.69	0.137	–0.15	0.634	–0.31	0.364
52	0.83	0.72–0.96	0.79	0.68–0.92	–0.89	0.012	–1.17	0.005	–0.89	0.001	–0.95	0.001
>52	0.79	0.61–1.03	0.76	0.58–0.99	–2.16	<0.001	–2.44	<0.001	–0.46	0.214	–0.56	0.160
Ethnicity												
Non-Hispanic white			1.00				–				–	
Non-Hispanic black			1.86	1.57–2.19			2.68	<0.001			2.04	<0.001
Mexican-American			0.97	0.70–1.34			0.48	0.290			–0.35	0.464

OR odds ratio; *95% CI* 95% confidence interval; all models adjusted for age, sex, marital status, metropolitan residence, region, nativity, language spoken at home, PIR, education, insurance status, diabetes, fair/poor health, obesity, physical inactivity, current drinking and smoking status

Table 3

Interaction between the regression of ethnicity and frequency of attendance to religious services on hypertension, systolic BP and diastolic BP, NHANES III

	Hypertension		Systolic BP		Diastolic BP	
	OR	**95% CI**	**β**	***P*-value**	**β**	***P*-value**
Race/ethnicity*Attendance						
Black*Attendance 1 (Never)	1.00		–		–	
Black*Attendance 2 (1–51)	1.26	0.90–1.76	0.40	0.631	0.35	0.592
Black*Attendance 3 (52)	1.23	0.89–1.69	0.87	0.267	0.13	0.847
Black*Attendance 4 (>52)	0.72	0.41–1.24	0.85	0.505	–0.61	0.504
Mexican-American*Attendance 1 (Never)	1.00		–		–	
Mexican-American*Attendance 2 (1–51)	1.57	0.94–2.64	1.87	0.014	0.74	0.276
Mexican-American*Attendance 3 (52)	1.57	1.03–2.39	1.91	0.002	2.07	0.003
Mexican-American*Attendance 4 (>52)	0.99	0.47–2.07	0.47	0.652	0.28	0.802

OR odds ratio; *95% CI* 95% confidence interval; all models adjusted for age, sex, marital status, metropolitan residence, region, nativity, language spoken at home, PIR, education, insurance status, diabetes, fair/poor health, obesity, physical inactivity, current drinking and smoking status

Table 4

Interaction between the regression of gender and frequency of attendance to religious services on hypertension, systolic BP and diastolic BP stratified by race/ethnicity, NHANES III

	Hypertension		Systolic BP		Diastolic BP	
	OR	**95% CI**	***β***	***P*-value**	***β***	***P*-value**
Non-Hispanic white						
Gender*Attendance						
Male*Attendance 1 (Never)	1.00		–		–	
Male*Attendance 2 (1–51)	1.02	0.62–1.69	0.26	0.803	0.48	0.454
Male*Attendance 3 (52)	0.76	0.49–1.18	–1.56	0.115	0.78	0.308
Male*Attendance 4 (>52)	1.15	0.64–2.07	1.61	0.213	1.63	0.076
Non-Hispanic black						
Gender*Attendance						
Male*Attendance 1 (Never)	1.00		–		–	
Male*Attendance 2 (1–51)	1.03	0.60–1.77	–1.64	0.263	–0.88	0.431
Male*Attendance 3 (52)	1.13	0.62–2.06	–1.24	0.323	–0.08	0.946
Male*Attendance 4 (>52)	1.97	1.06–3.65	–0.37	0.811	–0.29	0.823
Mexican-Americans						
Gender*Attendance						
Male*Attendance 1 (Never)	1.00		–		–	
Male*Attendance 2 (1–51)	1.86	1.02–3.40	0.50	0.703	0.27	0.781
Male*Attendance 3 (52)	1.25	0.60–2.63	–0.60	0.602	0.27	0.726
Male*Attendance 4 (>52)	1.28	0.56–2.92	0.26	0.902	–0.10	0.934

OR odds ratio; *95% CI* 95% confidence interval; all models adjusted for age, sex, marital status, metropolitan residence, region, nativity, language spoken at home, PIR, education, insurance status, diabetes, fair/poor health, obesity, physical inactivity, current drinking and smoking status

Table 5

Regression of frequency of attendance to religious services on hypertension, systolic BP and diastolic BP by ethnicity, NHANES III

	Non-Hispanic white		Non-Hispanic black		Mexican-American	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Hypertension						
Attendance (times per year)						
Never	1.00		1.00		1.00	
1–51	0.83	0.63–1.09	1.04	0.87–1.25	1.34	0.88–2.04
52	0.75	0.62–0.91	1.00	0.77–1.31	1.29	0.86–1.92
>52	0.79	0.56–1.10	0.66	0.45–0.97	0.85	0.39–1.81

	β	***P*-value**	***β***	***P*-value**	***β***	***P*-value**
Systolic BP						
Attendance (times per year)						
Never	–		–		–	
1–51	–0.82	0.138	–0.77	0.173	1.09	0.028
52	–1.33	0.004	–0.99	0.188	0.72	0.187
>52	–2.57	0.002	–2.18	0.030	–1.77	0.026
Diastolic BP						
Attendance (times per year)						
Never	–		–		–	
1–51	–0.46	0.254	0.10	0.843	0.41	0.486
52	–1.10	0.001	–0.76	0.206	0.64	0.251
>52	–0.56	0.260	–0.68	0.314	–0.51	0.561

OR odds ratio; *95% CI* 95% confidence interval; all models adjusted for age, sex, marital status, metropolitan residence, region, nativity, language spoken at home, PIR, education, insurance status, diabetes, fair/poor health, obesity, physical inactivity, current drinking and smoking status

Table 6

Regression of frequency of attendance to religious services on hypertension by ethnicity and gender, NHANES III

	Non-Hispanic white				Non-Hispanic black				Mexican-American			
	Female		Male		Female		Male		Female		Male	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Hypertension												
Attendance (times per year)												
Never	1.00		1.00		1.00		1.00		1.00		1.00	
1–51	0.86	0.55–1.34	0.78	0.56–1.10	1.01	0.70–1.45	1.00	0.74–1.36	0.87	0.52–1.48	1.63	1.00–2.66
52	0.79	0.60–1.05	0.86	0.49–0.99	0.91	0.62–1.33	1.08	0.70–1.65	0.90	0.52–1.55	1.49	0.86–2.57
>52	0.71	0.49–1.03	0.86	0.53–1.56	0.46	0.26–0.80	1.09	0.67–1.78	0.52	0.21–1.29	1.04	0.44–2.46

OR odds ratio; *95% CI* 95% confidence interval; all models adjusted for age, sex, marital status, metropolitan residence, region, nativity, language spoken at home, PIR, education, insurance status, diabetes, fair/poor health, obesity, physical inactivity, current drinking and smoking status