HEALTH BELIEFS AND THE PREVENTION OF HYPERTENSION IN A BLACK POPULATION LIVING IN LONDON

Maxine Newell, DrPH; Naomi Modeste, DrPH; Helen Hopp Marshak, PhD; Colwick Wilson, PhD

In the United Kingdom, the morbidity and mortality associated with hypertension is much higher in Blacks than in Whites. We studied a convenience sample of 312 persons aged 25–79 years from 17 predominantly Black Seventh-Day Adventist churches across London by using the health belief model to examine their beliefs about the prevention of hypertension. A questionnaire was used to collect demographic and anthropometric data, lifestyle practices, and perceptions toward hypertension by using the health belief model constructs of susceptibility, severity, benefits, barriers, and self-efficacy. A relative risk estimate score was developed to assess the presence of several risk factors of hypertension for each participant. Based on multiple regression analyses, the demographic variables were independent predictors of systolic blood pressure (R^2=.195), the combined behavioral variable (risk score) was an independent predictor of diastolic blood pressure (β=.18, P=.02), and self-efficacy was the only independent variable significantly associated with risk scores (β=−.21, P=.008). The perception of self-efficacy to perform behaviors that will decrease hypertension risk needs to be effectively harnessed by health educators to decrease the prevalence of hypertension in this population. (*Ethn Dis*. 2009;19:35–41)

Key Words: Health Belief Model, London, Blacks, Hypertension Risk Factors, Hypertension, Prevention

From the School of Public Health, Loma Linda University, Loma Linda, California (MN, NM, HHM); School of Science and Technology, Loma Linda University, Loma Linda, California (CW).

Address correspondence and reprint requests to: Naomi N. Modeste, DrPH; School of Public Health, Loma Linda University; Loma Linda, CA 92350; 909-558-4741; nmodeste@llu.edu

INTRODUCTION

Hypertension is the most commonly diagnosed condition in the United Kingdom, and its treatment the "most important single intervention" in the primary care setting;[1] however, national surveys demonstrate that it is substantially underdiagnosed[2] and poorly controlled.[3] Despite the increased prevalence of hypertension among people of African descent compared with other ethnic groups in the United Kingdom,[4–10] most of the research on hypertension in this population is conducted among persons who have already been diagnosed with hypertension. A key tenet to health education and the changing of health outcomes on a population level is the concept of prevention.

Many psychosocial theoretical models are used by health educators to change or explain behavior. The health belief model has been used to explain and predict health behavior for more than 50 years[11] and is one of the most widely used models.[12] Although the importance of the different model constructs varies within and between cultures and across health behaviors,[12] studies support the validity of these constructs to predict a wide variety of behaviors, especially preventive behaviors.[13]

Most of the literature on the health beliefs of Blacks concerning hypertension, and prevention in particular, comes from the United States. While African Americans in the United States and African Caribbeans in the United Kingdom have some commonalities, their cultural, traditional, and social patterns are not the same.[4] Consequently, findings from the United States cannot necessarily be extrapolated to the UK population.

…we used the health belief model to examine the beliefs, perceptions, and behaviors of Black Seventh-Day Adventists living in London and to provide information on the lifestyle practices related to preventing hypertension.

African Americans correctly associate the use of salt to the development of hypertension, but they did not associate obesity, lack of exercise, alcohol consumption, and smoking with hypertension.[14] Similar findings have been reported in UK Blacks.[4]

The Seventh-Day Adventist church promotes abstinence from smoking and the use of alcohol, a vegetarian or near-vegetarian diet, and an active lifestyle.[15,16] As such, Seventh-Day Adventist lifestyles are generally healthier than those of non-Seventh Day Adventists.[17] Studies of Seventh-Day Adventist populations in the Netherlands, Japan, Denmark, Norway, and the United States support the finding that a Seventh-Day Adventist lifestyle decreases the risk of disease, including hypertension.[15,16] Therefore, we used the health belief model to examine the beliefs, perceptions, and behaviors of Black Seventh-Day Adventists living in London and to provide information on the lifestyle practices related to preventing hypertension.

METHODS

This was a cross-sectional study of Black Seventh-Day Adventists living in London. The study employed quantitative survey methods and blood pressure, height, weight, and waist circumference measurements. To recruit subjects, we placed announcements in bulletins and on the bulletin boards of the selected churches and followed up with an oral presentation to promote the study and invite participation. A total of 352 participants from 17 predominantly Black churches across London agreed to be part of the study and volunteered to complete a questionnaire and have blood pressure and anthropometric measurements taken by qualified nurses.

The inclusion criteria for the study were membership in the Seventh-Day Adventist church, residence in any of the London boroughs, aged 25–79 years, and self-identification as Black. Potential participants were excluded if they had been diagnosed with hypertension and were taking medication to control their blood pressure.

We used digital monitors validated by the British Hypertension Society to measure blood pressure. It was measured seated, once in each arm, and then repeated in the arm with the highest reading. An average of the repeated measure in one arm was calculated.

Anthropometric measures were taken with participants in light clothing and without shoes. Weight was measured by using an electronic scale, and height was measured by using a portable Seca Leicester height measure. Body mass index was categorized as <18.5 kg/m^2 (underweight), 18.5–24.9 kg/m^2 (normal weight), 25.0–29.9 kg/m^2 (overweight), 30.0–39.9 kg/m^2 (obese), and ≥ 40.0 kg/m^2 (extremely obese). Waist circumference was measured and recorded in centimeters by using a flexible measuring tape.

A structured questionnaire was developed for use in this study. The items in the first section focused on demographic questions such as age, sex, education, and yearly income. Education was categorized as ''primary education school'' vs ''secondary education and beyond'' and was used as the measure of socioeconomic status for the analyses.[18] Questions were formulated to assess the participants' knowledge and lay beliefs concerning hypertension. Also included were questions on diet and exercise to evaluate participants' current practices related to hypertension prevention.

A five-point Likert scale was used to assess the health belief model constructs. Most of the items for the constructs were drawn from previous instruments.[20,21] The questionnaire was checked for clarity before it was used for data collection. Internal reliability was assessed after data collection, and the Cronbach α for the five scales were .59 for susceptibility, .72 for severity, .74 for benefits, .68 for barriers, and .85 for self-efficacy. We replaced missing values for items in the health belief model scales with the mean score for that item.

Based on the 10-year relative risk estimates for cancers,[22] heart disease and stroke,[23] a 10-year risk score for hypertension was used to assess the risk for the participants in this study.[24]

SPSS version 14.0 (SPSS, Inc, College Station, Texas) was used to analyze data. Frequencies, percentages, and descriptive statistics were computed for all variables, and the associations between levels of education and knowledge about hypertension and levels of education and blood pressure were examined. Correlations were run between risk scores and systolic blood pressure (SBP) and diastolic blood pressure (DBP). Linear regressions were performed to determine if the perceptions of hypertension described by the health belief model variables independently predicted the risk scores for hypertension.

RESULTS

We distributed 352 questionnaires; 27 were not returned, and of those that were returned 13 could not be used, for a final sample of 312. Of the 312 respondents, 171 were born in the Caribbean, 32 in Africa, and 108 in the United Kingdom (Table 1). The mean age for all of the respondents was 44.4 years. When age was examined by place of birth, the means were significantly different ($P<.001$) with the Africans (37.38) being the youngest and Caribbeans (49.24) being the eldest. The largest percentage for marital status was 43.2% for those who were married for the first time followed by 36.4% who were single/never married. Only 4.2% did not complete secondary school, while a little over one third (34.7%) completed graduate degrees (Table 1). (The finding for the hypertension risk factors in this study are available elsewhere.[24])

On average, the respondents scored 73.0% on the knowledge scale. 96.6% individuals believed that people could do things to lower their BP and 91.2% knew that even lowering BP a little improves health. Less that 50% were able to correctly identify the numbers for SBP and DBP and 33% felt that individuals could tell if their BP was high. Knowledge about hypertension, however, was not associated with relative risk scores but education was inversely associated with SBP ($r=-.28$, $P<.01$) and DBP ($r=-.18$, $P<.05$).

The mean 10-year risk score for hypertension was 2.7 (standard deviation [SD] 3.8), and scores ranged from -6 to 12 with a mode of 5. More than two-thirds of the respondents (68.6%) had positive scores and were at increased risk for developing hypertension. The association between risk score and SBP was not significant ($r=.013$), but the association between risk score and DBP approached significance ($r=.122$, $P=.06$).

Table 1. Demographic characteristics of 312 Black Seventh-Day Adventists living in London

Characteristic*	Total* (*N*=312)	Place of Birth			*P* value
		Caribbean (*n*=171, 55.0%)	Africa (*n*=32, 10.3%)	United Kingdom (*n*=108, 34.7%)	
Sex, *n* (%)					
Male	94 (31.1)	53 (31.7)	11 (37.9)	30 (28.6)	
Female	208 (68.9)	114 (68.3)	18 (62.1)	75 (71.4)	
Mean age, years (SD)	44.4 (12.7)	49.2 (14.1)	37.4 (10.8)	39.0 (6.4)	<.001
Marital Status, *n* (%)					<.001
Single/Never married (%)	112 (36.4)	43 (25.6)	9 (29.0)	59 (54.6)	
First time married	133 (43.2)	80 (47.6)	19 (61.3)	34 (31.5)	
Remarried	14 (4.5)	10 (6.0)	0	4 (3.70	
Divorced	28 (9.1)	21 (12.5)	1 (3.2)	6 (5.6)	
Separated	12 (3.9)	6 (3.6)	1 (3.2)	5 (4.6)	
Widowed	9 (2.9)	8 (4.8)	1 (3.2)	0	
Annual household income, *n* (%)					.003
≤£9,999	41 (16.7)	25 (19.7)	4 (16.0)	11 (11.8)	
£10,000–£19,999	58 (23.6)	35 (27.6)	8 (32.0)	15 (16.1)	
£20,000–£29,999	55 (22.4)	30 (23.6)	3 (12.0)	22 (23.7)	
£30,000–£39,999	37 (15.0)	16 (12.6)	3 (12.0)	18 (19.4)	
£40,000–£49,999	17 (6.9)	9 (7.1)	3 (12.0)	5 (5.4)	
£50,000–£74,999	27 (11.0)	10 (7.9)	1 (4.0)	16 (17.2)	
£75,000–£99,999	5 (2.0)	0	3 (12.0)	2 (2.2)	
≥£100, 000	6 (2.4)	2 (1.6)	0	4 (4.3)	
Highest level of education, *n* (%)					<.001
Primary school	12 (4.2)	10 (6.6)	0	2 (1.9)	
Secondary school	35 (12.2)	30 (19.7)	2 (6.9)	3 (2.8)	
Trade/vocational school	59 (20.5)	35 (23.0)	4 (13.8)	19 (17.9)	
Undergraduate polytechnic or university	82 (28.5)	39 (25.7)	7 (24.1)	36 (34.0)	
Graduate degree	100 (34.7)	38 (25.0)	16 (55.2)*	46 (43.3)	

* One respondent did not indicate country of birth, 16 respondents did not indicate sex, 4 did not indicate marital status, 66 did not report household income, and 24 did not indicate level of education.

The 5-point Likert scale for the health belief model variables was labeled from strongly agree to strongly disagree. Overall perceptions of susceptibility to hypertension was neutral (3.41, SD .73) as was the response to barriers that hinder the adaptation of behaviors which decrease the risk of hypertension (3.67, SD .66). In general the group did not perceive that developing hypertension had severe consequences (2.22, SD .55). Severity was the only variable that was significantly associated with either SBP or DBP. As perceptions of the severity of hypertension increased, SBP and DBP decreased ($P<.01$, $r=-.139$ and $-.118$, respectively). Most respondents thought that doing things to decrease the risk of hypertension was beneficial (4.18, SD .84), and felt they had the self-efficacy to change these behaviors (4.01, SD .72).

Before we ran the multiple regressions, the correlation between household income and level of education was examined. These two variables were positively associated ($r=.284$, $P=.01$). Because 21.2% of the participants did not respond to the household income item, level of education was used as the measure for socioeconomic status in the regression equations.

Regressions were run to determine which variables were independently associated with normal SBP, DBP, and blood pressure (<139/89 mm Hg). The demographic variables of age, sex, and family history of hypertension were independently associated with SBP. The change in R^2 was only .007 when the relative risk score was added to the model (Table 2).

When controlling for age, sex, family history of hypertension, education and country of birth, the relative risk estimate score was the only variable that was significantly independently associated with DBP. Although the overall model was not significant for this regression, the addition of the risk score variable changed the R^2 by .027 (Table 3).

None of the health belief variables or knowledge scores were significant independent predictors of blood pressure levels. When the risk score was the dependent variable, however, along with the demographic variables of age, sex, and family history of hypertension, self-efficacy was the only health belief model variable that was a significant independent predictor ($P=.008$) (Table 4). Between the first model, which only included the demographic variables, and the second model, which also included all of the health belief variables and knowledge scores, the R^2 change was .057.

… the general feeling of the respondents, concerning susceptibility to developing hypertension, was that Blacks were neither more or less susceptible.

DISCUSSION

In the findings of Oliveria, Chen, McCarthy, Davis and Hill,[25] the respondents were knowledgeable about hypertension: 96% thought that people could do things to lower their BP and the same percentage also thought that lowering BP would improve health. The responses in this study were similar. Though the overall performance on the knowledge questions was good, there remained a lack of knowledge concerning the specifics of SBP and DBP which would allow for effective self-monitoring of BP.

The prevalence of hypertension among people of African descent, particularly the Caribbeans, in the UK is higher than the general population (38.4% and 31.7% for Caribbean men and women vs 31.7% and 29.5% for men and women in the general population)[26] and 25.3% of the study group was hypertensive without knowing it. Despite these findings, the general feeling of the respondents, concerning susceptibility to developing hypertension, was that Blacks were neither more or less susceptible. This perception could be the reason that though the participants knew that lowering BP would improve health, many did not know that they were hypertensive and could improve their own health by decreasing their BP. This disconnection between knowledge and personal risk is also described by Rieder.[27]

While more than 90% correctly associated the effects of weight, stress, salt consumption, and exercise on BP, and there was general agreement that controlling BP was beneficial, there were also many perceived barriers to preventing hypertension. Salt consumption, finding a place and time to exercise, and having to worry about controlling their weight were the barriers that had the highest levels of agreement as to their preventing the performance of behaviors that would improve these same risk factors. Similarly, in a study by Desmond et al[20] the barriers that were most significant for Blacks were those of liking salty food and of not being able to eat the food you like. The fact that the respondents in Desmond et al's study were teenagers, who had similar barriers to that of the older respondents in this study, suggests that the perceptions are formed early and persists through adulthood.

Though the general perception that hypertension was not a severe disease probably accounted for the fact that 68.6% of the respondents were at increased risk for developing hypertension, it was incongruous with the relatively high knowledge scores about the effects of hypertension: 94% correctly identified that high BP could lead to strokes and heart problems, and 65% knew that hypertension makes the kidneys work harder, but perceived severity scores were well below the scale midpoint. These findings are in contrast to those of Brown and Segal,[28] whose subjects felt that hypertension was a serious disease. This difference could be due to the fact that Brown and Segal's[28] subjects were all diagnosed with hypertension, while none of those in our study were either diagnosed with, or being treated for hypertension.

Table 2. Regression analysis for the dependent variable of systolic blood pressure

	B	SE *B*	β	*P* value	95% CI
Model 1 (R^2=.188)					
Constant	117.02	6.58		<.001	104.04 to 130.00
Age	.31	.10	.22	.003	.11 to .50
Sex (reference: male)	−10.66	2.25	−.32	<.001	−15.09 to −6.23
Family history of hypertension	7.20	2.29	.21	.002	2.68 to 11.72
Education	−1.80	3.48	−.04	.60	−8.67 to 5.06
Africa born (reference: Caribbean)	3.26	3.69	.06	.38	−4.01 to 10.53
UK born (reference: Caribbean)	−.99	2.48	−.03	.69	−5.88 to 3.90
Model 2 (R^2=.195)					
Constant	116.52	6.58		<.001	103.54 to 129.52
Age	.32	.10	.23	.002	.12 to .52
Sex (reference: male)	−11.19	2.28	−.33	<.001	−15.68 to −6.69
Family history of hypertension	6.50	2.35	.19	.006	1.85 to 11.14
Education	−2.26	3.49	−.05	.52	−9.15 to 4.63
Africa born (reference: Caribbean)	3.07	3.68	.06	.40	−4.19 to 10.33
UK born (reference: Caribbean)	−.56	1.60	−.03	.73	−5.66 to 4.13
Relative risk estimate score	.38	.30	.09	.20	−20 to .96

CI = confidence interval.

Table 3. Regression analysis for the dependent variable of diastolic blood pressure

	B	SE *B*	β	*P* value	95% CI
Model 1 (R^2=.038)					
Constant	71.22	4.27		<.001	62.80 to 79.65
Age	.09	.07	.11	.16	−.04 to .22
Sex (reference: male)	−1.67	1.46	−.08	.25	−.4.5 to 1.21
Family history of hypertension	2.57	1.49	.13	.09	−.37 to 5.51
Education	.33	2.26	.01	.88	−4.13 to 4.79
Africa born (reference: Caribbean)	1.65	2.39	.05	.49	−3.08 to 6.36
UK born (reference: Caribbean)	−.81	1.61	−.04	.61	−3.99 to 2.36
Model 2 (R^2=.065)					
Constant	70.65	4.23		<.001	62.30 to 79.00
Age	.11	0.65	.13	.09	−.02 to 24
Sex (reference: male)	−2.28	1.47	−.11	.12	−5.17 to .61
Family history of hypertension	1.75	1.51	.09	.25	−1.24 to 4.74
Education	−.20	2.24	−.01	.93	−4.63 to 4.23
Africa born (reference: Caribbean)	1.42	2.37	.05	.55	−3.25 to 6.09
UK born (reference: Caribbean)	−.56	1.60	−.03	.73	−3.71 to 2.59
Relative risk estimate score	.44	.19	.18	.02	.07 to .81

CI = confidence interval.

Respondents expressed confidence in their ability to perform all five of the behaviors that would decrease hypertension risk: getting their BP checked regularly; limiting their salt intake; eating five or more servings of fruit and vegetables daily; exercising at least 30 minutes four or more days of the week and controlling their weight. As self-efficacy increased, the RRE score reflecting the lifestyle risk factors for developing hypertension decreased. This association between self-efficacy and behavior has been described by other researchers[29–31] and was confirmed in our study.

It should also be noted that from the regression analyses, there were more males at risk than females and this does not corroborate studies that show that being female puts you at higher risk for hypertension.[17,37]

Table 4. Regression analysis for the dependent variable of relative risk estimate score for hypertension

	B	SE *B*	β	*P* value	95% CI
Model 1 (R^2=.133)					
Constant	1.93	1.63		.24	−1.29 to 5.15
Age	−.05	.03	−.15	.05	−.10 to .001
Sex (reference: male)	1.42	.56	.18	.01	.32 to 2.52
Family history of hypertension	1.85	.57	.23	.001	.73 to 2.97
Education	1.25	.85	.11	.15	−.44 to 2.93
Africa born (reference: Caribbean)	.62	.92	.05	.51	−1.21 to 2.44
UK born (reference: Caribbean)	−.75	.62	−.10	.22	−1.97 to .47
Model 2 (R^2=.189)					
Constant	11.77	3.96		.003	3.96 to 19.58
Age	−.06	.03	−.19	.02	−.11 to −.01
Sex (reference: male)	1.48	0.56	.19	.01	.38 to 2.59
Family history of hypertension	2.08	0.57	.26	<.001	.95 to 3.20
Education	.06	0.85	.09	.22	−.625 to 2.75
Africa born (reference: Caribbean)	.76	.93	.06	.42	−1.08 to 2.61
UK born (reference: Caribbean)	−1.14	.63	−.15	.07	2.38 to .11
Susceptibility score	−.14	.38	−.27	.71	−.89 to .61
Severity score	−.24	.55	−.04	.66	−1.33 to .84
Benefit score	−.16	.44	−.03	.71	−1.03 to .70
Barrier score	−.16	.42	−.03	.71	−1.00 to .68
Self-efficacy	−1.43	.54	−.21	.008	−2.49 to −.37
Knowledge score	−0.14	.02	−.08	.42	−.05 to .021

CI = confidence interval.

CONCLUSION

Despite having knowledge about the causes and consequences of hypertension and knowing that people can do things to lower their BP, the respondents in our study had not adopted behaviors to prevent hypertension. 25.3% were hypertensive and over two-thirds (68.6%) were at increased risk of developing hypertension. The general feeling of our study group, however, was that Blacks were neither more nor less susceptible to developing hypertension than other ethnic groups.

Although many of the items used in the survey instrument were adapted from previously validated scales, one limitation of this study is that no pilot study was done prior to data collection. This could have increased the validity and reliability of the instrument used. Additionally, having a convenience sample of individuals who self-selected into the study increased the probability that the participants represented individuals who were more concerned about their health, in general, than other Black Seventh Day Adventists (SDA) who attended church. Although random selection would have avoided this effect and increased the generalizability of the findings it would have been difficult to achieve as records of church membership are frequently out of date and time and funding for this study were limited.

Given the SDA focus on healthy living and the frequency of health seminars at local churches, it can be assumed that some of the respondents in this study were previously exposed to information about hypertension. That education about diseases is only the beginning of the effective intervention of health educators is supported by the findings of Haase, Steptoe, Sallis, and Wardle,[32] who, like this study, found that knowledge was not associated with behavior. For the emphasis on healthy living by the SDA church to translate into performance of preventative behaviors among the members more attention needs to be given to behavior change.

The increased prevalence of hypertension among Blacks has been well documented.[4–10,32–35] The perception of the participants in our study, however, is contrary to what is described in the literature and highlights the need for educators to make sure that while their target group understands the severity of a given disease, they also need to have a correct understanding of their susceptibility to that disease.

Finally, as health educators and other professionals design prevention and intervention programs for hypertension, they need to take into account the emotional effects of having many positive risk factors. Strecher et al[36] describe a process where their subjects, who had multiple risk behaviors, were encouraged to select one risk factor to focus on for change, and subsequently they were encouraged to select another behavior. For our study group, the high perception of self-efficacy to perform behaviors that will decrease hypertension risk could be effectively harnessed by encouraging individuals to tackle one behavior at a time or making small changes in several of the behaviors in order to prevent hypertension. The sequential approach described by Strecher et al[36] would also encourage ongoing evaluations of individuals' health, rather than a one-time assessment during an intervention program.

REFERENCES

1. Mead M. British Hypertension Society guidelines 2004-BHS IV. Ten key comments for primary care. *Br J Cardiol*. 2004;11:246–250.
2. Williams B, Poulter NR, Brown MJ, et al. British Hypertension Society guidelines for hypertension management 2004 (BSH-IV): summary. *Br Med J*. 2004;328:634–640.
3. Ross S, Walker A, MacLeod MJ. Patient compliance in hypertension: role of illness perceptions and treatment beliefs. *J Hum Hypertens*. 2007;18:607–613.
4. Higginbottom GM. "Pressure of life": ethnicity as a mediation factor in mid-life and older peoples' experience of high blood pressure. *Sociol Health Illn*. 2006;28:583–610.
5. Khan JM, Beevers DG. Management of hypertension in ethnic minorities. *Heart*. 2005;91:1105–1109.
6. Swift PA, Markandu ND, Sagnella GA, He FJ, MacGregor GA. Modest salt reduction reduces blood pressure and urine protein excretion in Black hypertensives: a randomized control trial. *Hypertens*. 2005;6:308–312.
7. Hajat C, Tilling K, Stewart JA, Lemic-Stojcevic N, Wolfe CD. Ethnic differences in risk factors for ischemic stroke: a European case-control study. *Stroke*. 2004;35:1562–1567.
8. Agyemang C, Bhopal R. Is the blood pressure of people from African origin adults in the UK higher or lower than that in European origin White people? A review of cross-sectional data. *J Hum Hypertens*. 2003;17:523–534.
9. Lane DA, Lip GYH. Ethnic differences in hypertension and blood pressure control in the UK. *QJM*. 2001;94:391–396.
10. Lemic-Stojcevic N, Dundas R, Jenkins S, Rudd A, Wolfe C. Preventable risk factors for coronary heart disease and stroke amongst ethnic groups in London. *Ethn Health*. 2001;6:87–94.
11. Janz NK, Champion VL, Strecher VJ. The health belief model. In: Glanz K, Rimer BK, Lewis FM, eds. *Health Behavior and Health Education: Theory, Research, and Practice.* 3rd ed. San Francisco, Calif: Jossey-Bass; 2002. p. 485–509.
12. Nahcivan NO, Secginli S. Health beliefs related to breast self-examination in a sample of Turkish women. *Oncol Nurs Forum*. 2007;34:425–432.
13. Shiloh S, Vinter M, Barak A. Correlates of health screening utilization: the roles of health beliefs and self-regulation motivation. *Pscychol Health*. 1997;12:301–317.
14. Peters RM, Aroian KJ, Flack JM. African American culture and hypertension prevention. *West J Nurs Res*. 2006;28:831–854.
15. Fraser GE. Diet and primordial prevention in Seventh-Day Adventists. *Prev Med*. 1999;29(6 Pt 2):18–23.
16. Fønnebø V. The healthy Seventh-Day Adventist lifestyle: what is the Norwegian experience? *Am J Clin Nutr*. 1994;59(5 Suppl):1124–1129.
17. Brathwaite N, Fraser H, Modeste N, Bromees H, King R. Obesity, diabetes, hypertension and vegetarian status among Seventh-Day Adventists in Barbados: preliminary results. *Ethn Dis*. 2003;13:34–39.
18. Dalstra JAA, Kunst AE, Borrell C, et al. Socioeconomic differences in the prevalence of common chronic diseases: an overview of eight European countries. *Int J Epidemiol*. 2005;34:316–326.
19. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav*. 1983;24:385–396.
20. Desmond S, Price J, Roberts S, Pituch M, Smith D. Perception of hypertension in Black and White adolescents. *J Health Beh Education Promotion*. 1992;16:3–10.

21. Champion VL. Instrument development for health belief model constructs. *ANS Adv Nurs Sci*. 1984;6:73–85.
22. Colditz GA, Atwood KA, Emmons K, et al. Harvard report on cancer prevention. Volume 4: Harvard Cancer Risk Index. *Cancer Causes Control*. 2000;11:477–488.
23. Siteman Cancer Center at Barnes-Jewish Hospital and Washington University School of Medicine. Your disease risk: relative risks. Available at: http://www.yourdiseaserisk.wustl.edu/pdf_files/rr_yDrpdf. Accessed August 14, 2007.
24. Newell M, Modeste N, Hopp Marshak H, Wilson C. *Risk Factors for Hypertension among a Church-based, Black Population in London* Unpublished manunscript. 2008.
25. Oliveria SA, Chen RS, McCarthy BD, Davis CC, Hill MN. Hypertension knowledge, awareness, and attitudes in a hypertensive population. *J Gen Intern Med*. 2004;20:219–225.
26. National Health Services, National Centre for Social Research. Health survey for England 2004. Volume 1: the health of minority ethnic groups. Available at: http://www.ic.nhs.uk/webfiles/publications/healthsurvey2004ethnicfull/HealthSurveyforEnglandVol1_210406_PDF.pdf. Accessed January 28, 2008.
27. Rieder A. Getting into a healthy ''CV success zone'': effective strategies to prevent CVD. *Eur Heart J Suppl*. 2007;9:B4–B7.
28. Brown CM, Segal R. The effects of health and treatment perceptions on the use of prescribed medication and home remedies among African American and White American hyptertensives. *Soc Sci Med*. 1996;43:903–917.
29. McClenahan C, Shevlin M, Adamson G, Bennett C, O'Neill B. Testicular self-examination: a test of the health belief model and the theory of planned behaviour. *Health Educ Res*. 2007;22:272–284.
30. Jackson L, Leclerc J, Erskine Y, Linden W. Getting the most out of cardiac rehabilitation: a review of referral and adherence predictors. *Heart*. 2005;91:10–4.
31. Sluijs EMF, Van Poppel MNM, Twisk JWR, Brug J, Van Mechelen W. The positive effect on determinants of physical activity of a tailored, general practice-based physical activity intervention. *Health Educ Res*. 2005;20:345–356.
32. Haase A, Steptoe A, Sallis JF, Wardle J. Leisure-time physical activity in university students from 23 countries: associations with health beliefs, risk awareness, and national economic development. *Prev Med*. 2004;39:182–190.
33. Covelli MM. Prevalence of behavioral and physiological risk factors of hypertension in African American adolescents. *Pediatr Nurs*. 2007;33(4):323–324.
34. Jones DW. Dietary sodium and blood pressure. *Hypertens*. 2004;43:932–935.
35. Haas M. Hypertension, race, and glomeruli: more than simply a numbers game [commentary]. *Kidney Int*. 2006;69:640–642.
36. Strecher V, Wang C, Derry H, Wildenhaus K, Johnson C. Tailored interventions for multiple risk behaviors. *Health Educ Res*. 2002;17:619–626.
37. Nazroo JY. *The Health of Britain's Ethnic Minorities: Findings from a National Survey*. London: Policy Study Institute; 1997.

AUTHOR CONTRIBUTIONS

Design concept of study: Newell, Modeste, Hopp Marshak, Wilson
Acquisition of data: Newell
Data analysis and interpretation: Newell, Modeste, Hopp Marshak, Wilson
Manuscript draft: Newell, Modeste, Hopp Marshak, Wilson
Statistical expertise: Hopp Marshak, Wilson
Acquisition of funding: Newell, Modeste, Hopp Marshak, Wilson
Administrative, technical, or material assistance: Modeste, Hopp Marshak, Wilson
Supervision: Modeste, Hopp Marshak, Wilson