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TRUST IN PHYSICIANS AND BLOOD PRESSURE CONTROL IN BLACKS AND WHITES BEING TREATED FOR HYPERTENSION IN THE REGARDS STUDY

Raegan W. Durant, MD, MPH; Leslie A. McClure, PhD; Jewell H. Halanych, MD, MSc; Cora E. Lewis, MD, MSPH; Ronald J. Prineas, MD, PhD; Stephen P. Glasser, MD; Monika M. Safford, MD

Objectives: Among persons treated for hypertension, Blacks are more likely to have uncontrolled blood pressure compared to Whites. Few studies have focused on trust in physicians as a potential contributor to this disparity in blood pressure (BP) control. The primary objective of this study was to assess the relationship between trust in physicians and blood pressure control among Blacks and Whites being treated for hypertension.

Design: Cross-sectional analysis of baseline data collected from the REasons for Geographic And Racial Differences in Stroke cohort, a US national, population-based cohort study. Participants were recruited by telephone from 2003–2007, completed a telephone survey, and had BP measured during an in-home visit.

Participants: 2843 Black and White adults aged >45 years with treated hypertension.

Main Outcome Measures: Uncontrolled blood pressure was defined as systolic blood pressure >140 mm Hg or diastolic blood pressure >90 mm Hg. For participants with diabetes, renal disease, or self-reported previous myocardial infarction, uncontrolled blood pressure was defined as systolic blood pressure >130 mm Hg or diastolic blood pressure >80 mm Hg.

Results: Trust in physicians was not associated with uncontrolled blood pressure in either unadjusted (odd ratio [OR] 1.07; 95% confidence interval [CI] 0.92, 1.25) or adjusted analyses (OR 0.97; 0.83, 1.14). Both Black race (OR 1.58; 1.36, 1.84) and imperfect medication adherence (OR 1.56; 1.31, 1.86) were associated with higher odds of uncontrolled blood pressure.

Conclusions: Trust in physicians was not related to blood pressure control among Blacks and Whites with treated hypertension in this sample. The racial disparity in blood pressure control was not completely explained by trust in physicians or medication adherence, and a better understanding of the mechanisms leading to this disparity is needed. (*Ethn Dis.* 2010;20:282–289)

Key Words: Hypertension, Trust, Disparities

From the Division of Preventive Medicine (RWD, JHH, CEL, SPG, MMS), the Department of Biostatistics (LAM), at the University of Alabama at Birmingham; and the Department of Epidemiology and Preventions at Wake Forest University of Medicine, Winston Salem, North Carolina (RJP).

Please address correspondence to Raegan W. Durant, MD, MPH; Division of Preventive Medicine; University of Alabama at Birmingham; 1717 11th Avenue South, Suite 607; Birmingham, AL 35294; 205-934-7608; rdurant@mail.dopm.uab.edu

INTRODUCTION

Blacks receiving antihypertensive therapy consistently have worse blood pressure (BP) control than Whites.[1–3] Despite improvements in BP control over the last several decades, slightly less than half of Blacks (49%) in the United States receiving treatment for hypertension have reached their BP goals, compared to 60% of their White counterparts.[4] High rates of uncontrolled hypertension among Blacks increase their risk of multiple complications, including heart failure, renal disease and stroke.[5–7] While differences in access to care may be a potential contributor to the racial disparity in BP control, national data suggest that Blacks are consistently more likely both to be aware of their elevated hypertension and to receive treatment for it when compared to Whites.[1,8–9] Once care is accessed, additional barriers may prevent Blacks from achieving the same rates of BP control compared to Whites. Previous studies have shown that differences in obesity or the presence of diabetes among Blacks do not completely explain the racial differences in BP control.[2,9] Previous data has shown that Blacks are slightly more intensely treated for their hypertension than otherwise similar Whites, but still have worse control.[10] One potential explanation for this disparity could be found in other less well-studied psychosocial factors such as trust in physicians.[11–14] Though clinical factors are often the primary focus of studies examining racial disparities among hypertensive individuals, some evidence suggests that trust in physicians may also influence control of hypertension.[15]

Trust in physicians is a key correlate of quality in physician-patient relationships.[16] For example, several studies

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have demonstrated associations between trust and patient satisfaction, self-rated health, health care utilization, and physician-patient communication.[17–19] However, less is known about the relationship between trust in physicians and actual health outcomes such as BP control among Blacks and Whites with hypertension.[20] Some have hypothesized that the relationship between trust in physicians and BP control may be mediated by medication adherence, that is, patients who maintain higher trust in their physicians may be more adherent, and therefore, experience better BP control.[19,21] The relationships among trust, medication adherence and control of hypertension have not been fully elucidated. Consequently, the primary objective of this study was to examine the relationship between trust in physicians and BP control among Blacks and Whites receiving treatment for hypertension, while also examining the potential mediating role of medication adherence.

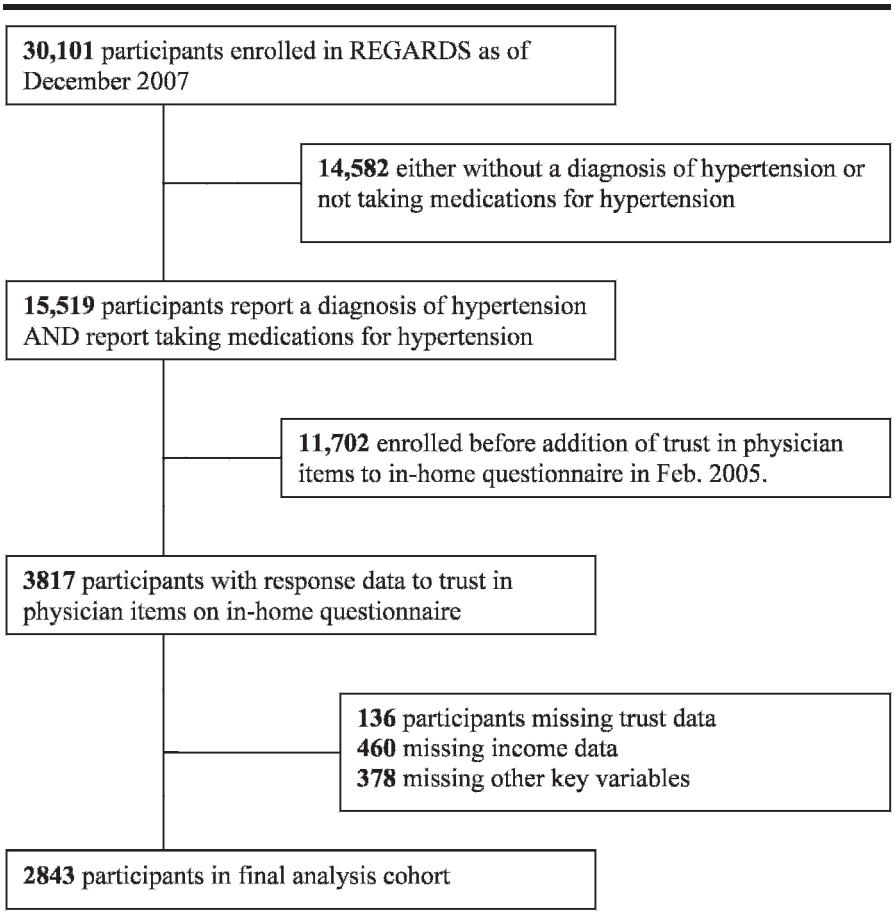

Fig 1. Flowchart describing definition of study population

METHODS

Study population

Baseline data were analyzed from a subset (n=2843) of the REasons for Geographic And Racial Differences in Stroke (REGARDS) cohort. The REGARDS effort is a national, population-based longitudinal cohort study including self-identified Blacks and Whites aged ≥45 years, living in the community, and balanced on sex and Black race by design. The sampling scheme and methods for REGARDS have been described in detail previously.[22] Briefly, the study cohort was recruited with an oversampling of both Blacks and persons living in either the stroke buckle (coastal plains region of North Carolina, South Carolina, and Georgia) or the stroke belt (remainder of North Carolina, South Carolina, and Georgia, plus Alabama, Mississippi, Tennessee, Arkansas, and Louisiana). At baseline, participants underwent computer-assisted telephone interviews assessing demographic information, medical history, and functional status. Following the computer-assisted telephone interview (CATI), trained research staff conducted an in-home visit which included an examination including a measurement of BP and a collection of blood and urine samples. During the in-home visit, self-administered questionnaires were left with participants to gather information on additional demographic and risk factor characteristics. Participants completed the questionnaires after the home visit and returned them by self-addressed, prepaid envelopes. Participants were contacted by telephone at 6-month intervals for surveillance of cardiovascular events such as stroke and myocardial infarction. The study methods were reviewed and approved by the institutional review boards at the collaborating institutions. This study focuses on the baseline data collected from the CATI, self-administered questionnaires and in-home visits.

The study population for these analyses was drawn from REGARDS participants with a diagnosis of hypertension who reported taking antihypertensive medications. At the time of these analyses in December 2007, 30,101 individuals (58% White, 42% Black) had completed the REGARDS baseline interview and in-home examination (Figure 1). Hypertension was defined as systolic blood pressure >140 mm Hg, diastolic blood pressure >90 mm Hg, or self-report of high blood pressure (a positive response to "Has a doctor or other health professional ever told you that you have high blood pressure?" excluding women told of hypertension only during pregnancy, defined as a positive response to "Was this only

when you were pregnant?''). Participants were considered treated for hypertension if they responded positively to the question, ''Are you now taking any medicine for high blood pressure?'' Of the total study population, 14,582 either did not have a diagnosis of hypertension or were not taking medications for hypertension. Of the remaining 15,519 participants, 11,702 were excluded because they were enrolled before the February 2005 addition of the trust in physician items to the self-administered questionnaire. Of the remaining 3817 participants, approximately 974 were excluded because of missing trust in physician data or other key variables. The final sample for these analyses was 2843, 1484 Blacks and 1359 Whites, all of whom had treated hypertension.

Measures

Blood pressure control was based on measurements taken during the in-home examination. Blood pressure was calculated as an average of 2 measurements taken after the participant was seated for 5 minutes measured by a trained technician using a standard protocol and regularly tested aneroid sphygmomanometer. Uncontrolled blood pressure was defined as systolic BP >140 mm Hg or diastolic BP >90 mm Hg based on guidelines from the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.[23] For those persons with diabetes (fasting glucose >126 mg/dL or use of insulin or other diabetes medications), renal disease (creatinine clearance <60 mL/min), or self-reported previous myocardial infarction, uncontrolled BP was defined as systolic BP >130 mm Hg or diastolic BP>80 mm Hg.[23,24]

Trust was measured using a 5-item modified version of the Primary Care Assessment Survey (PCAS) trust subscale which in our sample had acceptable internal reliability (Cronbach's alpha=.76).[25] The trust subscale has no substantial floor and ceiling effects and a relatively narrow item-total correlation of .49–.73.[25] The subscale is scored continuously (range 5–25) and higher scores represent higher levels of trust in one's physician. Scores were dichotomized around the median (20) into groups of high and low trust. In secondary analyses, PCAS trust subscale data were also included in analyses as continuous scores or categorized in quartiles. Information on race, age, sex, education level, income, tobacco and alcohol use, and exercise were all collected during the baseline interview.

Demographic variables included age and sex. Socioeconomic status variables were years of education (categorized as less than high school, high school graduate, some college, or college graduate), family income (<$25,000, $25,000–$50,000, and >$50,000), and whether the participant reported having health insurance (answering positively to ''Do you have any kind of healthcare coverage such as health insurance, an HMO, or a government plan like Medicare or Medicaid?''). Region was dichotomized as residence in the stroke belt (including the buckle region) or the remaining 40 contiguous states. Based on US census criteria and participant's home address, we categorized each participant's county of residence as urban (>75% urban), mixed (25–75% urban), or rural (<25% urban).[26] Body mass index (BMI) was categorized as normal (≤24.9 kg/m^2), overweight (25–29.9), or obese (≥30). Functional status was measured using the physical (PCS-12) and mental functioning (MCS-12) components of the SF-12.[27]

Behavioral risk factors potentially related to BP control were also examined. Medication adherence was assessed using the 4-item Morisky scale dichotomized into perfect (absence of any non-adherence) and imperfect adherence (any non-adherence for any reason).[28] Other health behaviors were assessed, including cigarette smoking (categorized as never, past, or current) and current alcohol consumption even occasionally (yes or no). Exercise was assessed by asking, ''How many times per week do you engage in intense physical activity, enough to work up a sweat?'' with response categories of never, <5 times per week, and >5 times per week. Responses were dichotomized into categories of 0 times per week and exercise at least once per week.

A social network scale was created using four items inquiring about: 1) the number of close relatives that you feel close to, 2) the number of close friends that you feel close to, 3) the availability of someone to provide transportation to doctor's visits, and 4) marital status. For the scale items, one point each was allotted to respondents for having at least 1 relative that he/she felt close to, having at least 1 friend that he/she felt close to, having someone to take you to the doctor at least some of the time and being married or living with someone in a marriage-like relationship. The social network scale scores ranged from 0 to 4, and higher scores represented stronger social networks.

Analysis

Using *t*-tests and chi-square test as appropriate, we compared participant characteristics among Blacks and Whites in the study population to identify any differences between the two groups. Bivariate analyses were then performed using chi-square or *t*-tests as appropriate to identify relationships between participant characteristics and uncontrolled BP. To determine the relationship between trust and uncontrolled BP, a logistic regression base model, including trust alone, was constructed. Covariates, grouped by domain, were sequentially added to determine if the relationship between trust in physicians and uncontrolled BP was altered by the addition of other characteristics to the model. The analyses also included tests for interactions between

Table 1. Characteristics of study population

Characteristics	Overall *N*=2843	Blacks *n*=1484, (52%)	Whites *n*=1359, (48%)	*P*-value
		n (%) or mean (SD)		
Uncontrolled blood pressure	1113 (39%)	658 (44%)	455 (33%)	<.0001
Sociodemographics				
Age (years)	66.0 (9.1)	64.7 (9.0)	67.3 (9.1)	<.0001
Male	883 (31%)	404 (27%)	479 (35%)	<.0001
Region: stroke belt/buckle	1695 (60%)	783 (53%)	912 (67%)	<.0001
Urban/rural residence				<.0001
Urban	1999 (70%)	1236 (83%)	763 (56%)	
Rural	269 (10%)	72 (5%)	197 (15%)	
Mixed	575 (20%)	176 (12%)	399 (29%)	
Socioeconomic factors				
Education ≤8th grade	362 (13%)	263 (18%)	99 (7%)	<.0001
Income				<.001
<$20,000	673 (24%)	463 (31%)	210 (15%)	
$20,000–$34,999	852 (30%)	455 (31%)	397 (29%)	
$35,000–$74,999	936 (33%)	433 (29%)	503 (37%)	
≥$75,000	382 (13%)	133 (9%)	249 (18%)	
Health insurance (yes)	2683 (94%)	1377 (93%)	1306 (96%)	.0001
Health behaviors				
Alcohol use				<.0001
None	1971 (69%)	1117 (75%)	854 (63%)	
Moderate	790 (28%)	342 (23%)	448 (33%)	
Heavy	82 (3%)	25 (2%)	57 (4%)	
Smoking				.0002
Never	1363 (48%)	706 (48%)	657 (48%)	
Current	399 (14%)	245 (17%)	154 (11%)	
Past	1081 (38%)	533 (36%)	548 (40%)	
No exercise	1110 (39%)	592 (40%)	518 (38%)	.33
Adherence (imperfect)*	844 (30%)	448 (30%)	396 (29%)	.54
Health Status				
SF-12				
Physical component score	43.9 (11.0)	43.2 (10.9)	44.7 (11.0)	.0002
Mental component score	51.9 (7.8)	51.6 (8.1)	53.3 (7.5)	.01
Social network†	3.2 (.8)	3.1 (.8)	3.4 (.8)	<.0001

* Adherence – Perfect (absence of non-adherence by 4-item Morisky scale); Imperfect (non-adherence for any reason).
† Continuous score on social network scale scored from 0 (weakest) to 4 (strongest) social network.

trust in physicians and other participant characteristics, and between race and other participant characteristics but there was no evidence for effect modification, thus interaction terms were not included in the final model. Data were analyzed using SAS version 9.1.[29]

RESULTS

Population Characteristics

Among the sample of 2843, the mean age was 66.0 (SD 9.1) and almost 1/3 were male (Table 1). There were nearly equal proportions of Blacks (52%) and Whites (48%). Blacks were slightly younger, more were female, and twice as many had a household income <$20,000. However there were no racial differences in imperfect medication adherence. Overall, 40% (1141/2843) of all participants expressed low trust in physicians. Respondents reporting low trust in physicians were more likely to be Black compared to White (56% vs 44%, $P<.0001$) (Table 2). Among those with perfect adherence, a larger proportion reported high trust compared to low trust (62% vs. 38%, $P<.005$). Respondents reporting low and high trust in physicians also varied by education level, adherence and social network scale score.

Trust, Race, and Blood Pressure Control

Trust in physicians was not associated with uncontrolled BP in the unadjusted analyses, and this was not altered by the sequential addition of other participant characteristics into the multivariable model. Therefore, only the univariate and final multivariable models are presented (Table 3). Secondary analyses

Table 2. Variation in trust in physicians by participant characteristics

Characteristics	Trust in Physicians		*P*-value
	High (*n*=1702)	Low (*n*=1141)	
	n (%)		
Race			<.0001
Black (*n*=1484)	834 (56%)	650 (44%)	
White (*n*=1359)	868 (64%)	491 (36%)	
Sex			.5
Male (*n*=883)	537 (61%)	346 (39%)	
Female (*n*=1960)	1165 (59%)	795 (41%)	
Region			.8
Stroke belt/buckle (*n*=1695)	1011 (60%)	684 (40%)	
Non-stroke belt/buckle (*n*=1148)	691 (60%)	457 (40%)	
Education			<.0001
≤8th grade (*n*=362)	169 (47%)	193 (53%)	
>8th grade (*n*=2481)	1533 (62%)	948 (38%)	
Adherence*			.005
Perfect (*n*=1999)	1230 (62%)	769 (38%)	
Imperfect (*n*=844)	472 (56%)	372 (44%)	
Social network† mean (SD)	3.3 (.76)	3.2 (.87)	<.0001

* Adherence – Perfect (absence of non-adherence by 4-item Morisky scale); Imperfect (non-adherence for any reason).

† Continuous score on social network scale scored from 0 (weakest) to 4 (strongest) social network.

using trust in physicians as a continuous or ordinal (quartiles of trust) measure also revealed no relationship with BP control. In absence of a primary relationship between trust in physicians and blood pressure control, the exploration of a role for medication adherence as a mediator was abandoned.

In adjusted analysis, Black race was associated with higher odds of uncontrolled BP (OR 1.57, 95% CI 1.34, 1.83). This relationship between race and BP control remained essentially unchanged with the addition of behavioral factors, health and functional status, and the social network scale to the multivariable model (Table 3). Other participant characteristics such as age, and male sex were related to uncontrolled BP in both univariate models and in the final multivariable model (Table 3).

The analyses demonstrated no relationship between trust in physicians and BP control.

DISCUSSION

The analyses demonstrated no relationship between trust in physicians and BP control. Though we found lower trust in physicians among Blacks compared to Whites, the higher odds of uncontrolled hypertension among Blacks compared to Whites was not attributable to the racial differences in trust. While other factors such as medication adherence were related to BP control, none completely explained the racial differences in control of hypertension.

This study reinforces the results of previous studies showing that Blacks are often less trusting of their physicians compared to Whites.[18,30] Similarly, some previous studies in hypertensive populations have also failed to show a relationship between trust in physicians and outcomes such as BP control.[20] In a VA population, Rawaf and colleagues found higher levels of trust among Whites compared to Blacks, but did not find an association between trust in physicians and BP control.[20]

The influence of trust in physicians on health outcomes, such as BP control, may vary according to patients' sense of vulnerability. Trust in physicians is based, in part, on a sense of vulnerability often due to patients' fears or lack of knowledge about a particular illness.[31] Hypertension is prevalent in the United States, providing for a relatively widespread understanding of both the disease and the need for medical therapy.[3] Futhermore, patients frequently underestimate the risk of long-term complications from hypertension and believe that alternative treatments such as taking herbs and stress reduction are also effective in lowering blood pressure.[3,32] A lower sense of vulnerability among largely asymptomatic hypertensives may minimize any influence of trust on BP control in this disease context. In contrast, trust in physicians, has been shown to be more closely related to medication adherence and other outcomes for more symptomatic or less commonly known diseases such as diabetes or inflammatory bowel disease.[33,34]

The absence of a relationship between trust in physicians and BP control in our study could have important implications for the development of culturally tailored interventions aimed at improving outcomes among hypertensive individuals. Some studies have already begun implementing or testing interventions designed to improve trust in physicians as a means of impacting hypertension and other outcomes.[35,36] However, while improving trust in physicians may be likely to improve patient satisfaction with care, continuity, and adherence,[37] it remains unclear what impact increasing trust will have on disease outcomes such as BP control among hypertensive individuals. Few would argue against the inherent value of trust in physicians, but interventions

Table 3. Unadjusted and adjusted odds ratios (95% confidence interval) of uncontrolled blood pressure*

	Univariate	Multivariate model
Trust	1.07 (.92, 1.25)	.97 (.83, 1.14)
Demographics		
Age (years)	1.02 (1.01, 1.02)	1.02 (1.02, 1.04)
Male (ref: female)	1.40 (1.17, 1.61)	1.65 (1.38, 1.97)
Region (belt/buckle) (ref: rest of US)	.92 (.78, 1.08)	1.03 (.87, 1.22)
Urban Group (ref: urban)		
Rural	1.06 (.86, 1.30)	1.09 (.88, 1.35)
Mixed	1.21 (.92, 1.59)	1.20 (.91, 1.60)
Black Race (ref: Whites)	1.58 (1.36, 1.84)	1.56 (1.31, 1.86)
SES Factors		
Education ≤8th Grade (ref: >8th grade)	1.44 (1.16, 1.80)	1.09 (.86, 1.40)
Income (ref: >$75,000)		
<$20000	1.9 (1.49, 2.54)	1.34 (.97, 1.85)
$20000–$34999	1.57 (1.21, 2.03)	1.24 (.93, 1.65)
$35000–$74,999	1.42 (1.10, 1.84)	1.22 (.93, 1.59)
Insurance (ref: uninsured)	1.04 (.75, 1.44)	1.03 (.72, 1.46)
Health Behaviors		
No alcohol use (ref: moderate or heavy alcohol use)	1.67 (1.02, 2.72)	1.43 (.85, 2.38)
Smoking (ref: never)		
Current	1.20 (.96, 1.51)	1.26 (.99, 1.61)
Past	.98 (.84, 1.16)	.88 (.74, 1.04)
Exercise 0 times per week (ref: >0 times per week)	1.06 (.92, 1.24)	.95 (.80, 1.12)
Health Status		
PCS†	.99 (.98, .99)	.99 (.99, 1.00)
MCS†	1.00 (.99, 1.01)	.99 (.99, 1.01)
Body mass index (ref: normal weight)		
Overweight	1.20 (.96, 1.52)	1.19 (.94, 1.51)
Obese	1.69 (1.36, 2.09)	1.75 (1.39, 2.21)
Social network‡	.84 (.76, .92)	.90 (.81, 1.00)
Imperfect adherence§ (ref: perfect adherence)	1.33 (1.13, 1.56)	1.33 (1.12, 1.58)

* Multivariable model adjusted for age, race, sex, region, rural/urban designation, education, income, insurance status, alcohol use, tobacco use, exercise, functional status, BMI, social network, and adherence.

† Continuous scores of PCS (physical component scores) and MCS (mental component scores) of SF-12.

‡ Continuous score on social network scale scored from 0 (weakest) to 4 (strongest) social network.

§ General medication adherence categorizes as perfect (absence of non-adherence by Morisky scale); imperfect (any non-adherence for any reason).

aimed at improving trust in physicians may only yield changes in intermediate outcomes rather than actual clinical endpoints such as improved BP control. Therefore, investigators should continue to clarify the link between trust and health outcomes to further inform reasonable expectations of ongoing and future trust-building interventions.

Though multiple factors such as medication adherence were related to BP control, none of them completely explained the racial disparity. Medication adherence is often heralded as a primary cause of less well-controlled BP among Blacks,[38] but in this study, there was no difference in medication adherence of Black compared to White participants. The analyses suggest that other factors are contributing to the racial differences in control of hypertension. Yet, other behavioral factors such as excess alcohol intake, tobacco use, and physical activity did not contribute to the disparity in BP control either. While more work is needed to understand other patient behaviors, such as diet, that may contribute to racial differences in BP control, investigators may wish to broaden their focus beyond patients as a source of disparities in hypertension.[39] Future efforts to identify contributing factors and potential solutions could include patient, environmental, and system factors.[40]

There are several limitations to be noted. Though REGARDS comprises a national community-dwelling cohort, the study population may not be representative of all persons with hypertension. We included only those receiving treatment for hypertension in this analysis, increasing the likelihood that each participant in the study sample was engaged with the healthcare system, but simultaneously excluding some individuals with hypertension. Furthermore, the levels of trust in physicians and

medication adherence were high among both Blacks and Whites in the study population. Consequently, the study sample may not be representative of those persons not engaged with the healthcare system with lower trust or lower medication adherence. We only measured trust in physicians without exploring other dimensions of trust such as institutional or societal trust. Certainly these other dimensions of trust may influence trust in physicians,[41] or may be independently related to BP control. We also measured medication adherence by self-report using the well-validated Morisky scale.[28] Although, self-reported medication adherence may not always correlate with more direct assessments of adherence such as medical event monitoring systems,[42] lower patient-reported adherence has been previously associated with higher BP levels in both Blacks and Whites.[43]

In conclusion, the analysis did not reveal an association between trust in physicians and BP control. Racial disparities in hypertension persisted despite controlling for other sociodemographics, clinical factors, and health behaviors. Trust in physicians can potentially influence patient communication and health behaviors, and future studies should build on this knowledge to identify those disease outcomes that are related to trust among persons being treated for hypertension. However, additional studies should also focus on other factors, including non-patient factors, as potential contributors to racial disparities in BP control.

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