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ORIGINAL RESEARCH

Association Between Patient-Clinician Relationships and Adherence to Antihypertensive Medications Among Black Adults: An Observational Study Design

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BACKGROUND: We assessed the associations between patient-clinician relationships (communication and involvement in shared decision-making [SDM]) and adherence to antihypertensive medications.

METHODS AND RESULTS: The 2010 to 2017 Medical Expenditure Panel Survey (MEPS) data were analyzed. A retrospective cohort study design was used to create a cohort of prevalent and new users of antihypertensive medications. We defined constructs of patient-clinician communication and involvement in SDM from patient responses to the standard questionnaires about satisfaction and access to care during the first year of surveys. Verified self-reported medication refill information collected during the second year of surveys was used to calculate medication refill adherence; adherence was defined as medication refill adherence ≥80%. Survey-weighted multivariable-adjusted logistic regression models were used to measure the odds ratio (OR) and 95% CI for the association between both patient-clinician constructs and adherence. Our analysis involved 2571 Black adult patients with hypertension (mean age of 58 years; SD, 14 years) who were either persistent (n=1788) or new users (n=783) of antihypertensive medications. Forty-five percent (n=1145) and 43% (n=1016) of the sample reported having high levels of communication and involvement in SDM, respectively. High, versus low, patient-clinician communication (OR, 1.38; 95% CI, 1.14–1.67) and involvement in SDM (OR, 1.32; 95% CI, 1.08–1.61) were both associated with adherence to antihypertensives after adjusting for multiple covariates. These associations persisted among a subgroup of new users of antihypertensive medications.

CONCLUSIONS: Patient-clinician communication and involvement in SDM are important predictors of optimal adherence to antihypertensive medication and should be targeted for improving adherence among Black adults with hypertension.

Key Words: adherence ■ antihypertensive medication ■ black adults ■ communication ■ hypertension ■ patient-clinician relationships ■ shared decision-making

Only 27% to 53% of Black adults are fully adherent to their antihypertensive medications,[1–6] which is associated with increased hypertension morbidity, mortality, and avoidable healthcare costs.[7–10] Black patients experience worse hypertension outcomes, potentially because of poorer adherence to antihypertensive medications, compared with all racial groups in the United States.[3,11–15] Interventions to increase adherence can improve clinical outcomes,[16–18] but only a few have been well studied among Black patients.[19–21]

Medication adherence functions as a shared agreement between patients and clinicians.[22] Patients are

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CLINICAL PERSPECTIVE

What Is New?

- The effects of patient-provider relationships on adherence to antihypertensive medication therapy were observed among Black adults but not among other racial/ethnic groups.
- Our data elucidated the associations between patient-provider relationships (communication and shared decision-making) and adherence to antihypertensive medications using a large national longitudinal data set.

What Are the Clinical Implications?

- Black patients may be more likely to benefit from effective communication and higher involvement in shared decision-making with respect to antihypertensive medication adherence than are other ethnic groups.
- It is possible that providers who communicate effectively and involve Black patients in shared decision-making may be less likely to be biased against Black patients.
- Black patients are likely to be more trusting of providers who communicate effectively and involve them in shared decision-making and, consequently, are more likely to adhere to treatment recommendation.

Nonstandard Abbreviations and Acronyms

CAHPS	consumer assessment of healthcare providers and systems
HCAHPS	hospital consumer assessment of healthcare providers and systems
MEPS	medical expenditure panel survey
MEPS-HC	household component of the medical expenditure panel survey
MRA	medication refill adherence
SAQ	self-administered questionnaire
SDM	shared decision-making

more receptive to clinical recommendations when there is an engaged partnership.[23,24] Existing conceptual frameworks have often placed adherence to medications as an intermediary outcome between patient-clinician relationships and health outcomes.[25,26] Communication and shared decision-making (SDM) have shown direct and indirect effects on medication adherence.[25,26] The indirect pathways between these tenets of the patient-clinician relationships and medication adherence are mediated by proximal affective-cognitive outcomes (eg, trust in clinicians, satisfaction with health care, and understanding) of the patient-clinician relationship.[26]

Patients are more likely to be adherent to medications, in general, when they have good communication with their clinician.[27] A few studies among small samples of Black patients (n=92–723) found a positive relationship between patient-clinician communication and adherence to antihypertensive medications.[28–31] Three separate systematic reviews reported that there is insufficient data to determine the effect of SDM on medication adherence in the general population and among socioeconomically disadvantaged groups.[26,32,33]

Methodological limitations regarding the use of cross-sectional study designs, small sample sizes of Black patients (n=92–723), lack of geographically representative populations, and self-reported measures of adherence limit the scientific rigor of the extant evidence base for the association between patient-clinician relationships and adherence. Disentangling these relationships with cross-sectional and cohort studies, where exposures and outcomes are measured at single fixed time points, is difficult. For instance, patients with controlled blood pressure (BP) tend to be more adherent, yet adherence to antihypertensive medications is also shown to improve BP control.[34–36] Patients with poor health outcomes, such as uncontrolled BP, also tend to have negative perceptions of interactions with clinicians.[37,38]

We therefore sought to leverage a nationally representative healthcare utilization data set to assess the associations between patient-clinician relationships (communication and involvement in SDM) and adherence to antihypertensive medications among Black adults with hypertension. A better understanding of the associations between patients' perspectives about their communication and SDM with clinicians on adherence could help guide the formulation of effective interventions to improve antihypertensive medication adherence among Black patients.

METHODS

We will make our analytic methods available to other researchers upon request. Medical Expenditure Panel Survey (MEPS) is publically available. The data that support the findings of this study are available from the MEPS website: https://www.meps.ahrq.gov/mepsweb/. The use of this publically available data set did not require institutional review board approval.

Data Source and Setting

We analyzed data from Household Component of the Medical Expenditure Panel Survey (MEPS-HC) from

2010 to 2017.[39] MEPS-HC data are collected from a nationally representative sample of households through an overlapping panel design (Figure 1). These data are collected in 5 rounds of interviews during a 2-year period. Survey questionnaires are used to gather data on self-reported health status, medical conditions, health insurance status, healthcare access, prescription medication use, and access to and satisfaction with the clinician. To verify and obtain detailed prescription medication use, respondents are asked to provide names of prescription medications obtained and to identify the pharmacy where medications were filled. MEPS seeks the consent of respondents to contact pharmacies to collect the following information about drugs obtained: payments, payers, date each prescription was filled, quantity dispensed, and the National Drug Code.[40] The pharmacies also provide information on the number of times medications are filled within a given calendar year.[40]

Study Design

Figure 1 is an illustration of how the MEPS panel design data were leveraged to create a cohort of antihypertensive medication users. In this illustration, 2 years of data from 5 rounds of surveys are combined to create a cohort of participants who filled at least 1 prescription of antihypertensive medication. Data collected from rounds 1 through 3 in 2015 (year 1) were used to define patient-clinician constructs (communication and SDM) and all potential confounders. The 2016 data (year 2) were used to define adherence measures based on medication refills and the days' supply of filled antihypertensive medications. Among the primary analysis cohort, we identified a subgroup of new users as patients who only began using antihypertensive medications in year 2 but had no prior records of antihypertensive medication use in year 1. The year 1 and 2 periods are referred to as the baseline and follow-up periods, respectively.

Participant Selection

Figure 2 is a flowchart of participant selection. Our analysis included participants who reported a hypertension diagnosis and antihypertensive medication use. For the patient-clinician communication and adherence analysis, we further restricted the primary analysis to only participants who reported visiting a clinic or a doctor's office in the past 12 months; the Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey questionnaire was administered to only participants who met this criterion. Additionally, participants were required to have had a usual source of care in the previous year to be included in the analysis for measuring the associations between SDM and adherence. This restriction was necessary because SDM is defined from both the CAHPS and access to healthcare survey questionnaires.
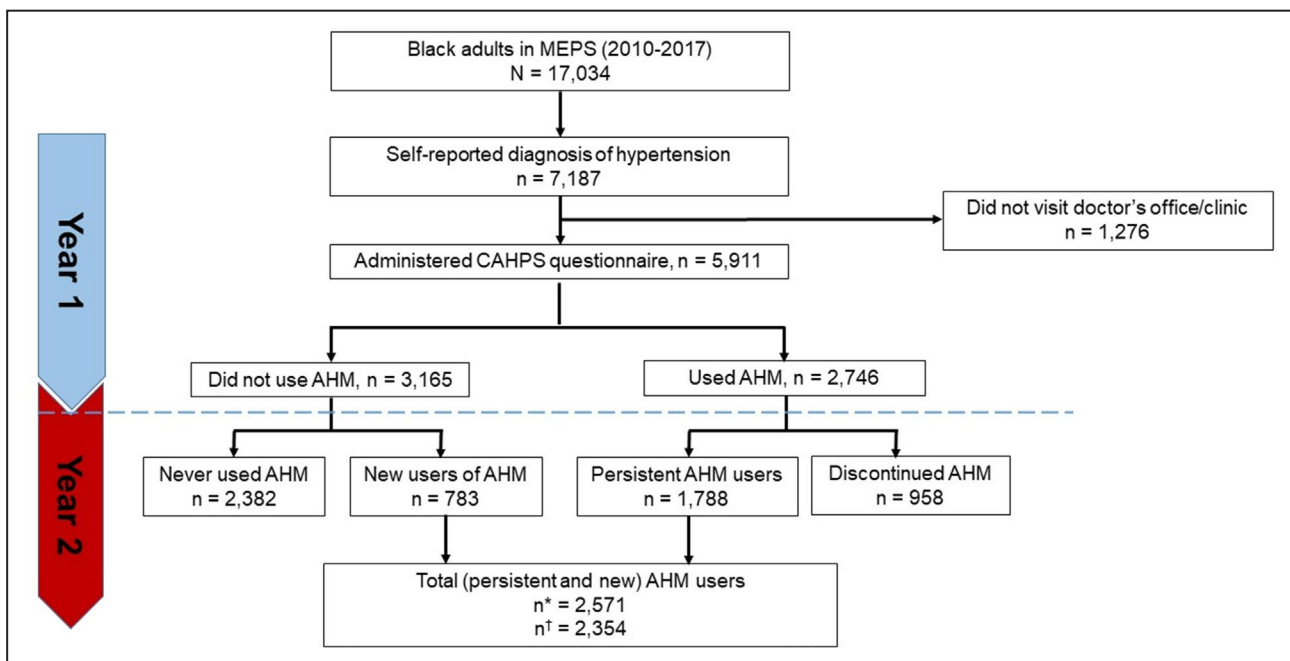
Figure 1. Study design.
In this illustration, 2 years of data from 5 rounds of surveys are combined to create a cohort of participants who filled at least 1 prescription of antihypertensive medication. Data collected from rounds 1 through 3 in 2015 are used to define patient-provider engagement factors (shared decision-making, communication, and trust) and all covariates (individual characteristics and provider characteristics). On the other hand, the 2016 data are used to define medication refill adherence based on medication refill and the days' supply of filled drugs. MEPS indicates Medical Expenditure Panel Survey.
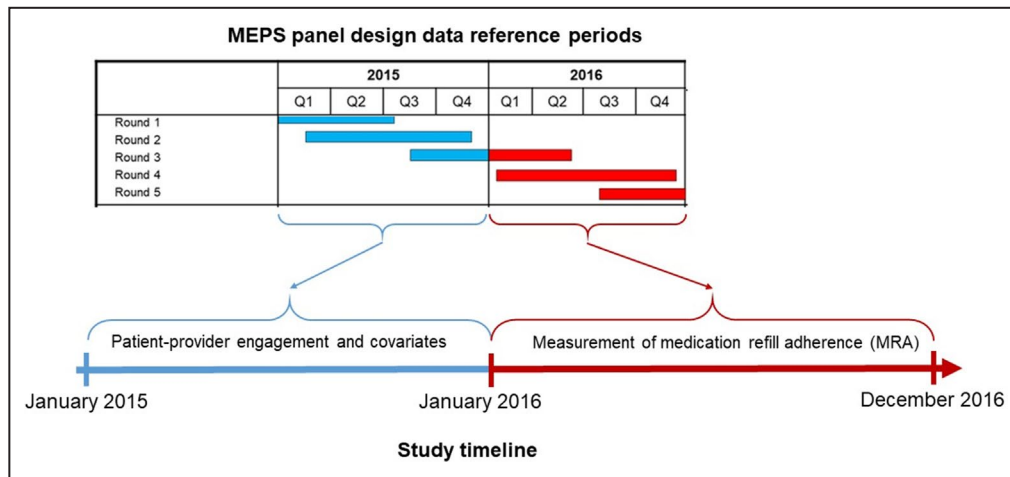
Figure 2.   Participant selection.
Black adults were identified from the 2010 to 2017 MEPS (Medical Expenditure Panel Survey) data. The year 1 data were used for identifying Black patients with a hypertension diagnosis and antihypertensive medication (AHM) use. Persistent use, discontinuation, and new use of AHMs were assessed from the year 2 data. *Sample for measuring associations between patient-clinician communication and adherence to AHMs. †Sample for measuring associations between patient involvement in shared decision-making and adherence to AHM. AHM users (n=217) were excluded if they lacked access to a usual source of care provider. CAHPS indicates Consumer Assessment of Healthcare Providers and Systems.

Measurement of Patient-Clinician Constructs

Our analysis is based solely on patients' perspectives about their engagement with clinicians. MEPS participants' perspectives about access to care and the quality of health care they received were assessed with computer-assisted personal interview and self-administered supplemental paper questionnaires (Self-Administered Questionnaire [SAQ]), respectively (https://www.meps.ahrq.gov/mepsweb/survey_comp/survey.jsp#Questionnaires). The healthcare quality measures in SAQ were adapted from the health plan version of CAHPS (Consumer Assessment of Healthcare Providers and Systems). CAHPS is a reliable and valid tool for capturing information about health plans' performances from racially/ethnically diverse consumers.[41–44] CAHPS' survey items have also been used to accurately measure patient-clinician communication and SDM among all racial/ethnic groups.[44,45] Previous studies have examined the associations between medication adherence and patient-clinician constructs defined from CAHPS survey items.[46–48] We referred to human providers as clinicians in this study.

The patient-clinician communication construct was created from participant responses (never, sometimes, usually, always) to the questions: how often does the care provider (1) listen carefully to the patient; (2) explain to the patient; (3) show respect to the patient; and (4) spend enough time with the patient? The Hospital CAHPS (HCAHPS) "top-box" scoring approach was used to dichotomize responses to each item as 1 for

"always" and 0 for any other response.[49] These binary scores were then summed to generate a composite score of patient-clinician communication ranging from 0 to 4 ("always" to all 4 items).[29] Composite scores of 4 ("always") were considered high and those <4 were considered low levels of patient-clinician communication.[49,50]

The SDM construct was defined from the 4 CAHPS items described above plus 3 additional questions about patients' satisfaction with their usual source of care provider: does the usual source of care provider (1) usually ask about and show respect for medical, traditional, and alternative treatments that the person is happy with (never/sometimes/usually/always)?; (2) ask the person to help make decisions between a choice of treatments (never/sometimes/usually/always)?; and (3) usually ask about prescription medications and treatments other doctors may give them (yes/no)?.[51] The top-box approach was used to dichotomize responses into 1 (always) and 0 (never, sometimes, usually) scores for the questions with Likert scale responses. "Yes" responses were coded as 1, whereas "no" responses were coded as 0. The sum of these scores ranged from 0 to 7, with SDM scores ≥6 considered as high and scores <6 considered as low based on the top-box approach.[49,50]

Outcomes

We considered medication refill adherence (MRA) as a measure of adherence to antihypertensive medications. The MEPS Prescribed Medicines Files provide

detailed information on the type, dosage, and payment for each filled prescription for MEPS participants in each year. For each individual selected for our analysis, MRA was calculated as the percent of total days' supply of antihypertensives divided by number of days of study participation (365 days).[52,53] MRA has been previously used to measure adherence from the MEPS data set.[47,54] An overall MRA was obtained as the average of MRAs calculated for separate therapeutic classes of antihypertensive medications if a participant was using >1 antihypertensive agent from multiple therapeutic classes. Patients were considered to be adherent to antihypertensive medications if their overall MRA was ≥80%.[55–57]

Potential Confounders

The World Health Organization suggests multidimensional frameworks of adherence through which several predictors affect medication adherence at the individual patient, healthcare provider and healthcare system levels.[58] We applied a directed acyclic graph to identify and illustrate the interrelationships between predictors of medication adherence as potential confounders of the associations between patient-clinician relationships and adherence to antihypertensive medications (Figure 3). Through this directed acyclic graph, we identified social/economic, patient-related, condition-related, and antihypertensive therapy–related factors as an individual patient-level potential confounder; a detailed list of these variables is provided in Table 1. These individual-level factors can influence both the patient-clinician relationships and adherence to

antihypertensive medications directly or indirectly via provider characteristics (provider specialty, race, and sex) and healthcare system factors (health insurance status, source of payment of healthcare services, out-of-packet payment, and number of office visits).

Statistical Analysis

Descriptive analysis was conducted to compare the frequency and mean distributions of baseline covariates between participants grouped into high versus low levels of communication and SDM. Standardized difference tests were used to assess the balance of baseline covariates between the comparison groups. Next, we used logistic regression models weighted by MEPS survey weights[59] to measure the odds ratios (ORs) and 95% CIs for the associations between each construct of the patient-clinician relationships and adherence to antihypertensive medications. Because the literature shows a worsening trend of hypertension awareness and control in recent years, we fixed a linear time trend in calculating all adjusted ORs.[60] We calculated all estimates (prevalences, averages, and ORs) and their standard errors based on standardized approaches for obtaining weighted estimates among subpopulations in MEPS.[59] The goal of our primary analyses was to measure the following associations between each patient-clinician construct and adherence, modeled as a binary outcome (MRA ≥80% versus <80%). Communication and SDM were modeled both as binary and ordinal-scale independent variables.

Three sets of sensitivity analysis were performed to:
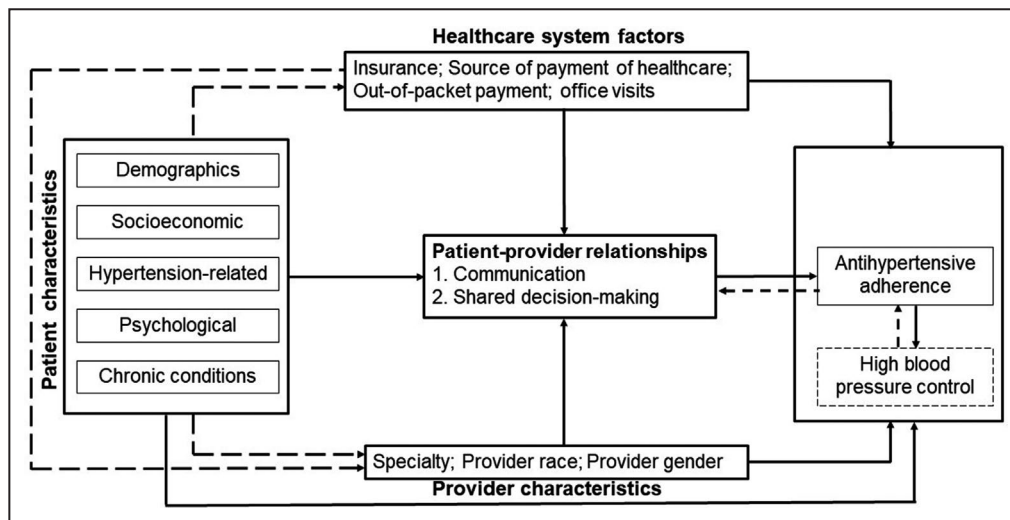
Figure 3.   Directed acyclic graph (DAG).
This DAG was used for identifying potential confounders of the associations between patient-clinician relationships and adherence to antihypertensive medications. The direct paths from each set of confounders (patient characteristics, provider characteristics, and healthcare system factors) to the primary exposure (patient-clinician relationships) and outcome (adherence) were modeled. Solid lines represent direct paths; dashed lines represent indirect paths or feedback loops.

Table 1. Distribution of Baseline Covariates by Levels of Communication and SDM Among Black Patients With Hypertension

Baseline Characteristics	Communication			Involvement in SDM		
	Frequency, %*		SDT†	Frequency, %*		SDT†
	Low (n=1426)	High (n=1145)		Low (n=1338)	High (n=1016)	
Demographics						
Age, mean (SD), y	57 (13)	59 (13)	0.10	58 (13)	59 (13)	0.05
Age categories, y						
18–44	232 (17)	159 (15)	0.06	201 (16)	145 (16)	0.01
45–64	721 (52)	585 (52)	0.00	684 (53)	508 (51)	0.04
≥65	473 (31)	401 (33)	0.04	453 (31)	363 (33)	0.06
Sex						
Women	903 (64)	751 (63)	0.01	863 (63)	665 (64)	0.01
Men	523 (36)	394 (37)	0.01	475 (37)	351 (36)	0.01
Geographic region of residence						
Midwest	248 (19)	203 (18)	0.03	238 (21)	171 (16)	0.11
Northeast	181 (11)	161 (13)	0.06	177 (12)	138 (12)	0.01
South	908 (63)	736 (65)	0.05	839 (61)	662 (68)	0.15
West	89 (7)	45 (4)	0.15	84 (7)	45 (4)	0.12
Education						
Up to high school	520 (58)	448 (57)	0.02	494 (58)	400 (56)	0.03
College and beyond	906 (42)	697 (43)	0.02	844 (42)	616 (44)	0.03
Speaking English at home						
English	1416 (99)	1137 (99)	0.03	1331 (99)	1008 (99)	0.01
Non-English	10 (1)	8 (1)	0.03	7 (1)	8 (1)	0.01
Socioeconomic factors						
Marital status						
Married	910 (62)	716 (58)	0.09	867 (62)	627 (58)	0.08
Not married	516 (38)	429 (42)	0.09	471 (38)	389 (42)	0.08
Employment status						
Employed	525 (42)	449 (42)	0.01	482 (42)	392 (43)	0.02
Unemployed	901 (58)	696 (58)	0.01	856 (58)	624 (57)	0.02
Poverty status						
Above poverty level	998 (78)	821 (78)	0.00	936 (77)	737 (79)	0.05
Below poverty level	428 (22)	324 (22)	0.00	402 (23)	279 (21)	0.05
Cost-related barriers						

(Continued)

Table 1. Continued

Baseline Characteristics	Communication			Involvement in SDM		
	Frequency, %*			Frequency, %*		
	Low (n=1426)	High (n=1145)	SDT†	Low (n=1338)	High (n=1016)	SDT†
Ever delay, forego, or make change in prescription medicine because of cost	101 (11)	38 (4)	0.25	83 (10)	40 (4)	0.24
Ever delay, forego, or make change in treatment because of cost	131 (8)	54 (3)	0.21	122 (7)	52 (4)	0.14
Hypertension-related						
Have blood checked in the past y	1378 (98)	1116 (98)	0.01	1301 (98)	992 (98)	0.03
Duration of hypertension, mean (SD), y	13 (11)	14 (11)	0.04	13 (11)	14 (11)	0.04
Antihypertensive therapy–related factors						
Prior use of AHMs	988 (68)	800 (69)	0.02	948 (70)	714 (69)	0.01
Adherent (MRA in y 1 ≥80%)	398 (40)	339 (42)	0.04	396 (41)	301 (42)	0.02
Chronic comorbidities						
Poor physical health	254 (17)	142 (11)	0.18	227 (15)	142 (13)	0.07
Poor mental health	111 (8)	53 (5)	0.13	96 (7)	56 (6)	0.04
Cognitive limitations	194 (12)	126 (10)	0.08	185 (12)	120 (10)	0.06
Coronary heart disease	158 (11)	130 (10)	0.02	150 (11)	121 (10)	0.02
Angina	80 (6)	46 (3)	0.12	77 (6)	41 (4)	0.11
Myocardial infarction	122 (7)	93 (8)	0.00	121 (8)	80 (6)	0.07
Other heart diseases	266 (19)	190 (17)	0.07	244 (19)	184 (18)	0.03
Stroke	177 (12)	134 (10)	0.06	163 (11)	128 (10)	0.03
Diabetes mellitus	430 (30)	396 (33)	0.07	417 (30)	355 (33)	0.07
Arthritis	766 (55)	579 (49)	0.12	730 (54)	532 (50)	0.08
Asthma	211 (15)	184 (16)	0.02	201 (15)	176 (17)	0.05
Chronic bronchitis	85 (5)	62 (5)	0.01	81 (5)	56 (5)	0.01
Cancer	151 (11)	117 (10)	0.05	133 (10)	117 (10)	0.00
Provider characteristics						
Provider specialty						
General/family practice/ internal medicine	381 (31)	363 (38)	0.14	402 (31)	342 (38)	0.15

(Continued)

Table 1. Continued

Baseline Characteristics	Communication			Involvement in SDM		
	Frequency, %*			Frequency, %*		
	Low (n=1426)	High (n=1145)	SDT†	Low (n=1338)	High (n=1016)	SDT†
Other medical doctor	37 (3)	21 (2)	0.08	32 (3)	26 (3)	0.01
Specialist (cardiologist/nephrologist)	133 (12)	94 (10)	0.08	134 (12)	93 (11)	0.04
Provider not human††	717 (55)	581 (53)	0.05	755 (57)	543 (51)	0.11
Other provider	13 (1)	14 (1)	0.02	15 (1)	12 (1)	0.01
Provider and patient are of the same sex	568 (45)	466 (47)	0.03	596 (46)	438 (45)	0.02
Provider and patient are of the same race	129 (11)	111 (12)	0.05	139 (110)	101 (13)	0.10
Healthcare system factors						
Uninsured	132 (8)	72 (5)	0.13	113 (8)	60 (6)	0.09
Do not have usual source of payment	183 (11)	104 (8)	0.11	141 (10)	93 (8)	0.05
Payment source is Medicaid	323 (20)	263 (20)	0.00	321 (21)	230 (20)	0.03
Payment source is Medicare	347 (23)	276 (23)	0.00	326 (22)	257 (24)	0.05
Payment source is private insurance	548 (44)	483 (49)	0.10	514 (44)	430 (49)	0.10
Out-of-pocket payments, mean (SD), $	307 (629)	323 (704)	0.02	325 (686)	303 (641)	0.03
No. of office visits, mean (SD)	10 (19)	9 (18)	0.06	10 (20)	9 (17)	0.04

AHM indicates antihypertensive medication; MRA, medication refill adherence; SDM, shared decision-making; and SDT, standardized difference test.

*Frequencies are absolute counts, whereas percentages are weighted by the Medical Expenditure Panel Survey's sampling weights.

†Standardized difference >0.10 indicates that the covariate is unbalanced between groups being compared.

††Provider not human refers to healthcare institutions where patients received care, a particular human provider (e.g. physician, nurse, etc) is not assigned in this case.

1. Test for the potential presence of reverse associations. The potential presence of reverse association between adherence and patient-clinician relationships is illustrated in the directed acyclic graph (Figure 1) by a feedback loop from high BP to adherence and back to patient-clinician relationships. For example, patients who have their BP under control are most likely to adhere and to rate their communication and involvement in SDM as high than when their high BP is not under control with antihypertensive treatment and vice versa. To test for the presence of a reverse association, we first repeated the analysis among new users of antihypertensive medications. We assumed that the reported baseline communication and SDM scores are not influenced by patients' adherence behaviors in year 1 since new users did not report using antihypertensives in year 1. Therefore, any observed associations between patient-clinician relationships and adherence among new users are not influenced by prior adherence behaviors (assumption 1). Second, we explored whether prior adherence (MRA in year 1) was associated with the patients' perceptions of their communication and involvement in SDM; a lack of association would suggest that the reported patient-clinician scores are not influenced by prior adherence (assumption 2). If both assumptions 1 and 2 hold true, then it is unlikely that the observed associations in the primary analysis are under the influence of potential reverse associations between patient-clinician relationships and adherence.

2. Identify individual items of patient-clinician constructs associated with adherence. We modeled individual items of both communication and SDM constructs as the main predictors of adherence by repeating the models described in the primary analysis.

3. Assess whether the associations between patient-clinician relationships and adherence is modified by race/ethnicity. We tested for interaction between race/ethnicity (Black versus non-Black individuals) and generated race/ethnicity-specific data on the associations between patient-clinician relationships and adherence.

Between 8% and 12% were missing a response to questions about patient-clinician communication and SDM; therefore, we imputed values via random selection methods.[61,62] The distributions of single items and overall communication and SDM scores did not change after random selection imputation (Table S1 and S2).

RESULTS

Participants

The primary analysis results reported are based on a total of 2571 (weighted n=2 039 511) Black adult patients with hypertension who had office/clinic visits in the past 12 months; 70% (weighted n=1 399 259) of these patients were persistent users and 30% (weighted n=640 252) started using antihypertensive medications during the second year of the MEPS surveys. Forty-five percent of the sample had high levels of communication with their clinicians. Among the 2354 patients (weighted n=1 865 852) who had a usual source of care provider and had an office/clinic visit in the past 12 months, 43% reported having high levels of involvement in SDM. The distribution of responses to individual items are reported in Table S2.

Distribution of Participant Characteristics

Table 1 describes the distribution of baseline characteristics by binary levels of patient-clinician communication (unweighted n=2571; weighted n=2 039 511) and patient involvement in the SDM process (unweighted n=2354; weighted n=1 865 852) among those who responded to CAHPS and the access to care questionnaire, respectively. The standardized difference tests (>0.10) showed that the majority of the baseline covariates were balanced between levels of communication except for geographic region of residence (West), healthcare cost–related barriers, healthcare system factors (uninsured, lack of usual source of payment), provider specialty (general medical doctor), and chronic comorbidities (poor physical and mental health, angina, arthritis). Similarly, geographic region of residence (Midwest, South, West), healthcare cost–related barriers, healthcare system factors (uninsured, lack of usual source of payment), provider specialty (general medical doctor, nonhuman), and chronic comorbidities (poor physical and mental health, angina, arthritis). The distribution of responses to patient-clinician interactions and baseline characteristics were similar before and after missing data imputation (Table S3).

Patterns of Prevalence of Adherence by Levels of Patient-Clinician Communication and Involvement in SDM

The overall prevalence of adherence to antihypertensive medications (MRA ≥80%) was 40% with a median MRA of 66% (interquartile range [IQR], 41%–98%). The median MRAs were significantly higher among patients with high (74.0; IQR, 41.1–98.6) compared with those with low (61.6; IQR, 32.9–95.9) levels of patient-clinician communication ($P<0.01$). Similarly, patients with higher levels of involvement in SDM had higher median MRAs (74.0; IQR, 41.1–98.6) compared with those who did not feel highly involved (63.7; IQR, 32.9–98.6) ($P=0.05$).

Associations between Patient-Clinician Relationships and Adherence to Antihypertensive Medications

The associations between patient-clinician relationships and adherence to antihypertensive medications among Black adults and other racial/ethnic groups are reported in Tables 2 and 3. In multivariable logistic regression analysis, the odds of adherence to antihypertensive medications was 38% (OR, 1.38; 95% CI, 1.14–1.67) higher among Black patients who reported having high levels of communication with their clinicians, versus low levels of communication, after adjusting for social and economic, patient-related, condition-related, and healthcare system/healthcare team factors (Table 2). Black patients were also more likely to adhere to antihypertensive medications if they felt more involved with the decision-making process of their health care than if they did not (OR, 1.32; 95% CI, 1.08–1.61) (Table 3). Both ordinal-level communication and SDM scores were significantly associated with adherence to antihypertensive medication (Table S4). The odds of adherence increased by 14% and 8% for every unit increase in communication (OR, 1.14; 95% CI, 1.07–1.22) and SDM scores (OR, 1.08; 95% CI, 1.04–1.15), respectively (Table S4). These associations persisted among subgroups of new users of antihypertensive medications (Table S4).

Sensitivity Analysis

There were 783 (weighted n=640 252) and 692 (weighted n=571 084) new users of antihypertensive medications among participants with communication and SDM scores, respectively. Similar to the primary analysis, both high levels of communication (OR, 1.45; 95% CI, 1.01–2.07) (Table 2) and involvement in SDM (OR, 1.59; 95% CI, 1.09–2.32) (Table 3) were significantly associated with adherence to antihypertensive medications among new users, consistent with prevalent users. Prior adherence (measured in the baseline period) was neither associated with patients' perceptions of their communication (OR, 1.09; 95% CI, 0.87–1.35) nor their involvement in SDM process (OR, 1.03; 95% CI, 0.82–1.29). In the second set of sensitivity analysis, all 4 individual items that make up the communication construct were significantly associated with adherence to antihypertensive medications (Table S5). On the other hand, the additional 3 individual items that were combined with the 4 communication items were observed to not be significantly associated with adherence (Table S5). Black race/ethnicity significantly modified the associations between both constructs

Table 2. Associations Between Patient-Provider Communication and Adherence to AHMs Among Prevalent and New Users

Racial/Ethnic Groups	Prevalence of Refill Adherence by Levels of Communication, % (95% CI)*		OR (95% CI)†	
	Low	High	Unadjusted	Adjusted for Patient, Provider, and Healthcare System–Level Factors‡
Black patients				
All users, n=2571	35 (32–38)	42 (39–45)	1.42 (1.18–1.71)	1.38 (1.14–1.67)
New users, n=783	29 (25–34)	36 (31–41)	1.47 (1.04–2.07)	1.45 (1.01–2.07)
Non–Hispanic White patients				
All users, n=4771	50 (48–52)	50 (48–52)	0.98 (0.86–1.12)	0.96 (0.86–1.12)
New users, n=1434	41 (37–45)	46 (42–51)	1.24 (0.96–1.58)	1.20 (0.93–1.55)
Hispanic patients				
All users, n=1675	41 (37–44)	43 (38–47)	1.09 (0.86–1.39)	1.02 (0.80–1.31)
New users, n=584	32 (26–38)	33 (26–40)	1.03 (0.67–1.57)	0.91 (0.58–1.43)
Other race/ethnicity§				
All users, n=689	43 (37–49)	43 (36–51)	1.02 (0.70–1.50)	1.10 (0.73–1.65)
New users, n=257	38 (28–47)	39 (26–52)	1.04 (0.53–2.04)	1.01 (0.47–2.16)

*Prevalence, odds ratios (ORs), and 95% CIs are weighted by Medical Expenditure Panel Survey's sampling weights.

†Referent group is "low."

‡Patient-level factors: age; sex; geographic region of residence; education; speaks English at home; marital status; employment status; poverty status; ever delay, forego, or make change in prescription medicine because of cost; ever delay, forego, or make change in treatment because of cost; have blood checked in the past year; duration of hypertension; used antihypertension medications (AHMs) in the baseline year (adjusted for among only new users); adherent in year 1 (adjusted for among only new users); poor physical health; poor mental health; cognitive limitations; coronary heart disease; angina; myocardial infarction; other heart diseases; stroke; diabetes mellitus; arthritis; asthma; chronic bronchitis; cancer. Provider-level factors: provider specialty; provider and patient are of the same sex; provider and patient are of the same race. Healthcare system–level factors: uninsured; usual source of payment; payment source; out-of-pocket payments; number of office visits.

§Other race/ethnicity: Native Americans, Alaskans, Asians, Hawaiians, and Pacific Islanders.

Table 3. Associations Between SDM and Adherence to AHMs Among Prevalent and New Users

Racial/Ethnic Groups	Prevalence of Refill Adherence by Levels of SDM, % (95% CI)*		OR (95% CI)†	
	Low	High	Unadjusted	Adjusted for Patient-, Provider-, and Healthcare System–Level Factors‡
Black patients				
All users, n=2354	37 (34–39)	40 (37–43)	1.32 (1.09–1.60)	1.32 (1.08–1.61)
New users, n=692	30 (26–35)	25 (19–30)	1.49 (1.03–2.14)	1.59 (1.09–2.32)
White patients				
All users, n=4495	50 (48–52)	51 (48–53)	1.02 (0.89–1.17)	1.01 (0.88–1.16)
New users, n=1344	42 (38–46)	48 (43–53)	1.25 (0.97–1.61)	1.23 (0.95–1.60)
Hispanic patients				
All users, n=1494	42 (38–46)	41 (37–46)	0.97 (0.75–1.25)	0.92 (0.71–1.20)
New users, n=510	34 (28–41)	33 (25–40)	0.93 (0.59–1.45)	0.84 (0.51–1.37)
Other race/ethnicity§				
All users, n=625	42 (36–47)	47 (39–55)	1.24 (0.82, 1.87)	1.29 (0.84–1.99)
New users, n=232	37 (27–46)	40 (26–55]	1.16 (0.56–2.39)	1.20 (0.51–2.83)

SDM indicates shared decision-making.

*Prevalence, odds ratios (ORs), and 95% CIs are weighted by Medical Expenditure Panel Survey's sampling weights.

†Referent group is "low."

‡Patient-level factors: age; sex; geographic region of residence; education; speaks English at home; marital status; employment status; poverty status; ever delay, forego, or make change in prescription medicine because of cost; ever delay, forego, or make change in treatment because of cost; have blood checked in the past year; duration of hypertension; used antihypertensive medications (AHMs) in the baseline year (adjusted for among only new users); adherent in year 1 (adjusted for among only new users); poor physical health; poor mental health; cognitive limitations; coronary heart disease; angina; myocardial infarction; other heart diseases; stroke; diabetes mellitus; arthritis; asthma; chronic bronchitis; cancer. Provider-level factors: provider specialty; provider and patient are of the same sex; provider and patient are of the same race. Healthcare system–level factors: uninsured; usual source of payment; payment source; out-of-pocket payments; number of office visits.

§Other race/ethnicity: Native Americans, Alaskans, Asians, Hawaiians, and Pacific Islanders.

of the patient-clinician relationships (communication [*P* interaction <0.001] and SDM [*P* interaction <0.01]) and adherence to antihypertensive medications. In contrast to the associations observed among Black patients, none of the associations between patient-clinician constructs and adherence to antihypertensive medications were statistically significant among non–Hispanic White patients, Hispanic patients, and other (Native Americans, Alaskans, Asians, Hawaiians and Pacific Islanders) racial/ethnic groups (Tables 2 and 3).

DISCUSSION

We show Black adults with hypertension who self-report as having high levels of communication and a high degree of involvement with their clinicians in making decisions about treatment were more likely to take antihypertensive medications as prescribed compared with those with lower levels of communication and involvement in SDM. These associations were independent of all provider characteristics: the clinician's race/ethnicity, sex, and specialty. Individual- and healthcare system–level factors did not influence these associations nor did the observed associations appear to have been influenced by potential reverse associations between patient-clinician relationships

and adherence. In contrast, neither communication nor SDM were associated with adherence to antihypertensive medications among non–Hispanic White patients, Hispanic patients, and other racial/ethnic groups. This suggests that the observed associations between patient-provider relationships and adherence are robust. Our analysis provides new data on the association between SDM and adherence to antihypertensive medications among Black adult patients with hypertension and also expands the growing evidence base on the potential benefits of patient-clinician communication on adherence to antihypertensive medications among Black patients.[28–31] Most importantly, we have addressed methodological limitations that have been identified in previously published studies on this topic.

The observed positive associations between communication and adherence corroborates data from studies conducted among Black patients[28–31] and among the general population.[27] However, our findings contradict those previously reported by Cooper et al (2011)[63] among 279 underserved primary care patients with hypertension randomized to physicians who received communication skills training versus a control physician group. There are no published data on the associations between SDM and adherence

to antihypertensive medications specifically among Black adults. Among a racially diverse population, overall medication adherence to either oral hypoglycemic, lipid-lowering, or antihypertensive medication increased with higher scores of SDM, although no association was observed among only users of antihypertensive medications.[48] Schoenthaler et al (2018)[64] also reported that SDM was positively associated with adherence to antihypertensive medications among 43 Black patients and 32 White patients with hypertension. In a systematic review of intervention studies, SDM interventions did not improve adherence to medications among the general population.[65]

The effects of patient-clinician communication and SDM on medication adherence has largely been postulated via indirect pathways involving affective-cognitive outcomes including knowledge, attitudes, and satisfaction with care, which are all known determinants of adherence to medications.[26,58] It has also been theorized that effective communication increases patients' knowledge about their medications and medical conditions. The complex regimens required for patients with more severe hypertension and/or comorbidities,[66] both more common among Black individuals, may particularly require effective communication to enhance long-term adherence. Indeed, we observed that patients who reported that their clinician always, versus not, explained things in a way that was easy to understand were more likely to be adherent (OR, 1.40; 95% CI, 1.15–1.72). Also, by listening attentively, respecting the sociocultural views of Black patients, and making them partners in decisions about their medications, clinicians may be better positioned to intervene by providing accurate evidence-based information and or switching medication in the instance where patients are experiencing drug adverse effects. Our data confirmed that patients who reported that their clinician always listened carefully, versus not, were more likely to be adherent (OR, 1.38; 95% CI, 1.13–1.69).

The lack of association between patient-provider relationships and adherence among non–Hispanic White patients, Hispanic patients, and other racial/ethnic groups was unexpected. We suspect that Black patients with hypertension may have more complex drug regimens[67] compared with other racial/ethnic groups because of the disproportionately higher severity of hypertension (uncontrolled BP) and burden of chronic comorbidities.[68,69] Therefore, it is plausible that higher levels of patient-provider communication and involvement in SDM probably had higher effects on mitigating the adverse effects of complex antihypertensive regimens on adherence among Black patients but not among other racial/ethnic groups. Additional research is needed to test empirically the hypothesis that our observed racial/ethnic disparities

in the associations between patient-provider communication and involvement in SDM are moderated by hypertension symptom severity and the complexity of the antihypertensive regimen. It is also possible that providers who communicate effectively and involve Black patients in SDM may be less likely to be biased against Black patients. Black patients are likely to be more trusting of such providers and, consequently, more likely to adhere to treatment recommendations. Future research on whether patient-provider relationships can close racial/ethnic disparities in adherence to antihypertensive medications is warranted.

Strengths and Limitations

Several limitations of this study need to be considered when interpreting our findings. First, because this is an observational study we cannot rule out the effects of potential unmeasured confounding although we adjusted for several patient-, provider-, and healthcare system–level confounders. Second, while MRA is a validated measure of refill adherence, it was measured based on self-reported medication use and may therefore be liable to recall bias. Any such bias, however, would have had a differential effect on measured associations since we expect recall bias to be similar between the groups compared by levels of communication and SDM. MRA as a refill adherence measure does not account for switching between antihypertensive medications after initiation. Third, we measured communication and SDM from the patient's perspective without the clinician's perspective. However, it has been shown that patient-perceived communication and SDM are more important in assessing patient outcomes.[26] Fourth, we could not ascertain from the data how long patients and clinicians interacted with each other. However, given that responses reflect the patient's experience with a clinician in the past 12 months and that on average patients had 9 (SD, 19) office visits during the same period, it is highly likely that patients and clinicians had an established ongoing relationship. Fifth, because the MEPS data do not include unique provider identification numbers, we could not verify whether patients received antihypertensive therapy from the same provider for whom they had provided responses to regarding their communication and involvement in the SDM process. However, given that the patients included in our analysis had frequent office visits and that 81% reported that their clinician asked about other medications that were prescribed by other doctors, we believe that our findings reflect patients' experiences with clinicians in general, irrespective of whether the clinician was the prescriber of the antihypertensive medications.

Notwithstanding these limitations, our study also features strengths that enhance its relevance for practice

and research. First, our sensitivity analysis shows that the observed associations are robust against the effects of potential reverse associations between patient-clinician relationships and adherence. Second, by using a longitudinal cohort study design to leverage a national survey data set, we have contributed critical data on the associations between patient-clinician relationships and adherence to antihypertensive medications among Black adults in the United States. Third, our findings are directly translatable to clinical practice because we defined patient-clinician relationships from standard survey instruments that are currently in use by healthcare providers in the United States.

CONCLUSIONS

Patient-clinician communication and SDM were identified as modifiable predictors of adherence to antihypertensive medications among Black patients but not among non–Hispanic White patients, Hispanic patients, or other racial/ethnic groups. Development of testable interventions to enhance these elements will support further assessment of the relationship between these patient-clinician factors and adherence to antihypertensive medications among Black adults. Based on our findings, we recommend that clinicians and healthcare systems consider emphasizing communication and SDM processes within patient-centered models as a strategy to improve adherence to antihypertensive medications among adult Black patients with hypertension.

Supplementary Material
Tables S1-S5

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Supplemental Material

Table S1. Distributions of single items and overall communication and shared decision-making scores before imputation.

Question	Response						
	Yes	No	Never	Sometimes	Usually	Always	Missing
Communication							
How often health providers listened carefully to you			33 (1.5)	187 (8.3)	424 (18.7)	1618 (71.5)	309 (12.0)
How often health providers explained things in a way that was easy to understand			28 (1.2)	174 (7.6)	491 (21.5)	1593 (69.7)	285 (11.1)
How often providers showed respect for what you had to say			20 (0.9)	157 (6.9)	419 (18.3)	1690 (73.9)	285 (11.1)
How often health providers spent enough time with you			42 (1.8)	244 (10.7)	610 (26.8)	1384 (60.7)	291 (11.3)
Shared decision-making[†]							
Does the USC provider usually ask the person to help make decisions between a choice of treatments			263 (10.4)	332 (13.2)	449 (17.8)	1474 (58.5)	147 (5.5)
Does the USC provider usually ask about and show respect for medical, traditional, and alternative treatments that the person is happy with			76 (3.1)	145 (6.0)	360 (14.9)	1837 (76.0)	247 (9.3)
Does the USC provider usually ask about prescription medications and treatments other doctors may give them	493 (19.0)	2099 (81.0)					73 (2.7)

[†]Shared decision-making is defined based on responses to all four communication items plus the three additional items listed under shared decision-making

Table S2. Distributions of single items and overall communication and shared decision-making scores after imputation.

Question	Yes	No	Never	Sometimes	Usually	Always
Communication						
How often health providers listened carefully to you			3.6 (1.4)	216 (8.4)	479 (18.6)	1840 71.6)
How often health providers explained things in a way that was easy to understand			32 (1.2)	197 (7.7)	543 (21.1)	1799 (70.0)
How often providers showed respect for what you had to say			22 (0.9)	178 (6.9)	472 (18.4)	1899 (73.9)
How often health providers spent enough time with you			45 (1.8)	285 (11.1)	685 (26.6)	1556 (60.5)
Shared decision-making[†]						
Does the USC provider usually ask the person to help make decisions between a choice of treatments			284 (10.7)	344 (12.9)	472 (17.7)	1565 (58.7)
Does the USC provider usually ask about and show respect for medical, traditional, and alternative treatments that the person is happy with			88 (3.3)	157 (5.9)	394 (14.8)	2026 (76.0)
Does the USC provider usually ask about prescription medications and treatments other doctors may give them	509 (19.1)	2156 (80.9)				

[†]Shared decision-making is defined based on responses to all four communication items plus the three additional items listed under shared decision-making

Table S3. Distribution of baseline characteristics before imputation.

Baseline characteristics	Communication			Involvement in shared decision-making (SDM)		
	Frequency (%)†			Frequency (%)†		
	Not good, n=1,101	Good, n = 1,135	SDT§	Low, n = 881	High, n = 935	SDT§
Demographics						
Age, mean (SD), years	57 (13)	59(13)	0.14	57 (13)	55 (13)	0.07
Age categories, years						
18 – 44	196 (18)	156 (15)	0.08	153 (18)	135 (17)	0.04
45 – 64	564 (52)	578 (52)	0.01	453 (53)	473 (50)	0.05
≥ 65	341 (29)	401 (33)	0.08	275 (29)	327 (33)	0.08
Sex						
Female	701 (64)	744 (63)	0.02	574 (63)	614 (64)	0.02
Male	400 (36)	391 (37)	0.02	307 (37)	321 (36)	0.02
Geographic region of residence						
Midwest	192 (19)	201 (18)	0.01	151 (18)	158 (17)	0.04
Northeast	139 (11)	160 (13)	0.07	124 (12)	129 (12)	0.00
South	710 (64)	729 (65)	0.04	559 (63)	606 (66)	0.08
West	60 (7)	45 (3)	0.17	47 (6)	42 (4)	0.10
Education						
Up to high school	684 (57)	688 (57)	0.00	551 (58)	560 (56)	0.03
College and beyond	417 (43)	447 (43)	0.00	330 (42)	375 (44)	0.03
Speaking English at home						
English	1094 (99)	1127 (99)	0.03	876 (99)	928 (99)	0.00
Non-English	7 (1)	8 (1)	0.03	5 (1)	7 (1)	0.00
Socioeconomic						
Marital status						
Married	708 (63)	709 (58)	0.11	573 (62)	571 (58)	0.07
Not married	393 (37)	426 (42)	0.11	308 (38)	364 (42)	0.07
Employment status						
Employed	404 (37)	444 (39)	0.01	311 (35)	364 (39)	0.02
Unemployed	697 (63)	691 (61)	0.01	570 (65)	571 (61)	0.02
Poverty status						
Above poverty level	775 (77)	816 (78)	0.02	616 (76)	677 (79)	0.06
Below poverty level	326 (23)	319 (22)	0.02	265 (24)	258 (21)	0.06
Cost-related barriers						
Ever delay, forego or make change in prescription medicine because of cost	81 (11)	36 (4)	0.26	55 (11)	37 (4)	0.25
Ever delay, forego or make change in treatment because of cost	110 (8)	52 (3)	0.23	86 (7)	47 (3)	0.18

Hypertension-related						
Have blood checked in the past year	1069 (98)	1106 (98)	0.02	854 (98)	913 (98)	0.00
Used AHM in the baseline year	777 (69)	793 (69)	0.00	634 (71)	661 (70)	0.02
Duration of hypertension, mean (SD), years	13 (11)	14 (11)	0.04	13 (11)	14 (12)	0.04
Chronic comorbidities						
Poor physical health	205 (18)	140 (11)	0.21	158 (17)	129 (13)	0.10
Poor mental health	88 (9)	53 (5)	0.15	65 (8)	54 (6)	0.06
Have cognitive limitations	153 (13)	125 (10)	0.010	128 (13)	112 (10)	0.08
CHD	109 (10)	130 (10)	0.01	99 (11)	116 (11)	0.01
Angina	65 (6)	46 (4)	0.13	55 (6)	40 (4)	0.10
Myocardial infarction	86 (7)	92 (8)	0.02	81 (9)	79 (7)	0.06
Other heart diseases	214 (20)	187 (17)	0.08	172 (19)	173 (19)	0.01
Stroke	139 (13)	133 (10)	0.08	115 (13)	123 (11)	0.05
Diabetes	333 (29)	395 (33)	0.09	278 (29)	322 (33)	0.07
Arthritis	602 (56)	576 (50)	0.14	490 (57)	496 (51)	0.12
Asthma	172 (16)	182 (16)	0.01	139 (15)	163 (17)	0.04
Chronic bronchitis	70 (5)	61 (5)	0.01	60 (6)	51 (5)	0.04
Cancer	116 (10)	117 (9)	0.02	88 (10)	108 (10)	0.01
Provider characteristics						
Clinician specialty						
General/Family practice/Internal Medicine	300 (31)	362 (38)	0.15	267 (32)	313 (37)	0.12
Other Medical doctor	28 (3)	21 (2)	0.08	17 (2)	24 (2)	0.01
Specialist (Cardiologist/Nephrologist)	106 (12)	94 (10)	0.09	82 (10)	87 (11)	0.04
Other provider	13 (1)	13 (1)	0.00	14 (2)	10 (1)	0.04
Provider not human	566 (55)	577 (53)	0.04	501 (57)	501 (52)	0.01
Same sex as patient	455 (45)	464 (47)	0.04	400 (47)	400 (45)	0.05
Same race as patient	95 (10)	111 (12)	0.07	57.8 (10)	59.1 (12)	0.08
Healthcare system factors						
Uninsured	104 (8)	71 (5)	0.13	76 (8)	56 (6)	0.08
Have usual source of payment	962 (89)	1033 (94)	0.16	787 (90)	847 (93)	0.11
Payment source is Medicaid	257 (20)	260 (20)	0.00	222 (21)	212 (20)	0.03
Payment source is Medicare	262 (22)	276 (23)	0.01	223 (23)	235 (24)	0.01
Payment source is private insurance	420 (43)	479 (49)	0.12	330 (43)	399 (50)	0.13
Out-of-pocket payments, mean (SD), dollars	324 (674)	325 (716)	0.00	350 (756)	312 (677)	0.05
Counts of office visits, mean (SD)	11 (20)	9 (18)	0.08	11 (22)	10 (18)	0.06

SD, standard deviation; STD, standardized difference test

[†]Frequencies are absolute counts whereas %s are weighted by the MEPS survey weights

[§]Standardized difference >0.10 indicates covariate is unbalanced between groups being compared

Table S4. Associations between ordinal-level communication and shared decision-making scores and adherence to antihypertensive medications among Blacks.

Patient-provider relationships	Odds ratio (95% confidence interval)			
	Unadjusted	Adjusted for Patient-level factors§	Adjusted for Provider and Healthcare System-level factors≠	Adjusted for Patient, Provider and Healthcare System-level factors
Communication[a]				
All users, n = 2,571	1.12 (1.06, 1.19)	1.12 (1.05, 1.19)	1.14 (1.07, 1.21)	1.14 (1.07, 1.22)
New users, n = 783	1.19 (1.07, 1.33)	1.19 (1.05, 1.35)	1.20 (1.07, 1.35)	1.21 (1.06, 1.39)
Shared decision-making†				
All users, n = 2,354	1.09 (1.04, 1.15)	1.10 (1.05, 1.16)	1.09 (1.04, 1.14)	1.08 (1.04, 1.15)
New users, n = 692	1.12 (1.03, 1.23)	1.15 (1.04, 1.27)	1.12 (1.02, 1.23)	1.14 (1.04, 1.26)

†Modeled as ordinal scale variables: Communication (0 – 4); shared decision-making (0 – 7)

§**Patient-level factors**: Age; Sex; Geographic region of residence; Education; Speake English at home; Marital status, Employment status, Poverty status, Ever delay, forego or make change in prescription medicine because of cost; Ever delay, forego or make change in treatment because of cost; Have blood checked in the past year; Duration of hypertension; Used AHM in the baseline year (adjusted for among only new users); Adherent in year 1 (adjusted for among only new users); Poor physical health; Poor mental health; Have cognitive limitations; Coronary heart disease; Angina; Myocardial infarction; Other heart diseases; Stroke; Diabetes; Arthritis; Asthma; Chronic bronchitis; Cancer.

≠**Provider-level factors**: Provider specialty; Provider and patient are of the same sex; Provider and patient are of the same race; **Healthcare system factors**: Uninsured; Have usual source of payment; Payment source; Out-of-pocket payments; Counts of office visits.

Table S5. Association between adherence and individual items of communication and shared decision-making composite constructs among Blacks.

Individual Items	Prevalence of Refill Adherence, % (95% CI)		Odds ratio (95% CI)			
	Never/ Sometimes/ Usually[†]	Always	Unadjusted	Adjusted for Patient –level factors[*]	Adjusted for Provider and Healthcare System-level factors[≠]	Adjusted for Patient, Provider and Healthcare System-level factors
How often health providers listened carefully to you						
All users, n = 2,571	35 (31,38)	40 (38,42)	1.44 (1.19, 1.75)	1.42 (1.16, 1.73)	1.40 (1.15, 1.70)	1.38 (1.13, 1.69)
New users, n = 783	25 (20, 30)	36 (32, 40)	1.75 (1.20, 2.55)	1.73 (1.17, 2.56)	1.73 (1.18, 2.54)	1.71 (1.15, 2.54)
How often health providers explained things in a way that was easy to understand						
All users, n = 2,571	34 (31, 37)	40 (38, 43)	1.44 (1.18, 1.75)	1.43 (1.17, 1.75)	1.41 (1.16, 1.72)	1.40 (1.15,1.72)
New users, n = 783	27 (21, 32)	36 (31, 40)	1.78 (1.23, 2.57)	1.69 (1.16, 2.46)	1.76 (1.22, 2.54)	1.67 (1.14,2.44)
How often providers showed respect for what you had to say						
All users, n = 2,571	35 (31, 38)	40 (37, 42)	1.35 (1.11, 1.65)	1.32 (1.08, 1.62)	1.35 (1.11, 1.65)	1.34 (1.09, 1.65)
New users, n = 783	27 (21, 33)	35 (31,39)	1.54 (1.06, 2.24)	1.57 (1.06, 2.33)	1.56 (1.07, 2.29)	1.63 (1.09, 2.43)
How often health providers spent enough time with you						
All users, n = 2,571	36 (33, 39)	40 (37, 42)	1.24 (1.03, 1.49)	1.22 (1.01, 1.47)	1.19 (0.99, 1.44)	1.19 (0.98, 1.44)
New users, n = 783	29 (24, 34)	35 (30, 39)	1.30 (0.91, 1.85)	1.26 (0.88, 1.80)	1.24 (0.87, 1.78)	1.23 (0.85, 1.78)
Does the USC provider usually ask the person to help make decisions between a choice of treatments						

All users, n = 2,665	38 (36, 40)	38 (36,41)	1.09 (0.91, 1.31)	1.12 (0.93, 1.36)	1.07 (0.89, 1.29)	1.10 (0.91, 1.33)
New users, n = 795	31 (26, 36)	32 (28, 36)	0.93 (0.66, 1.32)	1.03 (0.71, 1.49)	0.97 (0.68, 1.38)	1.07 (0.74, 1.54)
Does the USC provider usually ask about and show respect for medical, traditional, and alternative treatments that the person is happy with						
All users, n = 2,665	37 (33, 40)	39 (37, 41)	1.14 (0.93, 1.39)	1.15 (0.94, 1.42)	1.13 (0.92, 1.38)	1.14 (0.93, 1.41)
New users, n = 795	31 (25, 37)	32 (28, 36)	1.08 (0.73, 1.58)	1.11 (0.74, 1.67)	1.14 (0.77, 1.67)	1.16 (0.78, 1.74)
Does the USC provider usually ask about prescription medications and treatments other doctors may give them§	**No**	**Yes**				
All users, n = 2,665	36 (33, 41)	39 (36, 41)	1.08 (0.86, 1.36)	1.16 (0.91, 1.46)	1.03 (0.82, 1.30)	1.11 (0.88,1.41)
New users, n = 795	30 (22, 37)	32 (29, 36)	1.21 (0.78, 1.85)	1.31 (0.80, 2.13)	1.16 (0.74, 1.82)	1.32 (0.81, 2.16)

CI, confidence interval

†Referent group is "Never/Sometimes/Usually"
§Referent group is "No"

*Patient-level factors**: Age; Sex; Geographic region of residence; Education; Speake English at home; Marital status, Employment status, Poverty status, Ever delay, forego or make change in prescription medicine because of cost; Ever delay, forego or make change in treatment because of cost; Have blood checked in the past year; Duration of hypertension; Used AHM in the baseline year (adjusted for among only new users); Adherent in year 1 (adjusted for among only new users); Poor physical health; Poor mental health; Have cognitive limitations; Coronary heart disease; Angina; Myocardial infarction; Other heart diseases; Stroke; Diabetes; Arthritis; Asthma; Chronic bronchitis; Cancer.

ǂ**Provider-level factors**: Provider specialty; Provider and patient are of the same sex; Provider and patient are of the same race; **Healthcare system factors**: Uninsured; Have usual source of payment; Payment source; Out-of-pocket payments; Counts of office visits.