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The Current State of Healthcare in The United States: Barriers to Healthcare, Quality of Care, and Self-Reported Health

Lauren Ashley Robinson Williams

THE CURRENT STATE OF HEALTHCARE IN THE UNITED STATES: BARRIERS TO

HEALTHCARE, QUALITY OF CARE, AND SELF-REPORTED HEALTH

by

Lauren Ashley Robinson Williams

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DEDICATION

This work is first dedicated to Arthur, Lilith, Eleanor, Lucy, George, Jessica Day, Presley, Joseph, and Lady. I would not be who I am today without your influence in my life. I am forever thankful for your unwavering love and support. This work is also dedicated to my family: Natasha and James Joiner, Amanda Robinson, Wesley and Evan Bunch, Larry Wampler, and Jenny and Dale Williams. Finally, I dedicate this work to those who are no longer with us but who each inspired me, in their own ways, to pursue a career in public health: Sean Robinson, Sandra Wampler, and Marianne Allen. I love you all. Dedicated to all human beings.

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PREFACE

This dissertation is original and unpublished work by the author and has been formatted according to BMC Health Services Research guidelines.

ABSTRACT

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A primary goal of the Affordable Care Act (ACA) was to increase health insurance coverage, reduce health care costs, and improve quality of care. Insurance coverage expanded, however, the effect of the ACA on barriers to accessing care and quality of care is less apparent. Outcome variables related to barriers (having a usual source of care, delaying care due to cost, forgoing care due to cost) and quality (whether healthcare providers always: showed respect, spent enough time listened, explained; and an overall rating of providers) from the Medical Expenditure Panel Survey (MEPS) were examined to evaluate whether barriers to healthcare and quality of care have changed since the implementation of the ACA. The analysis was performed on all adults who participated in MEPS aged 18-64 and on subgroups: young adults aged 18-25 due to the provision expanding coverage from their parents' insurance; and adults aged 18-64 with a chronic condition and private insurance to assess secular background changes. In all groups, having a usual source of care decreased from 2009 to 2019 while delaying and forgoing care due to cost rose significantly. Quality of care showed differences across race; Whites reported no improvements or slight declines while all other races reported improvements. Results show that barriers to accessing care may have worsened from 2009 to 2019, however, some evidence suggests that the quality of care reported by minority racial groups have improved.

It is unknow to what extent barriers to accessing care and quality of care impact health. Mental and physical self-reported health were examined as outcomes associated with barriers to accessing care and quality of care in all adults aged 18 and over who participated in the 2019 MEPS. Most of the sample reported good self-reported health, although the impact of barriers on

self-reported health were largely negative, suggesting delaying or forgoing care due to cost is done at the expense of health. High quality of care was positively associated with good self-reported health in Whites. Results suggest that exposure to barriers to accessing care and a negative quality of care may have a negative impact on health.

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List of Abbreviations

ACA – The Patient Protection & Affordable Care Act

AOR – Adjusted Odds Ratio

CAHPS – Consumer Assessment of Healthcare Providers and Systems

CI – Confidence Interval

MEPS – Medical Expenditure Panel Survey

OR – Odds Ratio

US – United States

USC – Usual Source of Care

Chapter 1: Introduction

The Patient Protection and Affordable Care Act (ACA) was signed into law on March

23rd, 2010, with the majority of its provisions implemented by January 1st, 2014. Among these

provisions, primary goals were to increase access to public and private health insurance

coverage, reduce rising health care costs, and improve quality and efficiency of health care [1].

Although major provisions were not enacted until 2014, a few ACA provisions were

implemented earlier, such as extending coverage to children up to age 26 years and the creation

of the Health Insurance Marketplace in 2010 [2]. Since the ACA's implementation, there are an

estimated 40% fewer uninsured non-elderly adults [3] and 2 million fewer adults with

catastrophic expenditures each year [4]. Research has shown that overall health insurance

coverage has expanded, however, the effect of the ACA on barriers to accessing care and quality

of care at the individual level is less apparent [5]. Although early evidence suggested that access

to care and affordability were generally improved due to ACA [6], other research has shown

mixed results [7] with disparities persisting across race and income[8]. Moreover, in 2016, over

20% of adults indicated that they faced more than one barrier in accessing a primary care

provider [9, 10]. These results demonstrate that an increase in insurance coverage from the ACA

may not have ensured access to a usual source of care [6] or prevented delaying or forgoing care

[5]. Insurance coverage, financial difficulty, and access to providers are considered system-level

barriers to healthcare and have the greatest effect on healthcare seeking behavior compared to

practitioner and person-level barriers [11]. These barriers are associated with problems getting

care [8], being less likely to receive recommended care [12] and delaying urgent care [8], all of

which may result in poorer health outcomes, such as delayed detection of cancers or

complications from existing conditions. This indicates that insurance coverage alone does not

necessarily translate to access to care or better health outcomes [11]. Facing barriers to

accessing care, specifically not having a usual source of care or delaying or forgoing care due to

cost, may contribute to poorer health, but there is insufficient evidence linking barriers to

accessing care and health outcomes.

A primary goal of the ACA was to increase quality of care. Quality of care is generally

rated lower by the poor and less educated in low and middle-income countries [13], however that

also seems to be true for the United States, at least prior to the ACA. Even after the ACA,

specific populations still report low levels of high-quality care. For example, recent diabetic

immigrants were less likely to receive high-quality care than diabetic immigrants who have been

in the US for at least 15 years [14] and less than 25% of cancer survivors reported high-quality

communication with any provider after their diagnosis, which underscores the suboptimal quality

of care in populations that certainly need more support and attention [15, 16]. These studies

highlight the importance of high-quality care, and how a reduction in disparities may increase

quality [17, 18], but the current literature is insufficient to understand how quality of care

impacts the health of the general population. Moreover, a negative quality of care can act as a

deterrent for future care-seeking behavior [19] which could result in a progression of poor health

outcomes. If poor quality care can reduce future care-seeking, does poor quality of care effect

patient's health? There is inadequate research on the association of quality of care and health.

The ACA increased health insurance coverage, but it is unclear if individuals are

reporting fewer barriers and an increased quality in the care they receive. Moreover, it is

unknown how, or to what extent, these two problems impact health outcomes [5, 20]. Research

suggests that self-reported health measures are valid health status indicators [21] even after

adjustment for potential confounders [22]. These measures are a quick and easy way to gauge an

individual's overall well-being in association with barriers to accessing healthcare and quality of care. Moreover, COVID-19 will have lasting impacts on the US healthcare system [23], so it is important to understand the state of healthcare in the US in 2019, the last year the US healthcare system was not impacted by COVID, to recognize how COVID has changed the landscape going forward.

Data used in this dissertation comes from the Medical Expenditure Panel Survey (MEPS). MEPS is an annual, nationally representative survey of noninstitutionalized US civilians conducted by the Agency for Healthcare Research and Quality and collects data on healthcare utilization and expenditures [24]. Both 2009 and 2019 MEPS included questions regarding barriers to accessing healthcare and quality of care.

This dissertation seeks to determine the change in barriers to accessing healthcare and quality of care before and after the ACA was implemented, and whether barriers and quality have an association with self-reported health, by addressing three aims. The first aim will evaluate whether the implementation of the ACA has changed barriers to accessing healthcare and quality of care in the United States, with the working hypothesis of the ACA influenced barriers to accessing healthcare and quality of care. The second aim will evaluate whether barriers to accessing healthcare are associated with self-reported ratings of physical and mental health. The working hypothesis for this aim is that people who report having barriers to accessing healthcare have different self-reported physical and mental health than those who report no barriers to accessing healthcare. The third aim will evaluate whether quality of care is associated with self-reported ratings of physical and mental health. The working hypothesis for the final aim is that people who report low quality care will have different self-reported physical and mental health than those who report receiving a higher quality of care.

Chapter 2: Barriers to Accessing Healthcare and Quality of Care in the United States Before and After the Patient Protection and Affordable Care Act and the Effect Modification of Race

Introduction

The Affordable Care Act

The Patient Protection and Affordable Care Act (ACA) was signed into law on March 23rd, 2010, with many of its provisions implemented by January 1st, 2014. The ACA's primary goals were to increase access to public and private health insurance coverage, reduce rising health care costs, and improve the quality and efficiency of health care [1]. Private insurance provisions were established to encourage individual maintenance of health insurance via the individual mandate (which has since been rescinded), set minimum standards for coverage, and provide financial assistance to increase access to care [25]. Public insurance provisions were also implemented to increase access to care and affordability; states were offered the option to expand Medicaid eligibility, however this coverage was not expanded on the national level [26]. Furthermore, provisions to increase quality of care included Medicare and Medicaid paying providers based on the quality of care they provide. Although most of these provisions were not enacted until 2014, a few ACA provisions were implemented earlier, such as extending coverage to children on their parents' policy up to age 26 years and the creation of the Health Insurance Marketplace in 2010 [2]. Since the ACA's implementation, there are an estimated 40% fewer uninsured non-elderly adults [3] and 2 million fewer adults with catastrophic expenditures each year [4]. Research has shown that overall health insurance coverage has expanded, however, the effect of the ACA on barriers to accessing care and quality of care at the individual level is less apparent [5].

Barriers to Accessing Care

There is little published peer-reviewed research on how the ACA has impacted barriers to accessing healthcare and quality of care. Although early evidence suggested that access to care and affordability were generally improved due to ACA [6], other research has shown mixed results, such as increasing healthcare costs [7][27] and persistent disparities in access to care across race and income[8]. Moreover, in 2016, over 20% of adults indicated that they faced more than one barrier in accessing a primary care provider [9, 10]. These results demonstrate that an increase in insurance coverage from the ACA may not have ensured access to a usual source of care [6] or prevented delaying or forgoing care [5]. Barriers to accessing care, such as insurance coverage, financial difficulty, and access to providers, can have a negative effect on healthcare seeking behavior [11]. Moreover, problems getting care [8], being less likely to receive recommended care [12] and delaying urgent care [8], may result in poorer health outcomes, such as delayed detection of cancers or complications from existing conditions. These findings indicate that insurance coverage alone does not necessarily translate to access to care or better health outcomes [11].

Quality of Care

One of the primary goals of the ACA was to increase quality of care, which is generally rated lower by the poor and less educated in low and middle-income countries [13], however that also seems to hold true for the United States, at least prior to the ACA [28]. Even after the ACA, specific populations still report low levels of high-quality care. For example, recent diabetic immigrants were less likely to report receiving high-quality care than diabetic immigrants who have been in the US for at least 15 years [14] and less than 25% of cancer survivors reported high-quality communication with any provider after their diagnosis, which underscores the

suboptimal quality of care in populations that certainly need greater support and attention [15, 16]. Just as facing barriers to accessing care can have a negative effect on healthcare seeking behavior [11], low healthcare quality can also act as a deterrent for future care-seeking [19] which could result in a progression of poor health outcomes. The purpose of this study is to compare barriers to accessing healthcare and quality of care in the United States from 2009 to 2019, and to determine whether race modifies the studied associations, to examine the change in barriers and quality over the first ten years of the ACA.

Method

Data Source

The Medical Expenditure Panel Survey (MEPS), which began in 1996, is an annual, nationally representative survey comprised of noninstitutionalized US civilians. MEPS participants are a subset of the prior year's National Health Interview Survey participants. MEPS is conducted by the Agency for Healthcare Research and Quality and collects data on healthcare utilization and expenditures [24]. MEPS components are comprised of both interviewer and self-administered questionnaires. Both 2009 and 2019 MEPS included questions regarding barriers to accessing healthcare and quality of care.

Sample Population

Adults aged 18-64 were identified from the 2009 and 2019 MEPS to assess changes in barriers to accessing healthcare variables from pre- and post-ACA (n = 32,600). Excluding adults aged 65 and older from these analyses was necessary to prevent potential effects of Medicare, which is not a focus of this research. To assess changes in quality-of-care outcomes, the sample was restricted to those who have gone to a healthcare provider at least once within the last 12 months of survey administration (n = 20,090). Individuals with missing outcome variables were

excluded from analyses (usual source of care: n = 381 (1.17%); delay care due to cost: n = 46 (0.14%); forgo care due to cost: n = 49 (0.15%); provider always showed respect: n = 207 (1.03%); provider always spent enough time: n = 213 (1.06%); provider always listened: n = 206 (1.03%); provider always explained: n = 207 (1.03%); best rating of healthcare providers: n = 147 (0.72%)).

Exposure Variable

Pre-ACA (2009) was compared to post-ACA (2019) to determine any changes on the eight outcome variables. The 2009 MEPS survey was selected as the pre-ACA data source due to the few provisions implemented in 2010. The 2019 MEPS survey was selected as the post-ACA data source as it contains the most recent, full-year, data available before COVID-19 impacted the U.S.

Outcome Variables

Barriers to accessing healthcare are assessed from responses to three questions: Does the person have a usual source of care provider? (yes/no); Did the person delay medical or dental care or prescription medication due to cost? (yes/no); Did the person forgo medical or dental care or prescription medication due to cost? (yes/no).

Quality of care will be measured by five Consumer Assessment of Healthcare Providers and Systems (CAHPS) [29] questions included in the MEPS that are designed to measure quality of care from the consumer's perspective. The first four questions included: how often providers showed respect for what the person receiving care had to say; how often providers spent enough time with the person receiving care; how often providers listened to the person receiving care; and how often providers explained things in a way that the person receiving care could understand. Each had four answer options (always, usually, sometimes, or never) which were

dichotomized to always/not always for the purpose of analyses. The final quality question is an overall rating of the person's health care providers and allowed respondents to rate providers on a 0 (worst) -10 (best) scale. For analyses, this was dichotomized to 10 (best health care possible) and <10. Quality variables were dichotomized based on use in previous research [30] and the patient-centered "culture of always" [31, 32].

Covariates

Self-reported independent variables include age (18-25, 26-35, 36-44, 45-53, and 54-64), sex, race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic or other), marital status (currently married or currently widowed/divorced/separated/never married), education level (less than high school graduate, high school graduate, some college or more), family income level (low [<139% federal poverty level (FPL)], middle [139-400% FPL], high [400%+ FPL]), census region (Northeast, Midwest, South, and West; states within each region are shown in *Figure 1*), and health insurance coverage (any private, public only, uninsured). Comorbidities were measured using MEPS priority conditions and include arthritis, asthma, cancer, diabetes, emphysema, heart disease (angina, coronary heart disease, heart attack, other heart conditions/diseases), high cholesterol, hypertension, and stroke. BMI (body mass index) was not included because weight is only collected every other year in MEPS starting in 2016 and was not available in the 2019 data set. Meeting physical activity guidelines (Yes or No/unknown) is defined as currently spending half an hour or more in moderate to vigorous physical activity at least five times a week, per the current Physical Activity Guidelines for Americans [33]. Cigarette smoking status was determined as currently smoking (Yes or No/unknown). Similar categorizations have been previously used with MEPS data [30, 34–36].

Census Regions of the United States
Medical Expenditure Panel Survey
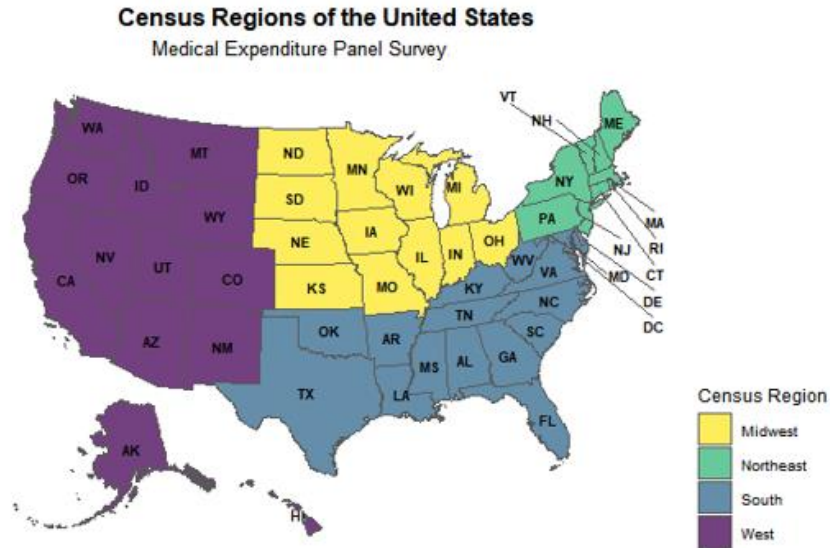
Figure 1. States that comprise each census region of the United States, MEPS

Statistical Analysis

Sample characteristics were summarized with appropriate descriptive statistics to calculate n and weighted percent. Since fewer than two percent of individuals were missing outcome or exposure variables, no sensitivity analyses were performed.

We first examined all covariates' association with the outcomes via logistic regression and reported respective crude odds ratios (OR) and 95% confidence intervals so that we could subsequently test for effect modification and confounding. We then assessed the potential for effect modification of race on each outcome via an interaction term with year (the exposure). To assess confounding, each covariate was added to the model that contained the outcome, exposure, and significant interaction term, in order to evaluate its strength of association. The confounder was preserved in the final model if it was also an effect modifier or if the adjusted odds ratio was more than 10% different from the crude association between the exposure and the outcome. The NOMCAR (not missing completely at random) option was used to account for any missingness of covariates, which calculates variance estimates by analyzing non-missing values

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separately as a sub-group, while the entire group includes non-missing and missing values . All analyses were conducted with SAS 9.4 [37] and incorporated weighting to account for the complex survey design and survey nonresponse. Figures were created with R and RStudio [38, 39]. Weighting variables were developed by MEPS and described in detail in the consolidated data file documentation [40]. Alpha levels for statistical significance were set at 0.05.

The same analysis was performed on two separate sub-groups: young adults aged 18-25 since the ACA extended health insurance coverage for this age group, and adults aged 18-64 who had private insurance and asthma in 2019 and 2009 to allow for examination of barrier and quality secular trends. Adults aged 18-64 with private insurance and a chronic condition will denote those who require regular and stable care in 2019 and 2009, with no difference signifying no secular background change.

Results

Demographics

Main Analysis: Adults aged 18-64 years

The main analysis for barriers included 32,600 individuals aged 18-64 years (*Table 1*), with more representation for non-Whites in 2019 compared to 2009, which is consistent with percent changes in race from the 2010 Census to the 2020 Census [41]. In 2019, fewer people reported being married, uninsured, getting adequate physical activity, and having arthritis, emphysema, high cholesterol, and hypertension, while more people reported high income, higher education levels, and having asthma and diabetes. Fewer people reported having a usual source of care (USC) in 2019, with 71.68% having a USC in 2009 compared to 66.49% in 2019. The proportion of those who reported delaying care due to cost was five times higher in 2019 compared to 2009 (21.92% vs. 4.88%) and forgoing care due to cost was two times higher

(15.93% vs. 7.24%). The main analysis for quality-of-care variables included 20,090 individuals who reported on the quality of the care they received, with minimal differences from 2009 to 2019 except for those reporting that the provider always listened to them, which was slightly lower in 2019. The distribution of barriers and quality variables are shown in *Table 2*.

Table 1. *Distribution of Sociodemographic Characteristics for Adults Aged 18-64, Medical Expenditure Panel Survey*[*]

	MEPS 2019		MEPS 2009	
	N	**Weighted %**	**N**	**Weighted %**
Total	13021	100.00	19579	100.00
Age Group				
18-25	1684	16.27	3383	17.16
26-35	2801	22.86	4300	21.27
36-44	2493	18.68	3985	19.30
45-53	2524	18.54	4036	20.94
54-64	3519	23.65	3875	21.33
Sex				
Male	6051	49.06	9048	49.35
Female	6970	50.94	10531	50.94
Race/Ethnicity				
Non-Hispanic White	6961	59.08	8416	65.73
Non-Hispanic Black	1879	12.52	3804	12.03
Hispanic	3030	18.65	5574	15.20
All other race/ethnicities	1151	9.80	1785	7.04
Current Marital Status				
Married	6491	50.82	10203	53.73
Not married	6530	49.18	9376	46.27
Education				
Less than high school graduate	1938	12.27	4473	15.63
High school graduate	3898	26.79	6019	30.57
Some college or more	7110	60.94	8935	53.80
Family Income				
Low	2816	15.90	5303	18.96
Middle	5178	38.88	8554	40.92
High	5027	45.22	5722	40.12
Census region				
Northeast	1853	17.36	2901	18.12
Midwest	2816	20.73	3872	21.94
South	4941	37.73	7442	36.56
West	3410	24.18	5363	23.38
Insurance Type				
Private	8902	74.08	11962	70.72
Public	2692	16.58	2838	10.13

Table 1 (Continued)

	MEPS 2019		MEPS 2009	
	N	**Weighted %**	**N**	**Weighted %**
Uninsured	1427	9.33	4779	19.14
Comorbidity				
Arthritis	2297	15.31	3471	18.76
Asthma	1849	13.86	1759	9.14
Cancer	850	6.09	989	6.03
Diabetes	1163	7.32	1402	6.17
Emphysema	162	0.91	251	1.40
Heart disease	1243	8.78	1725	9.53
High cholesterol	3010	21.43	4813	25.46
Hypertension	3383	22.94	5099	25.37
Stroke	307	1.82	391	1.82
Adequate Physical Activity	6553	51.98	11279	61.48
Current Smoker	2982	20.63	3818	20.71

*Weighted proportions calculated with chi-square test of independence

Table 2. *Distribution of Outcomes for Adults Aged 18-64, Medical Expenditure Panel Survey**

	MEPS 2019		MEPS 2009		
	N	**Weighted %**	**N**	**Weighted %**	***P* value**
Barriers to Accessing Care					
Total	13021	100.00	19579	100.00	
Has a Usual Source of Care					
Yes	8755	66.49	13293	71.68	**<0.001**
No	4266	33.51	6286	28.32	
Delay Care due to Cost					**<0.001**
Yes	3083	21.92	964	4.88	
No	9938	78.08	18615	95.12	
Forgo Care due to Cost					**<0.001**
Yes	2315	15.93	1494	7.24	
No	10706	84.07	18085	92.76	
Quality of Care					
Total	8173	100.00	11917	100.00	
Provider Always Showed Respect	5208	63.38	7276	62.55	0.3570
Provider Always Spent Enough Time	4186	50.51	5660	49.98	0.6076
Provider Always Listened	4663	56.45	6830	58.79	**0.0121**
Provider Always Explained	4841	59.17	6763	58.28	0.3645
Best Rating of Healthcare Providers	2075	24.39	2932	24.40	0.9889

*Proportions and *P* value calculated with chi-square test of independence.

Sub-group analysis: Adults aged 18-25 years

The 18–25-year-old analysis had 5,067 individuals report on barriers to healthcare and 2,532 report on quality of care (*Table 3*). As in the full-sample analysis, there was a larger proportion of non-Whites, fewer people reported being married, uninsured, and getting adequate physical activity, and more people reported higher incomes, more education, and having asthma and diabetes in 2019 than in 2009. There were no differences in 18-25-year-olds reporting having a usual source of care in 2019 (58.68% vs. 59.69%), however, in 2019, more reported delaying care due to cost (17.40% vs. 3.59%) and forgoing care due to cost (12.98% vs. 7.12%). As in the full analysis, most quality-of-care measures saw no significant differences, although the best rating of the healthcare providers changed from 18.59% vs. 23.55% from 2009 to 2019. The distribution of barriers and quality-of-care variables are shown in *Table 4*.

Table 3. *Distribution of Sociodemographic Characteristics for the subgroup of Adults Aged 18-25, Medical Expenditure Panel Survey**

	MEPS 2019		MEPS 2009	
	N	**Weighted %**	**N**	**Weighted %**
Total	1684	100.00	3383	100.00
Sex				
Male	831	50.40	1638	50.40
Female	853	49.60	1745	49.60
Race/Ethnicity				
Non-Hispanic White	750	52.92	1195	30.07
Non-Hispanic Black	270	13.34	748	14.44
Hispanic	500	23.08	1134	18.25
All other race/ethnicities	164	10.66	306	7.24
Current Marital Status				
Married	131	8.41	431	12.07
Not married	1553	91.59	2952	87.93
Education				
Less than high school graduate	440	22.16	1112	28.28
High school graduate	599	32.99	1133	33.89
Some college or more	643	44.86	1129	37.83
Family Income				
Low	484	21.92	1294	27.90
Middle	755	45.53	1450	42.71
High	445	32.55	639	29.39

Table 3 (Continued)

	MEPS 2019		MEPS 2009	
	N	Weighted %	N	Weighted %
Census region				
Northeast	234	17.82	473	17.24
Midwest	353	20.56	693	22.72
South	646	37.34	1288	36.64
West	451	24.28	929	23.40
Insurance Type				
Private	1067	69.93	1611	58.53
Public	432	20.93	710	14.77
Uninsured	185	9.13	1062	26.70
Comorbidity				
Arthritis	30	1.76	65	2.46
Asthma	275	15.89	330	10.04
Cancer	17	0.90	33	1.10
Diabetes	25	1.62	19	0.40
Emphysema	1	0.06	5	0.21
Heart disease	70	4.30	115	4.40
High cholesterol	63	4.43	128	3.64
Hypertension	68	3.91	171	5.55
Stroke	6	0.31	9	0.29
Adequate Physical Activity	878	54.21	2124	68.58
Current Smoker	321	16.71	628	20.62

*Weighted proportions calculated with chi-square test of independence

Table 4. *Distribution of Outcomes for the sub-group of Adults Aged 18-25, Medical Expenditure Panel Survey**

	MEPS 2019		MEPS 2009		*P* value
	N	Weighted %	N	Weighted %	
Barriers to Accessing Care Factors					
Total	1684	100.00	3383	100.00	
Has a Usual Source of Care					0.6278
Yes	985	58.68	1837	59.69	
No	699	41.32	1546	40.31	
Delay Care due to Cost					**<0.001**
Yes	298	17.40	114	3.59	
No	1386	82.60	3269	96.41	
Forgo Care due to Cost					**<0.001**
Yes	218	12.98	230	7.21	

Table 4 (Continued)

	MEPS 2019		MEPS 2009		
	N	Weighted %	N	Weighted %	*P* value
No	1466	87.02	3153	92.79	
Quality of Care Factors					
Total	825	100.00	1707	100.00	
Provider Always Showed Respect	535	65.42	1025	60.47	0.0647
Provider Always Spent Enough Time	428	51.44	774	47.91	0.1839
Provider Always Listened	485	58.79	954	56.82	0.4394
Provider Always Explained	485	59.13	922	55.49	0.1704
Best Rating of Healthcare Providers	540	23.55	332	18.59	**0.0185**

*Proportions and *P* value calculated with chi-square test of independence.

Sub-group analysis: Adults aged 18-64 years with private insurance & asthma

The 18–64-year-olds with private insurance and asthma sub-group had 2,155 individuals report on barriers to healthcare and 1,634 report on quality-of-care (*Table 5*). There was a larger proportion of non-Whites, fewer people reported being married, getting adequate physical activity, and having arthritis emphysema, high cholesterol, or hypertension, and more people reported higher education in 2019 compared to 2009. Fewer people reported having a usual source of care (76.53% vs 85.83%) and more people reported delaying care due to cost (25.64% vs. 5.11%) and forgoing care due to cost (16.99% vs. 5.86%) in 2019 compared to 2009. There were no significant differences for quality-of-care variables. The distribution of barriers and quality-of-care variables are shown in *Table 6.*

Table 5. *Distribution of Characteristics for the sub-group of Privately Insured Adults with Asthma Aged 18-64, Medical Expenditure Panel Survey**

	MEPS 2019		MEPS 2009	
	N	Weighted %	N	Weighted %
Total	1141	100.00	1014	100.00
Age Group				
18-25	159	17.69	161	15.26
26-35	271	24.08	213	22.28
36-44	209	18.97	214	20.37

Table 5 (Continued)

	MEPS 2019		MEPS 2009	
	N	**Weighted %**	**N**	**Weighted %**
45-53	202	16.38	215	21.47
54-64	300	22.88	211	20.62
Sex				
Male	494	46.43	385	39.22
Female	647	53.57	629	60.78
Race/Ethnicity				
Non-Hispanic White	718	66.27	575	74.40
Non-Hispanic Black	153	11.76	190	10.25
Hispanic	179	13.02	151	8.34
All other race/ethnicities	91	8.95	98	7.01
Current Marital Status				
Married	599	51.50	574	58.07
Not married	542	48.50	440	41.93
Education				
Less than high school graduate	83	6.81	108	8.80
High school graduate	293	22.93	282	26.71
Some college or more	764	70.26	620	64.49
Family Income				
Low	106	7.34	121	8.77
Middle	467	37.63	475	42.02
High	568	55.02	418	49.20
Census region				
Northeast	181	18.17	162	18.89
Midwest	242	20.39	226	22.73
South	381	34.49	343	33.42
West	337	26.96	283	24.96
Comorbidity				
Arthritis	264	19.14	295	28.55
Cancer	105	7.96	73	8.09
Diabetes	101	7.99	95	8.50
Emphysema	25	1.53	35	4.31
Heart disease	125	10.78	139	13.18
High cholesterol	296	23.80	337	32.86
Hypertension	300	23.17	335	31.68
Stroke	25	1.66	27	2.17
Adequate Physical Activity	568	50.29	583	59.39
Current Smoker	199	16.69	174	17.56

*Weighted proportions calculated with chi-square test of independence

Table 6. Distribution of Outcomes for the sub-group of Privately Insured Adults with Asthma Aged 18-64, Medical Expenditure Panel Survey*

	MEPS 2019		MEPS 2009		
	N	**Weighted %**	**N**	**Weighted %**	**P value**
Barriers to Care Factors					
Total	1141	100.00	1014	100.00	
Has a Usual Source of Care					**<0.001**
Yes	885	76.53	873	85.83	
No	256	23.47	141	14.17	
Delay Care due to Cost					**<0.001**
Yes	320	25.64	52	5.11	
No	821	74.36	962	94.89	
Forgo Care due to Cost					**<0.001**
Yes	229	16.99	60	5.86	
No	912	83.01	954	94.14	
Quality of Care Factors					
Total	840	100.00	794	100.00	
Provider Always Showed Respect	515	62.31	494	60.83	0.6078
Provider Always Spent Enough Time	402	47.86	408	49.47	0.6052
Provider Always Listened	454	54.41	470	58.15	0.2000
Provider Always Explained	494	59.03	472	57.78	0.6478
Best Rating of Healthcare Providers	185	22.94	190	22.15	0.7525

*Proportions and *P* value calculated with chi-square test of independence.

Barriers: Usual Source of Care

Main Analysis: Adults aged 18-64 years

The crude associations for having a usual source of care (USC) for adults aged 18-64 years (*Table 7*) show that having a USC was significantly less likely in 2019 than in 2009 [odds ratio (OR)=0.78; 95% CI: 0.71, 0.86]. Older age was associated with being more likely to have a USC than younger age groups, with ages 36-64 significantly more likely than the 18-25 age group. Being female, married, having a high school education or higher, having a middle or high income, or any comorbidity were all associated with being more likely to have a USC. Those living in the South and West regions were less likely to have a USC than the Northeast, with no difference between the Midwest and Northeast. Being any race/ethnicity other than non-Hispanic

White, uninsured, reporting adequate physical activity, and being a current smoker was
associated with being less likely to have a USC.

Table 7. *Crude Associations of Usual Source of Care for Adults Aged 18-64, Medical Expenditure Panel Survey*

	Has a Usual Source of Care	
	OR (95%CI)	***P* value**
2019 vs 2009	0.78 (0.71, 0.86)	**<0.001**
Age Group		
18-25	reference	
26-35	0.88 (0.80, 0.97)	**0.0099**
36-44	1.54 (1.40, 1.69)	**<0.001**
45-53	2.25 (2.02, 2.50)	**<0.001**
54-64	3.25 (2.91, 3.63)	**<0.001**
Sex		**<0.001**
Male	reference	
Female	1.71 (1.61, 1.81)	**<0.001**
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	0.66 (0.60, 0.73)	**<0.001**
Hispanic	0.40 (0.37, 0.45)	**<0.001**
All other race/ethnicities	0.69 (0.60, 0.80)	**<0.001**
Current marital status		
Married	reference	
Not married	0.57 (0.53, 0.61)	**<0.001**
Education		
Less than high school graduate	reference	
High school graduate	1.28 (1.17, 1.41)	**<0.001**
Some college or more	1.69 (1.54, 1.85)	**<0.001**
Family Income		
Low	reference	
Middle	1.22 (1.12, 1.33)	**<0.001**
High	2.08 (1.89, 2.28)	**<0.001**
Census region		
Northeast	reference	
Midwest	1.08 (0.90, 1.29)	0.4015
South	0.63 (0.53, 0.73)	**<0.001**
West	0.72 (0.61, 0.85)	**<0.001**
Insurance Type		
Private	reference	
Public	0.93 (0.84, 1.03)	0.1535
Uninsured	0.22 (0.20, 0.24)	**<0.001**
Clinical Factors		
Comorbidity		

Table 7 (Continued)

	Has a Usual Source of Care	
	OR (95% CI)	*P* value
Arthritis	3.20 (2.89, 3.53)	**<0.001**
Asthma	1.56 (1.41, 1.72)	**<0.001**
Cancer	2.66 (2.29, 3.08)	**<0.001**
Diabetes	3.28 (2.79, 3.86)	**<0.001**
Emphysema	3.22 (2.23, 4.65)	**<0.001**
Heart disease	2.48 (2.19, 2.81)	**<0.001**
High cholesterol	3.21 (2.95, 3.49)	**<0.001**
Hypertension	2.65 (2.45, 2.86)	**<0.001**
Stroke	3.17 (2.43, 4.14)	**<0.001**
Lifestyle Factors		
Adequate Physical Activity	0.89 (0.83, 0.96)	**0.0020**
Current Smoker	0.75 (0.69, 0.81)	**<0.001**

*Proportions and *P* value calculated with chi-square test of independence.

Race was found to be a modifier and income and insurance type was found to be confounders of the association between year and having a usual source of care in adults aged 18 to 64. The final model included year, income, insurance type, race, and the interaction term of race and year. Stratified by race and controlling for income and insurance type, Whites, Blacks, and Hispanics were less likely to report having a usual source of care in 2019 than in 2009 [adjusted odds ratio (AOR) White = 0.60; 95% CI: 0.53, 0.69), (AOR Black = 0.63; 95% CI: 0.52, 0.75), (AOR Hispanic = 0.74; 95% CI: 0.64, 0.85), (AOR other = 0.81; 95% CI: 0.62, 1.06)]. The measures of association are shown in *Table 8*.

Table 8. *Adjusted Associations of Year with Having a Usual Source of Care for Adults Aged 18-64, Stratified by Race, Medical Expenditure Panel Survey*

	Has a Usual Source of Care			
	White	**Black**	**Hispanic**	**Other**
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
2019 vs 2009	0.60 (0.53, 0.69) [†]	0.63 (0.52, 0.75) [†]	0.74 (0.64, 0.85) [†]	0.81 (0.62, 1.06)
Family Income				
Low	reference	reference	reference	reference

Table 8 (Continued)

	Has a Usual Source of Care			
	White	**Black**	**Hispanic**	**Other**
	AOR (95% CI)	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**
Middle	1.12 (0.97, 1.29)	1.20 (0.99, 1.45)	1.16 (0.99, 1.35)	0.90 (0.64, 1.26)
High	1.60 (1.37, 1.88)[†]	1.57 (1.21, 2.03)[†]	1.77 (0.44, 2.19)[†]	0.97 (0.67, 1.39)
Insurance Type				
Private	reference	reference	reference	reference
Public	1.22 (1.02, 1.45)[†]	1.78 (1.43, 2.22)[†]	1.24 (0.99, 1.56)	1.02 (0.72, 1.46)
Uninsured	0.26 (0.22, 0.30)[†]	0.32 (0.26, 0.40)[†]	0.26 (0.22, 0.31)[†]	0.23 (0.16, 0.33)[†]

* Odds ratios calculated with binary logistic regression.

† Statistically significant at $\alpha = 0.05$.

Sub-group analysis: Adults aged 18-25 years

The crude associations for having a usual source of care for adults aged 18-25 years (*Table 9*) show no differences between years. Factors associated with being more likely to have a usual source of care include being female, married, non-Hispanic White, high income, private insurance, or specific comorbidities (arthritis, asthma, diabetes, heart disease, and high cholesterol) compared to males, all other races/ethnicities, low income, uninsured, and not having those specific comorbidities. Living in South and West regions were associated with being less likely to have a USC than the Northeast, with no differences between the Midwest and Northeast. Being married and achieving adequate physical activity both showed no significant differences. Having a high school education vs. less than high school and being a current smoker was associated with being less likely to have a USC.

Table 9. *Crude Associations of Usual Source of Care for the sub-group of Adults Aged 18-25, Medical Expenditure Panel Survey*

	Has a Usual Source of Care	
	OR (95%CI)	*P* value
2019 vs 2009	0.96 (0.81, 1.14)	0.1634
Sex		
Male	reference	
Female	1.69 (1.46, 1.96)	**<0.001**
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	0.76 (0.62, 0.94)	**0.0105**
Hispanic	0.48 (0.39, 0.58)	**<0.001**
All other race/ethnicities	0.76 (0.55, 1.04)	0.0839
Current marital status		
Married	reference	
Not married	1.34 (1.06, 1.70)	**0.0160**
Education		
Less than high school graduate	reference	
High school graduate	0.84 (0.71, 1.01)	0.0591
Some college or more	1.07 (0.88, 1.28)	0.5010
Family income		
Low	reference	
Middle	1.13 (0.95, 1.34)	0.1802
High	2.32 (1.86, 2.89)	**<0.001**
Census region		
Northeast	reference	
Midwest	0.89 (0.66, 1.20)	0.4345
South	0.56 (0.42, 0.73)	**<0.001**
West	0.67 (0.50, 0.89)	**0.0054**
Insurance Type		
Private	reference	
Public	0.89 (0.73, 1.08)	0.2498
Uninsured	0.28 (0.23, 0.34)	**<0.001**
Comorbidity		
Arthritis	1.76 (1.05, 2.97)	**0.0333**
Asthma	1.40 (1.15, 1.72)	**0.0011**
Cancer	0.98 (0.51, 1.86)	0.9497
Diabetes	1.68 (0.70, 4.07)	0.2459
Emphysema	0.37 (0.04, 3.35)	0.3760
Heart disease	1.92 (1.31, 2.82)	**0.0009**
High cholesterol	1.56 (1.08, 2.25)	**0.0176**
Hypertension	1.12 (0.80, 1.57)	0.5026
Stroke	1.83 (0.64, 5.27)	0.2607
Adequate Physical Activity	1.11 (0.95, 1.29)	0.1902
Current Smoker	0.75 (0.62, 0.90)	**0.0021**

*Proportions and *P* value calculated with chi-square test of independence.

Race was found to be a modifier and insurance type was found to be a confounder of the association between year and having a usual source of care in young adults aged 18-25. The final model included year, insurance type, race, and the interaction term of race and year. Stratified by race and controlling for insurance type, Whites had 0.66 times the odds of reporting having a usual source of care in 2019 than in 2009 while other races were as likely in 2019 as 2009 [(AOR White = 0.66; 95% CI: 0.51, 0.87), (AOR Black = 1.12; 95% CI: 0.78, 1.60), (AOR Hispanic = 0.97; 95% CI: 0.73, 1.30), (AOR other = 0.76; 95% CI: 0.43, 1.35)]. The measures of association are shown in *Table 10.*

Table 10. *Adjusted Associations of Year with Having a Usual Source of Care for the sub-group of Adults Aged 18-25, Stratified by Race, Medical Expenditure Panel Survey**

	Has a Usual Source of Care			
	White	**Black**	**Hispanic**	**Other**
	AOR (95% CI)	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**
2019 vs 2009	0.66 (0.51, 0.87)[†]	1.12 (0.78, 1.60)	0.97 (0.73, 1.30)	0.76 (0.43, 1.35)
Insurance Type				
Private	reference	reference	reference	reference
Public	0.88 (0.61, 1.29)	1.25 (0.83, 1.87)	1.18 (0.84, 1.64)	0.71 (0.36, 1.41)
Uninsured	0.35 (0.26, 0.47)[†]	0.34 (0.21, 0.55)[†]	0.23 (0.17, 0.32)[†]	0.19 (0.09, 0.40)[†]

* Odds ratios calculated with binary logistic regression.
† Statistically significant at $\alpha = 0.05$.

Sub-group analysis: Adults aged 18-64 years with private insurance & asthma

The crude associations for having a usual source of care for adults aged 18-64 with private insurance and asthma (*Table 11*) show that having a USC was significantly less likely in 2019 than in 2009. Being older was associated with being more likely to have a USC, with 36-64-year-olds significantly more likely to have a USC than 18-35-year-olds. Being female, married, having a high income, and specific comorbidities (arthritis, cancer, heart disease, high cholesterol, hypertension, and stroke) were all associated with being more likely to have a usual

source of care than males, not married, low income, and not having those specific comorbidities. Being a current smoker was associated with being less likely to have a USC.

No modifiers or confounders were observed for the association between year and having a usual source of care in privately insured adults with asthma aged 18-64. Those in 2019 had 0.54 times the odds of reporting a usual source of care than in 2009 (OR = 0.54; 95% CI: 0.40, 0.72).

Table 11. *Crude Associations of Usual Source of Care for the sub-group of Privately Insured Adults with Asthma Aged 18-64, Medical Expenditure Panel Survey*

	Has a Usual Source of Care	
	OR (95%CI)	***P* value**
2019 vs 2009	0.54 (0.40, 0.72)	**<0.001**
Age Group		
18-25	reference	
26-35	0.86 (0.60, 1.25)	0.4303
36-44	2.35 (1.52, 3.65)	**0.0002**
45-53	3.33 (2.07, 5.34)	**<0.001**
54-64	3.32 (2.10, 5.26)	**<0.001**
Sex		
Male	reference	
Female	2.07 (1.59, 2.69)	**<0.001**
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	0.76 (0.53, 1.09)	0.1365
Hispanic	0.62 (0.42, 0.90)	**0.0115**
All other race/ethnicities	1.25 (0.75, 2.06)	0.3884
Current marital status		
Married	reference	
Not married	0.49 (0.38, 0.64)	**<0.001**
Education		
Less than high school graduate	reference	
High school graduate	0.75 (0.46, 1.20)	0.2283
Some college or more	0.91 (0.56, 1.48)	0.7091
Family Income		
Low	reference	
Middle	1.27 (0.85, 1.89)	0.2478
High	1.97 (1.30, 2.99)	**0.0014**
Census region		
Northeast	reference	
Midwest	0.87 (0.57, 1.35)	0.5435

Table 11 (Continued)

	Has a Usual Source of Care	
	OR (95% CI)	*P* value
South	0.82 (0.54, 1.24)	0.3374
West	0.89 (0.59, 1.34)	0.5607
Comorbidity		
Arthritis	3.13 (2.19, 4.48)	**<0.001**
Cancer	2.72 (1.47, 5.02)	**0.0014**
Diabetes	1.57 (0.92, 2.66)	0.0983
Emphysema	2.10 (0.82, 5.37)	0.1214
Heart disease	2.22 (1.37, 3.60)	**0.0013**
High cholesterol	3.55 (2.44, 5.15)	**<0.001**
Hypertension	1.93 (1.39, 2.68)	**<0.001**
Stroke	3.34 (1.06, 10.56)	**0.0399**
Adequate Physical Activity	0.87 (0.66, 1.14)	0.3155
Current Smoker	0.70 (0.52, 0.95)	**0.0221**

Barriers: Delaying Care due to Cost

Main Analysis: Adults aged 18-64 years

The crude associations for delaying care due to cost for adults aged 18-64 (*Table 12*)
show that delaying care due to cost was more likely in 2019 than in 2009. Older age was
associated with being more likely to delay care due to cost, with ages 26-64 significantly more
likely to delay than the 18-25 age group. Being female, non-Hispanic White, not married, having
less than high school education, having a low income, public or no insurance, and any type of
priority condition were all associated with being more likely to delay care due to cost. Living in
the Midwest, South, and West regions were more likely to delay than the Northeast region.
Achieving adequate physical activity was associated with being less likely to delay care due to
cost and being a current smoker was associated with being more likely to delay care due to cost.

Table 12. *Crude Associations of Delay Care Due to Cost for Adults Aged 18-64, Medical Expenditure Panel Survey*

	Delay Care due to Cost	
	OR (95%CI)	*P* value
2019 vs 2009	5.48 (4.87, 6.16)	**<0.001**
Age Group		
18-25	reference	
26-35	1.45 (1.23, 1.70)	**<0.001**
36-44	1.22 (1.04, 1.43)	**0.0132**
45-53	1.42 (1.23, 1.64)	**<0.001**
54-64	1.55 (1.32, 1.83)	**<0.001**
Sex		
Male	reference	
Female	1.32 (1.23, 1.43)	**<0.001**
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	0.91 (0.78, 1.06)	0.2212
Hispanic	1.02 (0.88, 1.19)	0.7489
All other race/ethnicities	0.73 (0.61, 0.89)	**0.0014**
Current marital status		
Married	reference	
Not married	1.60 (1.46, 1.76)	**<0.001**
Education		
Less than high school graduate	reference	
High school graduate	0.93 (0.82, 1.05)	0.2264
Some college or more	0.86 (0.76, 0.97)	**0.0152**
Family Income		
Low	reference	
Middle	0.77 (0.68, 0.87)	**<0.001**
High	0.41 (0.35, 0.46)	**<0.001**
Census region		
Northeast	reference	
Midwest	1.51 (1.26, 1.81)	**<0.001**
South	1.68 (1.41, 1.99)	**<0.001**
West	1.51 (1.25, 1.81)	**<0.001**
Insurance Type		
Private	reference	
Public	2.01 (1.77, 2.29)	**<0.001**
Uninsured	2.11 (1.84, 2.42)	**<0.001**
Comorbidity		
Arthritis	1.69 (1.54, 1.87)	**<0.001**
Asthma	1.86 (1.66, 2.09)	**<0.001**
Cancer	1.44 (1.23, 1.69)	**<0.001**
Diabetes	1.65 (1.45, 1.87)	**<0.001**
Emphysema	2.18 (1.65, 2.86)	**<0.001**
Heart disease	1.63 (1.44, 1.83)	**<0.001**

Table 12 (Continued)

	Delay Care Due to Cost	
	OR (95% CI)	*P* value
High cholesterol	1.25 (1.15, 1.36)	**<0.001**
Hypertension	1.35 (1.23, 1.47)	**<0.001**
Stroke	1.99 (1.57, 2.51)	**<0.001**
Adequate Physical Activity	0.69 (0.63, 0.75)	**<0.001**
Current Smoker	1.77 (1.61, 1.96)	**<0.001**

Insurance type confounded the association of year of survey with delaying care due to cost in adults aged 18-64. There were no effect modifiers. Those in 2019 had 6.42 times the odds of reporting delaying care due to cost than in 2009 (AOR = 6.42; 95% CI: 5.69, 7.24 (*Table 13*).

Table 13. *Adjusted Associations of Year with Delaying Care Due to Cost for Adults Aged 18-64, Medical Expenditure Panel Survey**

	Delay Care Due to Cost
	AOR (95% CI)
2019 vs 2009	6.42 (5.69, 7.24)†
Insurance Type	
Private	reference
Public	1.77 (1.55, 2.02)†
Uninsured	3.29 (2.87, 3.78)†

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Sub-group analysis: Adults aged 18-25 years

The crude associations for delaying care due to cost for adults aged 18-25 (*Table 14*) show that young adults in 2019 were more likely to delay care due to cost than in 2009. Having a low income, being uninsured, and specific comorbidities (asthma and heart disease) were all associated with being more likely to delay care due to cost. Reporting adequate physical activity was associated with being less likely to delay care due to cost and being a current smoker was associated with being more likely to delay care due to cost.

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Table 14. *Crude Associations of Delay Care Due to Cost for the sub-group of Adults Aged 18-25, Medical Expenditure Panel Survey*

	Delay Care due to Cost	
	OR (95%CI)	***P* value**
2019 vs 2009	5.65 (4.27, 7.48)	**<0.001**
Sex		
Male	reference	
Female	1.28 (0.99, 1.66)	0.0586
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	0.74 (0.49, 1.11)	0.1476
Hispanic	1.04 (0.74, 1.47)	0.8209
All other race/ethnicities	0.84 (0.51, 1.38)	0.4870
Current marital status		
Married	reference	
Not married	0.88 (0.57, 1.36)	0.5605
Education		
Less than high school graduate	reference	
High school graduate	1.12 (0.80, 1.55)	0.5152
Some college or more	1.04 (0.75, 1.44)	0.8239
Family income		
Low	reference	
Middle	0.94 (0.72, 1.24)	0.6840
High	0.35 (0.23, 0.52)	**<0.001**
Census region		
Northeast	reference	
Midwest	1.60 (0.95, 2.69)	0.0775
South	1.62 (0.98, 2.69)	0.0604
West	1.42 (0.82, 2.44)	0.2068
Insurance Type		
Private	reference	
Public	1.22 (0.88, 1.71)	0.2343
Uninsured	1.57 (1.15, 2.14)	**0.0047**
Comorbidity		
Arthritis	2.04 (0.97, 4.29)	0.0588
Asthma	1.99 (1.43, 2.78)	**<0.001**
Cancer	2.53 (0.87, 7.36)	0.0886
Diabetes	2.00 (0.75, 5.37)	0.1680
Emphysema	N/A	N/A
Heart disease	2.03 (1.12, 3.70)	**0.0203**
High cholesterol	1.97 (1.15, 3.38)	**0.0134**
Hypertension	1.30 (0.76, 2.21)	0.3364
Stroke	2.34 (0.78, 7.00)	0.1282
Adequate Physical Activity	0.54 (0.41, 0.69)	**<0.001**
Current Smoker	1.60 (1.18, 2.17)	**0.0028**

Insurance type was found to be a confounder of the association between year and delaying care due to cost in adults aged 18-25. There were no modifiers. Controlling for insurance, those in 2019 had 7.31 times the odds of report delaying care due to cost than in 2009 (AOR = 7.31; 95% CI: 5.28, 10.11). The measures of association are shown in *Table 15*.

Table 15. *Adjusted Associations of Year with Delaying Care Due to Cost for the sub-group of Adults Aged 18-25, Stratified by Race, Medical Expenditure Panel Survey**

	Delay Care Due to Cost
	AOR (95% CI)
2019 vs 2009	7.31 (5.28, 10.11)†
Insurance Type	
Private	reference
Public	1.11 (0.79, 1.56)
Uninsured	3.00 (2.12, 4.24)†

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Sub-group analysis: Adults aged 18-64 years with private insurance & asthma

The crude associations for delaying care due to cost for adults aged 18-64 with private insurance and asthma (*Table 16*) showed that people in 2019 were more likely to delay care due to cost than in 2009. Being female, not married, having specific comorbidities (arthritis, diabetes, and stroke), or a current smoker was more likely to delay care due to cost. Having middle and high incomes was associated with being less likely to delay care due to cost. There were no modifiers or confounders of the association between year and delaying care due to cost in privately insured adults with asthma aged 18-64. Privately Insured Adults with Asthma Aged 18-64 had 6.40 times the odd of reporting delaying care due to cost than in 2009 (AOR = 6.40; 95% CI: 4.58, 8.94).

Table 16. *Crude Associations of Delay Care Due to Cost for the sub-group of Privately Insured Adults with Asthma Aged 18-64, Medical Expenditure Panel Survey*

	Delay Care due to Cost	
	OR (95%CI)	*P* value
2019 vs 2009	6.40 (4.58, 8.94)	**<0.001**
Age Group		
18-25	reference	
26-35	1.22 (0.77, 1.95)	0.4000
36-44	0.89 (0.57, 1.40)	0.6140
45-53	1.06 (0.68, 1.65)	0.7877
54-64	1.34 (0.84, 2.14)	0.2171
Sex		
Male	reference	
Female	1.56 (1.21, 2.02)	**0.0007**
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.16 (0.79, 1.70)	0.4379
Hispanic	1.17 (0.78, 1.75)	0.4595
All other race/ethnicities	1.01 (0.62, 1.64)	0.9785
Current marital status		
Married	reference	
Not married	1.60 (1.20, 2.12)	**0.0012**
Education		
Less than high school graduate	reference	
High school graduate	1.06 (0.66, 1.72)	0.8018
Some college or more	0.95 (0.62, 1.47)	0.8225
Family Income		
Low	reference	
Middle	0.63 (0.40, 1.00)	0.0517
High	0.39 (0.25, 0.60)	**<0.001**
Census region		
Northeast	reference	
Midwest	1.07 (0.63, 1.84)	0.7980
South	1.42 (0.88, 2.29)	0.1476
West	1.25 (0.76, 2.05)	0.3787
Comorbidity		
Arthritis	1.39 (1.04, 1.86)	**0.0254**
Cancer	1.29 (0.83, 1.99)	0.2548
Diabetes	1.78 (1.20, 2.65)	**0.0045**
Emphysema	1.55 (0.85, 2.84)	0.1518
Heart disease	1.07 (0.74, 1.55)	0.7255
High cholesterol	1.11 (0.83, 1.48)	0.4789
Hypertension	1.10 (0.83, 1.46)	0.5024
Stroke	4.02 (2.08, 7.76)	**<0.001**
Adequate Physical Activity	0.73 (0.57, 0.94)	**0.0137**

Table 16 (Continued)

	Delay Care Due to Cost	
	OR (95% CI)	*P* value
Current Smoker	1.84 (1.27, 2.66)	**0.0014**

Barriers: Forgoing Care due to Cost

Main Analysis: Adults aged 18-64 years

      The crude associations for forgoing care due to cost for adults aged 18-64 (*Table 17*) show that forgoing care due to cost was more likely in 2019 than in 2009. Adults aged 45-64 were more likely to forgo care due to cost than young adults (aged 18-25), with no other age group differences. Being female, not married, having public or no insurance, any comorbidity, or being a current smoker were all associated with being more likely to forgo care due to cost. Living in the Midwest, South or West regions were associated with being more likely to forgo care than the Northeast region. Having a middle or high income, high school or higher education, or achieving adequate physical activity were associated with being less likely to forgo care due to cost.

Table 17. *Crude Associations of Forgo Care Due to Cost for Adults Aged 18-64, Medical Expenditure Panel Survey*

	Forgo Care Due to Cost	
	OR (95%CI)	*P* value
2019 vs 2009	2.43 (2.17, 2.72)	**<0.001**
Age Group		
18-25	reference	
26-35	1.14 (0.97, 1.34)	0.1079
36-44	1.11 (0.96, 1.29)	0.1479
45-53	1.34 (1.16, 1.56)	**<0.001**
54-64	1.27 (1.09, 1.47)	**0.0016**
Sex		
Male	reference	
Female	1.32 (1.22, 1.42)	**<0.001**
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.03 (0.89, 1.18)	0.7028

Table 17 (Continued)

	Forgo Care Due to Cost	
	OR (95% CI)	*P* value
Hispanic	1.07 (0.93, 1.23)	0.3758
All other race/ethnicities	0.84 (0.69, 1.01)	0.0630
Current marital status		
Married	reference	
Not married	1.84 (1.66, 2.04)	**<0.001**
Education		
Less than high school graduate	reference	
High school graduate	0.85 (0.74, 0.98)	**0.0214**
Some college or more	0.61 (0.53, 0.69)	**<0.001**
Family Income		
Low	reference	
Middle	0.62 (0.56, 0.69)	**<0.001**
High	0.23 (0.20, 0.27)	**<0.001**
Census region		
Northeast	reference	
Midwest	1.59 (1.30, 1.95)	**<0.001**
South	1.83 (1.52, 2.20)	**<0.001**
West	1.67 (1.37, 2.04)	**<0.001**
Insurance Type		
Private	reference	
Public	2.79 (2.44, 3.20)	**<0.001**
Uninsured	3.26 (2.86, 3.72)	**<0.001**
Comorbidity		
Arthritis	1.90 (1.72, 2.10)	**<0.001**
Asthma	1.81 (1.61, 2.03)	**<0.001**
Cancer	1.44 (1.24, 1.67)	**<0.001**
Diabetes	1.73 (1.54, 1.94)	**<0.001**
Emphysema	2.24 (1.76, 2.86)	**<0.001**
Heart disease	1.82 (1.61, 2.06)	**<0.001**
High cholesterol	1.29 (1.18, 1.41)	**<0.001**
Hypertension	1.46 (1.34, 1.58)	**<0.001**
Stroke	2.40 (1.91, 3.01)	**<0.001**
Adequate Physical Activity	0.71 (0.65, 0.78)	**<0.001**
Current Smoker	2.20 (1.98, 2.44)	**<0.001**

Income and insurance type were found to be confounders of the association between year

and forgoing care due to cost in adults aged 18 to 64. There were no modifiers. Controlling for

income and insurance type, those in 2019 had 3.05 times the odds of reporting forging care due

to cost than in 2009 (AOR = 3.05; 95% CI: 2.72, 3.41). The measures of association are shown

in *Table 18*.

Table 18. *Adjusted Associations of Year with Forgoing Care due to Cost for Adults Aged 18-64, Medical Expenditure Panel Survey**

	Forgo Care Due to Cost
	AOR (95% CI)
2019 vs 2009	3.05 (2.72, 3.41)†
Family Income	
Low	reference
Middle	0.74 (0.65, 0.83)†
High	2.93 (2.57, 3.34)†
Insurance Type	
Private	reference
Public	1.56 (1.34, 1.82)†
Uninsured	2.93 (2.57, 3.34)†

* Odds ratios calculated with binary logistic regression.
† Statistically significant at $\alpha = 0.05$.

Sub-group analysis: Adults aged 18-25 years

The crude associations for forgoing care due to cost for adults aged 18-25 (*Table 19*) showed that forgoing care due to cost was more likely in 2019 than in 2009. Being female, non-Hispanic White, having a low income, no insurance, or specific comorbidities (asthma and stroke) were all associated with being more likely to forgo care due to cost. Living in South and Midwest regions were associated with being more likely to forgo care due to cost than the Northeast. Achieving adequate physical activity was associated with being less likely to forgo care due to cost and being a current smoker was associated with more likely to forgo care due to cost.

Table 19. *Crude Associations of Forgo Care Due to Cost for the sub-group of Adults Aged 18-25, Medical Expenditure Panel Survey*

	Forgo Care Due to Cost	
	OR (95%CI)	*P* value
2019 vs 2009	1.92 (1.49, 2.47)	**<0.001**
Sex		
Male	reference	
Female	1.31 (1.01, 1.70)	**0.0426**
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	0.83 (0.56, 1.23)	0.3510
Hispanic	1.05 (0.76, 1.43)	0.7754
All other race/ethnicities	1.01 (0.60, 1.70)	0.9637
Current marital status		
Married	reference	
Not married	0.65 (0.40, 1.06)	0.0824
Education		
Less than high school graduate	reference	
High school graduate	1.03 (0.75, 1.40)	0.8675
Some college or more	0.77 (0.54, 1.08)	0.1314
Family income		
Low	reference	
Middle	0.76 (0.58, 0.99)	**0.0478**
High	0.21 (0.13, 0.33)	**<0.001**
Census region		
Northeast	reference	
Midwest	2.24 (1.25, 4.03)	**0.0069**
South	2.27 (1.31, 3.92)	**0.0036**
West	2.20 (1.23, 3.95)	**0.0084**
Insurance Type		
Private	reference	
Public	1.36 (0.97, 1.90)	0.0761
Uninsured	2.37 (1.76, 3.19)	**<0.001**
Comorbidity		
Arthritis	1.51 (0.63, 3.58)	0.3541
Asthma	2.12 (1.53, 2.92)	**<0.001**
Cancer	1.63 (0.39, 6.84)	0.5022
Diabetes	1.24 (0.41, 3.81)	0.7020
Emphysema	N/A	N/A
Heart disease	1.52 (0.74, 3.13)	0.2560
High cholesterol	1.62 (0.88, 2.97)	0.1191
Hypertension	1.04 (0.62, 1.76)	0.8695
Stroke	0.11 (0.01, 0.88)	**0.0378**
Adequate Physical Activity	0.61 (0.47, 0.77)	**<0.001**
Current Smoker	1.97 (1.47, 2.65)	**<0.001**

Insurance type was found to be the only confounder of the association between year of survey and forgoing care due to cost in adults aged 18-25. There were no modifiers. Controlling for insurance type, those in 2019 had 2.50 times the odds of reporting forging care due to cost than in 2009 (AOR = 2.50; 95% CI: 1.91, 3.27). The measures of association are shown in *Table 20*.

Table 20. *Adjusted Associations of Year with Forgoing Care due to Cost for the sub-group of Adults Aged 18-25, Medical Expenditure Panel Survey**

	Forgo Care Due to Cost
	AOR (95% CI)
2019 vs 2009	2.50 (1.91, 3.27)†
Insurance Type	
Private	reference
Public	1.27 (0.90, 1.78)
Uninsured	3.24 (2.38, 4.40)†

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Sub-group analysis: Adults aged 18-64 years with private insurance & asthma

The crude associations for delaying care due to cost for adults aged 18-64 with private insurance and asthma (*Table 21*) showed forgoing care due to cost was more likely in 2019 than in 2009. Being female, not married, having some college education or more, specific comorbidities (arthritis, diabetes, high cholesterol, hypertension, and stroke), or being a current smoker were all associated with being more likely forgo care due to cost. Having middle or high incomes and achieving adequate physical activity was associated with being less likely to forgo care due to cost. Midwest and South regions were more likely to forgo care than the Northeast region.

Table 21. *Crude Associations of Forgo Care Due to Cost for the sub-group of Privately Insured Adults with Asthma Aged 18-64, Medical Expenditure Panel Survey*

	Forgo Care Due to Cost	
	OR (95%CI)	*P* value
2019 vs 2009	3.29 (2.32, 4.67)	**<0.001**
Age Group		
18-25	reference	
26-35	0.74 (0.45, 1.21)	0.2229
36-44	0.64 (0.38, 1.07)	0.0891
45-53	1.00 (0.60, 1.65)	0.9964
54-64	0.94 (0.56, 1.57)	0.8057
Sex		
Male	reference	
Female	2.13 (1.58, 2.86)	**<0.001**
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.45 (0.95, 2.22)	0.0807
Hispanic	0.78 (0.51, 1.22)	0.2779
All other race/ethnicities	1.31 (0.79, 2.19)	0.2969
Current marital status		
Married	reference	
Not married	1.78 (1.32, 2.41)	**0.0002**
Education		
Less than high school graduate	reference	
High school graduate	1.05 (0.62, 1.79)	0.8503
Some college or more	0.63 (0.37, 1.05)	0.0765
Family Income		
Low	reference	
Middle	0.52 (0.32, 0.82)	**0.0057**
High	0.23 (0.14, 0.38)	**<0.001**
Census region		
Northeast	reference	
Midwest	1.44 (0.76, 2.72)	0.2567
South	1.86 (1.07, 3.24)	**0.0278**
West	1.82 (1.03, 3.24)	**0.0406**
Comorbidity		
Arthritis	1.79 (1.31, 2.44)	**0.0003**
Cancer	1.52 (0.98, 2.35)	0.0625
Diabetes	1.67 (1.11, 2.53)	**0.0150**
Emphysema	0.72 (0.29, 1.80)	0.4816
Heart disease	1.26 (0.87, 1.81)	0.2189
High cholesterol	1.23 (0.91, 1.65)	0.1791
Hypertension	1.19 (0.89, 1.60)	0.2344
Stroke	3.95 (2.03, 7.71)	**<0.001**
Adequate Physical Activity	0.64 (0.48, 0.85)	**0.0023**
Current Smoker	1.96 (1.43, 2.71)	**<0.001**

Income was found to be confounders of the association between year and forgoing care due to cost in privately insured adults with asthma aged 18-64. No modifier was observed. Controlling for income, those in 2019 had 4.01 times the odds of reporting forging care due to cost than in 2009 (AOR = 4.01; 95% CI: 2.80, 5.75). The measures of association are shown in *Table 22*.

Table 22. *Adjusted Associations of Year with Forgoing Care due to Cost for the sub-group of Privately Insured Adults with Asthma Aged 18-64, Medical Expenditure Panel Survey**

	Forgo Care Due to Cost
	AOR (95% CI)
2019 vs 2009	4.01 (2.80, 5.75)†
Family Income	
Low	reference
Middle	0.49 (0.30, 0.80)†
High	0.20 (0.12, 0.33)†

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Quality-of-Care: Provider Always Showed Respect

Main Analysis: Adults aged 18-64 years

The crude associations for reporting that the provider always showed respect for adults aged 18-64 (*Table 23*) showed no differences in year, age group, sex, marital status, or region. All other races/ethnicities were more likely to report their provider always respected them than non-Hispanic Whites. Some college or more education levels were more likely to always feel respected than those with less than high school education. Having public insurance or being uninsured were associated with being less likely to report respect than having private insurance. Individuals with specific comorbidities (arthritis, asthma, and stroke) were more likely to always feel respected than those not having those conditions. Achieving adequate physical activity was

associated with being more likely to always feel respected by providers than no physical activity

but being a current smoker was associated with being less likely to always feel respected.

Table 23. *Crude Associations of Provider Always Showed Respect for Adults Aged 18-64, Medical Expenditure Panel Survey*

	Always Showed Respect	
	OR (95%CI)	***P* value**
2019 vs 2009	1.04 (0.94, 1.14)	0.7972
Age Group		
18-25	reference	
26-35	0.91 (0.79, 1.05)	0.2041
36-44	1.04 (0.91, 1.19)	0.5757
45-53	1.00 (0.87, 1.15)	0.9885
54-64	1.06 (0.93, 1.20)	0.3766
Sex		
Male	reference	
Female	0.96 (0.89, 1.03)	0.2345
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.38 (1.23, 1.54)	**<0.001**
Hispanic	1.06 (0.95, 1.18)	0.3247
All other race/ethnicities	1.08 (0.93, 1.26)	0.2897
Current marital status		
Married	reference	
Not married	0.93 (0.86, 1.01)	0.0733
Education		
Less than high school graduate	reference	
High school graduate	1.07 (0.95, 1.20)	0.2460
Some college or more	1.19 (1.07, 1.32)	**0.0012**
Family Income		
Low	reference	
Middle	1.18 (1.07, 1.31)	**0.0016**
High	1.33 (1.20, 1.46)	**<0.001**
Census region		
Northeast	reference	
Midwest	0.98 (0.88, 1.10)	0.7322
South	0.97 (0.87, 1.09)	0.6147
West	0.89 (0.80, 1.01)	0.0622
Insurance Type		
Private	reference	
Public	0.80 (0.72, 0.88)	**<0.001**
Uninsured	0.67 (0.59, 0.76)	**<0.001**
Comorbidity		
Arthritis	0.83 (0.76, 0.90)	**<0.001**
Asthma	0.86 (0.78, 0.95)	**0.0029**

Table 23 (Continued)

	Always Showed Respect	
	OR (95%CI)	*P* value
Cancer	1.00 (0.88, 1.14)	0.9619
Diabetes	1.05 (0.93, 1.19)	0.4080
Emphysema	0.79 (0.62, 1.02)	0.0688
Heart disease	0.92 (0.82, 1.02)	0.1114
High cholesterol	0.97 (0.89, 1.05)	0.3912
Hypertension	1.00 (0.93, 1.08)	0.9906
Stroke	0.79 (0.65, 0.96)	**0.0173**
Adequate Physical Activity	1.13 (1.05, 1.22)	**0.0009**
Current Smoker	0.71 (0.64, 0.78)	**<0.001**

Race was found to be a modifier and there were no confounders of the association

between year and providers always showed respect in adults aged 18-64. The final model

included year, race, and the interaction term of race and year. Stratified by race, Whites were less

likely to report providers always showed respect in 2019 than in 2009 and Blacks, Hispanics, and

all other races/ethnicities were more likely to report providers always showed respect in 2019

than in 2009 [(AOR White = 0.90; 95% CI: 0.82, 0.99), (AOR Black = 1.25; 95% CI: 1.02,

1.53), (AOR Hispanic = 1.54; 95% CI: 1.26, 1.87), (AOR other = 1.63; 95% CI: 1.24, 2.15)].

The measures of association are shown in *Table 24*.

Table 24. *Adjusted Associations of Year with Provider Always Showing Respect for Adults Aged 18-64, Stratified by Race, Medical Expenditure Panel Survey**

	Provider Always Showed Respect			
	White	Black	Hispanic	Other
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
2019 vs 2009	0.90 (0.82, 0.99)[†]	1.25 (1.02, 1.53)[†]	1.54 (1.26, 1.87)[†]	1.63 (1.24, 2.15)[†]

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Sub-group analysis: Adults aged 18-25 years

The crude associations for provider always showed respect for adults aged 18-25 (*Table 25*) showed that young adults in 2019 were more likely to report their providers always showed them respect than in 2009. There were no differences for sex, race/ethnicity, marital status, education, income, region, comorbidities, and adequate physical activity. Having public or no insurance was associated with being significantly less likely to report always being shown respect than private insurance. Being a current smoker was associated with being less likely to report always being shown respect.

Table 25. *Crude Associations of Provider Always Showed Respect for the sub-group of Adults Aged 18-25, Medical Expenditure Panel Survey*

	Always Showed Respect	
	OR (95%CI)	*P* value
2019 vs 2009	1.24 (0.98, 1.55)	0.0682
Sex		
Male	reference	
Female	0.92 (0.74, 1.14)	0.4433
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.46 (1.08, 1.99)	**0.0151**
Hispanic	1.16 (0.86, 1.56)	0.3208
All other race/ethnicities	0.88 (0.60, 1.29)	0.5074
Current marital status		
Married	reference	
Not married	1.03 (0.74, 1.41)	0.8744
Education		
Less than high school graduate	reference	
High school graduate	1.01 (0.78, 1.30)	0.9402
Some college or more	1.09 (0.84, 1.40)	0.5251
Family Income		
Low	reference	
Middle	1.06 (0.80, 1.40)	0.6710
High	1.28 (0.96, 1.71)	0.0904
Census region		
Northeast	reference	
Midwest	1.07 (0.74, 1.54)	0.7134
South	0.80 (0.57, 1.11)	0.1772

Table 25 (Continued)

	Always Showed Respect	
	OR (95%CI)	P value
West	0.82 (0.57, 1.19)	0.3007
Insurance Type		
Private	reference	
Public	0.72 (0.54, 0.96)	**0.0231**
Uninsured	0.58 (0.43, 0.79)	**0.0005**
Comorbidity		
Arthritis	0.69 (0.36, 1.34)	0.2778
Asthma	0.84 (0.64, 1.11)	0.2226
Cancer	0.66 (0.27, 1.61)	0.3563
Diabetes	0.72 (0.28, 1.81)	0.4790
Emphysema	N/A	N/A
Heart disease	0.71 (0.42, 1.18)	0.1860
High cholesterol	0.81 (0.50, 1.29)	0.3733
Hypertension	1.34 (0.85, 2.11)	0.2037
Stroke	0.30 (0.05, 1.90)	0.2013
Adequate Physical Activity	1.12 (0.89, 1.40)	0.3255
Current Smoker	0.52 (0.40, 0.67)	**<0.001**

N/A: Sample size too small to calculate OR.

We found race to be a modifier and no confounders of the association between year and providers always showed respect in adults aged 18-25. The final model included year, race, and the interaction term of race and year. Stratified by race, White, Hispanics, and all other races were as likely to report providers always showed respect in 2019 than in 2009 while Blacks had 2.34 times the odds of reporting that providers always showed respect in 2019 than in 2009 [(AOR NH White = 1.06; 95% CI: 0.77, 1.46), (AOR Black = 2.34; 95% CI: 1.27, 4.32), (AOR Hispanic = 1.65; 95% CI: 0.99, 2.70), (AOR other = 1.26; 95% CI: 0.64, 2.48)]. The measures of association are shown in *Table 26*.

Table 26. *Adjusted Associations of Year with Provider Always Showing Respect for the sub-group of Adults Aged 18-25, Stratified by Race, Medical Expenditure Panel Survey**

| | Provider Always Showed Respect | | | |
| | White | Black | Hispanic | Other |
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
2019 vs 2009	1.06 (0.77, 1.46)	2.34 (1.27, 4.32) [†]	1.65 (0.99, 2.70)	1.26 (0.64, 2.48)

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Sub-group analysis: Adults aged 18-64 years with private insurance & asthma

The crude associations for provider always showed respect for adults aged 18-64 with private insurance and asthma (*Table 27*) showed no differences for year, age, marital status, education, income, region, comorbidities, and adequate physical activity. Females were less likely to report their provider always showed respect than males, all other races/ethnicities were more likely to report their provider always showed respect than non-Hispanic Whites, and current smokers were less likely to report their provider always showed respect.

Table 27. *Crude Associations of Provider Always Showed Respect for the sub-group of Privately Insured Adults with Asthma Aged 18-64, Medical Expenditure Panel Survey*

| | Always Showed Respect | |
	OR (95%CI)	*P* value
2019 vs 2009	1.06 (0.84, 1.35)	0.6070
Age Group		
18-25	reference	
26-35	0.86 (0.55, 1.34)	0.4962
36-44	0.89 (0.60, 1.31)	0.5554
45-53	1.05 (0.70, 1.57)	0.8048
54-64	0.95 (0.64, 1.41)	0.7991
Sex		
Male	reference	
Female	0.77 (0.61, 0.97)	**0.0247**
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	2.32 (1.59, 3.39)	**<0.001**
Hispanic	1.06 (0.74, 1.53)	0.7421
All other race/ethnicities	1.65 (1.05, 2.60)	**0.0304**

Table 27 (Continued)

	Always Showed Respect	
	OR (95%CI)	*P* value
Current marital status		
Married	reference	
Not married	1.07 (0.83, 1.39)	0.5893
Education		
Less than high school graduate	reference	
High school graduate	1.14 (0.71, 1.84)	0.5779
Some college or more	1.13 (0.73, 1.76)	0.5882
Family Income (% Poverty)		
Low-income <139%	reference	
Middle-income 139-400%	1.22 (0.78, 1.91)	0.3892
High-income >400%	1.34 (0.88, 2.04)	0.1774
Census region		
Northeast	reference	
Midwest	0.85 (0.56, 1.27)	0.4159
South	0.88 (0.60, 1.28)	0.5032
West	0.82 (0.57, 1.18)	0.2877
Comorbidity		
Arthritis	0.90 (0.70, 1.15)	0.4078
Cancer	1.20 (0.83, 1.74)	0.3235
Diabetes	1.43 (0.97, 2.10)	0.0735
Emphysema	0.91 (0.53, 1.57)	0.7447
Heart disease	0.83 (0.59, 1.19)	0.3182
High cholesterol	0.97 (0.76, 1.24)	0.7895
Hypertension	1.02 (0.80, 1.31)	0.8575
Stroke	0.49 (0.25, 0.96)	**0.0384**
Adequate Physical Activity	1.21 (0.96, 1.53)	0.1063
Current Smoker	0.57 (0.42, 0.78)	**0.0004**

Race was found to be a modifier and there were no confounders of the association between year and providers always showed respect in privately insured adults with asthma aged 18-64. The final model included year, race, and the interaction term of race and year. Stratified by race, Whites, Blacks, and Hispanics were as likely to report providers always showed respect in 2019 than in 2009 and all other races/ethnicities had 4.24 times the odds of reporting that providers always showed respect in 2019 than in 2009 [(AOR NH White = 0.95; 95% CI: 0.72,

1.25), (AOR Black = 0.99; 95% CI: 0.51, 1.92), (AOR Hispanic = 1.18; 95% CI: 0.61, 2.30),

(AOR other = 4.24; 95% CI: 1.78, 10.11)]. The measures of association are shown in *Table 28*.

Table 28. *Adjusted Associations of Year with Provider Always Showing Respect for the sub-group of Privately Insured Adults with Asthma Aged 18-64, Stratified by Race, Medical Expenditure Panel Survey**

	Provider Always Showed Respect			
	White	**Black**	**Hispanic**	**Other**
	AOR	**AOR**	**AOR**	**AOR**
	(95% CI)	**(95% CI)**	**(95% CI)**	**(95% CI)**
2019 vs 2009	0.95 (0.72, 1.25)	0.99 (0.51, 1.92)	1.18 (0.61, 2.30)	4.24 (1.78, 10.11) [†]

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Quality: Provider Always Spent Enough Time

Main Analysis: Adults aged 18-64 years

The crude associations for "provider always spent enough time" with adults aged 18-64 (*Table 29*) showed no differences in year, sex, race/ethnicity, or region. Adults aged 26-35 were significantly less likely and adults aged 54-64 were more likely to report that providers always spend enough time than adults aged 18-25, with no differences for other age groups. Those not married, those who have public or no insurance, and current smokers were less likely to report providers spending enough time with them. High school and some college or more education levels, middle and high incomes, having specific comorbidities (arthritis, asthma, and hypertension), and those who achieve adequate physical activity were more likely than to report enough time with providers than those with less than high school educations.

Table 29. *Crude Associations of "Provider Always Spent Enough Time" for Adults Aged 18-64, Medical Expenditure Panel Survey*

	Always Spent Enough Time	
	OR (95%CI)	*P* value
2019 vs 2009	1.02 (0.92, 1.12)	0.6076
Age Group		
18-25	reference	
26-35	0.83 (0.73, 0.94)	**0.0049**
36-44	1.05 (0.92, 1.20)	0.4391
45-53	1.04 (0.92, 1.17)	0.5482
54-64	1.18 (1.04, 1.33)	**0.0077**
Sex		
Male	reference	
Female	0.98 (0.92, 1.05)	0.5814
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.15 (1.04, 1.28)	**0.0068**
Hispanic	0.95 (0.85, 1.05)	0.2912
All other race/ethnicities	0.99 (0.85, 1.16)	0.9423
Current marital status		
Married	reference	
Not married	0.91 (0.85, 0.98)	**0.0134**
Education		
Less than high school graduate	reference	
High school graduate	1.16 (1.04, 1.30)	**0.0082**
Some college or more	1.12 (1.02, 1.25)	**0.0216**
Family Income		
Low	reference	
Middle	1.14 (1.03, 1.25)	**0.0092**
High	1.29 (1.18, 1.41)	**<0.001**
Census region		
Northeast	reference	
Midwest	0.92 (0.80, 1.05)	0.2004
South	0.93 (0.83, 1.05)	0.2598
West	0.82 (0.71, 0.94)	**0.0037**
Insurance Type		
Private	reference	
Public	0.88 (0.80, 0.97)	**0.0101**
Uninsured	0.69 (0.61, 0.79)	**<0.001**
Comorbidity		
Arthritis	0.88 (0.81, 0.95)	**0.0013**
Asthma	0.86 (0.77, 0.95)	**0.0037**
Cancer	1.03 (0.92, 1.17)	0.5782
Diabetes	1.12 (1.00, 1.26)	0.0594
Emphysema	1.01 (0.79, 1.30)	0.9205

Table 29 (Continued)

	Always Spent Enough Time	
	OR (95%CI)	*P* value
Heart disease	0.93 (0.84, 1.04)	0.1946
High cholesterol	1.02 (0.94, 1.11)	0.6013
Hypertension	1.08 (1.00, 1.17)	**0.0387**
Stroke	0.87 (0.70, 1.08)	0.2130
Adequate Physical Activity	1.18 (1.08, 1.27)	**<0.001**
Current Smoker	0.83 (0.75, 0.91)	**<0.001**

Race was found to be a modifier and there were no confounders of the association between year and participants reporting that providers always spent enough time with adults aged 18-64. The final model included year, race, and the interaction term of race and year. Stratified by race, Whites were less likely to report providers always spent enough time in 2019 than in 2009 and Blacks, Hispanics, and all other races/ethnicities were more likely to report providers always spent enough time in 2019 than in 2009 [(OR NH White = 0.87; 95% CI: 0.78, 0.97), (OR Black = 1.23; 95% CI: 1.05, 1.54), (OR Hispanic = 1.80; 95% CI: 1.49, 2.16), (OR other = 1.49; 95% CI: 1.14, 1.96)]. The measures of association are shown in *Table 30*.

Table 30. *Adjusted Associations of Year with Provider Always Spent Enough Time for Adults Aged 18-64, Stratified by Race, Medical Expenditure Panel Survey**

	Provider Always Spent Enough Time			
	White	**Black**	**Hispanic**	**Other**
	AOR (95% CI)	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**
2019 vs 2009	0.87 (0.78, 0.97)[†]	1.23 (1.05, 1.54)[†]	1.80 (1.49, 2.16)[†]	1.49 (1.14, 1.96)[†]

* Odds ratios calculated with binary logistic regression.
† Statistically significant at $\alpha = 0.05$.

Sub-group analysis: Adults aged 18-25 years

The crude associations for providers always spending enough time with adults aged 18-25 (*Table 31*) show that young adults in 2019 were more likely to report providers always

spending enough time than in 2009. There were no differences between sex, race/ethnicity,

marital status, education, insurance type, region, comorbidities, or adequate physical activity.

Those with high incomes were more likely to report enough time than low incomes. Being a

current smoker was associated with being less likely to report providers spending enough time.

Table 31. *Crude Associations of Provider Always Spent Enough Time for the sub-group of Adults Aged 18-25, Medical Expenditure Panel Survey*

	Always Spent Enough Time	
	OR (95%CI)	*P* value
2019 vs 2009	1.15 (0.93, 1.42)	0.1852
Sex		
Male	reference	
Female	0.95 (0.77, 1.16)	0.5842
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.30 (0.95, 1.76)	0.0971
Hispanic	1.10 (0.83, 1.44)	0.5076
All other race/ethnicities	0.97 (0.65, 1.43)	0.8695
Current marital status		
Married	reference	
Not married	1.05 (0.77, 1.44)	0.7609
Education		
Less than high school graduate	reference	
High school graduate	1.04 (0.82, 1.32)	0.7284
Some college or more	1.05 (0.83, 1.33)	0.6697
Family Income		
Low	reference	
Middle	1.12 (0.87, 1.45)	0.3755
High	1.45 (1.09, 1.92)	**0.0105**
Census region		
Northeast	reference	
Midwest	0.95 (0.67, 1.36)	0.7917
South	0.90 (0.65, 1.25)	0.5197
West	0.83 (0.57, 1.19)	0.3026
Insurance Type		
Private	reference	
Public	0.83 (0.63, 1.09)	0.1784
Uninsured	0.76 (0.55, 1.06)	0.1049
Comorbidity		
Arthritis	0.70 (0.36, 1.38)	0.3050
Asthma	0.83 (0.63, 1.10)	0.1910

Table 31 (Continued)

| | Always Spent Enough Time | |
	OR (95%CI)	*P* value
Cancer	0.92 (0.40, 2.12)	0.8503
Diabetes	0.50 (0.22, 1.13)	0.0965
Emphysema	N/A	N/A
Heart disease	0.80 (0.47, 1.36)	0.4125
High cholesterol	1.07 (0.67, 1.71)	0.7841
Hypertension	1.44 (0.93, 2.24)	0.1013
Stroke	2.87 (0.51, 16.26)	0.2323
Adequate Physical Activity	1.14 (0.91, 1.43)	0.2445
Current Smoker	0.65 (0.49, 0.86)	**0.0025**

Race was found to be a modifier and there were no confounders of the association between year and participants reporting providers always spent enough time with adults aged 18-25. The final model included year, race, and the interaction term of race and year. Stratified by race, Whites and all other races/ethnicities were as likely to report providers always spent enough time in 2019 than in 2009 and Blacks and Hispanics had over 2.28 and 2.26 times the odds, respectively, of reporting "providers always spent enough time" in 2019 than in 2009 [(AOR NH White = 0.87; 95% CI: 0.64, 1.19), (AOR Black = 2.28; 95% CI: 1.34, 3.87), (AOR Hispanic = 2.26; 95% CI: 1.43, 3.56), (AOR other = 1.14; 95% CI: 0.58, 2.56)]. The measures of association are shown in *Table 32*.

Table 32. *Adjusted Associations of Year with Provider Always Spent Enough Time for the sub-group of Adults Aged 18-25, Stratified by Race, Medical Expenditure Panel Survey**

| | Provider Always Spent Enough Time | | | |
| | White | Black | Hispanic | Other |
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
2019 vs 2009	0.87 (0.64, 1.19)	2.28 (1.34, 3.87) [†]	2.26 (1.43, 3.56) [†]	1.14 (0.58, 2.56)

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Sub-group analysis: Adults aged 18-64 years with private insurance & asthma

The crude associations for providers always spending enough time with adults aged 18-64 who have private insurance and asthma (*Table 33*) show no differences for all variables except region, where the Midwest and West were less likely to report providers always spending enough time than the Northeast region. There were no modifiers or confounders of the association between year and providers always spent enough time in adults aged 18-64. Those in 2019 were as likely to report providers always spent enough time as those in 2009 (AOR = 0.94; 95% CI: 0.73, 1.20).

Table 33. *Crude Associations of Provider Always Spent Enough Time for the sub-group of Privately Insured Adults with Asthma Aged 18-64, Medical Expenditure Panel Survey*

	Always Spent Enough Time	
	OR (95%CI)	*P* value
2019 vs 2009	0.94 (0.73, 1.20)	0.6045
Age Group		
18-25	reference	
26-35	0.87 (0.56, 1.34)	0.5220
36-44	0.97 (0.65, 1.47)	0.8924
45-53	1.21 (0.80, 1.84)	0.3622
54-64	1.09 (0.73, 1.65)	0.6667
Sex		
Male	reference	
Female	0.90 (0.73, 1.12)	0.3495
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.62 (1.12, 2.34)	**0.0103**
Hispanic	1.18 (0.78, 1.78)	0.4405
All other race/ethnicities	0.81 (0.51, 1.28)	0.3586
Current marital status		
Married	reference	
Not married	1.12 (0.88, 1.43)	0.3408
Education		
Less than high school graduate	reference	
High school graduate	1.16 (0.71, 1.87)	0.5579
Some college or more	0.99 (0.64, 1.54)	0.9748
Family Income		

Table 33 (Continued)

| | Always Spent Enough Time | |
	OR (95%CI)	*P* value
Low	reference	
Middle	1.08 (0.71, 1.63)	0.7301
High	1.10 (0.75, 1.60)	0.6345
Census region		
Northeast	reference	
Midwest	0.67 (0.45, 0.99)	**0.0466**
South	0.78 (0.54, 1.13)	0.1902
West	0.68 (0.48, 0.96)	**0.0307**
Comorbidity		
Arthritis	0.91 (0.71, 1.15)	0.4113
Cancer	1.11 (0.75, 1.63)	0.6092
Diabetes	1.41 (0.97, 2.05)	0.0696
Emphysema	1.55 (0.85, 2.84)	0.1518
Heart disease	0.88 (0.61, 1.27)	0.4894
High cholesterol	0.94 (0.74, 1.21)	0.6500
Hypertension	1.15 (0.87, 1.51)	0.3218
Stroke	0.60 (0.31, 1.18)	0.1380
Adequate Physical Activity	1.19 (0.95, 1.51)	0.1352
Current Smoker	0.89 (0.64, 1.24)	0.4972

Quality: Provider Always Listened

Main Analysis: Adults aged 18-64 years

The crude associations for provider always listened to adults aged 18-64 (*Table 34*) showed no differences in year, age, sex, marital status. Having a high school education, higher and middle or high incomes, or achieving adequate physical activity was associated with being more likely to report providers always listen. Being non-Hispanic White, having public or no insurance, living in the West region, having specific comorbidities (arthritis, asthma, emphysema, and heart disease), and being a current smoker were associated with being less likely to report providers always listened than private insurance.

Table 34. *Crude Associations of Provider Always Listened for Adults Aged 18-64, Medical Expenditure Panel Survey*

	Always Listened	
	OR (95%CI)	***P* value**
2019 vs 2009	0.91 (0.82, 1.01)	0.7261
Age Group		
18-25	reference	
26-35	0.87 (0.77, 0.99)	**0.0369**
36-44	1.04 (0.93, 1.18)	0.4708
45-53	0.98 (0.87, 1.11)	0.7985
54-64	1.06 (0.94, 1.19)	0.3726
Sex		
Male	reference	
Female	0.96 (0.90, 1.04)	0.3165
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.38 (1.23, 1.54)	**<0.001**
Hispanic	0.95 (0.86, 1.05)	0.3540
All other race/ethnicities	1.04 (0.90, 1.21)	0.5759
Current marital status		
Married	reference	
Not married	0.96 (0.89, 1.04)	0.3077
Education		
Less than high school graduate	reference	
High school graduate	1.12 (1.00, 1.26)	**0.0468**
Some college or more	1.10 (0.99, 1.22)	0.0756
Family Income (% Poverty)		
Low-income <139%	reference	
Middle-income 139-400%	1.10 (1.00, 1.21)	**0.0492**
High-income >400%	1.18 (1.07, 1.30)	**0.0009**
Census region		
Northeast	reference	
Midwest	0.95 (0.84, 1.07)	0.4133
South	0.97 (0.87, 1.09)	0.6079
West	0.83 (0.74, 0.93)	**0.0015**
Insurance Type		
Private	reference	
Public	0.89 (0.81, 0.98)	**0.0223**
Uninsured	0.72 (0.63, 0.82)	**<0.001**
Comorbidity		
Arthritis	0.88 (0.81, 0.95)	**0.0013**
Asthma	0.87 (0.78, 0.96)	**0.0055**
Cancer	0.95 (0.85, 1.07)	0.4282
Diabetes	1.01 (0.89, 1.15)	0.8619
Emphysema	0.74 (0.57, 0.95)	**0.0193**
Heart disease	0.89 (0.80, 0.99)	**0.0312**

Table 34 (Continued)

	Always Listened	
	OR (95%CI)	*P* value
High cholesterol	0.97 (0.90, 1.05)	0.5031
Hypertension	1.02 (0.94, 1.10)	0.6716
Stroke	0.97 (0.79, 1.19)	0.7716
Adequate Physical Activity	1.18 (1.10, 1.27)	**<0.001**
Current Smoker	0.80 (0.73, 0.88)	**<0.001**

Race was found to be a modifier and there were no confounders of the association between year and providers always listened in adults aged 18-64. The final model included year, race, and the interaction term of race and year. Stratified by race, Whites were less likely to report providers always listened in 2019 than in 2009, Hispanics were more likely to report providers always listened in 2019 than in 2009, and Blacks and all other races/ethnicities were as likely to report providers always listened in 2019 and 2009 [(AOR NH White = 0.79; 95% CI: 0.72, 0.87), (AOR Black = 1.06; 95% CI: 0.87, 1.28), (AOR Hispanic = 1.43; 95% CI: 1.21, 1.70), (AOR other = 1.29; 95% CI: 0.99, 1.68)]. The measures of association are shown in *Table 35*.

Table 35. *Adjusted Associations of Year with Provider Always Listened for Adults Aged 18-64, Stratified by Race, Medical Expenditure Panel Survey**

	Always Listened			
	White	Black	Hispanic	Other
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
2019 vs 2009	0.79 (0.72, 0.87)†	1.06 (0.87, 1.28)	1.43 (1.21, 1.70) †	1.29 (0.99, 1.68)

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Sub-group analysis: Adults aged 18-25 years

The crude associations for provider always listened to adults aged 18-25 (*Table 36*) showed no differences between year, sex, race/ethnicity, marital status, education, income,

region, or insurance type. Having a specific priority condition (arthritis, emphysema, and heart disease) or being a current smoker was associated with being less likely to report provider always listened while achieving adequate physical activity was associated with being more likely to report that the provider always listened.

Table 36. *Crude Associations of Provider Always Listened for the sub-group of Adults Aged 18-25, Medical Expenditure Panel Survey*

	Always Listened	
	OR (95%CI)	*P* value
2019 vs 2009	1.08 (0.88, 1.33)	0.4413
Sex		
Male	reference	
Female	0.88 (0.71, 1.09)	0.2377
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.72 (1.27, 2.32)	**0.0004**
Hispanic	1.09 (0.82, 1.45)	0.5611
All other race/ethnicities	0.93 (0.62, 1.40)	0.7326
Current marital status		
Married	reference	
Not married	1.02 (0.73, 1.42)	0.9087
Education		
Less than high school graduate	reference	
High school graduate	0.93 (0.73, 1.19)	0.5750
Some college or more	0.94 (0.72, 1.22)	0.6383
Family Income		
Low	reference	
Middle	1.04 (0.81, 1.33)	0.7577
High	1.16 (0.89, 1.52)	0.2642
Census region		
Northeast	reference	
Midwest	0.88 (0.64, 1.21)	0.4171
South	0.86 (0.64, 1.16)	0.3193
West	0.73 (0.53, 1.02)	0.0664
Insurance Type		
Private	reference	
Public	0.92 (0.70, 1.22)	0.5544
Uninsured	0.81 (0.60, 1.11)	0.1912
Comorbidity		
Arthritis	0.36 (0.18, 0.73)	**0.0046**
Asthma	0.77 (0.59, 1.01)	0.0583
Cancer	0.72 (0.29, 1.77)	0.4716

Table 36 (Continued)

	Always Listened	
	OR (95%CI)	P value
Diabetes	0.89 (0.39, 2.03)	0.7868
Emphysema	N/A	N/A
Heart disease	0.59 (0.35, 1.00)	0.0501
High cholesterol	0.83 (0.53, 1.29)	0.3998
Hypertension	1.32 (0.87, 1.98)	0.1905
Stroke	0.39 (0.06, 2.45)	0.3149
Adequate Physical Activity	1.29 (1.03, 1.60)	**0.0245**
Current Smoker	0.64 (0.50, 0.82)	**0.0004**

N/A: Sample size too small to calculate OR.

Race was found to be a modifier and there were no confounders of the association between year and providers always listened in adults aged 18-25. The final model included year, race, and the interaction term of race and year. Stratified by race, Hispanics were more likely to report providers always listened in 2019 than in 2009 while Whites, Blacks, and all other races/ethnicities were as likely to report providers always listened in 2019 than in 2009 [(AOR White = 0.89; 95% CI: 0.67, 1.18), (AOR Black = 1.68; 95% CI: 0.95, 2.96), (AOR Hispanic = 1.91; 95% CI: 1.18, 3.09), (AOR other = 1.04; 95% CI: 0.51, 2.13)]. The measures of association are shown in *Table 37*.

Table 37. *Adjusted Associations of Year with Provider Always Listened for the sub-group of Adults Aged 18-25, Stratified by Race, Medical Expenditure Panel Survey**

	Always Listened			
	White	Black	Hispanic	Other
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
2019 vs 2009	0.89 (0.67, 1.18)	1.68 (0.95, 2.96)	1.91 (1.18, 3.09) †	1.04 (0.51, 2.13)

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Sub-group analysis: Adults aged 18-64 years with private insurance & asthma

The crude associations for provider always listened among adults aged 18-64 with private

insurance and asthma (*Table 38*) showed no differences for all variables except race, region, smoking. All other races/ethnicities were more likely to report always being listened to than non-Hispanic Whites. Living in the Midwest region and being a current smoker was associated with being less likely to report always being listened to than living in the Northeast or being a non-smoker.

Table 38. *Crude Associations of Provider Always Listened for the sub-group of Privately Insured Adults with Asthma Aged 18-64, Medical Expenditure Panel Survey*

	Always Listened	
	OR (95%CI)	*P* value
2019 vs 2009	0.86 (0.68, 1.08)	0.1997
Age Group		
18-25	reference	
26-35	1.05 (0.71, 1.57)	0.7973
36-44	1.19 (0.80, 1.76)	0.3846
45-53	1.25 (0.83, 1.88)	0.2902
54-64	1.23 (0.83, 1.81)	0.3042
Sex		
Male	reference	
Female	0.82 (0.64, 1.04)	0.0985
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	2.29 (1.51, 3.48)	**0.0001**
Hispanic	1.11 (0.75, 1.63)	0.6111
All other race/ethnicities	1.22 (0.81, 1.83)	0.3453
Current marital status		
Married	reference	
Not married	1.02 (0.79, 1.31)	0.8903
Education		
Less than high school graduate	reference	
High school graduate	1.14 (0.70, 1.85)	0.6009
Some college or more	0.92 (0.58, 1.46)	0.7111
Family Income		
Low	reference	
Middle	1.25 (0.82, 1.92)	0.2927
High	1.40 (0.96, 2.05)	0.0846
Census region		
Northeast	reference	

Table 38 (Continued)

	Always Listened	
	OR (95%CI)	*P* value
Midwest	0.75 (0.51, 1.10)	0.1401
South	0.85 (0.60, 1.22)	0.3761
West	0.65 (0.46, 0.92)	**0.0145**
Comorbidity		
Arthritis	0.91 (0.70, 1.18)	0.4720
Cancer	1.38 (0.96, 1.99)	0.0773
Diabetes	1.40 (0.96, 2.06)	0.0829
Emphysema	1.28 (0.71, 2.33)	0.4089
Heart disease	0.79 (0.54, 1.15)	0.2113
High cholesterol	0.99 (0.79, 1.26)	0.9589
Hypertension	1.21 (0.93, 1.58)	0.1526
Stroke	0.76 (0.38, 1.51)	0.4331
Adequate Physical Activity	1.18 (0.92, 1.52)	0.1904
Current Smoker	0.69 (0.49, 0.96)	**0.0267**

There were no confounders or modifier of the association between year and providers always listened in privately insured adults with asthma aged 18-64. The final model included only year, which showed no association (AOR = 0.86; 95% CI: 0.68, 1.08).

Quality: Provider Always Explained

Main Analysis: Adults aged 18-64 years

The crude associations for "participants reporting that the provider always explained" so the patient understood for adults aged 18-64 (*Table 39*) showed no differences between years, sex, race, or marital status. Ages 54-64 were more likely to report provider always explained so the patient understood than those aged 18-25 with no other age group differences. Having a high school or higher education, middle or high incomes, and achieving adequate physical activity was associated with being more likely to report their provider always explained so the patient understood while having public or no insurance, living in the West region, having specific

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comorbidities (arthritis, asthma, emphysema), and being a current smoker was associated with

being less likely to report their provider always explained so the patient understood.

Table 39. *Crude Associations of Provider Always Explained for Adults Aged 18-64, Medical Expenditure Panel Survey*

	Always Explained	
	OR (95%CI)	*P* value
2019 vs 2009	1.04 (0.94, 1.14)	0.3653
Age Group		
18-25	reference	
26-35	0.99 (0.87, 1.13)	0.9090
36-44	1.07 (0.95, 1.21)	0.2729
45-53	1.05 (0.93, 1.19)	0.4118
54-64	1.15 (1.02, 1.30)	**0.0220**
Sex		
Male	reference	
Female	1.07 (1.00, 1.14)	0.0545
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.25 (1.12, 1.39)	**<0.001**
Hispanic	0.88 (0.80, 0.98)	**0.0163**
All other race/ethnicities	0.90 (0.78, 1.03)	0.1294
Current marital status		
Married	reference	
Not married	0.93 (0.86, 1.01)	0.0716
Education		
Less than high school graduate	reference	
High school graduate	1.17 (1.04, 1.31)	**0.0078**
Some college or more	1.38 (1.25, 1.53)	**<0.001**
Family Income		
Low	reference	
Middle	1.21 (1.10, 1.34)	**0.0001**
High	1.33 (1.21, 1.46)	**<0.001**
Census region		
Northeast	reference	
Midwest	0.95 (0.84, 1.07)	0.3987
South	0.94 (0.84, 1.06)	0.3067
West	0.87 (0.77, 0.99)	**0.0295**
Insurance Type		
Private	reference	
Public	0.85 (0.77, 0.94)	**0.0016**
Uninsured	0.71 (0.62, 0.81)	**<0.001**
Comorbidity		
Arthritis	0.89 (0.83, 0.97)	**0.0045**
Asthma	0.89 (0.81, 0.98)	**0.0159**

Table 39 (Continued)

	Always Explained	
	OR (95%CI)	*P* value
Cancer	1.05 (0.94, 1.19)	0.3826
Diabetes	1.07 (0.94, 1.21)	0.3034
Emphysema	0.75 (0.59, 0.96)	**0.0212**
Heart disease	0.93 (0.83, 1.04)	0.1882
High cholesterol	0.97 (0.89, 1.05)	0.3906
Hypertension	1.00 (0.93, 1.08)	0.9663
Stroke	0.89 (0.71, 1.10)	0.2667
Adequate Physical Activity	1.15 (1.07, 1.24)	**0.0002**
Current Smoker	0.81 (0.73, 0.89)	**<0.001**

Race was found to be a modifier and no confounders of the association between year and providers always explained in adults aged 18-64. The final model included year, race, and the interaction term of race and year. Stratified by race, Whites, Blacks, and Other races/ethnicities were as likely to report providers always explained in 2019 than in 2009 while Hispanics were more likely to report providers always explained in 2019 than in 2009 [(AOR White = 0.95; 95% CI: 0.86, 1.05), (AOR Black = 1.14; 95% CI: 0.94, 1.39), (AOR Hispanic = 1.46; 95% CI: 1.22, 1.75), (AOR other = 1.25; 95% CI: 0.98, 1.59)]. The measures of association are shown in *Table 40*.

Table 40. *Adjusted Associations of Year with Provider Always Explained for Adults Aged 18-64, Stratified by Race, Medical Expenditure Panel Survey*

	Provider Always Explained			
	White	Black	Hispanic	Other
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
2019 vs 2009	0.95 (0.86, 1.05)	1.14 (0.94, 1.39)	1.46 (1.22, 1.75) [†]	1.25 (0.98, 1.59)

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Sub-group analysis: Adults aged 18-25 years

The crude associations for provider always explained so the patient understood for adults aged 18-25 (*Table 41*) showed no differences for all variables except physical activity and current smoking status, where those who achieve adequate physical activity were more likely and current smoker were less likely to report the provider always explained so that the patient understood.

Table 41. *Crude Associations of Provider Always Explained for the sub-group of Adults Aged 18-25, Medical Expenditure Panel Survey*

	Always Explained	
	OR (95%CI)	*P* **value**
2019 vs 2009	1.16 (0.94, 1.44)	0.1728
Sex		
Male	reference	
Female	1.05 (0.85, 1.30)	0.6448
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.54 (1.15, 2.06)	**0.0040**
Hispanic	1.08 (0.81, 1.43)	0.6162
All other race/ethnicities	0.92 (0.63, 1.35)	0.6705
Current marital status		
Married	reference	
Not married	0.83 (0.58, 1.18)	0.2886
Education		
Less than high school graduate	reference	
High school graduate	1.09 (0.84, 1.42)	0.5062
Some college or more	1.29 (1.01, 1.66)	**0.0409**
Family Income		
Low	reference	
Middle	1.16 (0.91, 1.48)	0.2217
High	1.22 (0.96, 1.56)	0.1100
Census region		
Northeast	reference	
Midwest	0.94 (0.67, 1.32)	0.7187
South	0.88 (0.63, 1.23)	0.4541
West	0.90 (0.64, .26)	0.5349
Insurance Type		
Private	reference	
Public	0.79 (0.61, 1.03)	0.0857
Uninsured	0.77 (0.57, 1.05)	0.0940
Comorbidity		

Table 41 (Continued)

	Always Explained	
	OR (95%CI)	*P* value
Arthritis	0.86 (0.45, 1.66)	0.6542
Asthma	0.77 (0.58, 1.02)	0.0681
Cancer	0.63 (0.26, 1.52)	0.3042
Diabetes	0.99 (0.43, 2.25)	0.9788
Emphysema	N/A	N/A
Heart disease	0.82 (0.49, 1.37)	0.4384
High cholesterol	1.15 (0.72, 1.85)	0.5505
Hypertension	1.25 (0.80, 1.95)	0.3324
Stroke	0.38 (0.06, 2.41)	0.3061
Adequate Physical Activity	1.24 (1.01, 1.52)	**0.0371**
Current Smoker	0.54 (0.41, 0.71)	**<0.001**

N/A: Sample size too small to calculate OR.

Race was found to be a modifier and no confounders of the association between year and providers always explained in adults aged 18-25. The final model included year, race, and the interaction term of race and year. Stratified by race, Whites, Hispanics, and all other races/ethnicities were as likely to report providers always explained in 2019 than in 2009 while Blacks had 2.24 times the odds of reporting providers always explained in 2019 than in 2009 [(AOR White = 0.99; 95% CI: 0.73, 1.33), (AOR Black = 2.24; 95% CI: 1.25, 4.00), (AOR Hispanic = 1.60; 95% CI: 0.99, 2.59), (AOR other = 1.13; 95% CI: 0.59, 2.18)]. The measures of association are shown in *Table 42*.

Table 42. *Adjusted Associations of Year with Provider Always Explained for the sub-group of Adults Aged 18-25, Stratified by Race, Medical Expenditure Panel Survey**

	Provider Always Explained			
	White	Black	Hispanic	Other
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
2019 vs 2009	0.99 (0.73, 1.33)	2.24 (1.25, 4.00) [†]	1.60 (0.99, 2.59)	1.13 (0.59, 2.18)

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Sub-group analysis: Adults aged 18-64 years with private insurance & asthma

The crude associations for provider always explained so the patient understood for adults aged 18-64 with private insurance and asthma (*Table 43*) showed no differences for all variables except region, where the Midwest & West were less likely to report provider always explained than the Northeast. There were no modifiers or confounders of the association between year and providers always explained in privately insured adults with asthma aged 18-64. The final model included year only and had no association (AOR = 1.05; 95% CI: 0.84, 1.31).

Table 43. *Crude Associations of Provider Always Explained for the sub-group of Privately Insured Adults with Asthma Aged 18-64, Medical Expenditure Panel Survey*

	Always Explained	
	OR (95%CI)	***P* value**
2019 vs 2009	1.05 (0.84, 1.31)	0.6480
Age Group		
18-25	reference	
26-35	1.06 (0.69, 1.64)	0.7868
36-44	1.09 (0.73, 1.61)	0.6773
45-53	1.23 (0.82, 1.84)	0.3242
54-64	1.26 (0.83, 1.93)	0.2790
Sex		
Male	reference	
Female	1.06 (0.84, 1.35)	0.6165
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.95 (1.35, 2.82)	**0.0004**
Hispanic	0.83 (0.59, 1.17)	0.2802
All other race/ethnicities	0.80 (0.52, 1.24)	0.3168
Current marital status		
Married	reference	
Not married	1.02 (0.81, 1.28)	0.8952
Education		
Less than high school graduate	reference	
High school graduate	1.10 (0.67, 1.82)	0.7068
Some college or more	1.33 (0.65, 2.09)	0.1969
Family Income		
Low	reference	
Middle	1.03 (0.70, 1.53)	0.8624
High	1.06 (0.72, 1.56)	0.7815
Census region		

Table 43 (Continued)

	Always Explained	
	OR (95%CI)	*P* value
Northeast	reference	
Midwest	0.71 (0.51, 0.99)	**0.0440**
South	0.80 (0.58, 1.11)	0.1838
West	0.61 (0.44, 0.84)	**0.0029**
Comorbidity		
Arthritis	0.97 (0.77, 1.23)	0.8189
Cancer	1.23 (0.85, 1.79)	0.2761
Diabetes	1.47 (0.98, 2.19)	0.0623
Emphysema	1.06 (0.59, 1.92)	0.8465
Heart disease	0.98 (0.71, 1.37)	0.9262
High cholesterol	1.01 (0.80, 1.27)	0.9193
Hypertension	1.04 (0.82, 1.32)	0.7603
Stroke	0.86 (0.43, 1.70)	0.6539
Adequate Physical Activity	1.07 (0.83, 1.37)	0.6012
Current Smoker	0.74 (0.53, 1.01)	0.0598

Quality: Best Rating of Healthcare Providers

Main Analysis: Adults aged 18-64 years

The crude associations for the best rating of healthcare providers for adults aged 18-64 (*Table 44*) saw no differences between years, income, physical activity, or smoking status. Ages 45-64 were more likely to give a best rating than ages 18-25. Females, races/ethnicities other than non-Hispanic Whites, some college or more education, having public insurance, or having specific comorbidities (diabetes, heart disease, high cholesterol, and hypertension) were more likely to give best ratings while being unmarried, having no insurance, and living in the West region less likely to give a best rating.

Table 44. *Crude Associations of Best Rating of Healthcare Providers for Adults Aged 18-64, Medical Expenditure Panel Survey*

	Best Rating	
	OR (95%CI)	*P* value
2019 vs 2009	1.00 (0.90, 1.10)	0.9357
Age Group		
18-25	reference	
26-35	0.89 (0.75, 1.05)	0.1676
36-44	1.15 (0.96, 1.37)	0.1277

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Table 44 (Continued)

	Best Rating	
	OR (95%CI)	*P* value
45-53	1.23 (1.05, 1.44)	**0.0125**
54-64	1.57 (1.35, 1.82)	**<0.001**
Sex		
Male	reference	
Female	1.14 (1.06, 1.22)	**0.0008**
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.25 (1.11, 1.40)	**0.0003**
Hispanic	1.27 (1.13, 1.42)	**<0.001**
All other race/ethnicities	0.88 (0.75, 1.04)	0.1364
Current marital status		
Married	reference	
Not married	0.88 (0.81, 0.95)	**0.0021**
Education		
Less than high school graduate	reference	
High school graduate	1.04 (0.90, 1.19)	0.6104
Some college or more	0.86 (0.77, 0.97)	**0.0128**
Family Income		
Low	reference	
Middle	0.97 (0.87, 1.09)	0.5930
High	1.00 (0.89, 1.11)	0.9481
Census region		
Northeast	reference	
Midwest	0.92 (0.81, 1.04)	0.1739
South	1.07 (0.95, 1.21)	0.2498
West	0.85 (0.75, 0.97)	**0.0147**
Insurance Type		
Private	reference	
Public	1.18 (1.07, 1.31)	**0.0015**
Uninsured	0.79 (0.67, 0.94)	**0.0075**
Comorbidity		
Arthritis	0.98 (0.88, 1.08)	0.6506
Asthma	0.92 (0.82, 1.05)	0.2132
Cancer	1.15 (1.00, 1.32)	0.0583
Diabetes	1.33 (1.18, 1.51)	**<0.001**
Emphysema	1.23 (0.93, 1.61)	0.1450
Heart disease	1.15 (1.03, 1.30)	**0.0173**
High cholesterol	1.15 (1.05, 1.25)	**0.0021**
Hypertension	1.15 (1.05, 1.25)	**0.0017**
Stroke	0.88 (0.69, 1.11)	0.2819
Adequate Physical Activity	1.08 (0.99, 1.17)	0.0684
Current Smoker	0.98 (0.89, 1.08)	0.6351

Race was found to be a modifier and there were no confounders of the association between year and best rating of healthcare providers in adults aged 18-64. The final model included year, race, and the interaction term of race and year. Stratified by race, Whites were less likely to give the best rating of healthcare providers in 2019 than in 2009 while Blacks, Hispanics, and all other races/ethnicities were more likely to report the best rating of healthcare providers in 2019 than in 2009 [(AOR White = 0.89; 95% CI: 0.79, 0.99), (AOR Black = 1.24; 95% CI: 1.01, 1.52), (AOR Hispanic = 1.40; 95% CI: 1.15, 1.71), (AOR other = 1.26; 95% CI: 0.93, 1.71)]. The measures of associations are shown in *Table 45*.

Table 45. *Adjusted Associations of Year with Best Rating of Healthcare Providers for Adults Aged 18-64, Stratified by Race, Medical Expenditure Panel Survey**

	Best Rating of Healthcare Providers			
	White	**Black**	**Hispanic**	**Other**
	AOR (95% CI)	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**
2019 vs 2009	0.89 (0.79, 0.99)†	1.24 (1.01, 1.52) †	1.40 (1.15, 1.71) †	1.26 (0.93, 1.71)

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Sub-group analysis: Adults aged 18-25 years

The crude associations for the best rating of healthcare providers for adults aged 18-25 (*Table 46*) showed young adults in 2019 were more likely to give a best rating than in 2009. There were no other differences except for two comorbidities. Having emphysema or hypertension was associated with being more likely to give a best rating than not having either, with no differences for other conditions.

Table 46. *Crude Associations of Best Rating of Healthcare Providers for the sub-group of Adults Aged 18-25, Medical Expenditure Panel Survey*

	Best Rating	
	OR (95%CI)	*P* value
2019 vs 2009	1.39 (1.07, 1.81)	**0.0148**
Sex		
Male	reference	
Female	0.99 (0.76, 1.30)	0.9623
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.46 (1.05, 2.02)	**0.0249**
Hispanic	1.34 (0.99, 1.81)	0.0567
All other race/ethnicities	0.88 (0.55, 1.42)	0.6072
Current marital status		
Married	reference	
Not married	1.05 (0.69, 1.60)	0.8062
Education		
Less than high school graduate	reference	
High school graduate	1.41 (1.00, 1.98)	**0.0492**
Some college or more	1.10 (0.80, 1.51)	
Family Income		
Low	reference	
Middle	0.75 (0.56, 1.01)	0.0622
High	1.07 (0.77, 1.50)	0.6912
Census region		
Northeast	reference	
Midwest	0.68 (0.46, 1.01)	0.0588
South	0.79 (0.53, 1.16)	0.2295
West	0.71 (0.47, 1.07)	0.0980
Insurance Type		
Private	reference	
Public	1.31 (0.97, 1.76)	0.0783
Uninsured	0.77 (0.50, 1.18)	0.2236
Comorbidity		
Arthritis	0.61 (0.29, 1.28)	0.1914
Asthma	1.00 (0.70, 1.42)	0.9832
Cancer	0.78 (0.26, 2.38)	0.6658
Diabetes	0.73 (0.26, 2.06)	0.5460
Emphysema	N/A	N/A
Heart disease	0.89 (0.49, 1.61)	0.7000
High cholesterol	1.34 (0.75, 2.39)	0.3157
Hypertension	1.98 (1.22, 3.20)	**0.0057**
Stroke	0.87 (0.09, 8.43)	0.9044
Adequate Physical Activity	1.00 (0.75, 1.34)	0.9964
Current Smoker	0.88 (0.61, 1.26)	0.4709

N/A: Sample size too small to calculate OR

We found no modifier or confounders of the association between year and best rating of healthcare providers in adults aged 18-25. The final model included year only, where those in 2019 were more likely to report a best rating of their healthcare providers than in 2009 (AOR = 1.45; 95% CI: 1.11, 1.90).

Sub-group analysis: Adults aged 18-64 years with private insurance & asthma

The crude associations for the best rating of healthcare providers for adults aged 18-64 with private insurance and asthma (*Table 47*) showed no differences for all variables except sex and region. Females were more likely to give a best rating than males and the Midwest region was less likely to report best rating than the Northeast. No significant interactions or confounders were observed. The final model includes only year, where 2019 saw no significant changes (OR 1.05; 95% CI: 0.79, 1.39).

Table 47. *Crude Associations of Best Rating of Healthcare Providers for the sub-group of Privately Insured Adults with Asthma Aged 18-64, Medical Expenditure Panel Survey*

	Best Rating	
	OR (95%CI)	***P* value**
2019 vs 2009	1.05 (0.79, 1.39)	0.7534
Age Group		
18-25	reference	
26-35	0.60 (0.33, 1.09)	0.0924
36-44	0.77 (0.45, 1.33)	0.3531
45-53	1.19 (0.70, 2.02)	0.5140
54-64	1.18 (0.71, 1.96)	0.5206
Sex		
Male	reference	
Female	1.36 (1.03, 1.81)	**0.0306**
Race / ethnicity		
Non-Hispanic White	reference	
Non-Hispanic Black	1.39 (0.93, 2.05)	0.1041
Hispanic	1.10 (0.71, 1.69)	0.6659
All other race/ethnicities	1.09 (0.65, 1.80)	0.7483
Current marital status		
Married	reference	

Table 47 (Continued)

	Best Rating	
	OR (95%CI)	*P* value
Not married	0.96 (0.72, 1.28)	0.8027
Education		
Less than high school graduate	reference	
High school graduate	0.83 (0.47, 1.49)	0.5372
Some college or more	0.68 (0.41, 1.13)	0.1352
Family Income		
Low	reference	
Middle	1.10 (0.65, 1.85)	0.7310
High	1.33 (0.82, 2.17)	0.2492
Census region		
Northeast	reference	
Midwest	0.72 (0.49, 1.06)	0.0942
South	0.82 (0.54, 1.24)	0.3360
West	0.55 (0.37, 0.84)	**0.0050**
Comorbidity		
Arthritis	0.78 (0.58, 1.05)	0.1024
Cancer	1.47 (0.94, 2.30)	0.0883
Diabetes	1.15 (0.71, 1.87)	0.5596
Emphysema	1.13 (0.55, 2.34)	0.7376
Heart disease	0.94 (0.61, 1.45)	0.7778
High cholesterol	0.97 (0.71, 1.34)	0.8754
Hypertension	1.05 (0.78, 1.42)	0.7350
Stroke	0.49 (0.22, 1.11)	0.0865
Adequate Physical Activity	1.11 (0.82, 1.50)	0.4890
Current Smoker	0.84 (0.56, 1.27)	0.4109

Discussion

Barriers

Usual source of care, delaying care due to cost, and forgoing care due to cost showed

considerable changes from 2009 to 2019 across all examined groups. Fewer Americans reported

having a usual source of care in 2019 compared to 2009, which is consistent with findings that

insurance coverage from the ACA not ensuring access to a usual source of care [6]. As in the full

18–64-year-old sample, a similar downward trend in usual source of care was seen in the 18-25

age group, who were able to stay on their parent's insurance due to certain provisions of the

ACA, and in the privately insured adults with asthma aged 18-64 group, who were examined for their consistency in requiring access to care. In particular, the privately insured with asthma group was examined to assess for background secular trends due to their need for frequent and consistent care to manage their condition. The decrease in proportion of these individuals who had a usual source of care from 2009 to 2019 indicate the possibility of secular background deterioration. The decrease in having usual source of care, especially for this subgroup, could potentially be explained by the rising costs of healthcare and/or no requirement of referrals from a primary care provider to see specialists. Furthermore, some differences persisted by race, indicating that disparities in having a usual source of care exist across racial groups, with White, Black and Hispanic Americans being less likely to have a usual source of care in 2019 compared to 2009 but no differences in other races/ethnicities.

Somewhat surprising is the magnitude of delaying and forgoing care due to cost from 2009 to 2019. In all examined groups, delaying and forgoing care due to cost was more likely in 2019 even after adjusting for potential confounders, with no differences in race. Overall, Americans are over 6 times more likely to report delaying care due to cost and over 2.5 times more likely to report forgoing care due to cost in 2019 compared to 2009. These results suggest that the cost of health care remains a burden and a barrier to accessing care, regardless of race/ethnicity. Although these results are consistent with previous findings that insurance coverage alone did not prevent delaying or forgoing care [5], those who had private insurance were less likely to delay or forgo care due to cost. Despite the increase in insurance coverage, a larger proportion of Americans are now delaying or forgoing care due to cost than they were a decade ago. Young adults saw a similar increase in delaying or forgoing care due to cost, indicating that this targeted age group did not see improvement. More worrisome, however, is

adults aged 18-64 with private insurance and the chronic condition of asthma were also more likely to delay or forgo care due to cost, indicating the possibility of secular background deterioration of delaying and forgoing care due to cost in the United States from 2009 to 2019.

While the aim of the ACA was to increase access to care and reduce cost, Americans are reporting that, even with more insurance coverage, barriers to accessing care not only persist but became more prevalent, which is consistent with other research that shows insurance coverage alone does not beget access to care [11]. While this study was not able to examine underlying factors to answer why or how these barriers increased, it does indicate that cost of healthcare is a major barrier to accessing care in the United States and is an important first step in understanding, as the public health implications of the rise in not having a usual source of care, delaying care due to cost, and forgoing care due to cost could lead to progressively worse health outcomes.

Quality

Quality of care showed some differences in race; Black, Hispanic, and other races/ethnicities reported some improvements in the quality of care they received, however, White Americans reported either no improvements or slight declines in the quality of care they received in 2019 compared to 2009. Young adults also showed similar trends, with improvements in quality for non-White Americans and quality of care remaining largely unchanged or declining for White Americans for most quality variables. This aligns with research prior to the ACA that showed racial minorities, specifically Black and Latino Americans, perceived a lower quality of care than White Americans [42–45]. Interestingly, Americans with private insurance and the chronic condition of asthma are reporting no differences in the quality of care they receive from their healthcare providers, even across race.

Although racial differences still exist overall, the improvements in quality that non-White Americans reported from 2009 to 2019, taken with the finding of no racial differences in the privately insured with asthma group, may be a small step toward eliminating these racial disparities.

<u>Strengths & Limitations</u>

Strengths of this study are that it uses a recent, large, nationally representative sample and that one percent or fewer of individuals were missing outcome variables, however, it is not without its limitations. The Medical Expenditure Panel Survey (MEPS) relies on self-reported data that can be subject to biases such as social desirability and potential inability to correctly recall past experiences. Moreover, although it is possible to analyze long-term trends in the MEPS [46], MEPS data are cross-sectional, so the ability to make causal inferences is limited. Additional limitations include residual confounding due to unmeasured potential confounders, such as gender. Gender is a socially constructed characteristic that may influence barriers to accessing care and quality of care, but the current study is unable to account for gender as it is not included in the MEPS. Additionally, only census regions are available in MEPS. Since Medicaid expansion varied by state, it may be possible to account for the effect of Medicaid expansion on barriers and quality by using census region as a proxy, as most Northeast states expanded Medicaid eligibility and most Southern states rejected the expansion, however, West and Midwest regions are heterogenous and may not be representative of their collective states. Moreover, the effects found in this study cannot to be attributed to any specific provision within the ACA due to its complex nature and study design. Finally, only two years of data were examined and, although MEPS can be compared across years to analyze long-term trends [46],

the 2009 and 2019 data are not the same population, therefore changes in outcomes from 2009 to 2019 could partially be attributed to demographic changes across that decade.

Future

From the American healthcare consumer's view, barriers to accessing care has not improved and may have worsened during the decade from 2009 to 2019, however, there is some evidence to suggest that the quality of the care minority racial groups received may have improved. The implications of this study suggest that since more Americans are not receiving or are delaying the care that they need, not addressing barriers to accessing healthcare may lead to an increasingly unhealthy America, and the increase in insurance coverage from the ACA is not enough to keep Americans healthy. The high cost of healthcare [47, 48] and an estimated 10% of Americans with medical debt in 2022 [49] indicate that millions of Americans still struggle to afford the care they need. Although the present study does not account for the fact that delaying and forgoing care due to cost is more than a function of healthcare costs themselves, the study highlights that healthcare is increasingly unaffordable than a decade ago. Future studies could examine the cost of healthcare contextually with the cost of basic necessities, such as housing and food. Future research will be necessary to examine the potential causes of the rise in number of people experiencing barriers to accessing healthcare and to continue to close the gap in racial disparities, especially given that the ongoing COVID-19 pandemic likely has a detrimental effect to both barriers to care and quality of care.

Chapter 3: Barriers to Accessing Healthcare in the United States and their Potential Impact on Perceived Health

Introduction

In 2016, over 20% of adults indicated that they faced more than one barrier to accessing a primary care provider [9, 10]. Barriers to accessing care, such as insurance coverage, financial difficulty, and access to providers, can have a negative effect on healthcare seeking behavior [11]. Experiencing these barriers are associated with problems getting care [8], being less likely to receive recommended care [12], and delaying urgent care [8], all of which may result in poorer health outcomes, such as delayed detection of cancers or complications from existing conditions. Although early evidence suggests that access to healthcare and affordability in the United States (US) were generally improved due to The Patient Protection and Affordable Care Act (ACA) [6], other research has shown mixed results [7] and disparities persist across race and income, where difficulty accessing care is disproportionally distributed [8]. These findings indicate that increased insurance coverage alone does not necessarily translate to better access to care or better health outcomes [11]. Facing barriers to accessing care, specifically not having a usual source of care or delaying or forgoing care due to cost, may contribute to poorer health, but there is scant evidence linking barriers to accessing care and health outcomes. It is also unknown how, or to what extent, barriers to accessing healthcare impacts health outcomes [5, 20].

Research suggests that self-reported health measures are valid health status indicators [21] and can even be prognostic for mortality across genders and racial groups [50]. These measures are a quick and easy way to gauge an individual's overall well-being and can be examined together with barriers to accessing healthcare to explore associations. Importantly, as the COVID-19 pandemic is expected to have a lasting impact on the US healthcare system [12],

analyzing healthcare utilization data from 2019 – the last year before COVID-19 pandemic shocked the US healthcare system – is necessary to establish baseline criteria against which the impact of COVID-19 on the U.S. healthcare system can be assessed going forward [23]. The purpose of this study is to evaluate whether barriers to accessing healthcare are associated with self-reported ratings of physical and mental health and whether factors, such as race or sex, modify the studied associations.

Method

Data Source

The Medical Expenditure Panel Survey (MEPS), which began in 1996, is an annual, nationally representative survey comprised of noninstitutionalized US civilians, subset from participants of the prior year's National Health Interview Survey. MEPS is conducted by the Agency for Healthcare Research and Quality and collects data on healthcare utilization and expenditures [24]. MEPS components are comprised of both interviewer and self-administered questionnaires.

Sample Population

Adults aged 18 and older (n = 17,855) were identified from the 2019 MEPS to assess the prevalence of barriers to accessing care and their associations with self-reported mental and physical health. Individuals with missing exposure (usual source of care: n = 221 (1.25%); delay care due to cost: n = 40 (0.24%); forgo care due to cost: n = 43 (0.26%)) or outcome variables (self-reported mental health: n = 13 (0.06%); self-reported physical health: n = 9 (0.05%)) were excluded from analyses.

Exposure Variables

Barriers to accessing healthcare are assessed from responses to three questions: Does the person have a usual source of care provider? (yes/no); Did the person delay medical or dental care or prescription medication due to cost? (yes/no); Did the person forgo medical or dental care or prescription medication due to cost? (yes/no).

Outcome Variables

Self-reported health measures in MEPS contain perceived physical and mental health status. Self-reported physical and mental health are measured as poor, fair, good, very good, and excellent, and were collapsed into two categories for the purpose of this research: good or better and poor or fair.

Covariates

Self-reported independent variables include age (18-25, 26-35, 36-44, 45-53, 54-64, and 65+), sex, race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, and all other races/ethnicities), marital status (currently married or currently widowed/divorced/separated /never married), education level (less than high school graduate, high school graduate, some college or more), family income level (low [<139% federal poverty level (FPL)], middle [139-400% FPL], high [400%+ FPL]), census region (Northeast, Midwest, South, and West), and health insurance coverage (any private, public only, uninsured). Comorbidities are measured using MEPS priority conditions and include arthritis, asthma, cancer, diabetes, emphysema, heart disease (angina, coronary heart disease, heart attack, other heart conditions/diseases), high cholesterol, hypertension, and stroke. BMI is not included because weight is only collected every other year in MEPS starting in 2016. Meeting physical activity guidelines (Yes or No/unknown) is defined as currently spending half an hour or more in moderate to vigorous physical activity at least five times a week, per the current Physical Activity Guidelines for

Americans [33]. Cigarette smoking status is determined as currently smoking (Yes or No/unknown). Similar categorizations have been previously used with MEPS data [30, 34–36].

Statistical Analysis

Sample characteristics were summarized with appropriate descriptive statistics. Since fewer than two percent of individuals were missing outcome or exposure variables, no sensitivity analyses were performed.

We first examined all crude associations with each covariate and outcome via logistic regression and reported respective odds ratios (OR) and 95% confidence intervals. We then assessed the potential for effect modification across age, sex, and race via an interaction term with each exposure and these covariates individually. To assess confounding, each covariate was added to the model that contains the outcome, exposure, and any significant interaction terms, in order of its strength of association. The confounder was preserved in the final model if it is also in a significant interaction term or if the adjusted odds ratio was more than 10% different. Insurance type was retained in each model regardless of its significance based on its association with barriers to accessing care. If a variable was found to be an effect modifier, fully adjusted model was stratified by said variable. The NOMCAR (not missing completely at random) option was used to account for any missingness of covariates. All analyses were conducted with SAS 9.4 [37] and incorporated weighting to account for the complex survey design and survey nonresponse. Weighting variables were developed by MEPS and described in detail in the consolidated data file documentation [40]. Alpha levels for statistical significance were set at 0.05.

Results

Demographics

Table 48 shows the distribution of characteristics of 17,855 adults aged 18 and older from the 2019 MEPS. Over 70% of the sample had a usual source of care, 21% delayed care due to cost, and 15% forwent care due to cost. More than half of the sample were non-Hispanic White and most had some college education or more, middle or high incomes, and private health insurance, similar to the U.S. Census estimates of 2020 [51]. In addition, most ages groups rated their self-reported health as good or better, with over 90% of all age groups rating their mental health as good or better. Over 80% of all age groups rated their physical health as good or better, with a higher percentage in younger age groups (over 90% for ages 18-25 & 26-35)) compared to older age groups (ranging from 81-89% for ages 36 and older).

Table 48. *Distribution of Sociodemographic Characteristics, Medical Expenditure Panel Survey, 2019*

	N (Weighted %)	Good or Better Mental Health	Good or Better Physical Health
		N (Weighted %)	N (Weighted %)
Total	17855 (100)	16253 (92.11)	15075 (86.95)
Has a Usual Source of Care	13125 (71.63)	11875 (91.50)	10833 (85.09)
Delay Care due to Cost	4013 (21.00)	3437 (86.47)	3037 (78.95)
Forgo Care due to Cost	2958 (15.16)	2461 (84.02)	2125 (75.59)
Age Group			
18-25	1684 (12.74)	1531 (91.51)	1557 (93.06)
26-35	2801 (17.90)	2571 (92.67)	2555 (92.06)
36-44	2493 (14.62)	2288 (92.81)	2160 (88.99)
45-53	2524 (14.51)	2294 (92.14)	2097 (85.26)
54-64	3519 (18.52)	3203 (92.68)	2833 (83.70)
65+	4834 (21.70)	4366 (91.04)	3873 (81.69)
Sex			
Male	8226 (48.25)	7549 (92.79)	7039 (87.98)
Female	9629 (51.75)	8704 (91.49)	8036 (85.99)
Race/Ethnicity			
Non-Hispanic White	10419 (62.63)	9505 (91.98)	8938 (87.60)
Non-Hispanic Black	2467 (11.82)	2229 (92.19)	2009 (85.79)
Hispanic	3537 (16.46)	3209 (92.32)	2887 (84.64)
All other race/ethnicities	1432 (9.10)	1310 (92.53)	1241 (88.16)
Current Marital Status			
Married	9053 (51.94)	8469 (94.24)	7876 (88.65)
Not married	8802 (48.06)	7784 (89.81)	7199 (85.12)

Table 48 (Continued)

	N (Weighted %)	Good or Better Mental Health N (Weighted %)	Good or Better Physical Health N (Weighted %)
Education			
Less than high school graduate	2707 (12.55)	2268 (85.66)	1926 (74.93)
High school graduate	5298 (27.14)	4802 (91.37)	4352 (84.32)
Some college or more	9741 (60.31)	9088 (93.79)	8712 (90.66)
Family Income			
Low	3822 (16.13)	3135 (82.74)	2716 (73.03)
Middle	7148 (39.19)	6542 (91.99)	6020 (86.21)
High	6885 (44.69)	6576 (95.59)	6339 (92.62)
Census region			
Northeast	2630 (17.48)	2393 (92.52)	2241 (87.24)
Midwest	3878 (20.81)	3527 (92.38)	3270 (87.34)
South	6786 (37.88)	6173 (92.04)	5660 (86.54)
West	4560 (23.83)	4159 (91.70)	3903 (87.06)
Insurance Type			
Private	11158 (68.56)	10502 (94.35)	10015 (90.92)
Public	5251 (24.05)	4402 (85.14)	3806 (75.32)
Uninsured	1446 (7.39)	1349 (94.02)	1254 (87.95)
Comorbidity			
Arthritis	5013 (24.14)	4280 (86.59)	3576 (73.75)
Asthma	2430 (13.31)	2029 (85.13)	1800 (77.53)
Cancer	2257 (11.20)	2032 (90.74)	1760 (80.08)
Diabetes	2328 (10.76)	1975 (86.84)	1484 (67.01)
Emphysema	378 (1.64)	283 (73.87)	172 (47.04)
Heart disease	2821 (14.00)	2397 (85.73)	1962 (72.15)
High cholesterol	5867 (29.61)	5151 (89.26)	4431 (78.39)
Hypertension	6598 (32.17)	5760 (88.59)	4875 (76.24)
Stroke	840 (3.75)	671 (80.82)	503 (62.67)
Adequate Physical Activity	8771 (51.00)	8259 (94.91)	7885 (91.47)
Current Smoker	3715 (19.20)	3204 (87.62)	2827 (78.99)

Self-Reported Mental Health

Crude odds ratios for all covariates are listed in *Table 49*. Having a usual source of care

(USC) and delaying or forgoing care due to cost were all associated with being less likely to

report a mental health rating of good or better. Females, high school or higher educated, those

with middle or high incomes, and those who achieve adequate physical activity were more likely

to have a good or better self-reported mental health compared to those with less than high school educations, those with low incomes, and those not achieving adequate physical activity. Not being married, having public insurance, having any type of the comorbidities except for cancer, or being a current smoker was associated with being less likely to self-report good or better mental health than being married, having private insurance, not having the examined comorbidity, and not being a current smoker.

Table 49. *Crude Associations of Self-Reported Health, Medical Expenditure Panel Survey, 2019*

	Good or Better Mental Health		Good or Better Physical Health	
	OR (95% CI)	*P* value	OR (95% CI)	*P* value
Has a Usual Source of Care	0.73 (0.62, 0.86)	**0.0002**	0.52 (0.46, 0.59)	**<0.001**
Delay Care due to Cost	0.44 (0.38, 0.50)	**<0.001**	0.46 (0.41, 0.52)	**<0.001**
Forgo Care Due to Cost	0.36 (0.31, 0.42)	**<0.001**	0.38 (0.34, 0.43)	**<0.001**
Age Group				
18-25	reference		reference	
26-35	1.17 (0.91, 1.51)	0.2140	0.87 (0.64, 1.17)	0.3435
36-44	1.20 (0.91, 1.58)	0.1995	0.60 (0.45, 0.80)	**0.0005**
45-53	1.09 (0.84, 1.41)	0.5226	0.43 (0.33, 0.57)	**<0.001**
54-64	1.18 (0.91, 1.51)	0.2075	0.38 (0.30, 0.49)	**<0.001**
65+	0.94 (0.72, 1.23)	0.6636	0.33 (0.26, 0.43)	**<0.001**
Sex				
Male	reference		reference	
Female	0.84 (0.74, 0.94)	**0.0037**	0.84 (0.77, 0.92)	**0.0002**
Race/Ethnicity				
Non-Hispanic White	reference		reference	
Non-Hispanic Black	1.03 (0.85, 1.24)	0.7686	0.85 (0.73, 1.00)	0.0509
Hispanic	1.05 (0.84, 1.30)	0.6694	0.78 (0.66, 0.92)	**0.0042**
All other race/ethnicities	1.08 (0.80, 1.45)	0.6159	1.05 (0.85, 1.31)	0.6397
Current Marital Status				
Married	reference		reference	
Not married	0.54 (0.46, 0.62)	**<0.001**	0.73 (0.66, 0.81)	**<0.001**
Education				
Less than high school graduate	reference		reference	
High school graduate	1.77 (1.52, 2.06)	**<0.001**	1.80 (1.55, 2.09)	**<0.001**
Some college or more	2.53 (2.16, 2.96)	**<0.001**	3.25 (2.82, 3.74)	**<0.001**
Family Income				
Low	reference		reference	
Middle	2.4 (2.07, 2.78)	**<0.001**	2.31 (2.04, 2.61)	**<0.001**

Table 49 (Continued)

	Good or Better Mental Health		Good or Better Physical Health	
	OR (95% CI)	*P* value	OR (95% CI)	*P* value
High	4.52 (3.72, 5.5)	**<0.001**	4.63 (4.01, 5.35)	**<0.001**
Census region				
Northeast	reference		reference	
Midwest	0.98 (0.79, 1.21)	0.8505	1.01 (0.85, 1.19)	0.9167
South	0.93 (0.75, 1.16)	0.5331	0.94 (0.80, 1.11)	0.4684
West	0.89 (0.69, 1.15)	0.3841	0.98 (0.82, 1.18)	0.8625
Insurance Type				
Private	reference		reference	
Public	0.34 (0.30, 0.40)	**<0.001**	0.30 (0.28, 0.34)	**<0.001**
Uninsured	0.94 (0.68, 1.30)	0.7096	0.73 (0.59, 0.90)	**0.0031**
Comorbidity				
Arthritis	0.42 (0.37, 0.48)	**<0.001**	0.27 (0.25, 0.30)	**<0.001**
Asthma	0.42 (0.36, 0.49)	**<0.001**	0.45 (0.40, 0.51)	**<0.001**
Cancer	0.82 (0.67, 1.00)	0.0528	0.56 (0.49, 0.63)	**<0.001**
Diabetes	0.52 (0.45, 0.60)	**<0.001**	0.24 (0.21, 0.27)	**<0.001**
Emphysema	0.23 (0.18, 0.30)	**<0.001**	0.13 (0.10, 0.16)	**<0.001**
Heart disease	0.44 (0.38, 0.52)	**<0.001**	0.31 (0.27, 0.35)	**<0.001**
High cholesterol	0.60 (0.53, 0.67)	**<0.001**	0.38 (0.34, 0.42)	**<0.001**
Hypertension	0.51 (0.45, 0.58)	**<0.001**	0.28 (0.25, 0.31)	**<0.001**
Stroke	0.34 (0.28, 0.41)	**<0.001**	0.23 (0.19, 0.27)	**<0.001**
Adequate Physical Activity	2.22 (1.93, 2.55)	**<0.001**	2.28 (2.03, 2.56)	**<0.001**
Current Smoker	0.52 (0.45, 0.60)	**<0.001**	0.47 (0.43, 0.52)	**<0.001**

Usual Source of Care

We found sex to be a modifier and insurance type and arthritis to be confounders of the

association between having a usual source of care and self-reported mental health. The final

model included usual source of care, insurance type, arthritis, sex, and the interaction term of sex

and usual source of care. Stratified by sex and controlling for insurance type and arthritis, males

who had a usual source of care were less likely to report a good or better mental health, while

there were no differences in females who had a usual source of care or who did not. [(odds ratio

(AOR) males = 0.71; 95% CI: 0.54, 0.94), (AOR females = 0.99; 95% CI: 0.77, 1.26)]. The

measures of associations are shown in *Table 50*.

Table 50. *Adjusted Associations of Having a Usual Source of Care & Self-Reported Mental Health, Stratified by Sex, Medical Expenditure Panel Survey, 2019**

| | Good or Better Mental Health | |
| | Males | Females |
	AOR (95% CI)	AOR (95% CI)
Has a Usual Source of Care	0.71 (0.54, 0.94)†	0.99 (0.77, 1.26)
Insurance Type		
Private	reference	reference
Public	0.27 (0.21, 0.35)†	0.30 (0.25, 0.37)†
Uninsured	0.81 (0.54, 1.21)†	2.45 (1.10, 5.46)†
Arthritis	0.43 (0.33, 0.55)†	0.41 (0.32, 0.51)†

* Odds ratios calculated with binary logistic regression.
† Statistically significant at $\alpha = 0.05$.

Delaying Care due to Cost

We found race and age to be modifiers and income and insurance type to be confounders of the association between delaying care due to cost and self-reported mental health. The final model included delaying care due to cost, income, insurance type, race, age, and the interaction terms of race and delaying care due to cost and age and delaying care due to cost. Stratified by race and age and controlling for income and insurance type, the association of delaying care due to cost and a good or better self-reported mental health varied across age and race. In young adults aged 18-25 (*Table 51*), Black Americans who delayed care due to cost were the least likely group to report a good or better mental health, followed closely by White Americans [(AOR White = 0.27; 95% CI: 0.14, 0.52), (AOR Black = 0.15; 95% CI: 0.04, 0.57), (AOR Hispanic = 0.60; 95% CI: 0.23, 1.57), (AOR Other: N = too small to estimate)].

Table 51. *Adjusted Associations of Delaying Care due to Cost & Self-Reported Mental Health for Ages 18-25, Stratified by Race, Medical Expenditure Panel Survey, 2019**

| | Good or Better Mental Health for Ages 18-25 | | | |
| | White | Black | Hispanic | Other |
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Delay Care due to Cost	0.27 (0.14, 0.52)†	0.15 (0.04, 0.57)†	0.60 (0.23, 1.57)	N/A
Family Income				
Low	reference	reference	reference	N/A

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Table 51 (Continued)

	Good or Better Mental Health for Ages 18-25			
	White	Black	Hispanic	Other
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Middle	1.36 (0.68, 2.72)	1.41 (0.55, 3.63)	1.94 (0.81, 4.68)	N/A
High	3.11 (1.16, 8.36)†	0.60 (0.11, 3.83)	2.49 (0.45, 13.63)	N/A
Insurance Type				
Private	reference	reference	reference	N/A
Public	0.43 (0.21, 0.85)†	0.20 (0.06, 0.63)†	0.51 (0.18, 1.44)	N/A
Uninsured	N/A	0.30 (0.06, 1.63)	0.73 (0.22, 2.44)	N/A

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.
N/A: Sample size too small to calculate OR.

In adults aged 26-35 (*Table 52.)*, White Americans who delayed care due to cost were the least likely group to report a good or better mental health [(AOR White = 0.45; 95% CI: 0.30, 0.69), (AOR Black = 0.80; 95% CI: 0.31, 2.12), (AOR Hispanic = 0.51; 95% CI: 0.26, 1.01), (AOR Other = 0.55; 95% CI: 0.19, 1.64)].

Table 52. *Adjusted Associations of Delaying Care due to Cost & Self-Reported Mental Health for Ages 26-35, Stratified by Race, Medical Expenditure Panel Survey, 2019**

	Good or Better Mental Health for Ages 26-35			
	White	Black	Hispanic	Other
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Delay Care due to Cost	0.45 (0.30, 0.69)†	0.80 (0.31, 2.12)	0.51 (0.26, 1.01)	0.55 (0.19, 1.64)
Family Income				
Low	reference	reference	reference	reference
Middle	2.38 (1.44, 3.92)†	0.98 (0.29, 3.26)	0.57 (0.25, 1.30)	2.51 (0.72, 8.80)
High	2.50 (1.35, 4.62)†	N/A	0.70 (0.23, 2.14)	N/A
Insurance Type				
Private	reference	reference	reference	reference
Public	0.78 (0.42, 1.36)	0.64 (0.17, 2.49)	0.34 (0.15, 0.78)†	1.82 (0.35, 9.39)
Uninsured	2.03 (0.77, 5.37)	1.26 (0.37, 4.30)	0.82 (0.35, 1.95)	N/A

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.
N/A: Sample size too small to calculate OR.

In adults aged 36-44 (*Table 53.)*, Americans of all other races/ethnicities who delayed care due to cost had 0.12 times the odds of reporting a good or better mental health, although Black and White Americans had 0.29 times and 0.38 times the odds of reporting a good or better

mental health [(AOR White = 0.38; 95% CI: 0.22, 0.63), (AOR Black = 0.29; 95% CI: 0.10, 0.83), (AOR Hispanic = 0.69; 95% CI: 0.31, 1.51), (AOR Other = 0.12; 95% CI: 0.03, 0.53)].

Table 53. *Adjusted Associations of Delaying Care due to Cost & Self-Reported Mental Health for Ages 36-44, Stratified by Race, Medical Expenditure Panel Survey, 2019**

	Good or Better Mental Health for Ages 36-44			
	White	**Black**	**Hispanic**	**Other**
	AOR (95% CI)	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**
Delay Care due to Cost	0.38 (0.22, 0.63)†	0.29 (0.10, 0.83)†	0.69 (0.31, 1.51)	0.12 (0.03, 0.53)†
Family Income				
Low	reference	reference	reference	reference
Middle	2.67 (0.80, 8.88)	2.41 (0.85, 6.87)	1.99 (0.92, 4.29)	1.58 (0.32, 7.83)
High	3.67 (1.01, 13.47)†	2.40 (0.60, 9.64)	3.90 (1.70, 28.00)	0.72 (0.11, 4.57)
Insurance Type				
Private	reference	reference	reference	reference
Public	0.52 (0.18, 1.52)	0.20 (0.07, 0.59)†	0.66 (0.26, 1.66)	0.19 (0.05, 0.69)†
Uninsured	0.42 (0.18, 1.01)†	1.95 (0.30, 12.52)	2.72 (0.73, 10.13)	0.75 (0.07, 8.00)

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

In adults aged 45-53 (*Table 54.*), Americans of all other races/ethnicities had 0.20 times the odds of reporting a good or better mental health and White Americans had 0.47 times the odds of reporting a good or better mental health [(AOR White = 0.47; 95% CI: 0.32, 0.70), (AOR Black = 1.03; 95% CI: 0.41, 2.58), (AOR Hispanic = 0.50; 95% CI: 0.24, 1.02), (OR Other = 0.20; 95% CI: 0.04, 0.92)].

Table 54. *Adjusted Associations of Delaying Care due to Cost & Self-Reported Mental Health for Ages 45-53, Stratified by Race, Medical Expenditure Panel Survey, 2019**

	Good or Better Mental Health for Ages 45-53			
	White	**Black**	**Hispanic**	**Other**
	AOR (95% CI)	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**
Delay Care due to Cost	0.47 (0.32, 0.70)†	1.03 (0.41, 2.58)	0.50 (0.24, 1.02)	0.20 (0.04, 0.92)†
Family Income				
Low	reference	reference	reference	reference
Middle	2.14 (1.15, 4.00)†	4.14 (1.33, 12.92)†	2.86 (0.96, 8.51)	2.17 (0.46, 10.13)
High	4.95 (2.59, 9.47)†	2.78 (0.71, 10.93)	7.64 (1.43, 40.98)†	1.69 (0.20, 14.42)
Insurance Type				
Private	reference	reference	reference	reference
Public	0.36 (0.21, 0.60)†	0.53 (0.19, 1.49)	0.44 (0.16, 1.23)	0.15 (0.03, 0.65)†

Table 54 (Continued)

| | Good or Better Mental Health for Ages 45-53 | | | |
| | White | Black | Hispanic | Other |
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Uninsured	1.60 (0.56, 4.55)	0.57 (0.12, 2.72)	2.13 (0.47, 9.58)	N/A

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.
N/A: Sample size too small to calculate OR.

In adults aged 54-64 (*Table 55.)*, Black Americans who delayed care due to cost were the least likely group to report a good or better mental health, followed closely by White Americans and Americans of all other races/ethnicities [(AOR White = 0.54; 95% CI: 0.39, 0.75), (AOR Black = 0.30; 95% CI: 0.13, 0.66), (AOR Hispanic = 1.19; 95% CI: 0.61, 2.32), (AOR Other = 0.77; 95% CI: 0.23, 2.54)].

Table 55. *Adjusted Associations of Delaying Care due to Cost & Self-Reported Mental Health for Ages 54-64, Stratified by Race, Medical Expenditure Panel Survey, 2019**

| | Good or Better Mental Health for Ages 54-64 | | | |
| | White | Black | Hispanic | Other |
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Delay Care due to Cost	0.54 (0.39, 0.75)†	0.30 (0.13, 0.66)†	1.19 (0.61, 2.32)	0.77 (0.23, 2.54)†
Family Income				
Low	reference	reference	reference	reference
Middle	1.59 (1.02, 2.47)†	2.58 (0.86, 7.68)	2.15 (1.01, 4.60)†	0.59 (0.12, 2.84)
High	2.55 (1.47, 4.42)†	2.69 (0.60, 12.11)	4.11 (1.39, 12.17)†	4.25 (0.81, 22.30)
Insurance Type				
Private	reference	reference	reference	reference
Public	0.25 (0.17, 0.38)†	0.55 (0.21, 1.47)	0.38 (0.16, 0.73)†	0.06 (0.01, 0.27)†
Uninsured	3.91 (1.37, 11.21)†	1.10 (0.38, 3.21)	1.77 (0.52, 6.02)	N/A

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.
N/A: Sample size too small to calculate OR.

In adults aged 65 and older (*Table 56)*, White Americans who delayed care due to cost had 0.69 times the odds of reporting a good or better health [(AOR White = 0.69; 95% CI: 0.51, 0.95), (AOR Black = 0.46; 95% CI: 0.18, 1.18), (AOR Hispanic = 1.05; 95% CI: 0.61, 1.79), (AOR Other = 0.60; 95% CI: 0.23, 1.55)]. Having a middle or high income was generally

associated with being more likely to report good or better mental health across all ages and races

and having public insurance or being uninsured was generally associated with being less likely to

report a good or better mental health across all ages and races, although their impact varies

slightly across age and race.

Table 56. *Adjusted Associations of Delaying Care due to Cost & Self-Reported Mental Health for Ages 65+, Stratified by Race, Medical Expenditure Panel Survey, 2019**

| | Good or Better Mental Health for Ages 65 + | | | |
| | White | Black | Hispanic | Other |
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Delay Care due to Cost	0.69 (0.51, 0.95)†	0.46 (0.18, 1.18)	1.05 (0.61, 1.79)	0.60 (0.23, 1.55)
Family Income				
Low	reference	reference	reference	reference
Middle	1.93 (1.33, 2.82)†	1.13 (0.55, 2.31)	1.67 (1.00, 2.19)	8.20 (2.68, 25.09)†
High	2.73 (1.85, 4.03)†	3.53 (1.14, 10.95)†	2.52 (0.88, 7.19)	7.52 (2.40, 23.58)†
Insurance Type				
Private	reference	reference	reference	reference
Public	1.93 (1.33, 2.82)†	0.67 (0.28, 1.64)	0.36 (0.16, 0.82)†	0.42 (0.12, 1.39)
Uninsured	N/A)	N/A	0.91 (0.09, 9.14)	N/A

* Odds ratios calculated with binary logistic regression.
† Statistically significant at $\alpha = 0.05$.
N/A: Sample size too small to calculate OR.

Forgoing Care due to Cost

Race was found to be a modifier and income and insurance type were confounders of the

association between forgoing care due to cost and self-reported mental health. The final model

included forgoing care due to cost, income, insurance type, race, and the interaction term of race

and forgoing care due to cost. Stratified by race and controlling for income and insurance, Black

Americans who forwent care due to cost were less likely to report a good or better mental health,

followed closely by White Americans and Americans of all other races/ethnicities [(AOR White

= 0.42; 95% CI: 0.34, 0.50), (AOR Black = 0.31; 95% CI: 0.21, 0.47), (AOR Hispanic = 0.80;

95% CI: 0.56, 1.12), (AOR Other = 0.45; 95% CI: 0.24, 0.88)], but having a middle or high

income was associated with being more likely to report good or better mental health while

having public insurance was associated with being less likely to report a good or better mental health. Measures of associations are shown in *Table 57*.

Table 57. *Adjusted Associations of Forgoing Care due to Cost & Good or Better Self-Reported Mental Health, Stratified by Race, Medical Expenditure Panel Survey, 2019**

| | Good or Better Mental Health | | | |
| | White | Black | Hispanic | Other |
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Forgo Care due to Cost	0.42 (0.34, 0.50)[†]	0.31 (0.21, 0.47)[†]	0.80 (0.56, 1.12)	0.45 (0.24, 0.88)[†]
Family Income				
Low	reference	reference	reference	reference
Middle	2.10 (1.67, 2.60)[†]	1.72 (1.10, 2.69)[†]	1.57 (0.69, 1.93)	2.29 (1.40, 3.75)[†]
High	3.31 (2.49, 4.40)[†]	2.73 (1.40, 5.29)[†]	2.57 (1.41, 4.67)[†]	4.75 (2.22, 10.18)[†]
Insurance Type				
Private	reference	reference	reference	reference
Public	0.61 (0.51, 0.73)[†]	0.48 (0.31, 0.73)[†]	0.37 (0.25, 0.54)[†]	0.45 (0.25, 0.82)[†]
Uninsured	1.44 (0.93, 2.23)	1.02 (0.49, 2.13)	1.16 (0.69, 1.93)	11.18 (1.50, 83.42)[†]

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Self-Reported Physical Health

The crude odds ratios for self-reported physical health are listed in *Table 49*. Having a USC and delaying or forgoing care due to cost were all associated with being less likely to report a physical health rating of good or better. An increase in age was associated with being less likely to report good or better physical health. Females, not being married, all races and ethnicities other than non-Hispanic Whites, having public or no insurance, having any type of priority condition, or being a current smoker were characteristics associated with being less likely to report good or better physical health compared to being male, being married, being non-Hispanic White, having private insurance, not having the priority conditions, and not currently smoking. Having middle and high incomes, having a high school education or higher, and achieving adequate physical activity were associated with being more likely to report good or better physical health than those with low incomes, less than high school education, and not achieving adequate physical activity.

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Usual Source of Care

Insurance type, age, and arthritis were found to be confounders of the association between having a usual source of care and self-reported physical health and no modifiers were detected. Controlling for age, insurance, and arthritis, having a usual source of care was associated with being less likely to report a good or better self-reported physical health rating [AOR= 0.68; 95% CI: 0.58, 0.80]. Adults aged 36-64 were less likely to have a good or better physical health than young adults aged 18-25, with no differences for adults aged 26-35 or 65 and older compared to young adults. Having public insurance, being uninsured, or having arthritis was associated with being less likely to report good or better physical health (*Table 58*).

Table 58. *Adjusted Associations of Having a Usual Source of Care & Self-Reported Physical Health, Medical Expenditure Panel Survey, 2019**

	Good or Better Physical Health
	AOR (95% CI)
Has a Usual Source of Care	0.68 (0.58, 0.80)[†]
Age Group	
18-25	reference
26-35	0.85 (0.63, 1.16)
36-44	0.66 (0.50, 0.88)[†]
45-53	0.56 (0.42, 0.74)[†]
54-64	0.59 (0.45, 0.76)[†]
65+	0.95 (0.72, 1.26)
Insurance Type	
Private	reference
Public	0.34 (0.30, 0.38)[†]
Uninsured	0.52 (0.41, 0.65)[†]
Arthritis	0.34 (0.30, 0.38)[†]

* Odds ratios calculated with binary logistic regression.
† Statistically significant at $\alpha = 0.05$.

Delaying Care due to Cost

Race was found to be a modifier and income and insurance type were found to be confounders of the association between delaying care due to cost and self-reported mental health.

The final model included delaying care due to cost, income, insurance type, race, and the interaction term of race and forgoing care due to cost. Stratified by race and controlling for income and insurance, delaying care due to cost was associated with being less likely to have a good or better self-reported physical health [(AOR White = 0.48; 95% CI: 0.41, 0.57), (AOR Black = 0.50; 95% CI: 0.37, 0.69), (AOR Hispanic = 0.72; 95% CI: 0.57, 0.91), (AOR Other = 0.47; 95% CI: 0.31, 0.71)], however, having a middle or high income was associated with being more likely to report good or better physical health across all races and having public insurance was associated with being less likely to report good or better physical health. The final model adjusted odds ratios are shown in *Table 59.*

Table 59. *Adjusted Associations of Delaying Care due to Cost & Good or Better Self-Reported Physical Health, Stratified by Race, Medical Expenditure Panel Survey, 2019**

| | Good or Better Physical Health | | | |
| | White | Black | Hispanic | Other |
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Delay Care due to Cost	0.48 (0.41, 0.57) [†]	0.50 (0.37, 0.69) [†]	0.72 (0.57, 0.91) [†]	0.47 (0.31, 0.71) [†]
Family Income				
Low	reference	reference	reference	reference
Middle	1.82 (1.47, 2.52) [†]	1.75 (1.28, 2.40) [†]	1.73 (1.34, 2.24) [†]	1.98 (1.35, 2.92) [†]
High	3.09 (2.47, 3.85) [†]	2.27 (1.49, 3.47) [†]	2.90 (1.97, 4.25) [†]	3.13 (1.75, 5.58) [†]
Insurance Type				
Private	reference	reference	reference	reference
Public	0.46 (0.40, 0.53) [†]	0.50 (0.37, 0.66) [†]	0.40 (0.30, 0.49) [†]	0.47 (0.29, 0.77) [†]
Uninsured	1.18 (0.79, 1.76)	1.18 (0.67, 2.07)	1.00 (0.72, 1.39)	2.33 (1.03, 5.27) [†]

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

Forgoing Care due to Cost

Income and insurance type were found to be confounders of the association between forgoing care due to cost and self-reported physical health and no modifiers were detected. Controlling for income and insurance, forgoing care due to cost was associated with being less likely to report a good or better mental health [AOR= 0.47; 95% CI: 0.41, 0.53]. Having middle or high incomes was associated with being more likely to report good or better physical health

while having public insurance was associated with being less likely to report good or better

physical health. Measures of associations are shown in *Table 60*.

Table 60. *Adjusted Associations of Forgoing Care due to Cost & Self-Reported Physical Health, Medical Expenditure Panel Survey, 2019**

	Good or Better Physical Health
	AOR (95% CI)
Forgo Care due to Cost	0.47 (0.41, 0.53)†
Family Income	
Low	reference
Middle	1.74 (1.53, 1.99)†
High	2.84 (2.41, 3.35)†
Insurance Type	
Private	reference
Public	0.46 (0.41, 0.51)†
Uninsured	1.18 (0.95, 1.46)

* Odds ratios calculated with binary logistic regression.
† Statistically significant at $\alpha = 0.05$.

Discussion

A majority of the study sample reported good or better mental and physical health,

although the impact of barriers to accessing care on self-reported health were largely negative.

All the studied barriers to accessing healthcare (having a usual source of care, delaying care due

to cost, and forgoing care due to cost) were found to be associated with self-reported health

ratings. The effect of delaying care due to cost varied across racial groups for self-reported

mental health and varied across age and racial groups for self-reported physical health. These

groups reported similar proportions of good or better self-reported health, so the impact of

barriers to accessing care effects these groups differently. Furthermore, although some research

suggests that self-reported health is a valid health indicator[21] and can be valid across racial

groups [50], other research has found that self-reported health is a stronger health indicator for

Whites than for Blacks, and that Black adults have an increased risk of health pessimism, or

worse self-reported health than White adults despite similar levels of morbidity [52], which should raise doubt and caution in the validity of interpreting self-reported health for Black Americans [53], especially older Black Americans [54].

The associations between delaying and forgoing care due to cost with being less likely to have good mental or physical health may be explained by those who know they need care but are unable to afford it rating their health poorly due to their health condition, either because their health status is worsening because they are unable to receive care or that they perceive their health status worsening because they are unable to receive care. Unsurprisingly, a higher income was positively associated with better mental and physical health while examining delaying or forgoing care due to cost, but despite this protective factor, facing these barriers to accessing care remains associated with poorer health. Furthermore, delaying or forgoing care has the potential to lead to increasingly worse health outcomes.

Although it might be expected that having a usual source of care would have a positive association with self-reported health, the results of this study indicate otherwise; having a usual source of care was negatively associated with self-reported mental health. This could potentially be explained by reverse causality, or those who have physical health issues and need medical care in the first place may be more likely to have a usual source of care because of those physical health issues, but also may be more likely to report a poorer physical health due to those health issues. This theory is supported by a study that found self-reported health to be inversely related to the number of physician contacts per year [21], possibly explained by ongoing physical health issues that require a usual source of care, or an increase in the number of physician contacts. Furthermore, having a usual source of care was negatively associated with self-reported mental

health in males but not in females, which may indicate that males are more affected by health issues that require a usual source of care than females.

A strength of this study is that it uses a recent, large, nationally representative sample, however, it is not without its limitations. The Medical Expenditure Panel Survey relies on self-reported data which can be subject to biases such as social desirability and recall. Moreover, MEPS data are cross-sectional, so the ability to make causal inferences is limited. Additional limitations include residual confounding due to unmeasured potential confounders, such as gender. Gender is a socially constructed characteristic that may influence barriers to accessing care and quality of care, but the current study is unable to account for gender as it is not a variable included in the MEPS. Additionally, only census regions are available in MEPS. Since Medicaid expansion varied by state, it may be possible to account for the effect of Medicaid expansion on barriers by using census region as a proxy, as most Northeast states expanded Medicaid eligibility and most Southern states rejected the expansion, however, West and Midwest regions are heterogenous and may not be representative of their collective states. Region heterogeneity may be negligible in this study since region was not a confounder and not required in final models. Finally, the validity of self-reported health measures in Black Americans should be considered when interpreting results.

The findings of this study indicate that, although a majority rated their health as good or better, an association between barriers to accessing healthcare and self-reported health may affect racial groups differently and warrants further research. The public health implications of the large effect sizes of the associations between delaying or forgoing care and self-reported mental and physical health suggest that those who delay or forgo care due to cost may be doing so at the expense of their health. The present analysis was unable to account for temporality, but

future studies could incorporate a temporal component to address potential causation. Future

research could also incorporate elements to measure the effects of the COVID-19 pandemic on

the disruption of access to healthcare.

Chapter 4: Quality of Care in the United States and its Potential Impact on Perceived

Health

Introduction

A primary goal of the Patient Protection and Affordable Care Act (ACA) was to improve quality of care in the United States (US)[1, 25]. Previous work has found that having health insurance and a usual source of care were associated with positive perceptions of care, however, prior to the ACA, women and low-income individuals in the U.S. were less likely to report high-quality care from providers and less likely to report that providers always explained things so that they understood, despite having health insurance and having a usual source of care [28]. Even after the implementation of ACA, specific populations still report low levels of perceived high-quality care. For example, recent diabetic immigrants were less likely to report high-quality care than diabetic immigrants who have been in the US for at least 15 years [14] and less than 25% of cancer survivors reported high-quality communication with any provider after their diagnosis, which underscores the suboptimal quality of care in populations that certainly require more support and attention due to their health conditions [15, 16]. Recent literature suggests that a reduction in disparities may improve quality, but disparities across race and sex still exist [17, 18]. Although these examples highlight the importance of addressing disparities and experiencing high-quality care, the current literature shows mixed results on how perceived quality of care impacts the health of the general population post ACA [55–58]. Moreover, negative perceived quality of care can act as a deterrent for future care-seeking behavior [19] that could result in a progression of poorer health outcomes. A study from 2000 found no association with quality-of-care ratings and health in older adults, but authors surmised that their study population was not generalizable, and more research was needed [59]. Therefore, it is unknown

how, or to what extent, perceived quality of care impacts health post-ACA [5, 20]. Some research suggests that self-reported health measures are valid health status indicators [22, 60] and are a quick and easy way to gauge an individual's overall well-being in association with quality of care. The purpose of this study is to evaluate whether perceived quality of care is associated with self-reported ratings of physical and mental health.

Method

Data Source

The Medical Expenditure Panel Survey (MEPS), which began in 1996, is an annual, nationally representative survey comprised of noninstitutionalized US civilians, subset from participants of the prior year's National Health Interview Survey. MEPS is conducted by the Agency for Healthcare Research and Quality and collects data on healthcare utilization and expenditures [24]. MEPS components are comprised of both interviewer and self-administered questionnaires.

Sample Population

Adults aged 18 and older (n = 12,265) were identified from the 2019 MEPS to assess associations in quality of care and self-reported health. Individuals with missing exposure or outcome variables will be excluded. Individuals with missing exposure (providers showed respect: n = 186 (1.39%); providers spent enough time: n = 188 (1.39%); providers listened: n = 181 (1.36%); providers explained: n = 191 (1.43%); rating of healthcare providers: n = 50 (0.34%)) or outcome variables (self-reported mental health: n = 10 (0.07%); self-reported physical health: n = 6 (0.04%)) were excluded from analyses.

Exposure Variable

Quality of care was measured by five Consumer Assessment of Healthcare Providers and Systems (CAHPS) [29] questions included in the MEPS that are designed to measure quality of care from the consumer's perspective. The first four questions are: how often providers showed respect for what the person receiving care had to say; how often providers spent enough time with the person receiving care; how often providers listened to the person receiving care; how often providers explained things in a way that the person receiving care could understand. The answer options were always, usually, sometimes, or never and were dichotomized to always and not always for the purpose of analyses. The final quality question is an overall rating of care of the person's health care providers, dichotomized to 10 (best health care possible) and <10.

Outcome Variables

Self-reported health measures in MEPS are comprised of physical and mental health and ask participants to rate their perceived health status. Self-reported physical and mental health are measured as poor, fair, good, very good, and excellent. For analyses, these were dichotomized into categories of good or better and poor or fair.

Covariates

Self-reported independent variables include age (18-25, 26-35, 36-44, 45-53, 54-64, and 65+), sex, race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, and all other races/ethnicities), marital status (currently married or currently widowed/divorced/separated /never married), education level (less than high school graduate, high school graduate, some college or more), family income level (low [<139% federal poverty level (FPL)], middle [139-400% FPL], high [400%+ FPL]), census region (Northeast, Midwest, South, and West), and health insurance coverage (any private, public only, uninsured). Comorbidities were measured using MEPS priority conditions and include arthritis, asthma, cancer, diabetes, emphysema, heart

disease (angina, coronary heart disease, heart attack, other heart conditions/diseases), high

cholesterol, hypertension, and stroke. BMI was not included since weight is only collected every

other year in MEPS starting in 2016. Meeting physical activity guidelines (Yes or No/unknown)

is defined as currently spending half an hour or more in moderate to vigorous physical activity at

least five times a week, per the current Physical Activity Guidelines for Americans [33].

Cigarette smoking status was determined as currently smoking (Yes or No/unknown). These

categorizations have been previously used with MEPS data [30, 34–36].

Statistical Analysis

Sample characteristics were summarized with appropriate descriptive statistics. Since

fewer than two percent of individuals were missing outcome or exposure variables, no sensitivity

analyses were performed.

We first examined all crude associations with each covariate and outcome via logistic

regression and reported respective odds ratios (OR) and 95% confidence intervals. We then

assessed the potential for effect modification across age, sex, and race via an interaction term

with each exposure and these covariates individually. To assess confounding, each covariate was

added to the model that contains the outcome, exposure, and any significant interaction terms, in

order of its strength of association. The confounder was preserved in the final model if it is also

in a significant interaction term or if the adjusted odds ratio was more than 10% different. If a

variable was found to be an effect modifier, the fully adjusted model was stratified by said

variable. The NOMCAR (not missing completely at random) option was used to account for any

missingness of covariates. All analyses were conducted with SAS 9.4 [37] and incorporated

weighting to account for the complex survey design and survey nonresponse. Weighting

variables were developed by MEPS and described in detail in the consolidated data file

documentation [40]. Alpha levels for statistical significance were set at 0.05.

Results

Table 61 shows the distribution of characteristics of 12,265 adults aged 18 and older. The

majority reported that their providers always showed respect, always spent enough time, always

listened, and always explained things so they understood, however, only 27.73% gave their

healthcare providers the best rating possible. More than two thirds of the sample were non-

Hispanic White, most had high school or higher education, private insurance, middle or high

incomes, which is consistent with the most recent 2020 U.S. Census estimates [51]. In addition, a

large majority rated their health as good or better, with 90.92% rating their mental health as good

or better and 84.56% rating their physical health as good or better.

Table 61. *Distribution of Sociodemographic Characteristics, Medical Expenditure Panel Survey, 2019*

	N (Weighted %)	Good or Better Mental Health	Good or Better Physical Health
		N (Weighted %)	N (Weighted %)
Total	12265 (100.00)	11020 (90.92)	10046 (84.56)
Provider Always Showed Respect	7843 (63.65)	7179 (92.34)	6610 (86.87)
Provider Always Spent Enough Time	6410 (51.53)	5871 (92.44)	5390 (86.83)
Provider Always Listened	7071 (57.04)	6474 (92.35)	5941 (86.72)
Provider Always Explained	7237 (58.91)	6631 (92.27)	6080 (86.41)
Best Rating of Healthcare Providers	3579 (27.73)	3294 (93.00)	3002 (86.85)
Age Group			
18-25	825 (9.83)	734 (89.66)	742 (90.63)
26-35	1521 (14.61)	1362 (90.67)	1365 (90.50)
36-44	1502 (13.28)	1354 (91.36)	1265 (86.49)
45-53	1662 (14.31)	1481 (90.61)	1340 (83.21)
54-64	2663 (20.81)	2401 (91.71)	2082 (81.67)
65+	4092 (27.16)	3688 (90.83)	3252 (81.16)
Sex			
Male	5131 (43.15)	4631 (91.20)	4210 (84.78)
Female	7134 (56.85)	6389 (90.70)	5836 (84.39)
Race/Ethnicity			

Table 61 (Continued)

	N (Weighted %)	Good or Better Mental Health N (Weighted %)	Good or Better Physical Health N (Weighted %)
Non-Hispanic White	7958 (69.10)	7200 (91.17)	6715 (86.20)
Non-Hispanic Black	1582 (10.60)	1409 (90.54)	1212 (80.77)
Hispanic	1809 (11.94)	1583 (89.63)	1353 (78.33)
All other race/ethnicities	916 (8.37)	828 (91.14)	766 (84.67)
Current Marital Status			
Married	6621 (55.73)	6135 (93.31)	5632 (86.69)
Not married	5644 (44.27)	4885 (87.91)	4414 (81.89)
Education			
Less than high school graduate	1597 (10.65)	1259 (80.70)	1023 (67.73)
High school graduate	3391 (24.86)	3029 (89.89)	2647 (80.51)
Some college or more	7222 (64.49)	6687 (93.00)	6337 (88.94)
Family Income			
Low	2390 (14.68)	1868 (78.63)	1566 (67.45)
Middle	4669 (36.57)	4198 (90.40)	3756 (82.62)
High	5206 (48.75)	4954 (94.99)	4724 (91.16)
Census Region			
Northeast	1942 (18.37)	1751 (91.59)	1621 (85.19)
Midwest	2813 (22.32)	2536 (91.57)	2318 (85.32)
South	4474 (36.40)	4002 (90.71)	3584 (83.88)
West	3035 (22.91)	2730 (90.06)	2522 (84.40)
Insurance Type			
Private	7960 (71.18)	7437 (93.57)	7008 (89.15)
Public	3928 (26.02)	3244 (83.73)	2733 (72.15)
Uninsured	377 (2.80)	339 (90.18)	305 (83.20)
Comorbidity			
Arthritis	4286 (30.43)	3642 (86.25)	3038 (73.21)
Asthma	1843 (14.62)	1514 (83.50)	1315 (74.82)
Cancer	1948 (14.17)	1743 (90.20)	1506 (79.27)
Diabetes	1981 (13.47)	1671 (86.24)	1245 (65.88)
Emphysema	320 (1.98)	236 (73.03)	145 (48.27)
Heart disease	2401 (17.53)	2039 (85.87)	1648 (71.11)
High cholesterol	4910 (36.49)	4297 (88.87)	3673 (77.57)
Hypertension	5440 (39.07)	4738 (88.33)	3964 (75.24)
Stroke	710 (4.67)	566 (80.28)	421 (61.84)
Adequate Physical Activity	5884 (49.87)	5505 (94.27)	5212 (90.25)
Current Smoker	2272 (16.77)	1884 (83.99)	1617 (74.08)

Odds ratios for crude associations are listed in *Table 62*. All quality-of-care variables

were associated with being more likely to self-report good or better mental and physical health.

There were no age group differences for self-reported mental health. For self-reported physical health, adults aged 36 and older were less likely to report a good or better physical health than young adults aged 18-25, with no differences between 18-25-year-olds and 26-35-year-olds. There were no sex, race, or regional differences. Not being married or being a current smoker was associated with being less likely to report good or better mental or physical health than those who are married or are not current smokers. Having any comorbidity except for cancer was also associated with being less likely to report good or better mental or physical health. Having cancer had no association with mental health ratings but was associated with being less likely to report a good or better physical health. Having middle or high incomes, being high school educated or higher, and achieving adequate physical activity were associated with being more likely to report a good or better mental and physical health than having a low income, having a less than high school education, and not achieving adequate physical activity. Having public insurance was associated with being less likely to self-report a good or better mental and physical health compared to private insurance. Being uninsured was associated with being less likely to report a good or better physical health compared to private insurance but no differences were observed in self-reported mental health when comparing private insurance to being uninsured. We found no modifiers or confounders for the association between providers always showed respect, provider always spent enough time, provider always explains, and self-reported mental or physical health. There were also no modifiers or confounders for the association between provider always listens and self-reported mental health.

Table 62. *Crude Associations of Self-Reported Health, Medical Expenditure Panel Survey, 2019*

	Good or Better Mental Health		Good or Better Physical Health	
	OR (95% CI)	*P* value	**OR (95% CI)**	*P* value
Always Showed Respect	1.58 (1.38, 1.80)	**<0.001**	1.60 (1.44, 1.78)	**<0.001**
Always Spent Enough Time	1.47 (1.28, 1.68)	**<0.001**	1.43 (1.29, 1.59)	**<0.001**
Always Listens	1.49 (1.31, 1.71)	**<0.001**	1.46 (1.31, 1.63)	**<0.001**
Always Explains	1.48 (1.30, 1.69)	**<0.001**	1.40 (1.25, 1.57)	**<0.001**
Best Rating	1.46 (1.21, 1.75)	**<0.001**	1.29 (1.12, 1.48)	**0.0004**
Age Group				
18-25	reference		reference	
26-35	1.12 (0.81, 1.54)	0.4837	0.99 (0.67, 1.44)	0.9392
36-44	1.22 (0.86, 1.72)	0.2590	0.66 (0.46, 0.95)	**0.0240**
45-53	1.11 (0.81, 1.53)	0.5142	0.51 (0.37, 0.72)	**0.0001**
54-64	1.28 (0.94, 1.73)	0.1157	0.46 (0.33, 0.64)	**<0.001**
65+	1.14 (0.83, 1.57)	0.4067	0.45 (0.32, 0.62)	**<0.001**
Sex				
Male	reference		reference	
Female	0.94 (0.82, 1.08)	0.3990	0.97 (0.87, 1.09)	0.6033
Race/Ethnicity				
Non-Hispanic White	reference		reference	
Non-Hispanic Black	0.93 (0.74, 1.17)	0.5170	0.67 (0.56, 0.80)	**<0.001**
Hispanic	0.84 (0.66, 1.06)	0.1390	0.58 (0.47, 0.71)	**<0.001**
All other race/ethnicities	1.00 (0.73, 1.36)	0.9818	0.88 (0.70, 1.11)	0.2850
Current Marital Status				
Married	reference		reference	
Not married	0.52 (0.45, 0.61)	**<0.001**	0.69 (0.62, 0.77)	**<0.001**
Education				
Less than high school graduate	reference		reference	
High school graduate	2.13 (1.78, 2.55)	**<0.001**	1.97 (1.64, 2.36)	**<0.001**
Some college or more	3.18 (2.64, 3.82)	**<0.001**	3.83 (3.26, 4.50)	**<0.001**
Family Income				
Low	reference		reference	
Middle	2.56 (2.16, 3.04)	**<0.001**	2.29 (2.00, 2.63)	**<0.001**
High	5.15 (4.14, 6.41)	**<0.001**	4.97 (4.25, 5.82)	**<0.001**
Census region				
Northeast	reference		reference	
Midwest	1.00 (0.80, 1.24)	0.9844	1.01 (0.82, 1.24)	0.9200
South	0.90 (0.72, 1.11)	0.3199	0.90 (0.74, 1.10)	0.3208
West	0.83 (0.65, 1.06)	0.1336	0.94 (0.77, 1.15)	0.5574
Insurance Type				
Private	reference		reference	
Public	0.35 (0.30, 0.42)	**<0.001**	0.32 (0.28, 0.35)	**<0.001**
Uninsured	0.63 (0.39, 1.01)	0.0554	0.60 (0.43, 0.85)	**0.0039**
Type of Comorbidities				
Arthritis	0.48 (0.41, 0.55)	**<0.001**	0.32 (0.29, 0.36)	**<0.001**

Table 62 (Continued)

	Good or Better Mental Health		Good or Better Physical Health	
	OR (95% CI)	*P* value	OR (95% CI)	*P* value
Asthma	0.43 (0.36, 0.51)	**<0.001**	0.47 (0.41, 0.55)	**<0.001**
Cancer	0.91 (0.73, 1.12)	0.3583	0.65 (0.56, 0.75)	**<0.001**
Diabetes	0.57 (0.49, 0.67)	**<0.001**	0.28 (0.24, 0.32)	**<0.001**
Emphysema	0.26 (0.19, 0.35)	**<0.001**	0.16 (0.13, 0.21)	**<0.001**
Heart disease	0.53 (0.45, 0.62)	**<0.001**	0.35 (0.31, 0.40)	**<0.001**
High cholesterol	0.69 (0.60, 0.78)	**<0.001**	0.45 (0.40, 0.50)	**<0.001**
Hypertension	0.61 (0.53, 0.70)	**<0.001**	0.32 (0.28, 0.36)	**<0.001**
Stroke	0.38 (0.31, 0.47)	**<0.001**	0.27 (0.23, 0.32)	**<0.001**
Adequate Physical Activity	2.29 (1.97, 2.67)	**<0.001**	2.44 (2.15, 2.76)	**<0.001**
Current Smoker	0.44 (0.37, 0.51)	**<0.001**	0.44 (0.39, 0.50)	**<0.001**

*Proportions and *P* value calculated with chi-square test of independence

For provider always listens and self-reported physical health, race was found to be a modifier and there were no confounders. Stratified by race, non-Hispanic Whites who reported their provider always listens to them had 1.69 times the odds of reporting a good or better physical health [AOR= 1.69; 95% CI: 1.47, 1.94], while those of all other races showed no association with provider always listens and good or better physical health [(AOR Black = 1.29; 95% CI: 0.94, 1.77), (AOR Hispanic = 1.25; 95% CI: 0.97, 1.61), (AOR Other = 1.22; 95% CI: 0.83, 1.80), *Table 63*].

Table 63. *Adjusted Associations of Provider Always Listens & Self-Reported Physical Health, Stratified by Race, Medical Expenditure Panel Survey, 2019*

	Good or Better Physical Health			
	White	Black	Hispanic	Other
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Provider Always Listens	1.69 (1.47, 1.94)†	1.29 (0.94, 1.77)	1.25 (0.97, 1.61)	1.22 (0.83, 1.80)

* Odds ratios calculated with binary logistic regression.
† Statistically significant at α = 0.05.

For the best rating of healthcare providers and self-reported mental health, race was found to be a modifier and there were no confounders. The final model included only the exposure and outcome and were stratified by race. The best rating of the healthcare providers

was associated with good or better mental health (*Table 64*) in non-Hispanic Whites [AOR=1.79; 95% CI: 1.41, 2.27], but not in other races [(AOR Black = 1.15; 95% CI: 0.74, 1.30), (AOR Hispanic = 0.87; 95% CI: 0.59, 1.30), (AOR Other = 1.43; 95% CI: 0.74, 2.74)].

Table 64. *Adjusted Associations of Best Rating of Healthcare Providers & Self-Reported Mental Health, Stratified by Race, Medical Expenditure Panel Survey, 2019**

	Good or Better Mental Health			
	White	**Black**	**Hispanic**	**Other**
	AOR (95% CI)	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**
Best Rating of Healthcare Providers	1.79 (1.41, 2.27)†	1.15 (0.74, 1.79)	0.87 (0.59, 1.30)	1.43 (0.74, 2.74)

* Odds ratios calculated with binary logistic regression.
† Statistically significant at $\alpha = 0.05$.

Race was found to be a modifier and no confounders of the association between the best rating of the healthcare providers and self-reported physical health. The final model included only the exposure and outcome and were stratified by race. The best rating of the healthcare providers was associated with good or better physical health (*Table 65*) in non-Hispanic Whites [AOR=1.52; 95% CI: 1.27, 1.82], but not in other races [(AOR Black = 1.29; 95% CI: 0.97, 1.71), (AOR Hispanic = 0.86; 95% CI: 0.64, 1.16), (AOR Other = 1.38; 95% CI: 0.80, 2.38)].

Table 65. *Adjusted Associations of Best Rating of Healthcare Providers & Self-Reported Physical Health, Stratified by Race, Medical Expenditure Panel Survey, 2019**

	Good or Better Physical Health			
	White	**Black**	**Hispanic**	**Other**
	AOR (95% CI)	**AOR (95% CI)**	**AOR (95% CI)**	**AOR (95% CI)**
Best Rating of Healthcare Providers	1.52 (1.27, 1.82)†	1.29 (0.97, 1.71)	0.86 (0.64, 1.16)	1.38 (0.80, 2.38)

* Odds ratios calculated with binary logistic regression.
† Statistically significant at $\alpha = 0.05$.

Discussion

High quality of care is positively associated with good or better self-reported health, but whether this association is causal remains unknown. A recent study found that a poorer self-rated

health was associated with more frequent negative care experiences [61], but the association between poor self-rated health, poor quality of care, and healthcare seeking behavior remains complex and the directionality of the associations remain unknown. Furthermore, racial differences exist in how some quality of care variables impact self-reported health, with associations seen in non-Hispanic Whites but no associations for other races. While some research suggests that self-reported health is a valid health indicator [60] and can be valid across racial groups [22], other research has found that self-reported health is a stronger health indicator for Whites than for non-Whites and that Black adults have an increased risk of health pessimism, or worse self-reported health, than White adults, despite similar levels of morbidity [52], which should raise doubt and caution in the validity of interpreting self-reported health for races other than White, especially Black Americans [53]. This could potentially explain why we see an association for non-Hispanic Whites that is not seen in other races.

A strength of this study is that it uses a recent, large, nationally representative sample, however, it is not without its limitations. The Medical Expenditure Panel Survey relies on self-reported data which may be subject to social desirability. Moreover, MEPS data are cross-sectional, so the ability to make causal inferences is limited. Additional limitations include residual confounding due to unmeasured potential confounders, such as gender. Gender is a socially constructed characteristic that may influence barriers to accessing care and quality of care, but the current study is unable to account for gender as it is not included in the MEPS. Additionally, only census regions are available in MEPS. Since Medicaid expansion varied by state, it may be possible to account for the effect of Medicaid expansion on quality of care by using census region as a proxy, as most Northeast states expanded Medicaid eligibility and most Southern states rejected the expansion, however, West and Midwest regions are heterogenous

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and may not be representative of their collective states. The region limitation may be negligible since it was not a confounder and not included in the final model.

Results from this study indicate that an association between quality of care and self-reported health exists, although temporality or causality was not able to be examined in this study design. Since perceived poor quality care can lead to a reduction in future care-seeking behavior [19] and has been found here to be associated with poorer self-rated health, the potential exists for worsening of health outcomes. Future research should be mindful of interpreting self-reported health measures of races other than non-Hispanic Whites and prospective studies should be developed to determine the directionality of the association between self-reported health and quality of care and to see if there is, in fact, a long-term effect.

Chapter 5: Summary

The Medical Expenditure Panel Survey provided robust data that were used to examine the aims of the previous three chapters and to address gaps in the literature. With MEPS data, we investigated barriers to accessing care and quality of care from 2009 (pre-ACA implementation) to 2019 (post-ACA implementation). Despite a higher proportion of health insurance coverage in 2019, we found that MEPS participants in 2019 were more likely to report delaying or forgoing care than in 2009. Quality of care showed differences across race, with Whites reporting no changes or slight declines while all other races reporting improvements. Results show that barriers to accessing care may have worsened from 2009 to 2019, however, some evidence suggests that the quality of care reported by minority racial groups have improved. These findings imply that more Americans are not receiving or are delaying the care that they need. Not addressing barriers to accessing healthcare may lead to an increasingly unhealthy America, and the increase in insurance coverage from the ACA is not enough to keep Americans healthy.

We also examined the association of mental and physical self-reported health with barriers to accessing care and quality of care in all adults aged 18 and over who participated in the 2019 MEPS. We found that although most of the sample reported good self-reported health, the impact of barriers on self-reported health were largely negative, suggesting delaying or forgoing care due to cost is done at the expense of health. Quality of care showed differences across race. High quality care was positively associated with good self-reported health in Whites but showed no association in all other races/ethnicities. Our findings suggest that exposure to barriers to accessing care and a negative quality of care may have a negative impact on health.

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<p align="center">Appendix</p>

Institutional Review Board Letter

Institutional Review Board
Division of Research and Innovation
Office of Research Compliance
University of Memphis
315 Admin Bldg
Memphis, TN 38152-3370

December 15, 2021

PI Name: Ashley Williams
Co-Investigators: Fawaz Mzayek, Courtnee Melton-Fant
Advisor and/or Co-PI: Vikki Nolan
Submission Type: Admin Withdrawal
Title: THE CURRENT STATE OF HEALTHCARE IN THE UNITED STATES: BARRIERS
TO HEALTHCARE, QUALITY OF CARE, AND SELF-REPORTED HEALTH
IRB ID: PRO-FY2022-179

From the information provided on your determination review request for "THE CURRENT
STATE OF HEALTHCARE IN THE UNITED STATES: BARRIERS TO HEALTHCARE,
QUALITY OF CARE, AND SELF-REPORTED HEALTH ", the IRB has determined that
your activity does not meet the Office of Human Subjects Research Protections definition of
human subjects research and 45 CFR part 46 does not apply.

This study does not require IRB approval nor review. Your determination will be
administratively withdrawn from Cayuse IRB and you will receive an email similar to this
correspondence from irb@memphis.edu. This submission will be archived in Cayuse IRB.

Thanks,

IRB Administrator
Division of Research and Innovation
Office of Research Compliance

315 Administration Building
Memphis, TN 38152-3370
P: 901.678.2705
F: 901.678.4409