



Educational Attainment and Satisfaction With the Healthcare System: Racial Variation

Shervin Assari^{1*}

¹Department of Family Medicine, Charles R. Drew University of Medicine and Science, Los Angeles, CA 90059, USA

***Corresponding Author:** Shervin Assari, M.D., M.P.H., Department of Family Medicine, Charles R. Drew University of Medicine and Science, Los Angeles, CA 90059, USA. Tel: +1-734-363-2678, Email: assari@umich.edu

Received May 13, 2020; Accepted October 7, 2020; Online Published November 1, 2020

Abstract

Background: As shown by Minorities' Diminished Returns (MDRs), ethnic minorities show weaker than expected effects of education level on health outcomes.

Objectives: We tested ethnic differences in the association between education level and satisfaction with healthcare among American adults.

Methods: The National Health Interview Survey (NHIS) included 24,835 adults who were Latino, non-Latino, African American, or White. The independent variable was education level. The dependent variable was satisfaction with healthcare. Logistic regression was used for data analysis.

Results: For Whites, higher education levels were associated with greater healthcare satisfaction, as high school graduates ($OR = 1.24$; 95% CI = 1.02-1.52; $P = 0.034$) and college graduates ($OR = 1.25$; 95% CI = 1.02-1.53; $P = 0.029$) showed greater healthcare satisfaction than those with less than a high school diploma. African Americans, none of these education levels were associated with greater healthcare satisfaction. In the pooled sample, African American ethnicity showed significant statistical interactions with education level suggesting significantly smaller effects of high educational attainment on satisfaction with healthcare for African Americans than White adults (0.61 ; 95% CI = 0.38-1.00; $P = 0.050$ for AA x High School Graduate and $OR = 0.60$; 95% CI = 0.37-0.97; $P = 0.036$ for AA x Some College).

Conclusion: High education level is associated with greater healthcare satisfaction for Whites but not African Americans. The healthcare system may undervalue people's class when the patient is African American.

Keywords: Population Groups, Ethnicity, Socioeconomic Status, Education, Healthcare, Satisfaction, Healthcare System

1. Background

Research on the Minorities' Diminished Returns (MDRs) phenomenon¹ has proposed a new explanation for why ethnic health disparities exist,^{2,3} sustain,⁴⁻⁶ and grow⁷⁻¹¹ over time. According to this framework, health inequalities are not limited to poor ethnic minorities, as the health of middle-class ethnic minorities also suffers.^{12,13} This view is supported by a large body of research showing that the health effects of socioeconomic status (SES), particularly education level, are weaker for ethnic minority groups relative to Whites.^{2,3} Similar patterns are shown for education level,¹⁴ income,¹⁵ employment,¹⁶ and marital status,¹⁷ suggesting that almost all SES indicators generate fewer tangible health outcomes for non-White than White Americans.

MDRs research has attributed some of the ethnic inequalities in self-rated health,¹⁸⁻²⁰ depression,²¹ anxiety,¹⁷ suicide,²² obesity,²³ chronic diseases,¹⁵ chronic obstructive pulmonary disease,²⁴ asthma,¹⁵ attention-deficit/hyperactivity disorder²⁵ hypertension,²⁶ disability,²⁷ hospitalization,²⁸ and mortality²⁹ in African Americans and

Latinos to effect of SES indicators for ethnic minorities. This means there is a spillover effect of health inequalities to higher SES sections of society and the middle-class in marginalized groups.^{12,30-33} As these MDRs are well established and consistently replicated at national and local levels, researchers have recently made an initiative to explore if social stratification, economic markets,^{2,3,19,34} psychological processes,^{35,36} health behaviors,³⁷⁻³⁹ and health care systems⁴⁰ have a role in explaining why high SES ethnic minorities still report poor health.¹⁸ Some studies have blamed the labor market by documenting a high risk of poverty among highly educated African American families.⁴¹ This view is further supported by evidence showing high levels of exposure to occupational stress and toxins in highly educated African Americans.⁴² Other studies have attributed MDRs to proximity to Whites and a higher risk of experiencing interpersonal discrimination in highly educated ethnic minorities.³⁰⁻³²

Although research has pointed to various mechanisms for such a phenomenon, one potential source of MDRs may be the healthcare system and behaviors related

to how ethnic minorities interact with the healthcare system. It has been suggested that highly educated African Americans and Latinos report less than expected health service utilization.⁴³ For example, highly educated and high income African Americans report less than expected usage of oral health exams,⁴⁴ breast exams,⁴⁵ and prostate exams. A similar pattern is shown for health risk behaviors, as African Americans and Latinos display weaker effects of education and income on health behaviors.^{37-39,46-49} To give a few examples, highly educated African Americans and Latinos commonly display worse than expected diet,⁴⁶ exercise,⁴⁷ smoking, vaping,³⁹ alcohol use,^{37,50} and binge drinking³⁷ behaviors. As shown by a recent study that followed individuals for 20 years, highly educated and high income African Americans show less than expected preventive health-seeking behaviors, suggesting that lower than expected health care use may be a reason for worse than expected health effects of ethnic minorities.^{40,43,44}

2. Objectives

There is a lack of previous study on MDRs of education level and income on satisfaction with healthcare across ethnic groups among adults. In response to this knowledge gap, this study investigated the MDRs of education level on satisfaction with healthcare among African American and Latino adults. We compared ethnic groups of adults for the association between education level and satisfaction with healthcare. In line with the MDRs theory,^{2,3} and past research,⁴³ we expected a weaker link between education level and satisfaction with healthcare for African Americans and Latinos in comparison to their White and non-Latino counterparts. That is, we expected a low satisfaction with healthcare across all levels of education for African Americans and Latinos, a pattern opposite for Whites and non-Latinos. According to our search, this will be among the first, if not the first study, to test racial and ethnic variation in the association between educational attainment and satisfaction with the health care system.

3. Methods

The National Health Interview Survey (NHIS) was used for this cross-sectional study. NHIS is one of the central national health surveys of adults in the US. The NHIS data collection is run by the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention (CDC). The NHIS study uses a face-to-face interview format at participants' houses. For some individuals, a face-to-face interview was followed by a phone interview.

3.1. Participants and Sampling

The NHIS sample is limited to US residents who are non-institutionalized, civilian adults. To enroll the sample, NHIS employed a multi-stage sampling strategy.

3.2. The Analytical Sample

A total of 24,835 adults were included in this analysis. This sample included all men and women who were 18+ years

of age, participated in the NHIS, were non-Latino, Latino White, or African American, and provided valid data for all our variables (including use of healthcare services in the past 12 months). We did not include people from other ethnic groups or those who had not used health care services in the past 12 months.

3.3. Measures

3.3.1. Moderator

Ethnicity. Ethnicity was self-reported and operationalized as two dichotomous variables: African Americans = 1 vs. Whites = 0 (reference category) and Latino = 1 vs. Non-Latino = 0 (reference category).

3.3.2. Outcome

Satisfaction with healthcare. Participants' satisfaction with healthcare was asked using the following single item: "How satisfied were you with health care over the past 12 months?". Originally responses ranged from 1 to 4 (1 = very dissatisfied, 2 = somewhat dissatisfied, 3 = somewhat satisfied, and 4 = very satisfied). We operationalized this variable as a dichotomous variable: 0 = dissatisfied (very dissatisfied or somewhat dissatisfied) and 1 = satisfied (somewhat satisfied or very satisfied). Thus, our outcome was positive, not negative.

3.3.3. Predictor

Education level. Education was a four-level categorical variable with the following levels: less than high school diploma, high school graduate, some college, and college graduate.

3.3.4. Covariates

Psych Distress. Borrowed from the Kessler 6-item Psychological Distress Scale,⁵¹⁻⁵³ the following six items were used to measure psychological distress in the participants: 1) "How often you felt so sad nothing cheers you up during the past 30 days", 2) "How often you felt nervous during the past 30 days", 3) "How often you felt restless/fidgety during the past 30 days", 4) "How often you felt hopeless during the past 30 days", 5) "How often you felt everything was an effort during the past 30 days", and 6) "How often you felt worthless during the past 30 days". Responses ranged from 0 to 4 (none of the time to all of the time). The total sum score was calculated with a potential range from 0 to 24, with a higher score indicating higher psychological distress. For this study, we used this measure as a categorical variable after applying a cut-off point of 6. These items are based mainly on the measure, which is widely validated and used.

Body Mass Index (BMI). Participants height and weight were self-reported. Participants BMI was calculated and then classified based on a threshold of 30. $BMI \geq 30$ was coded as 1 and $BMI < 30$ was coded as 0.

Self-rated health (SRH). NHIS applied the conventional single-item measure of SRH to measure self-rated health. Participants were asked to report their overall health.

Possible responses were excellent, very good, good, fair, or poor. High SRH indicates worse health. We operationalized SRH as a dichotomous variable (0 = good health vs. 1 = poor health). Research has well-established high the validity and reliability of SRH as one of the strongest predictors of all-cause risk of mortality.⁵⁴

Chronic Medical Conditions (CMCs). Participants were asked if a doctor has ever told them that they have any of the following chronic medical conditions: 1) diabetes mellitus, 2) emphysema/asthma, 3) stroke, 4) heart disease, 5) cancer, 6) arthritis, 7) hypertension, and/or 8) psychiatric conditions. We operationalized this variable as a dichotomous variable: 0 = no chronic disease vs. 1 = any chronic diseases.

Usual Place of Care. The NHIS used a single item to measure usual place of care. Participants were asked "Do you have a place you usually go when you get sick?". Responses were 1 (with a usual place of care) and 0 (without a usual place of care).

Demographic Characteristics. Demographics included age, marital status, and region. Age, an interval variable, was treated as a continuous measure in our analysis. Region was treated as a categorical variable, and included Northeast, Midwest, South, and West.

3.4. Statistics

The NHIS used a multi-stage sample design. Thus, we re-estimated standard errors (SEs) by adjusting for the survey weights. We used weighted analysis/SPSS 23.0 (IBM Inc, New York, USA), to perform univariate (descriptive) and multivariable (analytical) analyses. We ran two logistic regression models, both in the pooled (overall) sample. In all models, education level (a 4-level categorical variable) was the independent variable. Healthcare satisfaction was the outcome/dependent variable. Ethnicity was the moderator. *Model 1* did not enter ethnicity by education level interaction terms. *Model 2*, however, included ethnicity by education level interaction terms.

4. Results

4.1. Descriptive Statistics

This study included 24,835 American adults. Participants were either Non-Latino, Latino, White ($n=20834$), or African American ($n= 4001$). Of all of the participants, 1403 (5.6%) were dissatisfied and 23432 (94.4%) were satisfied with the healthcare they had received over the past 12 months. **Table 1** provides a summary of the descriptive statistics in the study.

4.2. Ethnic-Stratified Multivariable Models

Table 2 summarizes the results of two ethnic-stratified logistic regression models with education level as the predictor/independent variable and satisfaction with healthcare as the outcome/dependent variable. One model was estimated in Whites (*Model 1*) and another model was estimated in African Americans (*Model 2*). *Model 1* showed that high education levels were associated with

Table 1. Descriptive Statistics in the Overall Sample (n=10880)

	N	%
Race		
White	20834	83.9
African American	4001	16.1
Ethnicity		
Non-Latino	22268	89.7
Latino	2567	10.3
Region		
Northeast	4296	17.3
Midwest	5662	22.8
South	9014	36.3
West	5863	23.6
Married		
No	13718	55.2
Yes	11117	44.8
Usual source of care		
No	2231	9.0
Yes	22601	91.0
Psychological distress		
No	19357	77.9
Yes	5478	22.1
Chronic medical conditions (1+)		
No	8240	33.2
Yes	16595	66.8
Body Mass Index (≥ 30)		
No	16337	65.8
Yes	8498	34.2
Self-rated health (SRH/Poor)		
No	20957	84.4
Yes	3878	15.6
Education		
Less than diploma	2832	11.4
High school graduate	6149	24.8
Some college	6989	28.1
College graduate	8865	35.7
Satisfaction with healthcare (Good)		
No	1403	5.6
Yes	23432	94.4
	Mean	SD
Age (y)	51.89	18.45

higher satisfaction with healthcare in Whites ($OR=1.24$; 95% CI = 1.02- 1.52; $P=0.034$ for high school graduates compared to those with less than a diploma, $OR=1.25$; 95% CI = 1.02-1.53; $P=0.029$ for college graduates). *Model 2* showed that higher education levels were not associated with higher satisfaction with healthcare in African Americans.

4.3. Pooled Sample Multivariable Models

Table 3 summarizes the results of two logistic regression models with education level as the predictor/independent variable and satisfaction with healthcare as the outcome/dependent variable. Both of these models were estimated

Table 2. Summary of Logistic Regression on the Effect of Education on Satisfaction With Healthcare in White and Black People

	Model 1 Whites (n=20,834)			Model 2 African Americans (n=4001)			<i>P</i>	
	OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>		
Ethnicity (Hispanic)	0.84	0.70	0.99	0.044	0.75	0.35	1.61	0.463
Region				0.001				0.034
Northeast	1.00				1.00			
Midwest	1.09	0.89	1.34	0.411	1.17	0.73	1.88	0.503
South	0.86	0.71	1.03	0.099	1.56	1.05	2.32	0.027
West	0.78	0.64	0.94	0.009	0.92	0.55	1.55	0.753
Age	1.01	1.00	1.01	<0.001	1.01	1.00	1.02	0.143
Married	1.02	0.90	1.15	0.747	1.32	0.92	1.90	0.136
Usual source of care	2.73	2.33	3.21	<0.001	2.85	1.92	4.21	<0.001
Psychological Distress (≥ 6)	0.39	0.35	0.45	<0.001	0.40	0.29	0.53	<0.001
Chronic medical conditions (1+)	0.76	0.65	0.88	<0.001	0.67	0.46	0.98	0.039
Body mass index ($BMI \geq 30$)	0.99	0.87	1.13	0.901	1.07	0.80	1.44	0.638
Self-rated health (Poor/Fair)	0.51	0.44	0.60	<0.001	0.62	0.45	0.87	0.006
Education level				0.134				0.635
Less than Diploma	1.00				1.00			
High School Graduate	1.24	1.02	1.52	0.034	0.77	0.49	1.22	0.269
Some College	1.21	0.99	1.47	0.066	0.75	0.48	1.18	0.217
College Graduate	1.25	1.02	1.53	0.029	0.83	0.51	1.36	0.464
Constant	7.80			<0.001	9.16			<0.001

Table 3. Summary of Logistic Regression on the Effect of Education on Satisfaction With Healthcare in the Pooled Sample

	Model 3 Main Effects			Model 4 Interactions			<i>P</i>	
	OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>		
Ethnicity (African American)	1.16	0.99	1.37	0.066	1.75	1.17	2.61	0.007
Ethnicity (Hispanic)	0.80	0.68	0.95	0.011	0.82	0.69	0.97	0.020
Region				0.002				0.002
Northeast	1.00				1.00			
Midwest	1.11	0.92	1.34	0.280	1.11	0.92	1.34	0.284
South	0.96	0.81	1.13	0.609	0.96	0.81	1.13	0.607
West	0.81	0.68	0.97	0.022	0.81	0.68	0.97	0.020
Age	1.01	1.01	1.01	<0.001	1.01	1.01	1.01	<0.001
Married	1.05	0.93	1.17	0.446	1.05	0.93	1.18	0.440
Usual source of care	2.75	2.37	3.19	<0.001	2.75	2.37	3.19	<0.001
Psychological distress (≥ 6)	0.39	0.35	0.44	<0.001	0.40	0.35	0.44	<0.001
Chronic medical conditions (1+)	0.75	0.65	0.86	<0.001	0.75	0.65	0.86	<0.001
Body mass index ($BMI \geq 30$)	1.00	0.89	1.13	0.972	1.00	0.89	1.13	0.944
Self-rated health (Poor/Fair)	0.53	0.46	0.60	<0.001	0.53	0.46	0.60	<0.001
Education level				0.407				0.114
Less than Diploma	1.00				1.00			
High School Graduate	1.15	0.95	1.38	0.148	1.25	1.02	1.53	0.030
Some College	1.11	0.92	1.33	0.269	1.21	1.00	1.48	0.055
College Graduate	1.17	0.97	1.40	0.107	1.26	1.03	1.54	0.023
AA x High school graduate					0.61	0.38	1.00	0.050
AA x Some college					0.60	0.37	0.97	0.036
AA x College graduate					0.64	0.38	1.07	0.087
Constant	7.84			<0.001	7.30			<.001

in the overall sample with the following difference: *Model 3* only entered the main effects, whereas *Model 4* added three interaction terms between ethnicity and education levels. Based on *Model 3*, higher education levels were not associated with higher satisfaction with healthcare. *Model 4* revealed interactions between African American ethnicity and education level on satisfaction with healthcare. These interactions suggested significantly smaller effects of high educational attainment on satisfaction with healthcare for African Americans than White adults ($0.61; 95\% \text{ CI}=0.38-1.00; P=0.050$ for AA x High School Graduate and $\text{OR}=0.60; 95\% \text{ CI}=0.37-0.97; P=0.036$ for AA x Some College). Similar interactions could not be found for Latino ethnicity, suggesting that education similarly enhances healthcare satisfaction for Latino and non-Latino adults. Thus, the effect of high education level on increasing satisfaction with healthcare was smaller for African Americans than Whites, but similar for Hispanic and non-Hispanic adults (Table 3).

5. Discussion

This study showed an association between education level and satisfaction with healthcare in Whites but not African Americans in the US. This means highly educated Whites tend to be more satisfied with the healthcare system, whereas, African Americans tend to remain dissatisfied with the healthcare system at all levels of education. We found a similar association between education level and satisfaction with healthcare for Latino and non-Latino adults suggesting that the association between education and healthcare satisfaction is similar regardless of whether an individual is Latino or not.

Our analysis successfully documented MDRs of education level for satisfaction with healthcare among African Americans relative to White adults. Previous research documented similar MDRs of various SES indicators in African Americans.²³ The unique aspect of this study was to replicate MDRs for a new outcome: satisfaction with healthcare. One previous study showed that in middle-aged and older adults, highly educated and high-income African Americans show poor health care use, preventive care use, and disease management.⁴³ This finding may be related to the high level of discrimination against African Americans in the healthcare system.⁵⁵

Social, economic, psychological, and behavioral mechanisms may explain why MDRs emerge. The psychological mechanism suggests that highly educated African Americans face more, not less, discriminatory experiences.⁵⁶⁻⁶⁰ Similarly, an increase in SES may increase rather than decrease African Americans' vulnerability to discrimination.³⁶ The social explanation discusses the role of segregation, and proximity to Whites when SES increases. Moving out of their communities to predominantly White neighborhoods, and working with predominantly White coworkers may increase perceived discrimination.⁵⁶⁻⁶⁰ At least some of this is because high SES African Americans tend to move closer to White communities, which may

increase their cross-ethnic interactions and encounters.⁵⁶⁻⁶⁰

Discrimination, being a risk factor for many undesired health outcomes, impairs the expected gains of SES for African Americans.^{14,38,44,60-63} An economic explanation refers to the high likelihood of poverty in highly educated African Americans.⁴¹ This is because education level has weaker effects on income³⁴ and job quality⁴² of African Americans. Thus highly educated African Americans work in worse conditions and experience more stress than Whites.⁶⁴ Highly educated African Americans also live in worse conditions compared to highly educated Whites.⁴¹ As a result of all these processes, highly educated African Americans do not similarly enjoy the expected effects of attaining additional education when compared to their White counterparts.

Overall, this study is the first to document MDRs of education on satisfaction with healthcare. Past research has shown MDRs of education and income for tobacco use,³⁸ drinking alcohol,^{37,65} fruit and vegetable intake,⁴⁶ impulsivity⁶⁶ obesity,²³ chronic illness,¹⁵ subjective health,¹⁸ happiness,³⁴ depressed mood,²¹ and suicidal ideation and attempt.⁶⁷ MDRs in healthcare satisfaction may be a mechanism by which MDRs in other health domains emerge.

Less than expected healthcare satisfaction of highly educated African Americans may be a consequence of differential treatment. An extensive body of research has shown that African Americans and other ethnic minority groups are often treated poorly in the healthcare system.⁶⁸ These differential treatments are shown for all types of healthcare needs and processes and are a rule rather than an exception.⁶⁸ Consequently, these differential treatments, combined with poor access, low trust, and low acceptability of healthcare interventions, may contribute to why African Americans experience worse healthcare satisfaction.⁶⁹⁻⁷¹

Ethnic minorities experience discrimination across all US institutions including the police, education system, labor market, banking,^{72,73} and healthcare system.⁶⁸ Such discrimination may explain why we observed diminished effects of SES on the healthcare satisfaction of African Americans (MDRs). Due to worse treatment, ethnic minorities have developed lower levels of trust toward the healthcare system.⁷⁴ No matter what the diagnostic or treatment process is, across all types of conditions and illnesses, care is always of lower quality for African Americans than Whites.⁶⁸ These discriminatory experiences in the health care system predict poor outcomes for African Americans.⁵⁵ As such, for African Americans, high education does not generate the best health outcomes for African Americans in the US healthcare system.^{34,41}

At least some of the MDRs of education for African Americans are due to structural factors and residential segregation. Given the existing social stratification, African American and Latino individuals are more likely to live in underserved and marginalized urban areas that are very limited in a wide range of resources, services, and goods. Still, some highly educated African Americans and Latinos

Research Highlights

What Is Already Known?

Education enhances satisfaction with the healthcare system. It is still unknown if the effect of education on healthcare satisfaction is similar or different across diverse ethnic groups.

What This Study Adds?

Although education enhances satisfaction with the healthcare system of Americans, this effect is unequal across ethnic groups. Education shows a diminishing effect on increasing satisfaction with the healthcare system for African Americans when compared with White Americans. Latino and non-Latino individuals, however, show similar effects of education on satisfaction with the healthcare system.

stay in their communities. Therefore, education for some Latinos and African Americans may not result in a change of neighborhood and greater access to resources. As such, highly educated Latinos and African Americans continue to live in underserved neighborhoods so they would have poor access to high-quality health care. Poor urban areas have few healthcare resources.^{23,75}

In the US, individual-level resources and assets are not enough for securing positive health outcomes. Such resources may generate positive health outcomes for Whites; however, they always generate less than expected positive health outcomes in any group that deviates from the center of society. This may be due to the high level of ethnocentrism in the US, and the fact that institutions are designed to function in a way that maximizes the gain of a particular group, White heterosexual men.

In a race-aware society, even if the individual is motivated to seek care, their experiences with institutions such as education, police, and the healthcare system are not always positive. At the same time, environmental conditions may not be conducive to a healthy lifestyle and health care use when needed. Neighborhoods with a high concentration of poverty, crime, violence, drugs, and social disorder may be a barrier against a healthy lifestyle.⁷⁶⁻⁸⁰ Due to segregation, access to a high-quality healthcare system may be diminished for African Americans. There is a need to study how these societal and contextual constraints reduce the health of high SES ethnic minorities.²³

As shown by previous research, health disparities have sustained⁴⁻⁶ and increased.⁷⁻¹¹ Ironically, education is not a real equalizer but instead may become a source of inequality.^{81,82} For example, Zajacova,⁸²⁻⁸⁴ Hayward,^{85,86} Montez,^{81,82} and others⁸⁶⁻⁸⁸ have all shown that education does not result in the same level of health for African Americans and Whites. While education can be acquired in different settings, education can seldom generate the same health for diverse ethnic groups. As such, education becomes a source of health disparities across ethnic

groups. Thus, we need to enhance the quality of education and access to the healthcare system, as well as reduce discrimination for Latino and African American people. These should be done in addition to reducing the SES gap between ethnic minorities and Whites.^{2,3}

5.1. Implications

The results generated by this study may contribute to a reduction of ethnic health disparities, particularly those that are MDRs-related and impact middle-class African Americans. We may be able to enhance preventive behaviors and improve disease management of highly educated ethnic minorities through increasing their satisfaction with the healthcare system. This is important because low satisfaction is a predictor of non-adherence to preventive care, disease management, treatment, and medication. Such differential adherence and timing of diagnosis, missed preventive care and disease management visits are among the major causes of ethnic disparities in healthcare. Increasing the satisfaction of ethnic minorities with the healthcare system may be one of the strategies that may reduce ethnic disparities in health. That means, health disparities can be narrowed without re-distribution of resources. Thus, there is a need to increase trust and reduce discriminatory experiences of African Americans and Latinos in the healthcare system.

5.2. Limitations

This study had a few limitations. First, we only tested MDRs of education level. Some other SES indicators, such as wealth, assets, income, and occupational prestige, were not considered. Future research should also explore how neighborhood-level SES indicators alter or explain the observed MDRs. Both the physical and social aspects of the environment may have a role in reducing the return on education for some ethnic groups. For example, characteristics of the educational institutions may have some role. Financial worries, health care access and utilization, and health insurance coverage may also confound or mediate the effects of education and race on satisfaction with the healthcare system. Third, we only focused on ethnic differences. Fourth, while we used logistic regression, another option was to use ordinal regression. Results may vary based on the statistical approach being used. Future research may also explore how other sources of marginalization, such as immigration, nativity, language, religion, and insurance, result in MDRs.⁸⁹⁻⁹⁴

Satisfaction with healthcare was measured using a single item. There is a need to study the experiences of individuals with the health care system. Such research may measure constructs and variables beyond self-reports. Administrative and claim data as well as direct observation of medical encounters may provide unique information.

6. Conclusion

In summary, ethnic differences in health are not all due to ethnic differences in exposure to risk factors and the

availability of resources but also the differential magnitude of the effect of resources. This study, for example, showed that education level has a diminishing return on satisfaction with healthcare among African Americans than Whites. It is still unknown if health care discrimination, mistrust, quality of care, or types of interactions reduce the satisfaction of highly educated African Americans with the healthcare system.

Conflict of Interest Disclosures

The author declares that he has no conflicts of interest.

Ethical Approval

All NHIS participants provided written consent. The NHIS study protocol was approved by the CDC Institutional Review Board (IRB). This analysis, however, is exempt from a full IRB review. According to the NIH decision tool available at <https://grants.nih.gov/policy/humansubjects/hs-decision.htm>, our paper was “Non-Human Subject Research”.

References

- Farmer MM, Ferraro KF. Are racial disparities in health conditional on socioeconomic status? *Soc Sci Med*. 2005;60(1):191-204. doi:10.1016/j.socscimed.2004.04.026.
- Assari S. Health disparities due to diminished return among Black Americans: public policy solutions. *Soc Issues Policy Rev*. 2018;12(1):112-145. doi:10.1111/sipr.12042.
- Assari S. Unequal gain of equal resources across racial groups. *Int J Health Policy Manag*. 2018;7(1):1-9. doi:10.15171/ijhpm.2017.90.
- Maika A, Mittinty MN, Brinkman S, Harper S, Satriawan E, Lynch JW. Changes in socioeconomic inequality in Indonesian children’s cognitive function from 2000 to 2007: a decomposition analysis. *PLoS One*. 2013;8(10):e78809. doi:10.1371/journal.pone.0078809.
- Hwang J, Lee EY, Lee CG. Measuring socioeconomic inequalities in obesity among Korean adults, 1998-2015. *Int J Environ Res Public Health*. 2019;16(9):1617. doi:10.3390/ijerph16091617.
- Fleetcroft R, Asaria M, Ali S, Cookson R. Outcomes and inequalities in diabetes from 2004/2005 to 2011/2012: English longitudinal study. *Br J Gen Pract*. 2017;67(654):e1-e9. doi:10.3399/bjgp16X688381.
- Bor J, Cohen GH, Galea S. Population health in an era of rising income inequality: USA, 1980-2015. *Lancet*. 2017;389(10077):1475-1490. doi:10.1016/s0140-6736(17)30571-8.
- Kuntz B, Lampert T. Social disparities in maternal smoking during pregnancy: comparison of two birth cohorts (1996-2002 and 2003-2012) based on data from the German KiGGS study. *Geburtshilfe Frauenheilkd*. 2016;76(3):239-247. doi:10.1055/s-0042-100207.
- Lorant V, de Gelder R, Kapadia D, et al. Socioeconomic inequalities in suicide in Europe: the widening gap. *Br J Psychiatry*. 2018;212(6):356-361. doi:10.1192/bjp.2017.32.
- Strand BH, Tverdal A. Trends in educational inequalities in cardiovascular risk factors: a longitudinal study among 48,000 middle-aged Norwegian men and women. *Eur J Epidemiol*. 2006;21(10):731-739. doi:10.1007/s10654-006-9046-5.
- Kim YJ, Lee JS, Park J, et al. Trends in socioeconomic inequalities in five major risk factors for cardiovascular disease in the Korean population: a cross-sectional study using data from the Korea National Health and Nutrition Examination Survey, 2001-2014. *BMJ Open*. 2017;7(5):e014070. doi:10.1136/bmjopen-2016-014070.
- Hudson D, Sacks T, Irani K, Asher A. The price of the ticket: health costs of upward mobility among African Americans. *Int J Environ Res Public Health*. 2020;17(4):1179. doi:10.3390/ijerph17041179.
- Chiteji NS, Hamilton D. Family connections and the Black-White wealth gap among middle-class families. *The Review of Black Political Economy*. 2002;30(1):9-28. doi:10.1007/bf02808169.
- Assari S. Parental educational attainment and mental well-being of college students; diminished returns of Blacks. *Brain Sci*. 2018;8(11):193. doi:10.3390/brainsci8110193.
- Assari S, Moghani Lankarani M. Poverty status and childhood asthma in White and Black families: National Survey of Children’s Health. *Healthcare (Basel)*. 2018;6(2):62. doi:10.3390/healthcare6020062.
- Assari S. Life expectancy gain due to employment status depends on race, gender, education, and their intersections. *J Racial Ethn Health Disparities*. 2018;5(2):375-386. doi:10.1007/s40615-017-0381-x.
- Assari S, Caldwell CH, Zimmerman MA. Family Structure and Subsequent Anxiety Symptoms; minorities’ diminished return. *Brain Sci*. 2018;8(6):97. doi:10.3390/brainsci8060097.
- Assari S, Lapeyrouse LM, Neighbors HW. Income and self-rated mental health: diminished returns for high income Black Americans. *Behav Sci (Basel)*. 2018;8(5):50. doi:10.3390-bs8050050.
- Assari S. Blacks’ diminished return of education attainment on subjective health; mediating effect of income. *Brain Sci*. 2018;8(9):176. doi:10.3390/brainsci8090176.
- Assari S. Ethnicity, educational attainment, and physical health of older adults in the United States. *Aging Med (Milton)*. 2019;2(2):104-111. doi:10.1002/agm2.12050.
- Assari S. High income protects Whites but not African Americans against risk of depression. *Healthcare (Basel)*. 2018;6(2):37. doi:10.3390/healthcare6020037.
- Assari S, Schatten HT, Arias SA, Miller IW, Camargo CA, Boudreaux ED. Higher educational attainment is associated with lower risk of a future suicide attempt among non-Hispanic Whites but not non-Hispanic Blacks. *J Racial Ethn Health Disparities*. 2019;6(5):1001-1010. doi:10.1007/s40615-019-0601-z.
- Assari S. Family income reduces risk of obesity for White but not Black children. *Children (Basel)*. 2018;5(6):73. doi:10.3390/children5060073.
- Assari S, Mistry R, Caldwell CH, Bazargan M. Protective effects of parental education against youth cigarette smoking: diminished returns of Blacks and Hispanics. *Adolescent Health, Medicine and Therapeutics*. 2020;11:63-71. doi:10.2147/AHMT.S238441.
- Assari S, Caldwell CH. Family income at birth and risk of attention deficit hyperactivity disorder at age 15: racial differences. *Children (Basel)*. 2019;6(1):10. doi:10.3390/children6010010.
- Assari S. Socioeconomic determinants of systolic blood pressure; minorities’ diminished returns. *J Health Econ Dev*. 2019;1(1):1-11.
- Assari S, Bazargan M. Educational attainment better reduces disability for non-Hispanic than Hispanic Americans. *Eur J Investig Health Psychol Educ*. 2020;10(1):10-17. doi:10.3390/ejihpe10010002.
- Assari S, Bazargan M. Minorities’ diminished returns of educational attainment on hospitalization risk: National Health Interview Survey (NHIS). *Hosp Pract Res*. 2019;4(3):86-91. doi:10.15171/hpr.2019.17.
- Assari S, Moghani Lankarani M. Race and urbanity alter the

- protective effect of education but not income on mortality. *Front Public Health.* 2016;4:100. doi:[10.3389/fpubh.2016.00100](https://doi.org/10.3389/fpubh.2016.00100).
30. Hudson DL, Bullard KM, Neighbors HW, Geronimus AT, Yang J, Jackson JS. Are benefits conferred with greater socioeconomic position undermined by racial discrimination among African American men? *J Mens Health.* 2012;9(2):127-136. doi:[10.1016/j.jomh.2012.03.006](https://doi.org/10.1016/j.jomh.2012.03.006).
 31. Hudson DL, Puterman E, Bibbins-Domingo K, Matthews KA, Adler NE. Race, life course socioeconomic position, racial discrimination, depressive symptoms and self-rated health. *Soc Sci Med.* 2013;97:7-14. doi:[10.1016/j.socscimed.2013.07.031](https://doi.org/10.1016/j.socscimed.2013.07.031).
 32. Hudson DL, Neighbors HW, Geronimus AT, Jackson JS. Racial discrimination, John Henryism, and depression among African Americans. *J Black Psychol.* 2016;42(3):221-243. doi:[10.1177/0095798414567757](https://doi.org/10.1177/0095798414567757).
 33. Hudson DL, Neighbors HW, Geronimus AT, Jackson JS. The relationship between socioeconomic position and depression among a US nationally representative sample of African Americans. *Soc Psychiatry Psychiatr Epidemiol.* 2012;47(3):373-381. doi:[10.1007/s00127-011-0348-x](https://doi.org/10.1007/s00127-011-0348-x).
 34. Assari S, Preiser B, Kelly M. Education and income predict future emotional well-being of Whites but not Blacks: a ten-year cohort. *Brain Sci.* 2018;8(7):122. doi:[10.3390/brainsci8070122](https://doi.org/10.3390/brainsci8070122).
 35. Assari S, Caldwell CH. Social determinants of perceived discrimination among Black youth: intersection of ethnicity and gender. *Children (Basel).* 2018;5(2):24. doi:[10.3390/children5020024](https://doi.org/10.3390/children5020024).
 36. Assari S, Preiser B, Moghani Lankarani M, Caldwell CH. Subjective socioeconomic status moderates the association between discrimination and depression in African American youth. *Brain Sci.* 2018;8(4):71. doi:[10.3390/brainsci8040071](https://doi.org/10.3390/brainsci8040071).
 37. Assari S, Farokhnia M, Mistry R. Education attainment and alcohol binge drinking: diminished returns of Hispanics in Los Angeles. *Behav Sci (Basel).* 2019;9(1):9. doi:[10.3390-bs9010009](https://doi.org/10.3390-bs9010009).
 38. Assari S, Mistry R. Educational attainment and smoking status in a national sample of American adults: evidence for the Blacks' diminished return. *Int J Environ Res Public Health.* 2018;15(4):763. doi:[10.3390/ijerph15040763](https://doi.org/10.3390/ijerph15040763).
 39. Assari S, Mistry R, Bazargan M. Race, educational attainment, and e-cigarette use. *J Med Res Innov.* 2020;4(1):10.32892/jmri.185. doi:[10.32892/jmri.185](https://doi.org/10.32892/jmri.185).
 40. Chalian H, Khoshpouri P, Assari S. Patients' age and discussion with doctors about lung cancer screening: diminished returns of Blacks. *Aging Med (Milton).* 2019;2(1):35-41. doi:[10.1002/agm2.12053](https://doi.org/10.1002/agm2.12053).
 41. Assari S. Parental education better helps White than Black families escape poverty: National Survey of Children's Health. *Economics.* 2018;6(2):30. doi:[10.3390/economics6020030](https://doi.org/10.3390/economics6020030).
 42. Assari S, Bazargan M. Unequal effects of educational attainment on workplace exposure to second-hand smoke by race and ethnicity; minorities' diminished returns in the National Health Interview Survey (NHIS). *J Med Res Innov.* 2019;3(2):e000179. doi:[10.32892/jmri.179](https://doi.org/10.32892/jmri.179).
 43. Assari S. Combined effects of race and educational attainment on physician visits over 24 years in a national sample of middle-aged and older Americans. *Hosp Pract Res.* 2020;5(1):17-23. doi:[10.34172/hpr.2020.04](https://doi.org/10.34172/hpr.2020.04).
 44. Assari S, Hani N. Household income and children's unmet dental care need; Blacks' diminished return. *Dent J (Basel).* 2018;6(2):17. doi:[10.3390/dj6020017](https://doi.org/10.3390/dj6020017).
 45. Assari S, Bazargan M. Educational attainment better increases the chance of breast physical exam for non-Hispanic than Hispanic American women: National Health Interview Survey. *Hosp Pract Res.* 2019;4(4):122-127. doi:[10.15171/hpr.2019.25](https://doi.org/10.15171/hpr.2019.25).
 46. Assari S, Moghani Lankarani M. Educational attainment promotes fruit and vegetable intake for Whites but not Blacks. *J (Basel).* 2018;1(1):29-41. doi:[10.3390/j1010005](https://doi.org/10.3390/j1010005).
 47. Assari S. Educational attainment and exercise frequency in American women; Blacks' diminished returns. *Womens Health Bull.* 2019;6(3). doi:[10.5812/whb.87413](https://doi.org/10.5812/whb.87413).
 48. Assari S, Caldwell CH. Parental Educational Attainment and Youth Outcomes: Hispanics' Diminished Returns. *J Family Reprod Health.* 2019;13(1):7-13.
 49. Assari S, Mistry R. Diminished return of employment on ever smoking among Hispanic Whites in Los Angeles. *Health Equity.* 2019;3(1):138-144. doi:[10.1089/heq.2018.0070](https://doi.org/10.1089/heq.2018.0070).
 50. Assari S, Smith J, Mistry R, Farokhnia M, Bazargan M. Substance use among economically disadvantaged African American older adults; objective and subjective socioeconomic status. *Int J Environ Res Public Health.* 2019;16(10):1826. doi:[10.3390/ijerph16101826](https://doi.org/10.3390/ijerph16101826).
 51. Kessler RC, Barker PR, Colpe LJ, et al. Screening for serious mental illness in the general population. *Arch Gen Psychiatry.* 2003;60(2):184-189. doi:[10.1001/archpsyc.60.2.184](https://doi.org/10.1001/archpsyc.60.2.184).
 52. Kessler RC, Green JG, Gruber MJ, et al. Screening for serious mental illness in the general population with the K6 screening scale: results from the WHO World Mental Health (WMH) survey initiative. *Int J Methods Psychiatr Res.* 2010;19 Suppl 1:4-22. doi:[10.1002/mpr.310](https://doi.org/10.1002/mpr.310).
 53. Prochaska JJ, Sung HY, Max W, Shi Y, Ong M. Validity study of the K6 scale as a measure of moderate mental distress based on mental health treatment need and utilization. *Int J Methods Psychiatr Res.* 2012;21(2):88-97. doi:[10.1002/mpr.1349](https://doi.org/10.1002/mpr.1349).
 54. Idler EL, Benyamin Y. Self-rated health and mortality: a review of twenty-seven community studies. *J Health Soc Behav.* 1997;38(1):21-37. doi:[10.2307/2955359](https://doi.org/10.2307/2955359).
 55. Assari S, Lee DB, Nicklett Ej, Moghani Lankarani M, Piette JD, Aikens JE. Racial discrimination in health care is associated with worse glycemic control among Black men but not Black women with type 2 diabetes. *Front Public Health.* 2017;5:235. doi:[10.3389/fpubh.2017.00235](https://doi.org/10.3389/fpubh.2017.00235).
 56. Assari S, Gibbons FX, Simons R. Depression among Black youth; interaction of class and place. *Brain Sci.* 2018;8(6):108. doi:[10.3390/brainsci8060108](https://doi.org/10.3390/brainsci8060108).
 57. Assari S, Moghani Lankarani M, Caldwell CH. Does discrimination explain high risk of depression among high-income African American men? *Behav Sci (Basel).* 2018;8(4):40. doi:[10.3390/bs8040040](https://doi.org/10.3390/bs8040040).
 58. Assari S. Does school racial composition explain why high income Black youth perceive more discrimination? a gender analysis. *Brain Sci.* 2018;8(8):140. doi:[10.3390/brainsci8080140](https://doi.org/10.3390/brainsci8080140).
 59. Assari S, Gibbons FX, Simons RL. Perceived discrimination among Black youth: an 18-year longitudinal study. *Behav Sci (Basel).* 2018;8(5):44. doi:[10.3390/bs8050044](https://doi.org/10.3390/bs8050044).
 60. Assari S, Moghani Lankarani M. Workplace racial composition explains high perceived discrimination of high socioeconomic status African American men. *Brain Sci.* 2018;8(8):139. doi:[10.3390/brainsci8080139](https://doi.org/10.3390/brainsci8080139).
 61. Assari S. Education attainment and obesity: differential returns based on sexual orientation. *Behav Sci (Basel).* 2019;9(2):16. doi:[10.3390/bs9020016](https://doi.org/10.3390/bs9020016).
 62. Assari S. Parental education attainment and educational upward mobility; role of race and gender. *Behav Sci (Basel).* 2018;8(11):107. doi:[10.3390/bs8110107](https://doi.org/10.3390/bs8110107).
 63. Assari S. Educational attainment better protects African American women than African American men against depressive symptoms and psychological distress. *Brain Sci.* 2018;8(10):182. doi:[10.3390/brainsci8100182](https://doi.org/10.3390/brainsci8100182).
 64. Assari S, Bazargan M. Unequal associations between educational attainment and occupational stress across racial

- and ethnic groups. *Int J Environ Res Public Health.* 2019; 16(19):3539. doi:[10.3390/ijerph16193539](https://doi.org/10.3390/ijerph16193539).
65. Assari S, Moghani Lankarani M. Education and alcohol consumption among older Americans; Black-White differences. *Front Public Health.* 2016;4:67. doi:[10.3389/fpubh.2016.00067](https://doi.org/10.3389/fpubh.2016.00067).
 66. Assari S, Caldwell CH, Mincy R. Family socioeconomic status at birth and youth impulsivity at age 15; Blacks' diminished return. *Children (Basel).* 2018;5(5):58. doi:[10.3390/children5050058](https://doi.org/10.3390/children5050058).
 67. Assari S. Ethnic and gender differences in additive effects of socio-economics, psychiatric disorders, and subjective religiosity on suicidal ideation among Blacks. *Int J Prev Med.* 2015;6:53. doi:[10.4103/2008-7802.158913](https://doi.org/10.4103/2008-7802.158913).
 68. Institute of Medicine (US) Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care. In: Smedley BD, Stith AY, Nelson AR, eds. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care.* Washington, DC: National Academies Press; 2013.
 69. Williams DR, Mohammed SA. Discrimination and racial disparities in health: evidence and needed research. *J Behav Med.* 2009;32(1):20-47. doi:[10.1007/s10865-008-9185-0](https://doi.org/10.1007/s10865-008-9185-0).
 70. Williams DR, Yan Y, Jackson JS, Anderson NB. Racial differences in physical and mental health: socio-economic status, stress and discrimination. *J Health Psychol.* 1997;2(3):335-351. doi:[10.1177/135910539700200305](https://doi.org/10.1177/135910539700200305).
 71. Duncan DT, Aldstadt J, Whalen J, White K, Castro MC, Williams DR. Space, race, and poverty: spatial inequalities in walkable neighborhood amenities? *Demogr Res.* 2012;26(17):409-448. doi:[10.4054/DemRes.2012.26.17](https://doi.org/10.4054/DemRes.2012.26.17).
 72. Gee GC, Ro A, Shariff-Marco S, Chae D. Racial discrimination and health among Asian Americans: evidence, assessment, and directions for future research. *Epidemiol Rev.* 2009;31:130-151. doi:[10.1093/epirev/mxp009](https://doi.org/10.1093/epirev/mxp009).
 73. Gee GC, Ford CL. Structural Racism And Health Inequities: Old Issues, New Directions. *Du Bois Rev.* 2011;8(1):115-132. doi:[10.1017/s1742058x11000130](https://doi.org/10.1017/s1742058x11000130).
 74. Arnett MJ, Thorpe RJ Jr, Gaskin DJ, Bowie JV, LaVeist TA. Race, medical mistrust, and segregation in primary care as usual source of care: findings from the exploring health disparities in integrated communities study. *J Urban Health.* 2016;93(3):456-467. doi:[10.1007/s11524-016-0054-9](https://doi.org/10.1007/s11524-016-0054-9).
 75. Assari S, Thomas A, Caldwell CH, Mincy RB. Blacks' diminished health return of family structure and socioeconomic status; 15 years of follow-up of a national urban sample of youth. *J Urban Health.* 2018;95(1):21-35. doi:[10.1007/s11524-017-0217-3](https://doi.org/10.1007/s11524-017-0217-3).
 76. Malambo P, De Villiers A, Lambert EV, Puoane T, Kengne AP. Associations of perceived neighbourhood safety from traffic and crime with overweight/obesity among South African adults of low-socioeconomic status. *PLoS One.* 2018;13(10):e0206408. doi:[10.1371/journal.pone.0206408](https://doi.org/10.1371/journal.pone.0206408).
 77. Assari S, Moghani Lankarani M, Caldwell CH, Zimmerman MA. Fear of neighborhood violence during adolescence predicts development of obesity a decade later: gender differences among African Americans. *Arch Trauma Res.* 2016; 5(2):e31475. doi:[10.5812/atr.31475](https://doi.org/10.5812/atr.31475).
 78. Choi SW, Park DJ, Kim J, et al. Association between obesity and neighborhood socioeconomic status in Korean adolescents based on the 2013 Korea youth risk behavior web-based survey. *Korean J Fam Med.* 2016;37(1):64-70. doi:[10.4082/kjfm.2016.37.1.64](https://doi.org/10.4082/kjfm.2016.37.1.64).
 79. Li F, Harmer P, Cardinal BJ, Bosworth M, Johnson-Shelton D. Obesity and the built environment: does the density of neighborhood fast-food outlets matter? *Am J Health Promot.* 2009;23(3):203-209. doi:[10.4278/ajhp.071214133](https://doi.org/10.4278/ajhp.071214133).
 80. Kwate NO. Fried chicken and fresh apples: racial segregation as a fundamental cause of fast food density in Black neighborhoods. *Health Place.* 2008;14(1):32-44. doi:[10.1016/j.healthplace.2007.04.001](https://doi.org/10.1016/j.healthplace.2007.04.001).
 81. Zajacova A, Johnson-Lawrence V. Anomaly in the education-health gradient: biomarker profiles among adults with subbaccalaureate attainment levels. *SSM Popul Health.* 2016; 2:360-364. doi:[10.1016/j.ssmph.2016.05.001](https://doi.org/10.1016/j.ssmph.2016.05.001).
 82. Zajacova A, Rogers RG, Johnson-Lawrence V. Glitch in the gradient: additional education does not uniformly equal better health. *Soc Sci Med.* 2012;75(11):2007-2012. doi:[10.1016/j.socscimed.2012.07.036](https://doi.org/10.1016/j.socscimed.2012.07.036).
 83. Zajacova A, Hummer RA. Gender differences in education effects on all-cause mortality for White and Black adults in the United States. *Soc Sci Med.* 2009;69(4):529-537. doi:[10.1016/j.socscimed.2009.06.028](https://doi.org/10.1016/j.socscimed.2009.06.028).
 84. Zajacova A, Lawrence EM. The relationship between education and health: reducing disparities through a contextual approach. *Annu Rev Public Health.* 2018;39:273-289. doi:[10.1146/annurev-publhealth-031816-044628](https://doi.org/10.1146/annurev-publhealth-031816-044628).
 85. Montez JK, Hummer RA, Hayward MD. Educational attainment and adult mortality in the United States: a systematic analysis of functional form. *Demography.* 2012;49(1):315-336. doi:[10.1007/s13524-011-0082-8](https://doi.org/10.1007/s13524-011-0082-8).
 86. Montez JK, Zajacova A, Hayward MD, Woolf SH, Chapman D, Beckfield J. Educational disparities in adult mortality across US states: how do they differ, and have they changed since the mid-1980s? *Demography.* 2019;56(2):621-644. doi:[10.1007/s13524-018-0750-z](https://doi.org/10.1007/s13524-018-0750-z).
 87. Montez JK, Hummer RA, Hayward MD, Woo H, Rogers RG. Trends in the educational gradient of US adult mortality from 1986 to 2006 by race, gender, and age group. *Res Aging.* 2011;33(2):145-171. doi:[10.1177/0164027510392388](https://doi.org/10.1177/0164027510392388).
 88. Brown DC, Hayward MD, Montez JK, Hummer RA, Chiu CT, Hidajat MM. The significance of education for mortality compression in the United States. *Demography.* 2012; 49(3):819-840. doi:[10.1007/s13524-012-0104-1](https://doi.org/10.1007/s13524-012-0104-1).
 89. Assari S. Psychosocial correlates of body mass index in the United States: intersection of race, gender and age. *Iran J Psychiatry Behav Sci.* 2016;10(2):e3458. doi:[10.17795/ijpbs-3458](https://doi.org/10.17795/ijpbs-3458).
 90. Assari S, Nikahd A, Malekahmadi MR, Moghani Lankarani M, Zamanian H. Race by gender group differences in the protective effects of socioeconomic factors against sustained health problems across five domains. *J Racial Ethn Health Disparities.* 2017;4:884-894. doi:[10.1007/s40615-016-0291-3](https://doi.org/10.1007/s40615-016-0291-3).
 91. Carter JD, Assari S. Sustained obesity and depressive symptoms over 6 years: race by gender differences in the health and retirement study. *Front Aging Neurosci.* 2016;8:312. doi:[10.3389/fnagi.2016.00312](https://doi.org/10.3389/fnagi.2016.00312).
 92. Assari S, Moghani Lankarani M. Mediating effect of perceived overweight on the association between actual obesity and intention for weight control; role of race, ethnicity, and gender. *Int J Prev Med.* 2015;6:102. doi:[10.4103/2008-7802.167616](https://doi.org/10.4103/2008-7802.167616).
 93. Assari S, Moghani Lankarani M. The association between obesity and weight loss intention weaker among Blacks and men than Whites and women. *J Racial Ethn Health Disparities.* 2015;2(3):414-420. doi:[10.1007/s40615-015-0115-x](https://doi.org/10.1007/s40615-015-0115-x).
 94. Assari S. Additive effects of anxiety and depression on body mass index among Blacks: role of ethnicity and gender. *Int Cardiovasc Res J.* 2014;8(2):44-51.