



Black Americans' Diminished Health Returns of Employment During COVID-19 Pandemic

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Abstract

Introduction: Employment is a major social determinant of health (SDoH) and core socioeconomic status (SES) indicator. This study used a nationally representative sample of American adults to test the association between employment and self-rated health (SRH) overall and by race.

Methods: Using data from the Health Information National Trends Survey (HINTS 2020) Cycle 4, this analysis included 1403 individuals including 1109 (79%) non-Latinx White and 294 (21%) non-Latinx Black participants. The dependent variable was SRH, the independent variable was employment, and age, sex, marital status, education, and income were the covariates. Race was the moderator.

Results: Employment was associated with better SRH overall. A significant statistical interaction reflected racial differences in the effect of employment (above and beyond education and income) on SRH by race. The protective health effects of employment on SRH were weaker for non-Latinx Black than non-Latinx White individuals.

Conclusion: The association between employment and SRH varies across racial groups, and this difference can also be seen during the COVID-19 pandemic. Diminished health returns of SES indicators such as employment in non-Latinx Black individuals compared to non-Latinx White people may reflect some additional health risk for middle-class non-Latinx Black communities in the US. Sustainability of marginalization-related diminished returns (MDRs), defined as weaker effects of social determinants and resources such as employment on health outcomes for marginalized than privileged social groups, is another risk for underserved populations during pandemics. These MDRs that reflect systemic inequalities may hinder our efforts to secure equality during pandemics.

Keywords: Social Determinants, Self-Rated Health, Population Groups, Employment

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Introduction

Social determinants of health (SDoH) and socioeconomic status (SES) indicators such as employment have systemic health effects for individuals and populations.^{1,2} Mirowsky and Ross,³⁻⁵ Marmot,⁶⁻¹¹ Link and Phelan,¹²⁻¹⁵ House and Lantz,¹⁶⁻¹⁸ and others¹⁹ have conducted multiple studies showing that regardless of their type, SDoH and SES indicators correlate with health outcomes. Other individuals such as Heckman,²⁰ McLoyd,²¹ Cabrera et al,²² McLanahan,²³ Brenner et al,²⁴ Brody and Flor,²⁵ and others²⁶ have shown that these effects hold for families and children as well. Some of the health effects of SES indicators are due to their coincidence with life stressors, adherence to health behaviors, neighborhood quality, and healthy development.^{27,28} For example, SES and SDoH indicators such as education, income, and employment protect individuals against tobacco use.^{29,30} This becomes more important as the effects of these social constructs on

special patterning of tobacco use have become more and more salient over time.²⁹ As such, tobacco use has become an issue requiring tailored intervention rather than a universally homogenous health problem.³¹⁻³³

However, the link between SES and SDoH indicators has complexities and nuances. First, different SES indicators may have different effects. We may observe differential effect of SES indicators for each outcomes. For example, improving education may better reduce cognitive risk compared to other SES indicators. Second, various SES indicators may operate through different mechanisms that may or may not have overlap. For example employment alters social context and residential area, social network, friends, access to power, stress, and income. Education, however, encourages healthy choices and behaviors, while income provides power, reduces stress, increases control over life, and does not have similar effects across social and demographic groups. SES

and SDoH indicators show their strongest effects on socially privileged groups who can easily mobilize their SES and SDoH indicators to tangible outcomes.^{34,35} At the same time, SES and SDoH indicators have weaker effects for racialized and marginalized people.^{34,35} This observation is summarized as **marginalization-related diminished returns (MDRs)** and **minorities' diminished returns (MDRs)**.³⁶ As a result of these MDRs, economic and health inequalities extend from lower to middle-class America.^{37,38} In line with these MDRs, some evidence suggests that some racial, economic, and health gaps may increase, rather than decrease, as SES increases.³⁹ These are in part because of structural racism, which can manifest in many shapes and forms including but not limited to segregation,⁴⁰ low education quality in urban areas, harsh school disciplinary actions,⁴¹ unfair banking policies,⁴² harsh policing,⁴³ and discrimination in the labor market,⁴⁴ all of which serves to block opportunities for minority populations across class lines. As such, establishing MDRs has become a tool to measure structural racism.^{45,46}

According to the MDRs literature, that has been exclusively conducted outside the COVID-19 pandemic, while high SES non-Latinx Whites show excellent health, high SES non-Latinx Blacks may remain at health risk.⁴⁷ This pattern is well established for parental education,⁴⁷ education,^{48,49} and income,⁵⁰ however, there are only two studies on MDRs of employment on health.^{51,52} While MDRs are shown for Latinx,⁵³ Asian,⁵⁰ and Native American⁵⁴ individuals, most of the literature is on Black vs. White individuals.⁴⁸ Therefore there is a need to test if the health effect of employment is similar for non-Latinx White in comparison to non-Latinx Black people, during the COVID-19 pandemic, while education and income are controlled.⁴⁷ In addition, although similar findings are shown for chronic disease,⁵⁵ obesity, use of cigarettes,⁴⁷ e-cigs,⁴⁹ Hookah,⁵⁶ and other substances,^{57,58} and SRH,⁵⁹ all of these comparisons have been conducted in normal times without a macro event such as COVID-19 pandemic. They are also relevant to children, youth, adults, elders and various sources of marginalized groups based on race,⁴⁷ ethnicity,^{60,61} sexual orientation,⁶² nativity,^{63,64} and even place,⁶⁵ suggesting that any marginalization in the society reduces the gains that are expected to follow SES and SDoH on health. As a result of these increased health risks, we observe higher than expected risk of asthma,⁶⁶ chronic obstructive pulmonary disease (COPD),⁶⁷ and heart disease⁵⁵ in high SES racialized adults.

There is a need for additional research on the MDRs of SES indicators, such as employment, with health outcomes such as SRH across diverse racial groups during the COVID-19 pandemic. Almost all past research is conducted in an era when pandemics do not limit living conditions. During the COVID-19 pandemic, SES indicators had an important role, and employment could impose or protect risk for individuals. As unemployment is higher for Blacks than Whites and Blacks typically have lower financial security, which could mean a higher reliance on the continuation of their job, it is important to test the employment-SRH link between White and Black adults during the COVID-19 pandemic.

We conducted this study to test the association between employment and SRH overall and by race. As employment is also confounded by education and income, we are interested to control for income and education. This will help us go beyond independent effects of employment and also test additive effects of employment, income, and education. We hypothesized an inverse association between employment and poor SRH, however, we expect this association to be stronger in non-Latinx Whites than non-Latinx Black individuals. In line with MDRs outside COVID-19 era, we expected employment, as a major economic resource, to have weaker health effects for Black people, as a historically marginalized group, during the COVID-19 pandemic.

Methods

This secondary data analysis applied a cross-sectional methodological design. Data came from the Health Information National Trends Survey (HINTS 2020) study Cycle 4 which was conducted between February 24, 2020, and June 15, 2020. Given the data's de-identified nature, our secondary analysis was exempt from a full ethics review.

The HINTS study participants were adults residing across US states in 2020. The sampling frame for Cycle 4 consisted of a database of addresses used by Marketing Systems Group (MSG) to provide random samples of addresses. Any non-vacant US residential address was subject to sampling. This included but not limited to those present on the MSG database, including post office (P.O.) boxes, throwbacks (i.e., street addresses for which mail is redirected by the United States Postal Service to a specified P.O. box), and seasonal addresses. Although a total number of 3865 individuals completed surveys, which resulted in a 37% response rate, for this analysis, we only included 1403 individuals including 1109 (79%) non-Latinx White and 294 (21%) non-Latinx Black participants who had complete data on employment, education, income, age, sex, marital status, and self-rated health (SRH) and were either non-Latinx White or non-Latinx Black. We only included those who were recruited after pandemic was announced by the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC).

The HINTS 2020 used a multi-stage stratified random sampling. For first sample stage, the sampling frame of addresses was grouped into the following two explicit sampling strata: 1). Addresses in areas with high concentrations of minority population; and 2). Addresses in areas with low concentrations of minority population. The second sampling stage was selection of a participant from each selected household. Only up to one participant was selected from each target household, upon eligibility.

SRH. The dependent variable was poor subjective SRH, measured by the following conventional SRH item: "In general, would you say your health is..." Item responses included excellent, very good, good, fair, or poor. We considered the answer "poor" as poor SRH (score=1) and excellent, very good, good, and fair as good SRH (score=0). So, our outcome reflected poor not good health.

Race. Participants were asked if they were White, Black, or from other racial background. The question read as “Are you Black or African American?” All participants who positively answered to the last question were excluded from this analysis.

Independent Variables

Employment

Educational attainment. The first independent variable was *highest level of education* at the individual level, measured by self-reported educational attainment question. We calculated this variable based on the highest level of education which was attained. The specific item was “What is the highest grade or level of schooling you completed?”. This variable was a continuous variable with the following seven categories. (1) Less than 8 years, (2) 8 through 11 years, (3) 12 years or completed high school, (4) Post high school training other than college (vocational), (5) Some college, (6) College graduate, and (7) Postgraduate.

Household income. Based on a self-report measure, we calculated total household income, earned from all sources. The item read as “What is your combined annual income, meaning the total pre-tax income from all sources earned in the past year?” Responses included 1) \$0 to \$9999, (2) \$10 000 to \$14 999, (3) \$15 000 to \$19 999, (4) \$20 000 to \$34 999, (5) \$35 000 to \$49 999, (6) \$50 000 to \$74 999, (7) \$75 000 to \$99 999, (8) \$100 000 to \$199 999, and (9) \$200 000 or more.

This variable was a continuous variable ranging from 1 to 9.

Marital status. The individual disclosed family marital status, a dichotomous variable which was coded as married or non-married (reference category). The specific item read as “What is your marital status?”

Gender. A dichotomous variable, gender was coded as male = 1 and female = 0 (reference category). Gender was self-

reported.

Age. Participants reported their age. Age was a continuous variable measured in years. The question read as “What is your age?”.

Using SPSS 21, we performed univariate, bivariate, and multivariable analysis. For univariate analysis, we reported the mean (SD) and frequency tables (%) for our variables overall and by racial group. We calculated Chi-square and t test to compare our study variables by racial group, for our bivariate analysis. For our multivariable analysis, logistic/linear regression models were estimated for each independent variable (education or income). The first models did not include any interaction terms. These models only included main effects of race, employment, education, income, and covariates. After running our Models 1, Models 2 were performed that also had race by employment interaction term. This model included all previous terms (main effects) in addition to one race by employment interaction term. To test our modeling assumptions, we ruled out collinearity between study variables particularly education, income, employment, and race. The independent variable was employment, covariates included education, income, gender, age, and marital status. The moderator was race, as a proxy of racialization because we had controlled various SES indicators. Odds ratio (OR), regression coefficient, standard errors (SEs), and *P* values were reported. A *P* value of less than 0.05 was significant.

Results

Overall, 1403 individuals entered our analysis. This number included 1109 (79%) non-Latinx White and 294 (21%) non-Latinx Black participants. Table 1 reports descriptive data overall and by race. Participants varied in age from 18 to 100

Table 1. Descriptive Data Overall and by Race (n=1403)

	All (N=1403)		Non-Latinx White (n=1109)		Non Latinx Black (n=294)		P Value
	No.	%	No.	%	No.	%	
Gender							
Women	829	59.1	641	57.8	188	63.9	*
Men	574	40.9	468	42.2	106	36.1	
Marital Status							
Unmarried	724	51.6	533	48.1	191	65.0	*
Married	679	48.4	576	51.9	103	35.0	
Employment Status							
Unemployed	631	45.0	487	43.9	144	49.0	*
Employed	772	55.0	622	56.1	150	51.0	
SRH							
Good	1371	97.7	1084	97.7	287	97.6	
Poor	32	2.3	25	2.3	7	2.4	
	Mean	SD	Mean	SD	Mean	SD	
Age (y)	55.51	16.36	55.44	16.68	55.74	15.09	
Education (1-7)	5.19	1.49	5.29	1.46	4.79	1.54	*
Household Income (1 - 9)	5.81	2.21	6.03	2.14	4.98	2.27	*

Abbreviation: SRH, self-rated health.

**P* < 0.05 for comparison of Blacks and Whites.

years old.

Table 2 provides a summary of binary logistic regression models without and with interaction term between employment and race. According to this table, based on Model 1, employment was inversely associated with poor SRH, meaning that adults who were employed reported better SRH. According to Model 2, however, the employment-SRH association varied by race, with the inverse association being weaker for non-Latinx Black than non-Latinx White individuals.

Table 3 provides summary of logistic regressions by race. The results of previous Model 2 were confirmed, meaning a weaker protection of employment against poor SRH for non-Latinx Black than non-Latinx White individuals. While the protection was significant for non-Latinx Whites, it was not significant for non-Latinx Blacks.

Discussion

The aim of this study was to test overall and racial differences in the association between employment and SRH among American adults during the COVID-19 pandemic. Our first hypothesis was there would be an inverse association between employment and poor SRH, which was reflective of better health of employed than unemployed people. Our second hypothesis was that the protective effect of employment against poor health would be stronger for non-Latinx White than non-Latinx Black individuals. Both of our hypotheses were confirmed.

Similar to education and income, employment is a major SDoH and SES indicator.^{1,2} As shown by Mirowsky and Rossm³⁻⁵ Marmot,⁶⁻¹¹ Link and Phelan,¹²⁻¹⁵ and House and Lantz,¹⁶⁻¹⁸ and others,¹⁹ health effects of SES indicators hold across populations, outcomes, settings, and age groups. Their work has generated robust empirical evidence and rich theoretical argument on better health of individuals who are employed, educated, and have higher income. These SDoHs and SES indicators enhance a wide range of health, behavioral, and developmental outcomes through various mechanisms that including better environment, healthy options, healthy choices, low stress, and healthy development.²⁰⁻²⁶ However, some SES indicators operate through more behavioral and some SES indicators may operate through developmental and contextual mechanisms.^{27,28} For example, families with higher SES and SDoH resources show less substance use,^{29,30} SRH,⁵⁹ and depression.⁶⁸ Over time, SES indicators and SDoHs are showing stronger health effects.²⁹

In line with MDRs, for non-Latinx Whites, poor health is concentrated for poor, unemployed, and less educated people.³¹⁻³³ This is not the case for Blacks for whom SES indicators are less salient, given diminished returns of SES.⁵⁹ For Blacks, health problems sustain across class lines, because SES and class show weaker health effects.

We found that in COVID-19 pandemic, an SES and SDoH indicator such as employment may have weaker effects for racialized and marginalized people, particularly non-Latinx Black people.^{34,35} This observation is in line with MDRs

Table 2. Association Between Employment and Poor Self-rated Health Overall (N = 1403)

	Model 1						Model 2					
	B	SE	OR	Lower Bound	Upper Bound	P Value	B	SE	OR	Lower Bound	Upper Bound	P Value
Black	-0.370	0.454	0.691	0.284	1.681	0.415	-0.897	0.568	0.408	0.134	1.241	0.114
Male	-0.039	0.389	0.962	0.449	2.060	0.920	-0.007	0.390	0.993	0.463	2.133	0.986
Age	0.005	0.013	1.005	0.980	1.031	0.675	0.003	0.013	1.003	0.978	1.029	0.800
Married	0.413	0.436	1.511	0.643	3.552	0.344	0.389	0.435	1.475	0.629	3.461	0.372
Education	-0.340	0.132	0.712	0.550	0.922	0.010	-0.333	0.131	0.717	0.555	0.927	0.011
Income	-0.271	0.109	0.762	0.615	0.945	0.013	-0.268	0.109	0.765	0.618	0.947	0.014
Employment	-1.181	0.557	0.307	0.103	0.914	0.034	-2.014	0.792	0.133	0.028	0.631	0.011
Employment x Race							2.317	1.083	10.141	1.213	84.789	0.033

Abbreviations: OR, odds ratio; SE, standard error.
Outcome: Poor SRH (Poor).

Table 3. Association Between Employment and Poor Self-rated Health by Race (N = 1403)

	Model 3						Model 4					
	B	SE	OR	Lower Bound	Upper Bound	P Value	B	SE	OR	Lower Bound	Upper Bound	P Value
Male	0.216	0.430	1.241	0.534	2.884	0.615	-0.995	1.110	0.370	0.042	3.255	0.370
Age	0.009	0.015	1.009	0.979	1.039	0.570	-0.019	0.029	0.981	0.928	1.038	0.512
Married	0.366	0.512	1.442	0.529	3.933	0.474	0.450	0.893	1.568	0.272	9.033	0.614
Education	-0.378	0.146	0.685	0.514	0.913	0.010	-0.100	0.296	0.905	0.506	1.617	0.736
Income	-0.230	0.128	0.795	0.618	1.021	0.072	-0.423	0.237	0.655	0.412	1.042	0.074
Employment	-1.976	0.808	0.139	0.028	0.676	0.014	0.195	0.920	1.215	0.200	7.375	0.832

Abbreviations: OR, odds ratio; SE, standard error.
Outcome: Poor SRH (Poor).

theory.³⁶ As a result of these MDRs, economic and health inequalities extend from lower to middle-class America.^{37,38} In line with these MDRs, some evidence suggests that some racial, economic, and health gaps may increase rather than decrease as SES increases.³⁹ Due to structural racism, Jim Crow, social stratification, historic discrimination, and residential and job segregation, as well as labor market discrimination, non-Latinx Black individuals work in worse jobs than non-Latinx White people, which may reduce the health return of employment for Black communities. This is why some scholars have indicated that MDRs reflects structural racism.^{45,46}

Racism can manifest in many shapes and forms including, but not limited to, segregation,⁴⁰ low job and education quality in urban areas,^{44,69-74} unfair banking policies,⁴² harsh policing,⁴³ and discrimination in the labor market.⁴⁴ All of these processes may further block opportunities for minority populations across class lines (regardless of their employment and SES). This is why MDRs should be undone if we wish to undo racism.³⁶ In one study, employed non-Latinx people were protected against tobacco use, but employed Latinx people had high risk of smoking.⁵¹ In another study, highly educated non-Latinx Black people had high occupational stress, while highly educated non-Latinx White people had low occupational stress.⁷⁵ Finally, in a study, employment had a larger effect on life expectancy of Black than White people.⁷⁶ These MDRs reflect unequal occupational opportunities of Whites and Blacks, regardless of SES indicators such as employment.⁵⁹ In the US, people's insurance status is closely tied to their employment. Thus insurance may be a factor in MDRs of employment for Black populations.

A recent piece of literature on MDRs has shown that, while high SES non-Latinx Whites show the least health problems, high SES Latinx and Black people report higher levels of poor health and risky behaviors.⁴⁷ This association is reported for parental education,⁴⁷ education,^{48,49} and income.⁵⁰ Similarly, the same finding is shown for mental,⁶⁸ physical health,⁶⁷ and health behaviors such as traditional cigarette,⁴⁷ e-cig,⁴⁹ Hookah⁵⁶ and alcohol use, suggesting that these diminished returns are independent of health problems or risk behaviors.⁷⁷ They are also shown for youth, adults, and older adults, as well as various sources of marginalization, namely race,⁴⁷ sexual orientation,⁶² and immigration status,^{63,64} suggesting that any marginalization in the society reduces the health gains that are expected to follow SES and SDoH. To give a few examples, we observe higher than expected risk of asthma,⁶⁶ COPD,⁶⁷ and heart disease⁵⁵ in high SES racialized and racial minority adults.

There is a need for additional research on the effect of time, cohort, pandemics, and other political and macro factors on the associations between SES indicators and health outcomes across diverse racial groups. Most past research is conducted regardless of macro events such as pandemics or economic slowdowns. These macro events may have differential impacts on subpopulations, and there is a need to compare White and Black individuals across time frames. Thus, there is a need to compare diverse groups for the health returns

of SES indicators across time intervals that may change human and economic behaviors. The COVID-19 pandemic, for example, resulted in a major pressure across minority populations.⁷⁸⁻⁸² While MDRs are also shown for Latinx,⁵³ Asian,⁵⁰ native American,⁵⁴ immigrant,^{63,64,83-85} and Black⁴⁸ individuals, almost all of this literature is on normal times.⁴⁸ So there is a need to test the effects of COVID-19 pandemics in changing the recognized patterns for diverse populations. Mechanisms of disparities may change based on macro data, and contributors of health disparities may vary across time.⁴⁷

Limitations

There are some limitations to the current study. The sample size was different across racial subgroups, thus the statistical power was non-identical across racial groups. The outcome was single item self-reported, which may reflect measurement bias by race. Experience and report of SRH may be influenced by race, culture, SES, and sex/gender. We excluded Latinx, Asian, and other marginalized groups. We also did not have data on type of job, years of experience, and pay per hour/year, that could reflect labor market discrimination. All our variables were individual level, and we did not have access to distribution of jobs and occupational segregation in neighborhoods. Some strengths include large overall sample size, robust methodology, and random sample, and control of other SES indicators such as education and income.

Conclusion

To conclude, employment, as a SES indicator, shows diminished health returns for marginalized and racialized people (non-Latinx Black), which may reflect racism, social stratification, and historic discrimination in the US. This observation holds for the COVID-19 era, and addressing health inequalities during the pandemic requires addressing MDRs.

Authors' Contributions

Study design: AA, data collection: BN, conceptual design: SA, data analysis: SA, prepare draft: AA, revision: AA, BN, SA. All authors approve the final draft.

Conflict of Interest Disclosures

The authors declare that they have no conflict of interest.

Research Highlights

What Is Already Known?

Employment protects against poor health. Individuals who are employed report better health. The association between employment and health is not universal.

What Does This Study Add?

There are racial differences in the link between employment and health. While employed White people are healthy, employed Black individuals report poor health. Social stratification, racism, and discrimination may reduce the health benefits of employment in Black communities.

Ethical Approval

It was exempt from a full IRB review because it was based on a fully deidentified publicly available data set.

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References

- Alter HJ. Social determinants of health: from bench to bedside. *JAMA Intern Med.* 2014;174(4):543-545. doi:10.1001/jamainternmed.2013.13302.
- Butler SM. Building blocks for addressing social determinants of health. *JAMA.* 2017;318(19):1855-1856. doi:10.1001/jama.2017.16493.
- Ross CE, Mirowsky J. Refining the association between education and health: the effects of quantity, credential, and selectivity. *Demography.* 1999;36(4):445-460.
- Ross CE, Mirowsky J. The interaction of personal and parental education on health. *Soc Sci Med.* 2011;72(4):591-599. doi:10.1016/j.socscimed.2010.11.028.
- Mirowsky J, Ross CE. Education, health, and the default American lifestyle. *J Health Soc Behav.* 2015;56(3):297-306. doi:10.1177/0022146515594814.
- Marmot M. Economic and social determinants of disease. *Bull World Health Organ.* 2001;79(10):988-989.
- Marmot M. *The Status Syndrome: How Social Standing Affects Our Health and Longevity.* London: Bloomsbury Press; 2004.
- Marmot M. Social determinants of health inequalities. *Lancet.* 2005;365(9464):1099-1104. doi:10.1016/s0140-6736(05)71146-6.
- Marmot M, Wilkinson R. *Social Determinants of Health.* Oxford: Oxford University Press; 2005.
- Marmot M. The health gap: the challenge of an unequal world. *Lancet.* 2015;386(10011):2442-2444. doi:10.1016/s0140-6736(15)00150-6.
- Stringhini S, Carmeli C, Jokela M, et al. Socioeconomic status, non-communicable disease risk factors, and walking speed in older adults: multi-cohort population based study. *BMJ.* 2018;360:k1046. doi:10.1136/bmj.k1046.
- Link BG, Phelan J. Social conditions as fundamental causes of disease. *J Health Soc Behav.* 1995;Spec No:80-94.
- Phelan JC, Link BG, Diez-Roux A, Kawachi I, Levin B. "Fundamental causes" of social inequalities in mortality: a test of the theory. *J Health Soc Behav.* 2004;45(3):265-285. doi:10.1177/002214650404500303.
- Link BG, Phelan J. The social shaping of health and smoking. *Drug Alcohol Depend.* 2009;104 Suppl 1:S6-10. doi:10.1016/j.drugalcdep.2009.03.002.
- Phelan JC, Link BG. Fundamental cause theory. In: Cockerham WC, ed. *Medical Sociology on the Move: New Directions in Theory.* Dordrecht: Springer; 2013. p. 105-125. doi:10.1007/978-94-007-6193-3_6.
- Lantz PM, House JS, Lepkowski JM, Williams DR, Mero RP, Chen J. Socioeconomic factors, health behaviors, and mortality: results from a nationally representative prospective study of US adults. *JAMA.* 1998;279(21):1703-1708. doi:10.1001/jama.279.21.1703.
- Lantz PM, House JS, Mero RP, Williams DR. Stress, life events, and socioeconomic disparities in health: results from the Americans' Changing Lives study. *J Health Soc Behav.* 2005;46(3):274-288. doi:10.1177/002214650504600305.
- Lantz PM, Mujahid M, Schwartz K, et al. The influence of race, ethnicity, and individual socioeconomic factors on breast cancer stage at diagnosis. *Am J Public Health.* 2006;96(12):2173-2178. doi:10.2105/ajph.2005.072132.
- Bostean G, Roberts CK, Crespi CM, et al. Cardiovascular health: associations with race-ethnicity, nativity, and education in a diverse, population-based sample of Californians. *Ann Epidemiol.* 2013;23(7):388-394. doi:10.1016/j.annepidem.2013.04.012.
- Heckman JJ. Role of income and family influence on child outcomes. *Ann N Y Acad Sci.* 2008;1136:307-323. doi:10.1196/annals.1425.031.
- McLoyd VC. Socioeconomic disadvantage and child development. *Am Psychol.* 1998;53(2):185-204. doi:10.1037//0003-066x.53.2.185.
- Cabrera NJ, Mincy R, Um H, Turpin JW, Toledo ED. *How fathers' earnings matter for children's development? Mediation pathways.* Washington, DC: Association for Public Policy Analysis and Management; 2016.
- McLanahan S. Fragile families and the reproduction of poverty. *Ann Am Acad Pol Soc Sci.* 2009;621(1):111-131. doi:10.1177/0002716208324862.
- Brenner AB, Zimmerman MA, Bauermeister JA, Caldwell CH. Neighborhood context and perceptions of stress over time: an ecological model of neighborhood stressors and intrapersonal and interpersonal resources. *Am J Community Psychol.* 2013;51(3-4):544-556. doi:10.1007/s10464-013-9571-9.
- Brody GH, Flor DL. Maternal resources, parenting practices, and child competence in rural, single-parent African American families. *Child Dev.* 1998;69(3):803-816.
- Singh-Manoux A, Foyon P, Marmot M. The relationship between parenting dimensions and adult achievement: evidence from the Whitehall II study. *Int J Behav Med.* 2006;13(4):320-329. doi:10.1207/s15327558ijbm1304_7.
- Rakesh D, Zalesky A, Whittle S. Similar but distinct - effects of different socioeconomic indicators on resting state functional connectivity: findings from the Adolescent Brain Cognitive Development (ABCD) Study®. *Dev Cogn Neurosci.* 2021;51:101005. doi:10.1016/j.dcn.2021.101005.
- Tomasi D, Volkow ND. Associations of family income with cognition and brain structure in USA children: prevention implications. *Mol Psychiatry.* 2021;26(11):6619-6629. doi:10.1038/s41380-021-01130-0.
- Leventhal AM, Bello MS, Galstyan E, Higgins ST, Barrington-Trimis JL. Association of cumulative socioeconomic and health-related disadvantage with disparities in smoking prevalence in the United States, 2008 to 2017. *JAMA Intern Med.* 2019;179(6):777-785. doi:10.1001/jamainternmed.2019.0192.
- Mistry R, McCarthy WJ, de Vogli R, Crespi CM, Wu Q, Patel M. Adolescent smoking risk increases with wider income gaps between rich and poor. *Health Place.* 2011;17(1):222-229. doi:10.1016/j.healthplace.2010.10.004.
- Pampel FC. Diffusion, cohort change, and social patterns of smoking. *Soc Sci Res.* 2005;34(1):117-139. doi:10.1016/j.ssresearch.2003.12.003.
- Dulgheroff PT, da Silva LS, Rinaldi AEM, Rezende LFM, Marques ES, Azeredo CM. Educational disparities in hypertension, diabetes, obesity and smoking in Brazil: a trend analysis of 578 977 adults from a national survey, 2007-2018. *BMJ Open.* 2021;11(7):e046154. doi:10.1136/bmjopen-2020-046154.
- Bhan N, Karan A, Srivastava S, Selvaraj S, Subramanian SV, Millett C. Have socioeconomic inequalities in tobacco use in India increased over time? Trends from the national sample surveys (2000-2012). *Nicotine Tob Res.* 2016;18(8):1711-1718. doi:10.1093/ntr/ntw092.
- Assari S. Combined Racial and Gender Differences in the Long-Term Predictive Role of Education on Depressive Symptoms and Chronic Medical Conditions. *J Racial Ethn Health Disparities.* 2017;4(3):385-396. doi:10.1007/s40615-016-0239-7
- Assari S. Understanding America: unequal economic returns of years of schooling in Whites and Blacks. *World J Educ Res.* 2020;7(2):78-92. doi:10.22158/wjer.v7n2p78.
- 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.
- Bell CN, Thorpe RJ Jr. Association between income and obesity

- in Black men: the role of work-life interference. *Ethn Dis*. 2020;30(4):629-636. doi:10.18865/ed.30.4.629.
38. 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.
 39. 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.
 40. Robert SA, Ruel E. Racial segregation and health disparities between Black and White older adults. *J Gerontol B Psychol Sci Soc Sci*. 2006;61(4):S203-211. doi:10.1093/geronb/61.4.s203.
 41. Fadus MC, Valadez EA, Bryant BE, et al. Racial disparities in elementary school disciplinary actions: findings from the ABCD study. *J Am Acad Child Adolesc Psychiatry*. 2021;60(8):998-1009. doi:10.1016/j.jaac.2020.11.017.
 42. Sewell AA. Political economies of acute childhood illnesses: measuring structural racism as mesolevel mortgage market risks. *Ethn Dis*. 2021;31(Suppl 1):319-332. doi:10.18865/ed.31.S1.319.
 43. Boylstein C. *When Police Use Force: Context, Methods, Outcomes*. Lynne Rienner Publishers; 2018.
 44. Reimers CW. Labor market discrimination against Hispanic and Black men. *Rev Econ Stat*. 1983;65(4):570-579. doi:10.2307/1935925.
 45. Assari S, Caldwell CH. Racism, Diminished returns of socioeconomic resources, and Black middle-income children's health paradox. *JAMA Pediatr*. 2021;175(12):1287-1288. doi:10.1001/jamapediatrics.2021.3277.
 46. Assari S, Zare H. Beyond access, proximity to care, and healthcare use: sustained racial disparities in perinatal outcomes due to marginalization-related diminished returns and racism. *J Pediatr Nurs*. 2022;63:e161-e163. doi:10.1016/j.pedn.2021.09.021.
 47. Assari S, Mistry R, Caldwell CH, Bazargan M. Protective effects of parental education against youth cigarette smoking: diminished returns of Blacks and Hispanics. *Adolesc Health Med Ther*. 2020;11:63-71. doi:10.2147/ahmt.s238441.
 48. 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.
 49. 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.
 50. Assari S. Diminished returns of income against cigarette smoking among Chinese Americans. *J Health Econ Dev*. 2019;1(2):1-8.
 51. 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.
 52. Zare H, Assari S. Non-Hispanic Black Americans' diminished protective effects of educational attainment and employment against cardiometabolic diseases: NHANES 1999-2016. *Austin J Public Health Epidemiol*. 2021;8(4):1109.
 53. Assari S, Boyce S, Caldwell CH, Bazargan M. Parent education and future transition to cigarette smoking: Latinos' diminished returns. *Front Pediatr*. 2020;8:457. doi:10.3389/fped.2020.00457.
 54. Assari S, Bazargan M. Protective effects of educational attainment against cigarette smoking: diminished returns of American Indians and Alaska natives in the National Health Interview Survey. *Int J Travel Med Glob Health*. 2019;7(3):105-110. doi:10.15171/ijtmgh.2019.22.
 55. Assari S, Cobb S, Saqib M, Bazargan M. Diminished returns of educational attainment on heart disease among Black Americans. *Open Cardiovasc Med J*. 2020;14:5-12. doi:10.2174/1874192402014010005.
 56. Assari S, Chalian H, Bazargan M. Social determinants of hookah smoking in the United States. *J Ment Health Clin Psychol*. 2020;4(1):21-27. doi:10.29245/2578-2959/2020/1.1185.
 57. 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.
 58. 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.
 59. 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.
 60. Assari S. Socioeconomic status and self-rated oral health; diminished return among Hispanic Whites. *Dent J (Basel)*. 2018;6(2):11. doi:10.3390/dj6020011.
 61. Assari S, Bazargan M. Educational attainment and tobacco harm knowledge among American adults: diminished returns of African Americans and Hispanics. *Int J Epidemiol Res*. 2020;7(1).
 62. Assari S, Bazargan M. Education level and cigarette smoking: diminished returns of lesbian, gay and bisexual individuals. *Behav Sci (Basel)*. 2019;9(10):103. doi:10.3390/bs9100103.
 63. Assari S. Socioeconomic status and current cigarette smoking status: immigrants' diminished returns. *Int J Travel Med Glob Health*. 2020;8(2):66-72. doi:10.34172/ijtmgh.2020.11.
 64. Assari S, Cobb S, Cuevas AG, Bazargan M. Diminished health returns of educational attainment among immigrant adults in the United States. *Front Psychiatry*. 2020;11:535624. doi:10.3389/fpsyt.2020.535624.
 65. Assari S, Boyce S, Bazargan M, Caldwell CH, Zimmerman MA. Place-based diminished returns of parental educational attainment on school performance of non-Hispanic White youth. *Front Educ (Lausanne)*. 2020;5:30. doi:10.3389/educ.2020.00030.
 66. 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.
 67. Assari S, Chalian H, Bazargan M. Race, ethnicity, socioeconomic status, and chronic lung disease in the U.S. *Res Health Sci*. 2020;5(1):48-63. doi:10.22158/rhs.v5n1p48.
 68. Assari S, Caldwell CH. High risk of depression in high-income African American boys. *J Racial Ethn Health Disparities*. 2018;5(4):808-819. doi:10.1007/s40615-017-0426-1.
 69. Bertrand M, Mullainathan S. Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination. *Am Econ Rev*. 2004;94(4):991-1013. doi:10.1257/0002828042002561.
 70. Huffman ML, Cohen PN. Racial wage inequality: job segregation and devaluation across U.S. labor markets. *Am J Sociol*. 2004;109(4):902-936. doi:10.1086/378928.
 71. Strully K. Racial-ethnic disparities in health and the labor market: losing and leaving jobs. *Soc Sci Med*. 2009;69(5):768-776. doi:10.1016/j.socscimed.2009.06.025.
 72. Gentsch K, Massey DS. Labor market outcomes for legal Mexican immigrants under the new regime of immigration enforcement. *Soc Sci Q*. 2011;92(3):875-893. doi:10.1111/j.1540-6237.2011.00795.x.
 73. Arcidiacono P, Beauchamp A, Hull M, Sanders S. Exploring the racial divide in education and the labor market through evidence from interracial families. *J Hum Cap*. 2015;9(2):198-238. doi:10.1086/681957.
 74. Gamoran A, Barfels S, Collares AC. Does racial isolation in school lead to long-term disadvantages? Labor market consequences of high school racial composition. *AJS*. 2016;121(4):1116-1167. doi:10.1086/683605.
 75. 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.
 76. 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.
77. 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.
 78. Alcendor DJ. Racial disparities-associated COVID-19 mortality among minority populations in the US. *J Clin Med.* 2020;9(8):2442. doi:10.3390/jcm9082442.
 79. Alkon AH, Bowen S, Kato Y, Young KA. Unequally vulnerable: a food justice approach to racial disparities in COVID-19 cases. *Agric Human Values.* 2020;37(3):535-536. doi:10.1007/s10460-020-10110-z.
 80. Chaudhary R, Bliden KP, Kreutz RP, et al. Race-related disparities in COVID-19 thrombotic outcomes: beyond social and economic explanations. *EClinicalMedicine.* 2020;29:100647. doi:10.1016/j.eclim.2020.100647.
 81. Gati SB, Bloomhardt HM, McArthur EA. COVID-19: widening health disparities among pediatric populations. *Am J Public Health.* 2020;110(9):1358-1359. doi:10.2105/ajph.2020.305815.
 82. Ingraham NE, Purcell LN, Karam BS, et al. Racial/ethnic disparities in hospital admissions from COVID-19 and determining the impact of neighborhood deprivation and primary language. *medRxiv [Preprint].* September 22, 2020. Available from: <https://www.medrxiv.org/content/10.1101/2020.09.02.20185983v3>.
 83. Assari S. Income and mental well-being of middle-aged and older Americans: immigrants' diminished returns. *Int J Travel Med Glob Health.* 2020;8(1):37-43. doi:10.34172/ijtmgh.2020.06.
 84. Assari S. Household income and children's depressive symptoms: immigrants' diminished returns. *Int J Travel Med Glob Health.* 2020;8(4):157-164. doi:10.34172/ijtmgh.2020.27.
 85. Assari S, Akhlaghipour G, Boyce S, Bazargan M, Caldwell CH. Parental human capital and adolescents' executive function: immigrants' diminished returns. *Med Res Arch.* 2020;8(10):10.18103/mra.v8i10.2235. doi:10.18103/mra.v8i10.2235.