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Minorities' Diminished Returns of Educational Attainment on Hospitalization Risk: National Health Interview Survey (NHIS)

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Abstract

Background: As suggested by the Minorities' Diminished Returns (MDRs) theory, educational attainment shows a weaker protective effect for racial and ethnic minority groups compared to non-Hispanic Whites. This pattern, however, is never shown for hospitalization risk.

Objectives: This cross-sectional study explored racial and ethnic variations in the association between educational attainment and hospitalization in the United States.

Methods: Data came from the National Health Interview Survey (NHIS 2015). The total sample was 28,959 American adults. Independent variable was educational attainment. The main outcome was hospitalization during the last 12 months. Age, gender, employment, marital status, region, obesity, and number of cardiovascular conditions were covariates. Race and ethnicity were the effect modifiers. Logistic regression models were utilized to analyze the data.

Results: From all participants, 16.2% were Black and 11.6% were Hispanic with a mean age of 51 years. Overall, higher education levels were associated with lower odds of hospitalization, independent of all confounders. Educational attainment showed significant interactions with race (odds ratio [OR] =1.04, 95% CI = 1.01-1.08) and ethnicity (OR = 1.04, 95% CI =1.01-1.07) on hospitalization, indicating smaller protective effects of educational attainment on hospitalization of Hispanics and Blacks than non-Hispanic Whites.

Conclusion: The protective effects of educational attainment on population health are smaller for Blacks and Hispanics compared to non-Hispanic Whites. To prevent health disparities, the diminished returns of educational attainment should be minimized for racial and ethnic minorities. To do so, there is a need for innovative and bold economic, public, and social policies that do not limit themselves to equalizing socioeconomic status, but also help minorities leverage their available resources and gain tangible outcomes.

Keywords: Race, Ethnicity, Educational Attainment, Minorities' Diminished Returns, Socioeconomic Status, Hospitalization

1. Background

High socioeconomic status (SES), particularly educational attainment, is protective against undesired health outcomes.[1-3] Individuals with high educational attainment are less likely to develop cardiovascular disease (CVD), which is the main cause of morbidity.[1,4-10] Racial and ethnic inequalities in health are due, in part, to racial and ethnic inequalities in SES and educational attainment.[11]

However, the protective effects of SES indicators on health outcomes differ among populations.[12-15] The effects of SES indicators, particularly educational attainment, on CVDs risk are also shown to vary across populations.[13,14] According to the Minorities' Diminished Returns (MDRs) theory,[16,17] SES indicators, particularly educational attainment, are less protective for racial and ethnic minority groups than for majority groups.[18] Most of the literature on this issue, however, has focused on the effects of SES on health outcomes for Blacks[18-20] and Hispanics[21,22] compared to Whites. For example, various studies have shown that SES indicators show larger effects on smoking[23] and drinking[21] for non-Hispanic Whites than for Hispanics or Blacks.

Very limited knowledge, however, exists on MDRs on the risk of hospitalization risk. One study has focused on MDRs on the use of healthcare services. In a study, family SES better reduced unmet health needs for Whites than for Hispanics and non-Hispanics.[24] Thus, it seems that the very same MDRs that are established on health for Hispanics

and Blacks[18-20] may also be relevant to health service use.

2. Objective

This study explored racial and ethnic variations in the effects of educational attainment on the odds of hospitalization over the past 12 months among Americans in the United States. It was hypothesized that high educational attainment would be associated with lower hospitalization risk; however, this effect would be smaller for Hispanics and Blacks than for non-Hispanic Whites.

3. Methods

3.1. Design and Settings

The National Health Interview Survey (NHIS) of 2015 was used for this study. The NHIS is the primary source of information on the health and wellbeing of American adults. The sample was limited to the civilian noninstitutionalized population of the United States. Data was collected by the National Center for Health Statistics (NCHS), CDC.

3.2. Data Collection

The U.S. Census Bureau acts as the data collection agent for the NHIS under a contractual agreement between the two organizations. Interviews for the NHIS are conducted face-to-face and in the participants' residences. The interviews are sometimes followed with and, on rare occasions, replaced by telephone interviews. The NHIS data is collected continuously throughout each year. Data is collected on demographic factors, socioeconomic characteristics, health behaviors, mental health, physical health, and utilization of healthcare facilities.

3.3. Sample and Sampling

The NHIS sampling and sample design are described elsewhere. The NHIS applies a multi-stage sampling strategy. Stage 1 of the sample design was the sampling of 428 primary sampling units (PSUs) drawn from 1,900 geographically defined PSUs, which may be a county, a small group of contiguous counties, or a metropolitan statistical area. All 50 US states and the District of Columbia have representative PSUs in the study.

The NHIS draws samples from households and noninstitutional group quarters such as college dormitories and has four main cores: (1) the Household Composition section, (2) the Family Core, (3) the Sample Child Core, and (4) the Sample Adult Core.

3.4. Inclusion and Exclusion Criteria

Individuals were eligible for participation if they were adults (age 18 years or more) and US residents. Those institutionalized in a correctional or healthcare setting were ineligible to participate.

3.5. Measures

3.5.1. Predictor

Educational Attainment. Educational attainment was a continuous variable ranging from 0 to 21. Participants were asked about the number of years of schooling they had. A higher score reflected a higher number of years of schooling.

3.5.2. Moderators

Race and Ethnicity. All participants self-identified their race and ethnicity. Races were Blacks/African Americans = 1 and Whites = 0. Ethnicity was a dichotomous variable: Hispanics = 1, Non-Hispanics = 0.

3.5.3. Covariates

Demographic Factors. Demographic data included participant age and gender. Age was continuous, but gender was dichotomous: males = 1, females = 0.

Marital status. A dichotomous variable was used for marital status: 1 married, 0 any other status.

Employment. A single item was used to measure employment over the prior week. This variable was a binary variable: employed = 1, unemployed = 0.

Region. Region was a four-level categorical variable coded as (1) Northeast, (2) Midwest, (3) South, and (4) West. This variable was treated as a nominal variable with West as the reference group.

Obesity. The current study defined obesity as a body mass index (BMI) equal to or larger than 30 kg/m^2.[25] This was based on data on individuals' self-reported weight and height.

Number of CVDs. Number of CVDs was measured using the self-reported history of doctor-diagnosed CVDs. Participants reported if a doctor had told them that they have 1) diabetes, 2) hypertension, 3) high cholesterol, 4) coronary heart disease, 5) angina pectoris, 6) heart attack, 7) heart condition/disease, or 8) stroke. A sum CVD score ranging from 0 to 8 was calculated, and a higher score indicated more CVDs.

3.5.4. Dependent Variable

Hospitalization. Participants were asked if they have been hospitalized overnight during the prior 12 months. Possible answers were yes and no.

3.6. Statistical Analysis

Data was analyzed using SPSS 23.0 (IBM Inc, NY, USA). For descriptive statistics, mean and proportion (frequencies) were reported. Two survey logistic regression models were used for multivariable analysis. In these models, educational attainment was used as the independent variable, hospitalization as the dependent variable, demographic factors, marital status, employment, region, obesity, and number of CVDs as covariates, and race and ethnicity as the focal moderators. Both logistic regression models were estimated in the pooled sample that included Blacks, Hispanics, and non-Hispanic Whites. Model 1 did not include race or ethnicity by educational attainment interaction terms, but Model 2 did. Cox & Snell R Square and Nagelkerke R Square were used to compare the fit of

Model 1 and Model 2. Adjusted Odds Ratios (ORs), 95% Confidence Intervals (CI), and *P* values were reported.

4. Results

4.1. Descriptive Statistics

A total number of 28,959 individuals entered this analysis. Table 1 summarizes the descriptive statistics of the participants overall. On average, the participants were 51 years old. Most of the sample were White (83.8%) and non-Hispanic (88.4%). Most participants were female (55.3%). From all participants, 54.2% were employed, 43.4% were married, 34.1% were obese, and 10.1% had been hospitalized during the 12 months prior to the study (Table 1).

4.2. Logistic Regressions

Table 2 presents the results of 2 pooled sample logistic regression models. Both models were statistically significant at the 0.001 level. Cox & Snell R Square for Model 1 and Model 2 were 0.057 and 0.058. Nagelkerke R square were 0.120 and 0.121 for Model 1 and Model 2, respectively. These fit statistics suggest that Model 2 showed statistically better fit compared to Model 1. Model 1 only included the main effects; however, model 2, also included two interaction terms between race and ethnicity with educational attainment. Model 1 showed that high educational attainment had a protective effect against hospitalization (odds ratio [OR] = 0.99, 95% CI =0.97-1.00) above and beyond our covariates. Model 2 showed significant interactions between the effects of race (OR =1.04, 95% CI = 1.01 - 1.08) and ethnicity (OR = 1.04, 95% CI =1.01 -1.07) and educational attainment on hospitalization, suggesting that the inverse association between educational attainment and odds of hospitalization is significantly smaller for Blacks and Hispanics than for non-Hispanic Whites (Table 2).

Table 1. Descriptive Statistics of the Participants Overall

	No.	%
Race		
White	24270	83.8
Black	4689	16.2
Ethnicity		
Non-Hispanic	25609	88.4
Hispanic	3350	11.6
Gender		
Female	16017	55.3
Male	12942	44.7
Married		
Other	16397	56.6
Married	12562	43.4
Employed		
Unemployed	13264	45.8
Employed	15695	54.2
Region		
Northeast	4884	16.9
Midwest	6593	22.8
South	10633	36.7
West	6849	23.7
Obese (BMI > 30)		
No	19074	65.9
Yes	9885	34.1
Hospitalized		
No	26032	89.9
Yes	2927	10.1
	Mean	**SD**
Age (y)	50.91	18.41
Education (y)	15.19	3.14
Cardiovascular diseases (n)	1.00	1.31

5. Discussion

Higher educational attainment was inversely associated with hospitalization in the pooled sample; however, this effect was smaller for Blacks and Hispanics than for non-Hispanic Whites.

It was found that, as educational attainment increases, people's risk of hospitalization decreases. This is, however, less true for Hispanic and Black Americans than for non-Hispanic Whites. This is a replication of MDRs[16,17] of the educational attainment in terms of hospitalization.

The results are in line with other observations that SES indicators, particularly educational attainment, generate less than expected health outcomes for marginalized groups than for mainstream ones. Similar patterns are shown for Blacks,[26-29] Hispanics,[21-23,30] and sexual minorities,[31,32] meaning that minority status, regardless of whether it is based on race,[33] ethnicity,[21,22] or sexual orientation,[31] reduces the health gains of SES resources.[33]

It is not only educational attainment,[34] but any SES indicator that generates less health for Blacks and Hispanics than for non-Hispanic Whites. The very same patterns are shown for income,[19] occupation,[35] and marital status.[36] The effects of education and income on chronic medical conditions such as CVDs,[19] asthma,[37] obesity,[18,38] and ADHD[20] are also shown to be smaller for Hispanics and Blacks than for non-Hispanic Whites. Finally, education and other SES indicators have a larger effect on reducing mental health problems such as depression,[39-41] suicide,[41] and anxiety for non-Hispanic Whites than Blacks.[36] Education also better reduces the risk of mortality for Blacks than for Whites.[35] None of these patterns have been previously shown for Hispanics compared to non-Hispanics. The contribution of this study is to extend this literature to hospitalization as the outcome to both racial and ethnic groups.

The systemic nature of the MDRs suggests that it is the society that differentially rewards and differently treats racial and ethnic groups.[16,17] This study argues that it is probably the marginalization processes that reduce full participation in society, and it is the social structure and function that do not allow non-White groups to fully leverage their human and economic resources and turn

Table 2. Association Between Educational Attainment and Hospitalization in the Pooled Sample

	Model 1 (Main Effects)					Model 2 (M1 + Interactions)				
	b	SE	B	95% CI	*P*	b	SE	B	95% CI	*P*
Race (Black)	0.00	0.06	1.00	0.90-1.12	.943	-0.60	0.25	0.55	0.33-0.90	0.017
Ethnicity (Hispanic)	-0.07	0.07	0.93	0.81-1.08	.342	-0.59	0.23	0.55	0.35-0.87	0.010
Gender (Male)	-0.23	0.04	0.80	0.73-0.87	< .001	-0.23	0.04	0.80	0.73-0.87	<0.001
Age (y)	0.00	0.00	1.00	0.99-1.00	.011	0.00	0.00	1.00	0.99-1.00	0.013
Married	-0.13	0.04	0.88	0.81-0.96	.003	-0.12	0.04	0.88	0.81-0.96	0.005
Employed (last week)	-0.88	0.05	0.42	0.38-0.46	< .001	-0.88	0.05	0.42	0.38-0.46	<0.001
Region										
Northeast	0.12	0.07	1.13	0.99-1.28	.080	0.12	0.07	1.12	0.99-1.28	0.081
Midwest	0.14	0.06	1.15	1.02-1.30	.022	0.14	0.06	1.15	1.01-1.29	0.030
South	0.07	0.06	1.07	0.95-1.20	.247	0.06	0.06	1.06	0.95-1.19	0.292
Obesity (BMI > 30)	0.05	0.04	1.06	0.97-1.15	.217	0.05	0.04	1.05	0.97-1.15	0.241
Cardiovascular diseases (n)	0.38	0.02	1.46	1.41-1.50	< .001	0.38	0.02	1.46	1.41-1.50	<0.001
Educational Attainment (y)	-0.01	0.01	0.99	0.97-1.00	.042	-0.03	0.01	0.97	0.95-0.99	<0.001
Ethnicity (Hispanic) × Educational Attainment (y)					< .001	0.04	0.02	1.04	1.01-1.08	0.014
Race (Black) × Educational Attainment (y)						0.04	0.02	1.04	1.01-1.07	0.018
Constant	-1.89	0.14	0.15			-1.65	0.16	0.19		<0.001

them into the highest levels of tangible outcomes.[16,17]

5.1. Future Research

There is a need to study the contextual, economic, and behavioral mediators of MDRs of educational attainment on the risk of hospitalization. One potential mechanism for this observation is through CVDs[19] as well as asthma,[37] hypertension,[30] obesity,[18,38] depression,[39-41] and suicidality.[42] Another mechanism that may increase the risk of hospitalization in high SES Blacks and Hispanics is high risk behavior such as poor diet,[43] poor exercise,[27] smoking,[23,44] and alcohol consumption.[21] High SES Blacks and Hispanics are also exposed to higher levels of stress[41,45-47] and more second-hand smoke.[48] Research on public and health policies that reduce the MDRs of educational attainment are also needed. Future research should attempt to replicate and validate these findings in other contexts, settings, and age groups.

5.2. Limitations

This study has some methodological, conceptual, and statistical limitations. With a cross-sectional design, no causal inferences are drawn between educational attainment and risk of hospitalization. The study could not include data on a wide range of potential covariates such as healthcare access and mental health. Other SES indicators, such as wealth and childhood SES indicators, should also be measured. All study variables were measured at the individual level. Structural factors such as availability and density of healthcare services as well as area-level SES and racial and ethnic compositions of the neighborhoods were not included in this study. Despite these limitations, this is the first of its kind to investigate the relevance of MDRs to the risk of hospitalization.

6. Conclusion

The protective effects of educational attainment on hospitalization seem to be smaller for Hispanics and Blacks compared to non-Hispanic Whites. To prevent racial and ethnic health disparities, policies and programs should go beyond equal access and focus on equal outcomes. For such a goal, policies that minimize diminished returns of SES for racial and ethnic minorities are needed. Innovative and bold economic, public, and social policies are needed for the members of racial and ethnic minorities to leverage their resources and gain tangible health outcomes. Researchers may also explore mediators and moderators of MDRs for Black and Hispanic people.

Authors' Contributions

SA analyzed the data and prepared the first draft of the paper. MB revised the manuscript. Both authors approved the final draft.

Conflict of Interest Disclosures

The authors declare that they have no conflicts of interest.

Ethical Approval

All participants provided written consent, and the ethics of the NHIS protocol was approved by the CDC Institutional

Research Highlights

What Is Already Known?

High educational attainment is known to protect individuals against risk of hospitalization. This effect is mainly due to better health status of individuals with higher education compared to individuals with lower educational levels.

What This Study Adds?

The protective effects of educational attainment on reducing risk of hospitalization is not equal across racial and ethnic groups. In the United States, highly educated Blacks and Hispanics remain at high risk of hospitalization, probably because of structural racism.

Review Board (IRB). According to the NIH guidelines and the decision tool regarding human subject involvement in secondary analyses of existing data, the current study was found to be a "Not Human Subject Research". The definition and decision tool which were applied are available here: https://grants.nih.gov/policy/humansubjects/hs-decision.htm. This study was found to be exempt from the IRB approval process for human involvement in research by the CDU IRB.

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