

Original Paper

Family's Subjective Economic Status and Children's Matrix Reasoning: Blacks' Diminished Returns

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Abstract

Background: Due to a pattern known as Marginalization-related Diminished Returns (MDRs), historically oppressed non-Hispanic Black Americans show weaker effects of economic status on health and development, when compared to socially privileged non-Hispanic White Americans. Such MDRs are also documented for the effects of economic status on the school performance of non-Hispanic Black children. However, the existing knowledge is minimal on similar diminished returns on children's intelligence. **Aim:** To compare racial and ethnic groups for the effect of subjective economic status on children's cognitive performance, we compared non-Hispanic White and non-Hispanic Black children for the effects of subjective economic status on children's matrix reasoning. **Methods:** This cross-sectional study included 7898 children from the Adolescent Brain Cognitive Development (ABCD) study. The predictor variable was subjective economic status, which was treated as a continuous measure. The primary outcome was children's matrix reasoning, a domain of cognitive performance, measured by the Wechsler Intelligence Scales for Children-IV (WISC-V) matrix reasoning total score. **Results:** Overall, high subjective economic status was associated with higher matrix reasoning score. Race showed a statistically significant interaction with subjective economic status on children's matrix reasoning score. This interaction suggested that high subjective economic status has a smaller boosting effect on increasing matrix reasoning score for non-Hispanic Black children relative to non-Hispanic White children. **Conclusion:** The degree by which subjective economic status correlates with matrix

reasoning score, an important domain of cognitive performance, depends on race and racialization. Non-Hispanic Black children may show weaker gains in matrix reasoning from their subjective economic status than their non-Hispanic White counterparts. To minimize the racial gap in cognitive performance, we need to address diminished returns that occur as a result of the racialization of racial and ethnic minority children. Not only should we equalize economic status, but also increase the marginal returns of economic status for racial minorities, particularly non-Hispanic Black families. Such efforts require public policies that go beyond access and also consider how we can empower non-Hispanic Black communities and families so they can more effectively leverage and utilize their economic resources to secure measurable and tangible outcomes. Structural and societal barriers such as residential and school segregation may hinder non-Hispanic Black children from receiving the full effects of their family-level economic status on a variety of outcomes, including their cognitive performance.

Keywords

race, ethnicity, population groups, socioeconomic status, children, cognition, brain, cognitive performance

1. Introduction

Compared to non-Hispanic White children, racial minority children, particularly non-Hispanic Black children, show worse cognitive performance measured by poor academic achievement and school dropout rates (Bumpus, Umeh, & Harris). As cognitive performance and associated academic success is the main gateway for future success (Burchinal et al., 2011; Cohen & Sherman, 2005; Gorey, 2009; Hair, Hanson, Wolfe, & Pollak, 2015), researchers and policymakers have shown interest in dissolving the social factors that shape inequalities in cognitive performance. Such knowledge may help reduce or even eliminate subsequent inequalities later in life (Burchinal et al., 2011; Cohen & Sherman, 2005; Gorey, 2009; Hair et al., 2015).

Race and family economic status are two closely overlapping social constructs (Ahmad, Zulaili, Shahril, Syed Abdullah, & Ahmed, 2018; Merz, Tottenham, & Noble, 2018; Valencia, Tran, Lim, Choi, & Oh, 2019). Racial minority status, particularly non-Hispanic Blacks and low economic status, have separate, additive, and multiplicative effects on children's cognitive development (Ahmad et al., 2018; Merz et al., 2018; Valencia et al., 2019). This is in part because both racial minority status and low economic status reflect poor access to resources, low parenting, social marginalization, and economic, housing, and food insecurity (DeSantis et al., 2007; Dismukes et al., 2018; Hanson et al., 2015; Miller & Taylor, 2012). As such, one of the strongest social determinants of children's cognitive development is the family's economic status (Alvarado, 2018; Barreto, de Figueiredo, & Giatti, 2013; Hemovich, Lac, & Crano, 2011; Schreier & Chen, 2013). High economic status is linked to a wide array of developmental outcomes among children (Alvarado, 2018; Barreto et al., 2013; Hemovich et al., 2011; Schreier & Chen, 2013). Several studies have consistently established a positive link between the economic status of the family

and desired cognitive, behavioral, developmental, and health outcomes (Harnett et al., 2019; Schulz et al., 2012; Yelin, Trupin, Bunde, & Yazdany, 2019). Families with high economic status show more supportive and engaged parenting, and invest more into the lives of their children (Cummings, 2014; Nogueira et al., 2005; Takada, Kondo, Hashimoto, & Committee, 2014). Children from wealthy families can afford to send their children to high-quality schools with sufficient resources and skilled teachers (Jefferson et al., 2011; Manly, Jacobs, Touradji, Small, & Stern, 2002; Richards et al., 2019). Both inside and outside of school, children from families with economic means have stimulating environments that can contribute to their cognitive development (Larson, Russ, Nelson, Olson, & Halfon, 2015). Finally, economic well-being buffers against stress, which is a risk factor for undesired cognitive outcomes in children (Gerra et al., 2020; Kelishadi et al., 2017; Rodriguez et al., 2019; Schibli, Wong, Hedayati, & D'Angiulli, 2017; Vargas et al., 2020). All these mechanisms have cumulative effects on children's cognitive development in families with economic resources (Bouthoorn et al., 2014; Christensen, Schieve, Devine, & Drews-Botsch, 2014; Karlsson, De Neve, & Subramanian, 2018; Madhushanthi, Wimalasekera, Goonewardena, Amarasekara, & Lenora, 2018; Poh et al., 2019).

Although both subjective and objective aspects of economic well-being and economic status matter (Senn, Walsh, & Carey, 2014), most of the existing literature has focused on objective economic indicators such as parental education, household income, parental employment, marital status, and wealth (Marmot, 2004). These indicators, however, only reflect some specific domains of economic well-being. Complementary to these objective measures are subjective indicators of economic well-being that capture how the individual and family perceives the sufficiency of economic means on a day-by-day basis. These subjective indicators have the potential to reflect economic strains and describe how an individual values their social status relative to others (Assari, Boyce, & Bazargan, 2020; Manuck, Phillips, Gianaros, Flory, & Muldoon, 2010; Moon, 1987; Wright & Steptoe, 2005).

The subjective economic status may have some health effects that are not due to objective indicators such as income, wealth, education, and occupation (Feldman & Steptoe, 2004; Manuck et al., 2010; Moon, 1987; Senn et al., 2014; Ursache, Noble, & Blair, 2015; Wright & Steptoe, 2005). For racial and ethnic minorities, subjective economic status reflects economic distress and insecurity of housing and food (Assari, Smith, Mistry, Farokhnia, & Bazargan, 2019; Assari, Smith, Saqib, & Bazargan, 2019). Some research, however, suggests that social groups, particularly racial and ethnic groups, may differ in the protective effects of subjective economic status on health (Assari, 2018a; Assari, 2018h). As mentioned before, traditionally, health inequality research has predominantly measured objective rather than subjective indicators of economic well-being (Link & Phelan, 1995, 2009; Phelan, Link, Diez-Roux, Kawachi, & Levin, 2004). As such, there is a need to explore how racial and ethnic groups differ in the effects of subjective economic indicators (Assari, Preiser, Lankarani, & Caldwell, 2018; Assari, Smith, Mistry, et al., 2019).

Two competing and complementary models have been used to study the simultaneous and joint effects of race and subjective economic status on children's outcomes. The first approach, which has traditionally

and historically dominated the field, attributes racial and ethnic gaps in children's outcomes to the scarcity of economic resources and a high prevalence of risk factors in the lives of racial minority families such as non-Hispanic Blacks (Bell, Sacks, Thomas Tobin, & Thorpe, 2020; Fuentes, Hart-Johnson, & Green, 2007; Kaufman, Cooper, & McGee, 1997; Samuel, Roth, Schwartz, Thorpe, & Glass, 2018). Some of the researchers who follow this line of work have suggested that economic status may partially mitigate the effects of race on children's outcomes (Assari, 2016, 2017a; Assari, Khoshpouri, & Chalian, 2019). This research advocates for enhancing the economic status of racial and ethnic minority groups as the main strategy to close the racial differences in children's outcomes (David R Williams, 1999; D. R. Williams, Costa, Odunlami, & Mohammed, 2008).

The second model, however, argues that economic resources may have differential effects on generating childhood outcomes across racial groups. Marginalization-related Diminished Returns (MDRs) (Assari, 2017b; Assari, 2018a) is defined as weaker effects of economic resources on tangible outcomes of non-Hispanic Black children than non-Hispanic White children. This model has received overwhelming support, suggesting that various indicators such as subjective economic status (Assari, Boyce, & Bazargan, 2020; Assari, Preiser, Lankarani, et al., 2018), parental education (Assari, Caldwell, & Bazargan, 2019), family income (Assari, C. H. Caldwell, & R. Mincy, 2018a; Assari, Thomas, Caldwell, & Mincy, 2018), employment (Assari, 2018d), and marital status (Assari & M. Bazargan, 2019) all generate fewer desired outcomes for non-Hispanic Black children than non-Hispanic White children.

Well-documented by the existing MDRs literature, economic resources of oneself (Assari, Farokhnia, & Mistry, 2019) and one's parents (Assari, 2018e; Assari, 2018b; Assari, 2018f) generate fewer desired outcomes for racial and ethnic minority groups. Non-Hispanic Black children and non-Hispanic White children differ in their opportunities to mobilize their economic resources to secure tangible outcomes (Assari, 2017b, 2018a, 2018f; Assari, Caldwell, & Mincy, 2018a; Assari, Caldwell, & Zimmerman, 2018; Assari & Hani, 2018). Given the existing MDRs, non-Hispanic Black children develop worse than expected outcomes when compared to non-Hispanic White children, a pattern seen across all economic levels (Assari, 2017b; Assari, 2018a; Assari, Caldwell, & Mincy, 2018a; Assari, C. H. Caldwell, & R. B. Mincy, 2018b; Assari, Thomas, et al., 2018). While these MDRs are shown for elements such as attention, impulsivity, inhibitory control, and reward orientation, we are not aware of any studies on matrix reasoning, which is an important domain of cognitive performance.

Matrix reasoning (Chierchia et al., 2019; Harrison, Shipstead, & Engle, 2015) is a major element of cognitive performance. Matrix reasoning (Allen & Fong, 2008; Harrison et al., 2015; Knight, 2003) is a type of visual-spatial problem solving, and closely correlates with general intelligence (Gottfredson, 1998). Matrix reasoning measurement commonly involves a series of figures in which there is a pattern, with one figure in the series intentionally left blank. The individual is shown an array of possibilities so the person who indicate which figure would complete the series or pattern (Mayes & Calhoun, 2008). Matrix reasoning correlates with overall cognitive performance and is highly affected in psychiatric conditions such as Attention Deficit Hyperactivity Disorder (ADHD), autism, psychosis, and learning

disabilities. Matrix reasoning is commonly measured using the widely IQ measure, Wechsler Intelligence Scales for Children-IV (WISC-IV) (Dombrowski, Canivez, & Watkins, 2018). Matrix reasoning is independent of the speed or motor planning. Such lack of requirements makes matrix reasoning a reliable test that is not confounded by executive function and executive control (Mayes & Calhoun, 2008). Matrix reasoning score also reflects strengths and weaknesses in verbal and visual reasoning, and attention in children with and without mental and intellectual disorders (Mayes & Calhoun, 2008).

1.1 Aims

To extend the knowledge that is already available regarding the combined effects of race/ethnicity and subjective economic status on children's cognitive performance, we built a study on the MDRs theory to compare race/ethnic groups of children for the boosting effect of subjective economic status on children's matrix reasoning, which is one of the main domains of cognitive function. Although we hypothesized a boosting effect of subjective economic status on children's matrix reasoning, we expected this effect to be weaker for non-Hispanic Black children than non-Hispanic White children. Our motivation is to understand if MDRs in cognitive function explains the observed MDRs of economic status on school performance (Assari, 2019b; Assari & Caldwell, 2019), given that cognitive function is a strong determinant of school performance (Jacques & Seitz, 2020; King & Markant, 2020; Schibli et al., 2017).

2. Methods

2.1 Design

A secondary analysis of wave 1 data of the Adolescent Brain Cognitive Development (ABCD) study (Alcohol Research: Current Reviews Editorial, 2018; Casey et al., 2018; Karcher, O'Brien, Kandala, & Barch, 2019; Lisdahl et al., 2018; Luciana et al., 2018), a landmark children's brain development study in the United States. More nuanced data on the details of the ABCD study is available here (Alcohol Research: Current Reviews Editorial, 2018; Auchter et al., 2018). The ABCD study's baseline data collection occurred between 2016 and 2018.

2.2 Sampling

In the ABCD study, participants were limited to 9-10 years old children who were recruited from multiple cities across several states. In total, 21 ABCD centers were involved in the recruitment of the children. The main strategy to recruit participants to the ABCD study was to utilize the US school system (Garavan et al., 2018). Eligibility criteria for the current analysis were not being a twin, not being Hispanic, and having valid data on race, demographic factors, and cognitive performance. Only non-Hispanic Black or non-Hispanic White individuals could enter our analysis.

2.3 Study Variables

The study variables included race/ethnicity (moderator), age, sex, parental education, parental employment, parental marital status, and household size (covariates), subjective economic status

(independent variable), and children's matrix reasoning (dependent variable).

2.4 Demographic and Socioeconomic Confounders

Age, sex, household size, parental education, parental employment, and parental marital status were the confounders. Parents were asked to report the age of their children. Age was a dichotomous variable 1 for 10 and 0 for 9 years old. Sex was also dichotomized as 1 for males and 0 for females. Household size was a continuous measure self-reported by the parent. Parental marital status was equal to 1 for married and equal to 0 for unmarried. Parental education was a continuous measure from 1 to 21. Parental employment was self-reported by the interviewed parent and was coded 1 for the presence of any employed parent in the household and 0 for no employed parent in the household.

2.5 Primary Outcome

Matrix reasoning (cognitive performance). The ABCD study used the Wechsler Intelligence Scale for Children -V (WISC-V) to measure the cognitive performance of the children (Raiford et al., 2016). WISC is one of the most commonly used measures to capture children's IQ and cognitive performance (Baron, 2005). In this analysis, we used the WISC-V matrix reasoning total score data (pea_wiscv_tss) as our outcome (Raiford et al., 2016). This variable is pre-calculated and was already available in the ABCD study. Our measure of WISC-V matrix reasoning had a normal distribution. For this continuous measure, a higher score indicates higher cognitive performance (Covin & Hatch, 1977; Salthouse, 1993; Soulieres et al., 2009).

2.6 Independent Variable

Subjective economic status. This study measured subjective economic status using seven items. Participants were asked "In the past 12 months, has there been a time when you and your immediate family experienced any of the following:" 1) "Needed food but couldn't afford to buy it or couldn't afford to go out to get it?", 2) "Were without telephone service because you could not afford it?" 3) "Didn't pay the full amount of the rent or mortgage because you could not afford it?", 4) "Were evicted from your home for not paying the rent or mortgage?", 5) "Had services turned off by the gas or electric company, or the oil company wouldn't deliver oil because payments were not made?", 6) "Had someone who needed to see a doctor or go to the hospital but didn't go because you could not afford it?" and 7) "Had someone who needed a dentist but couldn't go because you could not afford it?" Responses were 0 or 1. A mean score (a continuous measure) was calculated, with a range varying between 0 and 1, where higher scores were indicative of higher subjective economic status (Assari, Preiser, Lankarani, et al., 2018; Assari, Smith, Mistry, et al., 2019; Boe, Petrie, Sivertsen, & Hysing, 2019; Chen & Paterson, 2006; Moon, 1987; Wright & Steptoe, 2005; Ye, Wen, Wang, & Lin, 2020). Subjective economic status shows strong effects on behavioral, developmental, and health outcomes (Assari, Preiser, Lankarani et al., 2018; Assari, Smith, Mistry et al., 2019; Manuck et al., 2010; Moon, 1987; Senn et al., 2014; Ursache et al., 2015).

2.7 Moderator

Race. Race/ethnicity was identified by the parents. Race/ethnicity was a categorical variable and coded 1 for non-Hispanic Black and 0 for non-Hispanic White.

2.8 Data Analysis

SPSS 23.0 (IBM, New York, NY, USA) was applied for data analysis. Mean, standard deviation (SD), frequency, and relative frequency (%) were reported to describe the sample. We described our sample overall and by race/ethnicity. We performed a Pearson bivariate test to rule out multicollinearity before performing our linear regression model. For our multivariable models, we applied multiple linear regression models. Our first two models were performed in the overall sample. Our last two models were performed in each race. *Model 1* did not have any interaction terms. *Model 2*, however, did add an interaction term between race/ethnicity and subjective economic status. *Model 3* was performed in non-Hispanic White children. *Model 4* was performed in non-Hispanic Black children. We reported b, SE, 95% CI, and p value.

2.9 Ethical Aspect

This analysis was exempt from a full Institutional Review Board (IRB) review by Charles R. Drew University of Medicine. The mother study (ABCD), however, was approved by the IRB at the University of California, San Diego (UCSD). Assent and consent were received from children and their parents, respectively (Auchter et al., 2018).

3. Results

3.1 Descriptives

As shown in Table 1, 7898, 9-10 years old children were included in our analysis. From this number, most were non-Hispanic Whites (n = 5839; 73.9%) and the rest were non-Hispanic Blacks (n = 2959; 26.1%).

Table 1. Socio-demographic Data Overall (n = 7898)

	<i>All</i>		<i>non-Hispanic White</i>		<i>non-Hispanic Black</i>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Child Race/Ethnicity						
Non-Hispanic White	5839	73.9	5839	100	0	0
Non-Hispanic Black	2059	26.1	0	0	2059	100
Child Sex						
Female	3738	47.3	2734	46.8	1004	48.8
Male	4160	52.7	3105	53.2	1055	51.2
Child Age (Year)						
9	4218	53.4	3115	53.3	1103	53.6
10	3659	46.3	2708	46.4	951	46.2

Parents' Marital Status*						
Not Married	2442	30.9	1037	17.8	1405	68.2
Married	5456	69.1	4802	82.2	654	31.8
Parents' Employment Status*						
Not Employed	2410	30.5	1684	28.8	726	35.3
Employed	5488	69.5	4155	71.2	1333	64.7
	Mean	SD	Mean	SD	Mean	SD
Household Size	4.66	1.53	4.69	1.43	4.58	1.80
Parental Education (1-21, High) *	16.96	2.38	17.55	2.00	15.30	2.58
Subjective Economic Status (0-1, High) *	0.93	0.16	0.96	0.12	0.85	0.22
Matrix Reasoning *	9.98	3.01	10.50	2.84	8.50	3.02

*p < 0.05 for comparison of non-Hispanic Blacks and non-Hispanic Whites

Table 2 presents the bivariate correlation between various study variables in the overall sample. Subjective economic status was positively correlated with cognitive performance. Other factors that were correlated with the cognitive score were race/ethnicity, sex, parental employment, parental marital status, and parental education.

Table 2. Correlations between Study Variables (n = 7898)

	1	2	3	4	5	6	7	8	9
1 Race (Non-Hispanic Black)	1	-0.02	-0.06*	-0.48*	-0.03*	-0.00	-0.42*	-0.30*	-0.29*
2 Sex (Male)		1	-0.01	0.01	0.02*	0.02*	-0.01	-0.01	-0.07*
3 Employed Parents			1	0.05**	-0.17*	0.01	0.25*	0.12*	0.08*
4 Married Parents				1**	0.25**	0.01	0.40*	0.30*	0.24*
5 Household size					1	-0.00	-0.08*	-0.02	-0.02
6 Age						1	0.00	0.01	0.00
7 Parental Education							1	0.31*	0.30*
8 Subjective economic status								1	0.16*
9 Cognitive performance									1

*p < 0.05

3.2 Pooled Sample Multivariate Analysis

In Table 3, two linear regression models have estimated our association of interest in the overall (pooled) sample. *Model 1* (Main Effect Model) showed the boosting effect of high subjective economic status on children's matrix reasoning. *Model 2* (Interaction Model) showed an interaction between the effects of race/ethnicity and subjective economic status on the outcome, suggesting that the boosting effect of high

subjective economic status on matrix reasoning is weaker for non-Hispanic Black children relative to their non-Hispanic White counterparts (Table 3).

Table 3. Overall Linear Regressions ($n = 7898$)

	Model 1 (Main Effects)				Model 2 (Interaction Effects)			
	b	SE	95% CI		b	SE	95% CI	
Race (Non-Hispanic Blacks)	-1.15*	0.09	-1.32	-0.98	-0.21	0.39	-0.97	0.56
Sex (Male)	-0.39*	0.06	-0.51	-0.26	-0.39*	0.06	-0.51	-0.26
Age	0.03	0.06	-0.09	0.16	0.03	0.06	-0.09	0.16
Household size	-0.05*	0.02	-0.09	0.00	-0.05*	0.02	-0.09	0.00
Parents employed	0.02	0.07	-0.12	0.16	0.02	0.07	-0.12	0.16
Married household	0.48*	0.09	0.31	0.65	0.47*	0.09	0.30	0.64
Parent education (years)	0.24*	0.02	0.21	0.27	0.24*	0.02	0.20	0.27
Subjective economic status	0.55*	0.22	0.12	0.98	1.10*	0.31	0.49	1.72
Subjective economic status \times Race					-1.05*	0.42	-1.88	-0.22

CI= Confidence Interval; SE= Standard Error; * $p < 0.05$

3.3 Race-specific Multivariate Models

Table 4 shows the results of linear regression models specific to each race/ethnic group. *Model 3* showed the protective effects of high subjective economic status on the children's matrix reasoning of non-Hispanic White children. *Model 4*, however, did not show any effect of high economic status on children's matrix reasoning for non-Hispanic Black children. The difference between the regression coefficients (b) in non-Hispanic White children and non-Hispanic Black children was statistically significant, according to the interaction term tested in *Model 2*.

Table 4. Race-specific Linear Regressions ($n = 7898$)

	Model 3 (Non-Hispanic White)				Model 4 (Non-Hispanic Black)			
	b	SE	95% CI		b	SE	95% CI	
Sex (Male)	-0.34*	0.07	-0.48	-0.20	-0.51*	0.13	-0.76	-0.25
Age	0.06	0.07	-0.08	0.21	-0.08	0.13	-0.34	0.18
Household size	-0.03	0.03	-0.09	0.02	-0.08*	0.04	-0.15	0.00
Parents employed	-0.13	0.08	-0.29	0.03	0.46*	0.15	0.17	0.75
Married household	0.38*	0.10	0.17	0.58	0.66*	0.16	0.36	0.97
Parent education (years)	0.25*	0.02	0.21	0.29	0.20*	0.03	0.14	0.25
Subjective economic status	1.17*	0.31	0.55	1.78	-0.09	0.31	-0.70	0.52

CI= Confidence Interval; SE= Standard Error; * $p < 0.05$

4. Discussion

Overall, high subjective economic status was associated with higher children's matrix reasoning. However, the boosting effect of subjective economic status on children's matrix reasoning was diminished for non-Hispanic Blacks when compared to non-Hispanic Whites.

The observed diminished returns (MDRs) of economic status on matrix reasoning for non-Hispanic Black children compared to non-Hispanic White children are similar to what the previous research has suggested (Assari, 2018a, 2018c; Assari, 2019a; Assari, Farokhnia et al., 2019). MDRs are repeatedly established by research both within and between individuals and families. These MDRs are robust and reliable as they are found to hold across all economic levels, developmental phases, types of outcomes, and visible and non-visible sources of marginalizing identities (Assari, 2017b; Assari, 2018a). MDRs are shown for income (Assari, Caldwell, & Mincy, 2018a), education (Assari, Farokhnia, et al., 2019), employment (Assari, 2018d), and marital status (Assari, Caldwell, & Zimmerman, 2018). Economic status results in more gain for non-Hispanic White children than non-Hispanic Black children (Assari, Caldwell, & Mincy, 2018a; Assari, Caldwell, & Mincy, 2018b; Assari, Thomas et al., 2018), adults (Assari, 2018a), and older adults (Assari & Lankarani, 2016). Also, MDRs not only apply to non-Hispanic Blacks (Assari, Thomas et al., 2018), or Hispanic Whites (HWs) (Assari, 2018g; Assari, 2019; Assari, Farokhnia et al., 2019; Shervin & Ritesh, 2019) as they also hold for Asian Americans (Assari, Boyce, Bazargan, & Caldwell, 2020), Native Americans (Shervin Assari & Mohsen Bazargan, 2019a), and LGBTQ individuals (Assari, 2019a). For example, some studies have documented racial differences in family structure effects on health (Cross, 2020). That means, racial differences exist in the effects of parental marital status (an indicator of economic status) on children's health; the return on living in a two-biological-parent family is weaker for Black children than White children (Cross, 2020). A wide range of societal mechanisms is likely to be involved in causing MDRs of economic status in non-Hispanic Black families. Non-Hispanic Black communities, families, and individuals face a wide range of stressors that are not due to economic resources, but rather social stratification and racism. These non-economic adversities are environmental, structural, and are related to race, racialization, and marginalization, adversities that are seen across all economic levels (Bowden, Bartkowski, Xu, & Lewis Jr, 2017). The marginal returns of economic mobility may be limited when upward social mobility is more difficult for a specific group (Chetty, Hendren, Kline, & Saez, 2014). Increased exposure to stress is believed to reduce children's ability to gain from their available economic status resources such as parental education and income. It is shown that for non-Hispanic Black families, an increase in economic status means an increase in experience (Assari, 2018b; Assari, F. X. Gibbons, & R. Simons, 2018a; Assari, F. X. Gibbons, & R. L. Simons, 2018b; Assari, Lankarani, & Caldwell, 2018; Assari & Moghani Lankarani, 2018) and vulnerability (Assari, Preiser, Lankarani et al., 2018) to discrimination. This might be because non-Hispanic Black families who have economic resources are more likely to be surrounded by non-Hispanic White families, which increases their exposure to discriminatory events (Assari, Gibbons, et al., 2018a; Assari, Gibbons, et al., 2018b). Needless to say, high levels of race-related and

general discrimination, which operate as a risk factor for many poor health outcomes such as cognitive decline, reduce the expected gains from economic resources (Assari & Caldwell, 2018; Assari, Lankarani, et al., 2018; Assari, Preiser, Lankarani et al., 2018).

Residential segregation may be a reason why we observe differences between non-Hispanic Black and non-Hispanic White contextual exposures. It might be a result of residential and school segregation that school options are limited for non-Hispanic Black children, across all economic levels. As a result, Black children are sent to poor schools that are located in highly segregated areas, and this is even true for families that have economic resources (Assari, 2019b; Assari S, 2019; Assari & Caldwell, 2019). This results in the differential effects of Socioeconomic Status (SES) on education and schooling of non-Hispanic White children and non-Hispanic Black children. While high SES non-Hispanic White children attend sufficiently resourced schools that are located in suburban areas with available funding and highly prepared teachers, non-Hispanic Black children are sent to schools that have a lower level of resources and less prepared teachers (Jefferson et al., 2011).

In this study, we did not argue that race has a fixed and unmodifiable effect on cognitive performance. We are not making a statement in the politically and morally charged debate on the effect of race on IQ. We conceptualize race as a proxy of racialization, and we exclusively focused on the effect of race as a social factor, on bounding the health effects of economic status. The argument here is that in a race aware society that has historically used racism to hold non-Hispanic Blacks behind, family level and individual level factors are not enough to secure desired outcomes. This is in part because non-Hispanic Black families who have high economic resources still report high levels of stress as they face a wide range of societal barriers (Assari, 2018b; Assari & Moghani Lankarani, 2018). Non-Hispanic White families with similar economic status are not required to deal with such stressors in their daily lives (Assari & Mohsen Bazargan, 2019b; Assari, Preiser, & Kelly, 2018; Assari, Preiser, Lankarani, et al., 2018).

Although the lack of economic resources imposes one type of risk to non-Hispanic Black communities and families, this is not the only disadvantage that Black families experience in the US. MDRs are reflective of another set of disadvantages in the life of Black families (Assari, 2017b; Assari, 2018a). While the solution to a lack of resources is to equalize access to resources, the solution to the second type requires equalization of the returns of economic resources. The MDRs-related inequalities are resistant to closing the racial gap in economic resources. Resolving MDRs requires addressing the structural barriers that are root causes of MDRs-related inequalities, even in families that have high SES.

It is essential to dissolve inequalities that are due to a lack of economic resources from those that are due to their diminishing returns. Researchers and policymakers should be able to recognize the difference between the two classes of adversities and provide and suggest specific solutions to each. Policymakers should also be aware that non-Hispanic Blacks are experiencing double disadvantage and jeopardy, one for low economic resources, and one for lower return of such resources when they become available to them. A real solution should make economic resources available to the communities of color and at the

same time ensure that those resources are utilized by individuals and families (Assari, 2018a; Assari, 2018h).

To explain causes of MDRs, scholars have studied the daily experiences of middle-class Black families (Chiteji & Hamilton, 2002; Weitzman, Byrd, & Auinger, 1999). Reviewing the work of the above-mentioned research on Black middle class suggests that middle-class non-Hispanic Black families experience their class and social status differently when compared to middle-class non-Hispanic White families (Hudson, Sacks, Irani, & Asher, 2020). It is shown that high subjective economic status may even operate as a source of vulnerability for non-Hispanic Black families, as it both increases exposure (Assari, 2018b; Assari, Gibbons, et al., 2018a; Assari, Gibbons, et al., 2018b; Assari, Lankarani, et al., 2018) and sensitivity (Assari, Preiser, Lankarani, et al., 2018) to discrimination.

5. Study Limitation

The current study had a few non-fatal limitations. With a cross-sectional design, we do not read our findings as causal associations between SES and children's cognitive performance. We only tested MDRs of subjective economic status, and MDRs of other SES indicators were not investigated. While we controlled for parental education, employment, and marital status, other indicators such as family income, family wealth, and neighborhood economic status may also show differential effects on Black and White children's cognitive performance. This study also did not test contextual variables that cause the associations between economic resources and developmental outcomes to differ across racial groups.

6. Conclusion

When compared to non-Hispanic White children, non-Hispanic Black children show weaker effects of subjective SES on their matrix reasoning. It is still unknown why high-SES non-Hispanic Black children show worse-than-expected outcomes.

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