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The Intergenerational Transmission of Discrimination: Children's Experiences of Unfair Treatment and Their Mothers' Health at Midlife

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Abstract

A growing body of research suggests that maternal exposure to discrimination helps to explain racial disparities in children's health. However, no study has considered if the intergenerational health effects of unfair treatment operate in the opposite direction—from child to mother. To this end, we use data from mother–child pairs in the National Longitudinal Survey of Youth 1979 to determine whether adolescent and young adult children's experiences of discrimination influence their mother's health across midlife. We find that children who report more frequent instances of discrimination have mothers whose self-rated health declines more rapidly between ages 40 and 50 years. Furthermore, racial disparities in exposure to discrimination among children explains almost 10% of the black–white gap but little of the Hispanic–white gap in self-rated health among these mothers. We conclude that the negative health impacts of discrimination are likely to operate in a bidirectional fashion across key family relationships.

Keywords

discrimination, family relationships, health disparities, life course, racial inequalities

U.S. health disparities across race are a persistent social problem that is both a source and symptom of racial inequalities. Excessive levels of morbidity and mortality among African Americans and Hispanics are primarily the result of serious chronic illnesses, such as hypertension, obesity, and diabetes (Geronimus, Bound, and Colen 2011; Riddell et al. 2018) and account for almost $230 billion in additional health care spending annually (LaVeist, Gaskin, and Richard 2011). For every one life saved due to medical advances, an estimated five deaths could be prevented by eliminating racial inequalities in health (Woolf et al. 2004). Thus, a more robust understanding of the underlying conditions driving these stark racial disparities is a national priority. One explanation for these unrelenting inequalities delineates the role that discrimination (i.e., unfair treatment) plays in the unequal distribution of health across race. A robust body of literature now exists to document the association between unfair treatment and suboptimal mental and physical functioning (Lewis, Cogburn, and Williams 2015; Williams and Sternthal 2010).

An aspect of the relationship between discrimination and health that remains understudied concerns how the negative effects of unfair treatment

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are passed from one generation to the next. These intergenerational processes are critical to understanding the seemingly intractable nature of racial inequalities in health (Umberson et al. 2017). While important, much of the extant research that investigates how exposure to discrimination in one generation influences the health of subsequent generations focuses on maternal to infant transmission (Chae et al. 2018; Collins et al. 2004; Dole et al. 2003; Earnshaw et al. 2013; Lauderdale 2006; Mustillo et al. 2004; Novak, Geronimus, and Martinez-Cardoso 2017; Orchard and Price 2017) or mental health outcomes among older children (Heard-Garris et al. 2018). At this time, we know of only one study that (1) examines whether the intergenerational health effects of discrimination occur in the opposite direction—from child to parent and/or (2) links the experiences of older children, specifically adolescents and young adults, to health outcomes among parents at later life course stages, such as midlife (Barr et al. 2018). We argue that to obtain a complete picture of the complex ways discrimination influences health, particularly for women, it is critical to explore how children's discrimination shapes parental well-being.

The current study was designed to address these gaps in the literature, thus expanding our understanding of how discrimination might erode the health of key family members who do not directly experience this race-related stressor. We use a merged life course and stress process theoretical approach (Elder 1998; Pearlin et al. 1981, 2005; Umberson, Liu, and Reczek 2008) to examine the negative health consequences of this type of intergenerational exposure. To this end, we combine data from the National Longitudinal Survey of Youth 1979 (NLSY79) with information from the corresponding young adults study (NLSY79-YA) to determine the extent to which adolescents' and young adults' experiences of unfair treatment negatively influence their mothers' health during midlife.

BACKGROUND

Stress process theory provides a useful theoretical approach to better understand the role discrimination (i.e., unfair treatment) plays in the unequal distribution of health across race (Pearlin et al. 1981, 2005). A growing body of research documents the association between unfair treatment and suboptimal physical functioning via stress mechanisms (Lewis et al. 2015; Williams and Mohammed 2013). We now know that individuals who experience more frequent discrimination demonstrate higher levels of stress as evidenced by slower blood pressure recovery, increases in inflammatory markers, and worse sleep patterns (Hicken et al. 2013; Kershaw et al. 2016; Moody et al. 2016; Sims et al. 2016). Even more compelling evidence is provided by studies that reveal a positive association between exposure to unfair treatment and telomere length (Chae et al. 2014, 2016; Lee, Kim, and Neblett 2017; Liu and Kawachi 2017), suggesting that this type of race-related stressor could lead to accelerated cellular senescence.

While stress processes are central to our understanding of how discrimination contributes to health disparities, life course theory suggests that the health of one generation is strongly connected to the health of another, with the experiences of parents and children inextricably linked (Elder 1998; Umberson, Crosnoe, and Reczek 2010). However, most studies on the intergenerational transmission of discrimination on health emphasize maternal-to-infant pathways (Collins et al. 2004; Dole et al. 2003; Earnshaw et al. 2013; Lauderdale 2006; Mustillo et al. 2004; Novak et al. 2017). Those that consider how maternal exposure to discrimination influences the well-being of older children overwhelmingly focus on mental as opposed to physical health outcomes (Heard-Garris et al. 2018).

To our knowledge only one study, (1) investigates whether the health effects of discrimination operate in the opposite direction—from child to parent and (2) links the experiences of unfair treatment among older children, specifically adolescents and young adults, to health outcomes among midlife parents (Barr et al. 2018). We argue that to fully understand how racial disparities in health shape life course trajectories, particularly during midlife, we must recognize the "linked lives" that parents and children share during this critical life course stage (Bengtson, Elder, and Putney 2012). In the following, we further theorize the relationship between intergenerational ties, discrimination, and health to build our hypotheses.

The Intergenerational Transmission of Discrimination

Recent studies have begun to examine the biophysiological mechanisms undergirding the association between unfair treatment and suboptimal health. We know that individuals who encounter more frequent discrimination exhibit worse cardiovascular reactivity and higher levels of inflammation and take longer to return to a steady state of physiological functioning than individuals who experience less

frequent discrimination (Goosby et al. 2015; Lewis et al. 2010; Richman et al. 2010; Szanton et al. 2012). While it is clear that the stress response is implicated in linking exposure to discrimination to suboptimal population health outcomes (Goosby, Cheadle, and Mitchell 2018), what is less well known is the extent to which stress reactivity as a result of unfair treatment can influence well-being *across* generations (Gee, Walsemann, and Brondolo 2012). Life course theory suggests that one of the strongest social ties is that which exists between a parent and child, and this tie is especially important for the former as the latter enters emerging adulthood (Umberson et al. 2010). Thus, we expect that the intergenerational effects of unfair treatment would be most relevant and particularly pronounced when examining intergenerational pairs as opposed to other types of social or familial bonds.

A small but growing area of research examines instances of discrimination among mothers and subsequent health outcomes among their infant children. Some of these studies directly measure experiences of unfair treatment (Collins et al. 2004; Dole et al. 2004; Earnshaw et al. 2013), while others exploit natural experiments to approximate these detrimental exposures (Lauderdale 2006; Novak et al. 2017). Mustillo et al. (2004) found that mothers who report three or more experiences of racial discrimination were five and three times more likely to give birth to a low birthweight or preterm baby, respectively, compared to mothers who reported no experiences of racial discrimination. Lauderdale (2006) noted that the probability of low birthweight and preterm birth significantly increased from the six-month period before September 11 to the six-month period after this event, but only among children born to Arab and Arab-American women, while Novak et al. (2017) reported declines in infant health of similar magnitudes among Hispanics following one of the largest immigration raids in U.S. history.

A notable exception is a recent study by Barr et al. (2018), who found preliminary evidence that challenges experienced by young adult children during the transition to adulthood are associated with higher allostatic load scores, worse self-rated health, and lower psychological well-being among their mothers. Unfortunately, the authors were unable to separate out the intergenerational impacts of children's discrimination on maternal health from other stressful life events occurring during emerging adulthood. Furthermore, the study sample only includes African Americans from two locales, so comparisons across race-ethnicity cannot be drawn, nor are findings generalizable to a nationally representative population.

The Health Effects of Discrimination—Child-to-Parent Transmission

How might the negative health effects of discrimination be transmitted from child to parent, particularly in ways that vary by race? We suggest this is likely to happen through stress proliferation mechanisms that operate across the life course as well as via key social relationships (Pearlin et al. 2005). Stress proliferation occurs when a primary stress exposure[1] creates a cascading effect, thereby resulting in subsequent stressors. This dynamic process is best characterized by using the analogy of an intricate game of dominos—as the first one falls, its impact reverberates across social network ties and spans life course stages, thus worsening health and contributing to widening disparities between lower and higher status groups. Rather than treat stressors as isolated events that each trigger an individualized physiological response, stress proliferation emphasizes the integrative, complex, and relational effects that stress exposures can have on health, particularly as individuals move through social space and/or time. In the following paragraphs, we highlight the most salient aspects of stress proliferation for the current study—hypervigilance, reactivation of early life traumas, and role transitions (Pearlin et al. 2005) —to further clarify how experiences of unfair treatment among children could impact their parents' health.

African American and Hispanic parents confront on a daily basis the likelihood that their children will be treated unfairly as a result of their race. Research shows this worry is constant and unrelenting, demanding that racial-ethnic minority parents, particularly mothers, maintain excessive levels of anticipatory hypervigilance in the face of unrelenting structural, cultural, institutional, and interpersonal racism (Lee and Hicken 2016; Nuru-Jeter et al. 2009). Thus, African American or Hispanic parents do not need to directly witness the discriminatory event or condition for it to extract a heavy toll on their health. Instead, they are likely to already be on high alert to the possibility that their child will encounter unfair treatment and rely on both subtle and overt social cues to gauge how likely this is to occur at a given time. It is this type of relentless psychosocial stressor that has been implicated in the worst population health outcomes and sustained racial inequalities in well-being (Goosby et al. 2018; Juster, McEwen, and Lupien 2010).

Sustained hypervigilance is not the only pathway through which children's experiences of unfair treatment is likely to negatively impact their parents' health. To obtain a more nuanced understanding of the intergenerational health effects of discrimination via stress proliferation mechanisms, we must consider how parents' prior experiences of personal and/or historical racialized trauma will interact with their own children's experiences of unfair treatment to set the stage physiologically for poor health (Heard-Garris et al. 2018). Previous research has shown that prior instances of discrimination increase stress reactivity and worsen health over time (Gee and Walsemann 2009; Pavalko, Mossakowski, and Hamilton 2003), which is expressed on a population level as accelerated aging or weathering (Geronimus et al. 2015). Thus, when helping children navigate a social world in which discrimination occurs frequently and is baked into the very nature of our social structures, parents might be reminded of their own current or historical traumatic experiences of unfair treatment. Furthermore, stress proliferation theory suggests that the compounding health impacts of intergenerational stress exposures will be exponential as opposed to additive, furthering supporting the notion that the health effects of children's exposure to discrimination on parents is likely to be of a substantial magnitude (Pearlin et al. 2005).

Another mechanism through which stress proliferation can occur is via role transitions, particularly those that are considered "mistimed" (Pearlin et al. 2005). We propose that both children in emerging adulthood and their parents in midlife are likely to be experiencing critical role transitions that often reshape the way both generations interact with and relate to other key family members as well as the social structures within which families are embedded. Life course theory pinpoints the transition to adulthood as an important inflection point during which adolescents and young adults make decisions, establish connections, and gain experiences that can set them on a particular trajectory for the rest of their lives (Arnett 2000; Fingerman 2017). Emerging adults experience a series of rapid role transitions as they move from childhood toward adulthood at an accelerating pace. Compared to younger children, emerging adults seek more independence, spend less time under direct parental supervision, engage in more risk-taking behaviors, and rely more on peer as opposed to familial networks for social cues and support (Umberson et al. 2010). In response to children's changing expectations and behaviors, midlife parents experience their own role transitions as they move from parenting school-agers to teens and young adults, adjusting their level of oversight and control to give their children more freedom as they move through their daily lives. These changes often result in parents redefining their own goals and priorities as well as renegotiating their own identities. Thus, we suspect that the intergenerational effects of discrimination on parental health will be particularly problematic for midlife parents raising emerging adults as both generations are undergoing simultaneous role transitions.

The pace at which these role transitions occur and how successful they are vary across race (Furstenberg 2010; Syed and Mitchell 2013). African American and Hispanic young adults leave full-time schooling earlier, are less successful finding employment, earn less at labor market entry, and experience teen childbearing more often than their white counterparts (McDaniel et al. 2011; Quillian et al. 2017; Sweeney and Raley 2014). With respect to discrimination, adolescents and young adults of color must ensure that their intentions during social interactions are clear and are not misinterpreted by others, particularly store managers, teachers, or police (Dow 2016). This type of stringent behavioral self-policing can force African American and Hispanic children to "grow up faster" or experience earlier role transitions than their white peers. To this end, Barr et al. (2018) demonstrated that African American mothers' health status declines when their young adult children experience more stressful transitions to adulthood, particularly older male children.

Based on the conceptual intersections between stress proliferation and life course theories and expected differences across race, the first two hypotheses to be tested are as follows:

> *Hypothesis 1:* Experiences of discrimination among adolescent and young adult children will be negatively associated with their mothers' health at midlife.
> *Hypothesis 2:* Racial disparities in health among mothers at midlife can be explained, at least in part, by their adolescent and young adult children's experiences of discrimination.

Racial Differences in the Effects of Children's Discrimination on Parental Well-being

Although individuals of all racial backgrounds experience instances of unfair treatment, we expect that the intergenerational health impacts of discrimination

will be more pronounced for African American and Hispanic parents. This hypothesis suggests that racial disparities in health among parents are not simply the result of more frequent experiences of unfair treatment among their children but stem from a differential intergenerational effect of discrimination across race. In the following section, we will delineate the reasoning behind this hypothesis.

First, racial inequality is entrenched within the very structure of American society, exposing African Americans and Hispanics to a lifetime's worth of unfair treatment. These negative social exposures have been shown to erode physical functioning exponentially over time, thus hastening the pace at which racial minorities, particularly women, age, or "weather" (Geronimus et al. 2015). Because of this accelerated process, the health of African American and Hispanic parents is already disadvantaged relative to their white counterparts at the beginning of midlife. By the time their own children are independently navigating instances of unfair treatment, (1) the health of African American and Hispanic parents has already begun to deteriorate, and (2) their ability to recover from race-related stressors, even those encountered by other family members, is less robust.

Second, compared to whites, African Americans and Hispanics are more likely to anticipate experiences of unfair treatment, particularly in certain settings (i.e., school) or when interacting with specific types of people (i.e., law enforcement; Feagin and Sikes 1994). Anticipatory stress is just as problematic—sometimes more so—than actual stress exposures in eroding health over time since the same biophysiological responses are triggered by thinking about or actually experiencing an environmental threat (McEwen and Gianaros 2011). Furthermore, constantly being prepared to encounter experiences of discrimination leads African Americans and Hispanics to maintain a steady state of race-related hypervigilance, which has been linked to suboptimal outcomes including worse cardiovascular reactivity, hypertension risk, obesity, depression, and poor sleep (Clark, Benkert, and Flack 2006; Hicken et al. 2013, 2014; Hicken, Lee, and Hing 2018; Himmelstein et al. 2015; LaVeist et al. 2014; Lindström 2008; Sawyer et al. 2012).

Third, because of the underlying common structures and processes that uphold different types of social inequality, individuals who occupy one disadvantaged social status are more likely to occupy others. This is especially true for African American or Hispanic mothers who already are facing the "double burden" of being both women and people of color (Collins 2002; St. Jean and Feagin 2015). We are not suggesting an adherence to a simple hierarchy of oppression framework to predict the pace at which health erodes over time. Rather, we believe the health effects of occupying more than one disadvantaged status are multiplicative and dynamic. Given these considerations, we test a third hypothesis:

> *Hypothesis 3*: The association between adolescent and young adult children's experiences of discrimination and mothers' health at midlife will be significantly more pronounced for racial-ethnic minority versus white parents.

DATA AND METHODS

Description of the Data

We combined data from two National Longitudinal Survey cohorts, the NLSY79 and the NLSY79-YA, to examine the extent to which discrimination among children was associated with their mothers' health. The NLSY79 contained information on a nationally representative sample of individuals who were 14 to 22 years in 1979. Respondents were reinterviewed annually or biannually through 2014. In 1986, interviewers began to collect data on all children born to NLSY79 mothers. It was this group of respondents who formed the basis for the NLSY79-YA survey. By 2015, the NLSY79 and the NLSY79-YA were comprised of 7,071 and 5,735 individuals, respectively, who were, on average, 55 and 28 years old.

In the mid-2000s, two comprehensive health assessments, each of which was conducted when respondents were 40 and 50 years old, were added to the NLSY79. We now have a rich picture of how the health of the NLSY79 cohort had fluctuated over time. In 2012, questions about experiences of unfair treatment were added to the NLSY79-YA survey. These were based on measures of interpersonal discrimination originally developed by David Williams, whose psychometric properties are well established and have been validated across a diverse set of study samples (Bastos et al. 2010; Krieger et al. 2005).

Description of the Measures

Self-rated health. To capture changes in mothers' health during midlife we relied on an indicator of self-rated health. As part of the 40th- and 50th-year health assessments, NLSY79 respondents were

asked, "In general, would you say your health is… excellent, very good, good, fair, or poor?" Measures of self-rated health have been shown to be a reliable indicator of subsequent morbidity and mortality, even among younger midlife cohorts (Latham and Peek 2013), and often predict outcomes more accurately than physician examination (DeSalvo et al. 2006; Jylhä 2009). Moreover, the proportion of missing data on this outcome measure remains extremely low, particularly compared to physical health assessments. Finally, self-rated health is one of the only health indicators to be included in both the 40th and 50th health modules, thus allowing us to assess declines in well-being rather than predicting health at a single point in time.

Interpersonal discrimination. We discerned experiences of discrimination among NLSY79 young adults using two multi-item measures. The Major Experiences of Discrimination Scale (MEDS) is comprised of five questions that asked respondents 21 years or older if they ever encountered discrete instances of discrimination in a number of settings (e.g., at school, at work, or during interactions with police). The Everyday Discrimination Scale (EDS) includes nine questions that assessed the frequency with which respondents were exposed to chronic forms of discrimination and was asked of all NLSY79 young adults 18 years or older. We analyzed acute (MEDS) and chronic (EDS) discrimination separately since they were theoretically distinct and prior studies have found these two types of unfair treatment to have differential effects on health (Lewis et al. 2015; Williams, Neighbors, and Jackson 2003). A complete description of the MEDS and the EDS is presented in Appendix A.

Race. To determine the race of the NLSY79 respondent, we relied on an indicator based on the interviewer's initial assessment in 1979. Subsequent analyses revealed a high correlation between the interviewer's and respondent's racial identification in the NLSY79 (Light and Nandi 2007). We divided the sample into three mutually exclusive racial categories—non-Hispanic whites, non-Hispanic blacks, and Hispanics.

Other sociodemographic variables. We considered key sociodemographic control variables that could confound the association between a child's experiences of unfair treatment and mother's health. All covariates were measured during the survey year in which the NLSY79 mother completed her 40th health assessment. These sociodemographic controls included: marital status (currently married, never married, or previously married), region of residence (Northeast, Midwest, South, or West), employment status (employed, unemployed, out of the labor force), and years of completed schooling.

Analytic Strategy

We estimated a series of ordered logistic regression models, which relied on maximum likelihood estimation, to determine the extent to which a child's exposure to discrimination negatively impacted his or her mother's health at age 50. We included self-rated health at age 40 as a control variable in all regression analyses. Subsequent sensitivity tests revealed that regression results were robust to different specifications of the outcome variable, including whether self-rated health was captured using five response categories or a dichotomous measure (fair/poor health vs. all others). We calculated robust standard errors using the Huber-White correction to account for heteroskedastic error terms and clustered at the highest level of aggregation (NLSY79 family).

We employed multiple imputation methods to deal with missing data. Once we restricted our analytic sample to include only respondents for whom we had complete data on the dependent and independent variables of interest, we relied on a diverse set of predictors to estimate five sets of responses for each missing value. We limited the number of imputed data sets to five because the proportion of missing values on all variables did not exceed 2%. Imputed values include a random component based on draws from the posterior predictive distribution of the missing data under a posited Bayesian model, which under the missing-at-random (MAR) ignorability assumption, provide unbiased estimates of variance (Allison 2001; Little and Rubin 2019). Since the MAR assumption was based on unobservable, as opposed to observable, distributions in the data, we estimated sensitivity analyses to verify that our results remained consistent across different imputation techniques, including complete case regression models (Cro et al. 2016).

Out of 3,256 NLSY79 mothers who completed the 40th and 50th health modules, 3,005 had children who provided answers to either acute or chronic discrimination questions. This subgroup formed the basis of our analytic sample.

RESULTS

Descriptive Results

Descriptive findings for the full sample and stratified by race are presented in Table 1. At age 40,

Table 1. Descriptive Statistics for National Longitudinal Survey of Youth 1979 Mothers and Their Young Adult Children.

	Full Sample	NH Whites	NH Blacks	*p*	Hispanics	*p*
Self-rated health at age 50						
Excellent	13.09	16.31	8.68	***	13.22	***
Very good	32.44	38.80	28.41		25.52	
Good	30.92	27.79	32.30		35.24	
Fair	17.51	12.47	23.02		19.44	
Poor	6.03	4.62	7.58		6.57	
Self-rated health at age 40						
Excellent	19.49	24.02	15.44	***	16.36	***
Very good	34.59	39.28	31.52		29.65	
Good	30.43	26.57	32.39		35.38	
Fair	12.57	7.20	18.14		15.10	
Poor	2.91	2.92	2.51		3.50	
Acute discrimination[a]						
High	15.36	10.52	21.83	***	14.49	***
Moderate	23.48	20.59	27.63		22.51	
Low	61.15	68.89	50.53		63.00	
Chronic discrimination	8.65	8.08	9.81	***	8.04	
	(6.31)	(5.77)	(6.95)		(6.13)	
Race-ethnicity						
NH white	44.85					
NH black	33.36					
Hispanic	21.79					
Marital status						
Married	61.52	77.61	39.47	Ref	62.17	Ref
Never married	11.23	2.24	25.99	***	7.13	***
Previously married	27.25	20.15	34.54	***	30.70	***
Region of residence						
Northeast	14.25	15.90	11.97	Ref	14.35	Ref
Midwest	25.75	36.89	21.12	+	9.89	***
South	40.12	30.91	60.16	***	28.41	
West	19.88	16.30	6.75	**	47.36	***
Employment status						
Employed	72.54	75.28	72.81	Ref	66.46	Ref
Unemployed	4.23	2.51	5.71	**	5.48	**
Out of labor force	23.24	22.20	21.48		28.06	**
Years of education	12.91	13.54	12.75	***	11.87	***
	(2.46)	(2.35)	(1.97)		(2.90)	
N children	6,562	2,943	2,189		1,430	
N mothers	3,004	1,448	958		598	

Note: NH white = non-Hispanic white; NH black = non-Hispanic black; Ref = reference category.
[a]Sample size for acute discrimination: 5,604 (combined), 2,404 (NH white), 1,965 (NH black), and 1,235 (Hispanic).
$^{+}p < 0.10$, $*p < .05$, $**p < .01$, $***p < .001$.

more than 54% of respondents rate their health as excellent or very good, while more than 15% describe their health as fair or poor. By age 50, only 46% of respondents say their health is excellent or very good, and almost 24% describe their health as fair or poor. Racial disparities in self-rated health are apparent. By age 50, 17% of non-Hispanic whites report having fair or poor health. This stands

in contrast to 31% and 26% of non-Hispanic blacks and Hispanics, respectively, who rate their health as fair or poor.

Regarding exposure to unfair treatment among the NLSY79 young adults, we find notable dissimilarities across race. For acute discrimination, non-Hispanic whites and blacks report the lowest and highest levels, respectively, while Hispanics fall in between. Eleven percent of non-Hispanic whites, 22% of non-Hispanic blacks, and 14% of Hispanics report frequent acute discrimination. Mean chronic discrimination scores follow a slightly different pattern, with non-Hispanic whites and Hispanics having almost identical values (8.08 and 8.04), while average chronic discrimination scores among non-Hispanic blacks are almost two-points higher (9.81).

Regression Results

Regression results are presented in Table 2. Models 1 and 3 reveal the extent to which experiences of major (MEDS) and everyday (EDS) discrimination, respectively, among adolescent and young adult children are associated with changes in their mothers' self-rated health net of the effects of race. Models 2 and 4 control for additional covariates.

Model 1 reveals a significant and graded association between children's exposure to unfair treatment and declines in their mothers' health between age 40 and 50 (Hypothesis 1). Compared to mothers of children reporting low levels of acute discrimination, mothers of children reporting moderate or high levels faced a 14% and 25% reduction in the odds of being in better health by age 50, respectively (Model 1). After controlling for a number of covariates (Model 2), these discrepant risks remained pronounced, with the health of mothers of children exposed to moderate or high, as opposed to low, levels of acute discrimination decreasing by 12% and 22%, respectively.

Results from Models 3 and 4 (Table 2) reveal a similar pattern concerning the association between children's chronic discrimination and their mothers' health. Model 3 illustrates that controlling for race and health at age 40, a one standard deviation increase in children's chronic discrimination results in their mothers' odds of better health decreasing by more than 10%. After adjusting for additional controls, this relationship remains practically unchanged, with the magnitude of the regression coefficient decreasing from –.110 to –.102 (Model 4). Taken together, findings from Table 2 suggest that experiences of unfair treatment among adolescent and young adult children are likely to negatively impact their mothers' health during midlife; moreover, this association does not appear to be largely driven by other key sociodemographic characteristics known to influence both exposure to discrimination and overall health.

Results from regression analyses designed to examine the extent to which unfair treatment among children contributes to racial disparities in health (Hypothesis 2) are shown in Table 3. Unlike findings presented in Table 2, all four regression models in Table 3 control for potential confounders. Model 1 clearly illustrates that black–white differences in self-rated health are pronounced by midlife. Compared to non-Hispanic white mothers, non-Hispanic black mothers face a 29% reduction in the odds of being in better health between 40 and 50 years of age. Hispanic mothers also experience greater health declines during their 40s than non-Hispanic white mothers, but this racial discrepancy is much smaller in magnitude (–.086 or 8%) and fails to reach statistical significance. Children's experiences of acute discrimination appear to explain some but not nearly all of the black–white gap in mothers' health at midlife (Model 2). Once we control for instances of acute unfair treatment among children, the coefficient for non-Hispanic black mothers decreases by 9% from –.344 to –.313 but remains sizeable and significant.

Models 3 and 4 of Table 3 present findings from an identical set of regression analyses designed to estimate the extent to which children's exposure to chronic, as opposed to acute, discrimination negatively influences their mothers' health during midlife. Results from Model 3 mirror those presented in Model 1 and reveal stark racial disparities in self-rated health among NLSY79 respondents, particularly African Americans. Compared to non-Hispanic white mothers, non-Hispanic black and Hispanic mothers can expect their self-rated health to decline by 29% and 10%, respectively, between 40 and 50 years of age. Similar to findings from Model 1, the Hispanic–white gap in self-rated health is modest and does not reach statistical significance. Once we take into account exposure to chronic discrimination, the regression coefficient for non-Hispanic blacks decreases by 7%, from –.344 to –.320, while the coefficient for Hispanics *increases* slightly by 9%, from –.107 to –.117. In sum, it appears that exposure to discrimination among adolescent and young adult children explains a modest amount of racial disparities in health among midlife mothers, particularly African Americans.

Results concerning the third and final study hypothesis are presented in Tables 4 (acute discrimination) and 5

Table 2. Regression Results Predicting Self-rated Health at Age 50 among National Longitudinal Survey of Youth 1979 Mothers.

	Acute Discrimination				Chronic Discrimination			
	Model 1		Model 2		Model 3		Model 4	
	b	SE[a]	*b*	SE[a]	*b*	SE[a]	*b*	SE[a]
Race-ethnicity								
NH white	Ref		Ref		Ref		Ref	
NH black	−.416***	.091	−.313**	.100	−.444***	.089	−.320**	.098
Hispanic	−.203^{+}	.108	−.084	.117	−.254*	.103	−.117	.111
Acute discrimination								
Low	Ref		Ref					
Moderate	−.150*	.063	−.132*	.063				
High	−.287***	.074	−.251**	.075				
Chronic discrimination[b]					−.110***	.024	−.102***	.024
Self-rated health at age 40	1.067***	.050	.997***	.051	1.072***	.048	.998***	.049
Marital status								
Currently married			Ref				Ref	
Never married			−.246^{+}	.146			−.242^{+}	.144
Previously married			−.221*	.092			−.245**	.091
Region of residence								
North			Ref				Ref	
Midwest			−.168	.125			−.204^{+}	.121
South			−.058	.117			−.091	.113
West			.022	.149			.002	.141
Employment status								
Employed			Ref				Ref	
Unemployed			−.285	.253			−.271	.241
Out of labor force			−.245*	.104			−.257**	.098
Years of education			.100***	.020			.100***	.018
N children	5,604		5,604		6,562		6,562	
N mothers	2,771		2,771		3,004		3,004	

Note: All regression models control for self-rated health at age 40. Models 2 and 4 also control for marital status, region, employment, and completed schooling. NH white = non-Hispanic white; NH black = non-Hispanic black; SE = standard error; Ref = reference category.

[a]Robust standard errors calculated using the Huber-White method and clustered at the National Longitudinal Survey of Youth 1979 family level.

[b]Chronic discrimination measure is standardized and presented in standard deviation units.

$^{+}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

(chronic discrimination). We include interaction terms to capture these more nuanced relationships and find very limited evidence that the health of African American and Hispanic mothers is more harmed by their children's experiences of unfair treatment than white mothers. The only interaction term in Tables 4 or 5 that approaches statistical significance is non-Hispanic black × high (acute) discrimination (Model 2, Table 4). This finding indicates that when children frequently encounter acute unfair treatment, the health of non-Hispanic black mothers declines less rapidly than the health of their white counterparts. Non-Hispanic white mothers whose children experience high levels of acute discrimination face a 35% decrease in the odds of being in better health, while non-Hispanic black mothers only face an 8% decrease in the odds of being in better health. Although this suggests a differential effect of child's discrimination on mother's health across race, it is in the opposite direction we originally hypothesized. We find no evidence of significant interactions for chronic discrimination (Table 5).

We conducted a series of sensitivity analyses to determine whether our findings were robust to considering (1) additional demographic characteristics of the young adult child and (2) mothers' own experiences of unfair treatment. For the former, we incorporated child's age, sex, highest grade completed, and

Table 3. Regression Results Predicting Racial Disparities in Self-rated Health at 50 among National Longitudinal Survey of Youth 1979 Mothers.

	Acute Discrimination				Chronic Discrimination			
	Model 1		Model 2		Model 3		Model 4	
	b	SE[a]	*b*	SE[a]	*b*	SE[a]	*b*	SE[a]
Race-ethnicity								
NH white	Ref		Ref		Ref		Ref	
NH black	–.344**	.100	–.313**	.100	–.344***	.098	–.320**	.098
Hispanic	–.086	.117	–.084	.117	–.107	.111	–.117	.111
Acute discrimination								
Low			Ref					
Moderate			–.132*	.063				
High			–.251**	.075				
Chronic discrimination[b]							–.102***	.024
Self-rated health at age 40	.998***	.050	.997***	.051	1.002***	.049	.998***	.049
Marital status								
Currently married	Ref		Ref		Ref		Ref	
Never married	–.254+	.146	–.246+	.146	–.249+	.145	–.242+	.144
Previously married	–.238**	.091	–.221*	.092	–.258**	.090	–.245**	.091
Region of residence								
North	Ref		Ref		Ref		Ref	
Midwest	–.161	.125	–.168	.125	–.203+	.121	–.204+	.121
South	–.051	.117	–.058	.117	–.082	.112	–.091	.113
West	.017	.148	.022	.149	–.008	.141	.002	.141
Employment status								
Employed	Ref		Ref		Ref	Ref		
Unemployed	–.295	.252	–.285	.253	–.276	.241	–.271	.241
Out of labor force	–.247*	.104	–.245*	.104	–.251*	.098	–.257**	.098
Years of education	.101***	.020	.100***	.020	.101***	.018	.100***	.018
N children	5,604		5,604		6,562		6,562	
N mothers	2,771		2,771		3,004		3,004	

Note: All regression models control for self-rated health at age 40, marital status, region, employment, and completed schooling. NH white = non-Hispanic white; NH black = non-Hispanic black; SE = standard error; Ref = reference category.
[a]Robust standard errors calculated using the Huber-White method and clustered at the National Longitudinal Survey of Youth 1979 family level.
[b]Chronic discrimination measure is standardized and presented in standard deviation units.
$^{+}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

self-rated health (all captured the year in which the 40th health assessment occurred) into regression models. For the latter, we adjusted for mothers' experiences of discrimination by relying on questions that were asked of all NLSY79 respondents in 1982 inquiring if they had problems getting a good job due to discrimination on the basis of race, sex, age, or nationality. Our findings remained qualitatively unchanged across model specifications (results not shown).

DISCUSSION

Discrimination is harmful for health, particularly among marginalized populations (Lewis et al. 2015). Prior research shows mothers who experience more instances of unfair treatment tend to have less healthy children (Rosenthal and Lobel 2011). Combining stress proliferation and life course theories, we test whether the intergenerational transmission of unfair treatment flows in the other direction—from child to mother—by examining how adolescent and young adult children's experiences of discrimination matter for mothers' health in midlife. This study advances our understanding of the intergenerational transmission of both discrimination and health and helps to explain (1) how disadvantage is reproduced from one generation to the next and (2) the importance of midlife as a critical

Table 4. Regression Results Predicting Self-rated Health at Age 50 among National Longitudinal Survey of Youth 1979 Mothers with Interactions for Acute Discrimination.

	Model 1		Model 2	
	b	SE[a]	*b*	SE[a]
Race-ethnicity				
NH white	Ref		Ref	
NH black	–.313**	.100	–.404***	.110
Hispanic	–.084	.117	–.084	.125
Acute discrimination				
Low	Ref		Ref	
Moderate	–.132*	.063	–.153^{+}	.091
High	–.251**	.075	–.437***	.121
Race × acute discrimination				
NH black × moderate			.118	.140
NH black × high			.357*	.166
Hispanic × moderate			–.085	.176
Hispanic × high			.138	.212
Self-rated health at age 40	.997***	.051	.997***	.051
Marital status				
Currently married	Ref		Ref	
Never married	–.246^{+}	.146	–.246^{+}	.146
Previously married	–.221*	.092	–.218*	.092
Region of residence				
North	Ref		Ref	
Midwest	–.168	.125	–.173	.125
South	–.058	.117	–.055	.117
West	.022	.149	.026	.149
Employment status				
Employed	Ref		Ref	
Unemployed	–.285	.253	–.282	.254
Out of labor force	–.245*	.104	–.246*	.104
Years of education	.100***	.020	.099***	.020
N children	5,604		5,604	
N mothers	2,771		2,771	

Note: All regression models control for self-rated health at age 40, marital status, region, employment, and completed schooling. NH white = non-Hispanic white; NH black = non-Hispanic black; SE = standard error; Ref = reference category.
[a]Robust standard errors calculated using the Huber-White method and clustered at the National Longitudinal Survey of Youth 1979 family level.
$^{+}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

life course period during which racial disparities in health emerge or worsen.

Regarding the first hypothesis, our results suggest that children's exposure to discrimination—both acute and chronic—during emerging adulthood is associated with significant declines in their mothers' health at midlife. To our knowledge, this is the first study to demonstrate that experiences of unfair treatment can have intergenerational negative health effects that operate from child to parent as opposed to from parent to child. This finding is consistent with what is known about how discrimination gets "under the skin" and erodes health over time. Given the primacy of anticipatory stress in activating the stress response, the cascade of physiological changes that occur when an individual encounters an environmental stressor can be similarly triggered whether the initial stressor is actual or perceived (McEwen and Gianaros 2011). Thus, engaging in anticipatory thinking about

Table 5. Regression Results Predicting Self-rated Health at Age 50 among National Longitudinal Survey of Youth 1979 Mothers with Interactions for Chronic Discrimination.

	Model 1		Model 2	
	b	SE[a]	*b*	SE[a]
Race-ethnicity				
NH white	Ref		Ref	
NH black	–.320**	.098	–.324**	.098
Hispanic	–.117	.111	–.121	.111
Chronic discrimination[b]	–.102***	.024	–.104**	.038
Race × chronic discrimination				
NH black × chronic discrimination			.023	.054
Hispanic × chronic discrimination			–.039	.067
Self-rated health at age 40	.998***	.049	.998***	.049
Marital status				
Currently married	Ref		Ref	
Never married	–.242^{+}	.144	–.242^{+}	.144
Previously married	–.245**	.091	–.243**	.091
Region of residence				
North	Ref		Ref	
Midwest	–.204^{+}	.121	–.204^{+}	.121
South	–.091	.113	–.089	.113
West	.002	.141	.004	.141
Employment status				
Employed	Ref		Ref	
Unemployed	–.271	.241	–.270	.241
Out of labor force	–.257**	.098	–.258**	.098
Years of education	.100***	.018	.100***	.018
N children	6,562		6,562	
N mothers	3,004		3,004	

Note: All regression models control for self-rated health at age 40, marital status, region, employment, and completed schooling. NH white = non-Hispanic white; NH black = non-Hispanic black; SE = standard error; Ref = reference category.
[a]Robust standard errors calculated using the Huber-White method and clustered at the National Longitudinal Survey of Youth 1979 family level.
[b]Chronic discrimination measure is standardized and presented in standard deviation units.
$^{+}p < .10$, $^{**}p < .01$, $^{***}p < .001$.

unfair treatment can turn what might typically be thought of as an acute stressor into a more chronic one. This is notable since sustained experiences of discrimination tend to be more health harmful than those occurring within a more circumscribed period of time (Lewis et al. 2015; Williams et al. 2003). Anticipatory stress also plays an important role in sustained hypervigilance, which recent research indicates might be a critical pathway through which unfair treatment impacts well-being (Hicken et al. 2013, 2014, 2018).

Our results concerning the intergenerational effects of discrimination on mothers' health also lend credence to the idea that the negative health consequences of unfair treatment are likely to operate across a wide range of family ties and other critical social network connections. Moreover, they echo findings by Barr and colleagues (2018) that mothers of African Americans who face challenges as they transition from adolescence to adulthood experience declines in psychological well-being and self-rated health. Similarly, they bolster the findings from a small but growing body of research that suggests discrimination might be better understood as a population- rather than an individual-level exposure (Chae et al. 2018; Lauderdale 2006; Novak et al. 2017; Orchard and Price 2017). In particular, studies that use major historical events or abrupt policy

changes to quantify the "spillover" effects of discriminatory attitudes, beliefs, or behaviors on health illustrate that the negative impacts of unfair treatment are not limited to only those who directly experience these race-related stressors. Thus, it might be beneficial for health researchers to expand their conceptualization of discrimination to reflect its effects on both individual and aggregate outcomes, such as those operating at the family, friendship network, or community level. Such a rethinking of how unfair treatment works to erode population health also suggests we should avoid simple theoretical dichotomies, which treat interpersonal and structural discrimination as two distinct phenomena through which disadvantage is transmitted via isolated pathways that never intersect.

Our second hypothesis considers if more frequent exposure to discrimination among adolescent and young adult children accounts, at least in part, for racial disparities in health among mothers during midlife. We find modest evidence to support this claim but only for African Americans. By adjusting for children's experiences of unfair treatment, we were able to explain almost 10% of the decline in self-rated health from age 40 to age 50 among non-Hispanic black NLSY79 mothers. Since health is a multifaceted construct with many contributing factors and the time interval between age 40 and 50 years is short in duration, we consider this finding to be notable and hope it will be further investigated by future research. Given what is known about "weathering" among African Americans (Geronimus et al. 2015), this finding might be a harbinger of widening racial inequalities in well-being that would have been detected if we could have followed NLSY79 mothers for longer periods of time.

The third objective of the current study was to determine if the negative impacts of children's unfair treatment on their mothers' health at midlife significantly differed across race. We hypothesized that the health of African American and Hispanic mothers would decline at a faster rate than that of their white counterparts. Results presented here do not support this supposition. Instead, we find that the health of African American mothers whose children experienced high levels of acute discrimination eroded at a slower pace than the health of white mothers. These results are not without precedent in the literature, as reflected by studies that report disparate health effects of discrimination across race-ethnicity (Bratter and Gorman 2011; Kessler, Michelson, and Williams 1999; Pavalko et al. 2003; Peterson et al. 2016; Williams et al. 1997).

Due primarily to data limitations, we were unable to further explore this finding, but we consider potential explanations. First, the more pronounced impact of children's discrimination on mothers' health among whites might be attributable to selection pressures. Mothers of white emerging adults who encounter frequent instances of unfair treatment might be a unique group whose social and economic circumstances, such as chronic poverty or downward social mobility, could result in rapid health deterioration. A similar trend is noted by LaVeist, Pollack, and colleagues (2011), who find that racial disparities in health are reduced or eliminated when comparing black and white residents of similar neighborhoods in southwest Baltimore. Another possible explanation stems from substantive racial differences in the way that African Americans and white individuals prepare, via a lifetime of learning, to deal with experiences of discrimination—especially acute instances of unfair treatment that are captured by the MEDS measure. Since discrimination is less common among whites, these mothers might be surprised to find that their children have been exposed to high levels of unfair treatment and have fewer coping skills to deal with feelings of parental helplessness and fear for their children's well-being.

Limitations

The findings of the current study should be interpreted in light of limitations. First, due to data availability, we could only examine the extent to which mothers' health at midlife changed between 40 and 50 years. We were not able to extend the follow-up period past age 50 because another health module has yet to be administered. Ten years is a short period of time between the initial and final health assessment. Moreover, this interval occurs at the very beginning of midlife rather than spanning the entirety of this life course stage. This shortcoming suggests that our findings are conservative estimates of the health effects of children's unfair treatment on mothers' health during midlife; however, it remains to be seen if our findings will remain consistent, become more pronounced, or dissipate as NLSY79 mothers continue to age.

The second limitation stems from our reliance on self-rated health as an outcome measure. The decision to use this indicator was made with a number of considerations in mind. Self-rated health is particularly useful when trying to capture racial differences in well-being that are just beginning to emerge and whose symptoms might still be subclinical. It is these

types of predisease states that we expect to be the most pronounced at the beginning of midlife. Furthermore, self-rated health is not dependent on physician diagnosis and thus not differentially impacted by racial disparities in health care access. However, in contrast to individual inflammatory markers (e.g., cortisol, interleukin 6, or C-reactive protein), multiitem measures of allostatic load, or genetic data used to capture stress responses (e.g., telomere length), self-rated health might be less sensitive to the intergenerational effects of discrimination. Thus, our findings are likely to be conservative estimates of the association between children's unfair treatment and mothers' health. Unfortunately, the NLSY79 does not contain biomarker data that we could use to more accurately discern biophysiological changes that might be occurring under the skin among mothers as a result of their children's discrimination. This is a potentially fruitful avenue for future research to explore.

Third, we were unable to examine the health effects of children's exposure to unfair treatment on fathers', as opposed to mothers', health. This shortcoming largely stems from linkages between NLSY79 cohorts. The NLSY79 young adults are children born to female original NLSY79 respondents. The children of male NLSY79 participants were not included in the young adult cohort and were not followed up over time. We do expect children's experiences of discrimination to have an intergenerational impact on their fathers' health and well-being, but the extent to which this is true remains an empirical question that has yet to be addressed.

Finally, we cannot be sure that the intergenerational health effects of discrimination between children and mothers remains significant in the face of rigorous controls for maternal exposures to unfair treatment. This is an important empirical question since mothers and children share many of the same social conditions that lead to instances of discrimination. Survey items regarding major and everyday experiences of discrimination were only asked of young adult respondents in the NLSY79-YA; thus, we could not control for mothers' experiences of unfair treatment in the current study. We were, however, able to account for different types of job discrimination on the basis of race, sex, age, and nationality in 1982. Although these measures were assessed approximately 30 years prior to our outcome of interest and are limited in scope, sensitivity results suggest that the association between children's unfair treatment and mothers' health during midlife was still apparent after accounting for maternal exposure to discrimination.

CONCLUSION

Despite recent gains in medical knowledge, clinical treatment, and access to care, racial disparities in health remain a persistent roadblock to widespread improvements in population health. It is critical that we gain a deeper understanding of the processes by which African Americans and Hispanics can expect to die earlier and live less healthy lives. Our results provide evidence that the negative health effects of discrimination are intergenerational and bidirectional in nature, at least when considering health outcomes of mothers in midlife. Furthermore, higher rates of acute and chronic unfair treatment help to explain, at least in part, why the health of African American women declines at a faster rate than their white counterparts. These findings, in conjunction with those from a growing body of literature concerning maternal experiences of unfair treatment and their impact on infant health, lend credence to the idea that discrimination should be viewed as a social exposure rather than a purely individual one. Efforts to reduce exposure to unfair treatment are likely be underestimated and undervalued as a mechanism through which racial disparities in health can be eliminated since as a society, we rarely ask to what extent these deleterious experiences harm those who do not directly encounter the discrimination itself.

Appendix A. Description of Major Experiences and Everyday Discrimination Scales.

Discrimination Measures	Response Categories
Major Experiences of Discrimination Scale	
In the following questions, we are interested in the way other people have treated you or your beliefs about how other people have treated you. Can you tell me if any of the following has ever happened to you:	
1. Have you ever been unfairly discouraged by a teacher or advisor from continuing your education?	Yes/No
2. Have you ever not been hired for a job?	
3. Have you ever been unfairly denied a promotion?	
4. Have you ever been unfairly fired?	
5. Have you ever been unfairly stopped, searched, questioned, physically threatened, or abused by the police?	
Everyday Discrimination Scale	
In your day-to-day life, how often have any of the following happened to you?	
1. How often have you been treated with less courtesy than other people?	Very often
2. How often have you been treated with less respect than other people?	Fairly often
3. How often have you received poorer service than other people at restaurants or stores?	Not too often Hardly Ever
4. How often have people acted as if they think you are not smart?	Never
5. How often have people acted as if they are afraid of you?	
6. How often have people acted as if they think you are dishonest?	
7. How often have people acted as if they are better than you?	
8. How often have you been called names or insulted?	
9. How often have you been threatened or harassed?	

NOTE

1. We are using the term *primary stress exposure*, as defined by Pearlin (1989), to refer to an initial experience or interaction that triggers the human stress response and often leads to secondary, or subsequent, stressors that can reactivate or worsen the stress response process. These primary exposures need not be the very first stressful experience encountered by a given individual during his or her lifetime. Rather, stress exposures simply need to be significant enough to set the cascade of physiological changes that make up the stress response in motion once it has returned to a steady state (homeostasis).

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