Longitudinal Health Consequences of Socioeconomic Disadvantage: Examining Perceived Discrimination as a Mediator

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Objective: Foundational theoretical perspectives suggest that socioeconomic disadvantage (SED) increases an individual's risk of being exposed to unfair treatment or discrimination. However, little empirical attention has been given to the role of perceived discrimination in the SED-health gradient. Addressing this knowledge gap, the current study examined the mediating role of discrimination in the longitudinal association between SED and self-rated health. *Method:* Participants in the Midlife in the United States (MIDUS) study were followed over 3 waves covering a 17- to 19-year period ($N = 6,286$; 53% female; 91% White; mean age at baseline = 47 years, $SD = 13$). SED was assessed from education, occupational prestige, income, and assets; self-rated health was measured at baseline and follow-up assessments. Two measures of discrimination—perceived inequality in work and everyday discrimination—were considered as mediators. *Results:* Both measures of discrimination emerged as important explanatory variables in the link between SED and health. SED at the baseline assessment was associated with changes in self-rated health over the 17- to 19-year period (B = −.15, $p < .001$). Measures of discrimination partially mediated this longitudinal association, explaining 22% of the total effect. Exposure to discrimination and its health consequences were also more pronounced at younger ages. *Conclusion:* Additional research is needed to replicate the findings of this study using objective health measures and to examine possible interventions. Challenging the ideologies and practices that underlie social class–related discrimination, or mitigating its harmful consequences, will both be important approaches to consider.

Keywords: socioeconomic inequality, social class, health disparities, perceived discrimination, stress, unfair treatment

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Gradients in health as a function of social class or socioeconomic disadvantage (SED) are well documented and evident in most societies around the world (Adler & Rehkopf, 2008; Mackenbach et al., 2008). Several explanations for the link between SED and health among adults have been examined, including neighborhood quality, health literacy, and subjective social status (Carpiano, Link, & Phelan,

2008; Matthews & Gallo, 2011). Unfair treatment and perceived discrimination have received considerably less attention, which is surprising given that social subordination and negative stereotypes about the poor are thought to play an important role in how socioeconomic status is reproduced across the life span and across generations (Bourdieu, 1977; Boyce, 2012; Boyce et al., 2012; Fiske, 2010; Lott, 2002; Rank, 2004; Sennett & Cobb, 1993).

Experiences of discrimination relating to SED or social class can occur in a wide range of community or workplace contexts and can take many forms, including being treated as less intelligent, receiving poorer service, or being treated with less courtesy or respect than others. The specific reasons for discrimination are often ambiguous—that is, not made explicit by the perpetrator and not unequivocally known by the victim (Sue et al., 2007). One important approach to operationalizing social class–related unfair treatment has therefore been to assess perceptions of general unfair treatment and link these empirically to assessments of SED in regression models that adjust for other characteristics of the individual such as race, sex, age, and obesity (Fuller-Rowell, Evans, & Ong, 2012). This approach helps address methodological limitations associated with asking individuals to report discrimination specifically attributed to their socioeconomic position when the reasons for unfair treatment are frequently ambiguous.

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A large body of work has focused on the role of discrimination in racial health disparities (Williams & Mohammed, 2009, 2013). Only a handful of published studies, however, have considered experiences of discrimination in the context of the socioeconomic status–health gradient. One study focused on a sample of adolescents and examined the mediating role of perceived discrimination in the association between SED and allostatic load (Fuller-Rowell et al., 2012). Results of this research showed that adolescents from less advantaged socioeconomic backgrounds reported more frequent experiences of discrimination and that perceived discrimination accounted for 13% of the association between SED and allostatic load. Analyses focusing on a sample of middle-aged adults in the United Kingdom (Whitehall II Study) found that socioeconomic status was associated with a single-item measure of general unfair treatment that, in turn, was associated with metabolic syndrome and coronary events (De Vogli, Brunner, & Marmot, 2007; De Vogli, Ferrie, Chandola, Kivimäki, & Marmot, 2007). Last, one cross-sectional study of adults in the United States found that perceived discrimination, assessed as unfair treatment attributed specifically to socioeconomic status, was associated with sleep problems among African Americans but not Whites (Van Dyke, Vaccarino, Quyyumi, & Lewis, 2016). With very few studies considering the role of discrimination in the association between SED and health, and a dearth of longitudinal data, the need for further inquiry is clear.

When considering the role of discrimination in a broad sample of adults at all life stages, age differences are also an important consideration. Classic developmental studies have established that an awareness of social class divisions emerges during childhood and adolescence and that one's place within the social class hierarchy has increasing influence on self-esteem across this period (Rosenberg & Pearlin, 1978). However, to our knowledge, the role of age in the context of social class–related discrimination across the adult years has not been considered. This omission is surprising given that studies of change in social networks, motivation, and emotional resilience suggest that developmental changes across the adult years may play an important role in how unfair treatment is experienced. In particular, as compared to younger adults, older adults have greater focus on close relationships and a declining focus on peripheral social connections, leading to a decrease in the overall size of social networks (Charles & Carstensen, 2010; Wrzus, Hänel, Wagner, & Neyer, 2013). Smaller network size and less time spent expanding social connections may thus decrease exposure to social class–related discrimination. Older adults are also known to attend to and remember more positive than negative information and experience fewer negative emotions (Reed, Chan, & Mikels, 2014), suggesting a positivity focus that might lead to greater avoidance of denigrating situations (Carstensen et al., 2011). Furthermore, negative experiences might have less of an effect on the health of older adults due to greater psychological resilience and emotional stability in older age (Charles & Carstensen, 2010; Ryff, 2014).

Focusing on a national sample of U.S. adults, aged 24–75 at baseline, the current study had five aims: (1) estimate longitudinal effects of SED on self-rated health over a 17- to 19-year period, (2) examine perceived discrimination in the workplace and general everyday discrimination as mediators of the SED–health association, (3) elucidate the degree to which the mediating role of discrimination might be confounded by negative affect or neurot-

icism (Diener, Oishi, & Lucas, 2003; McCrae, 1990), (4) test age as a moderator of associations between SED and discrimination and between discrimination and self-rated health, and (5) examine, in sensitivity analyses, whether findings vary by race or sex (Pascoe & Smart Richman, 2009; Williams, Neighbors, & Jackson, 2003) or with alternative modeling specifications that address potential methodological biases (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

Based on the empirical evidence reviewed above, overarching hypotheses were that SED would be associated with higher levels of discrimination on both measures and that each measure of perceived discrimination would significantly mediate the longitudinal association between SED and self-rated health. Hypothesized mediation results were also expected to persist after adjusting for negative affect and neuroticism. Last, we expected that at younger ages, SED would be more strongly associated with experiences of discrimination and that discrimination would be more strongly associated with self-rated health.

Method

Analyses draw on data from the Midlife in the United States (MIDUS) Study (Brim, Ryff, & Kessler, 2004; Dienberg Love, Seeman, Weinstein, & Ryff, 2010). MIDUS is a national study of health and aging that began in 1995 (MIDUS 1 [T1]) with more than 7,000 noninstitutionalized adults from the 48 contiguous states (Brim et al., 2004; Radler & Ryff, 2010). Follow-up assessments were conducted approximately 9 and 18 years later with approximately 75% of surviving respondents participating at each subsequent wave: MIDUS 2 (T2) and MIDUS 3 (T3). A telephone interview and a self-administered questionnaire were conducted at all three time points. Participants included in the current analysis were 6,286 adults who completed the telephone interview and self-administered questionnaire at the T1 assessment (91% White; 53% female; mean age at T1 = 47 years, SD = 11), such that they had valid T1 self-rated health data. The analyses reported in the article were approved as exempt by the Auburn University Institutional Review Board. Data collection was also originally approved by an institutional review board, and all participants provided written, informed consent.

Measures

Self-rated health. Self-rated health is an established indicator of health risk, longitudinally linked to a range of objective health outcomes across socioeconomic groups (Benyamini, 2011; DeSalvo, Bloser, Reynolds, He, & Muntner, 2006). Self-rated physical health was assessed at all three time points with one item in the telephone interview ("In general, would you say your physical health is excellent, very good, good, fair, or poor?") and one item in the self-administered questionnaire ("Using a scale from 0 to 10 where 0 means 'the worst possible health' and 10 means 'the best possible health,' how would you rate your health these days?"). Both items have been linked to mortality in the MIDUS cohort (Ferraro & Wilkinson, 2015). The two items were standardized to be on the same scale, with possible values ranging from 1–5 and higher scores representing better health. A mean score was then created for each time point. A two-item index is preferred over a single item because it allows for consideration as a continuous (as

opposed to dichotomous or ordered categorical) variable and for estimation of Cronbach's alpha (T1: .75, T3: .78) and Spearman-Brown (T1: .76, T3: .80) statistics (Eisinga, Grotenhuis, & Pelzer, 2013), both of which indicated adequate reliability. Moreover, because participants responded to the two items on different days and in different formats (one in an initial telephone interview and one in a subsequent self-administered questionnaire), the index may be less subject to mood state effects (Podsakoff et al., 2003).

Socioeconomic disadvantage. An aggregate index of socioeconomic disadvantage was derived from four established socioeconomic indicators: education, occupational prestige, income, and assets (Chapman, Fiscella, Kawachi, & Duberstein, 2010; Galobardes, Shaw, Lawlor, Lynch, & Smith, 2006). Combined indexes of socioeconomic status or disadvantage are frequently used and are optimal when attempting to capture overall disadvantage within a single variable (Galobardes et al., 2006; Gruenewald et al., 2012). Education was assessed on a 12-point scale ranging from less than eighth grade (coded as 1) to completion of a professional degree (coded as 12). Occupational prestige was calculated from Census occupation categories using established methods (Stevens & Cho, 1985). Household income net of government assistance was calculated from a set of items measuring wages, pension, and Social Security for all household members, and total assets were assessed as money left over after selling off all assets and paying off all debts (Chapman et al., 2010). Income and assets were logged to mitigate skew, and each socioeconomic indicator was standardized before taking a mean of the four measures. The composite was then reverse scored so that higher values indicated greater SED at T1 (α = .69). SED was also scored for T2 and T3 in order to estimate stability over time. Correlations between waves ranged from .70–.74, indicating moderate stability.

Perceived discrimination. Two measures of perceived discrimination were considered. Perceived inequality in work was assessed at T1 (α = .69) and T2 (α = .73) with four items (Ryff, Magee, Kling, & Wing, 1999; Slopen et al., 2013). Participants indicated on a 4-point scale ranging from *not at all* to *a lot* the degree to which each item describes the way they feel about their work (e.g., "I feel cheated about the chances I have had to work at good jobs"). The four items were averaged such that higher scores indicated greater perceptions of unfair treatment in job opportunities and in the workplace. Two of the original six items were excluded due to conceptual overlap with socioeconomic disadvantage.

Everyday discrimination was measured at T1 (α = .93) and T2 (α = .92) with nine items (Williams, Yan Yu, Jackson, & Anderson, 1997). Participants indicated on a 4-point scale from *never* to *often* the frequency that they had experienced each type of discrimination (e.g., "People act as if they think you are not as good as they are"). The average of the T1 and T2 scores was used in the analysis for both discrimination measures (autoregressive correlations ranged from .39–.54). In the case that only one assessment was available, then we used the single score. T3 measures were not included so that longitudinal associations between discrimination and self-rated health could be examined.

Additional measures. Measures of sex (0 = female, 1 = male), age (in years), cohabitation status (0 = single, 1 = married or living with partner), and employment status (0 = unemployed; 1 = currently employed) were adjusted for in analyses. For race/ethnicity, dichotomously coded variables for Black/African Amer-

ican (5% of sample) and other race (4% of sample) were included, and White/European American was considered as the reference. Body mass index, calculated from participant-reported height and weight, was used to assess overweight (values of 25 to <30) and obese ($\geq$30) status, with normal-weight status (<25) being the referent. In preliminary analyses, underweight status (<18.5) was not associated with measures of discrimination and therefore was grouped with normal weight. Negative affect (α = .91) was assessed using an established six-item scale (Mroczek & Kolarz, 1998). Neuroticism (α = .74) was assessed using an established four-item scale (Keyes, Shmotkin, & Ryff, 2002; Rossi, 2001).

Analysis Plan

As is common in longitudinal research, attrition was found to be associated with health and sociodemographic variables (Radler & Ryff, 2010). Specifically, as compared to those who remained, participants no longer in the study at T3 had worse self-rated health, had greater socioeconomic disadvantage, were less likely to have current employment, reported greater discrimination, and were more likely to be male, to be a racial/ethnic minority, to not be married, and to report greater negative affect and more neuroticism at the T1 assessment. Full-information maximum likelihood (FIML) estimation was used to handle missing data. FIML is a robust missing data approach that uses all available data to estimate each model path while also providing unbiased standard errors, based on actual available data for a given parameter estimate rather than the total analytic sample size (Enders, 2010; Little & Rubin, 2014). Following established FIML procedures, correlates of missing data were included in all models (Dong & Peng, 2013). This approach is known to optimize model efficiency and reduce any bias associated with nonrandom attrition (Collins, Schafer, & Kam, 2001; J. W. Graham, 2003). Analyses were also conducted to examine whether the results differed when including only those who were still in the study at T3. The general pattern of findings and statistical inference was unchanged, bolstering confidence in the reported results. Of the 6,286 individuals included in analyses, for T1 variables, 1% had missing data for socioeconomic disadvantage, 2% for race/ethnicity, 1% for current employment status, 4% for overweight and obesity status, and 1% for neuroticism. For discrimination mediators, which were aggregated across T1 and T2, 23% had missing data for perceived work inequality and 2% for everyday discrimination. For T3 self-rated health, assessed 17–19 years onward from T1, 50% had missing data. All other variables included in the analysis had less than 1% missing data.

A series of path models were estimated in Mplus Version 7.4 to test the stated hypotheses (Muthén & Muthén, 2013). Single-indicator latent variables were created for T1 and T3 self-rated health and SED by specifying the error variance from Cronbach's alpha and sample variance using the standard formula (Hayduk & Littvay, 2012). Bias-corrected 95% confidence intervals (CIs) were estimated using 1,000 bootstrapped samples to account for potential asymmetry in standard errors (MacKinnon, Lockwood, & Williams, 2004). Indirect effects were estimated using the product of coefficients method (MacKinnon, Fairchild, & Fritz, 2007).

An initial model (Model 1) was estimated to consider the association between socioeconomic disadvantage and each of the two perceived discrimination measures, adjusting for race, age,

sex, employment status, and overweight/obese status. Model 2 then estimated the longitudinal association between SED at T1 and self-rated health at T3, adjusting for race, age, sex, cohabitation, and self-rated health at T1. Model 3 added perceived inequality at work (averaged across T1 and T2) as a mediator of the link between SED and self-rated health. Model 4 then added everyday discrimination (averaged across T1 and T2) as a second mediator. The decision to average discrimination measures across T1 and T2 was made so that the resulting constructs would reflect exposure across the two time points. An additional model was then estimated adjusting for the effects of negative affect and neuroticism on discrimination measures in order to consider the possibility that any associations between SED and discrimination might be due to a negative or pessimistic outlook on life (Diener et al., 2003; McCrae, 1990). A final set of models tested the moderating role of age. Age was initially considered a continuous variable. Next, to facilitate interpretation of any age moderation finding (i.e., probe whether effects are linear or driven by a particular age group), four dichotomously coded age variables were created using T1 age and interacted with SED: 35 years or younger (reference category), 36–45, 46–55, and 56 years or older. Additional analyses were then conducted to consider whether the findings varied by race or sex and whether results were consistent under alternative modeling specifications. The first alternative specification was to examine mediation tests using work inequality and everyday discrimination measured only at T2, rather than as aggregates of T1 and T2 measures. The second was to consider an aggregate of T1 and T2 SED rather than only T1 SED.

Results

Sample descriptive statistics are shown in Table 1, and bivariate correlations between study variables are shown in Table 2. SED was positively correlated with perceived work inequality and everyday discrimination, as well as with self-rated health at both time points. Work inequality and everyday discrimination were negatively correlated with self-rated health at baseline and follow-up assessments.

Model Results

SED and perceived discrimination. Estimates for Models 1–5 are shown in online supplemental materials, Table S1. Results of Model 1 indicated that SED at T1 was associated with greater perceived inequality in the workplace (B = .202, 95% CI [.177, .227], $p < .001$) and more everyday discrimination (B = .054, 95% CI [.035, .073], $p < .001$), after adjusting for race, sex, age, employment status, and weight status. Effect sizes for these associations were equivalent to .37 and .11 standard deviation (SD) units of each discrimination measure, respectively, for each SD unit increase in SED.

SED and self-rated health. Model 2 results showed that SED was associated with self-rated health at T3 (B = −.154, 95% CI [−.207, −.101], $p < .001$), adjusting for race, sex, age, cohabitation status, and self-rated health at T1. The magnitude of this effect was equivalent to a .18 SD unit decrease in self-rated health (based on T1 SD units) for each SD unit increase in SED.

Perceived discrimination mediators. Model 3 results showed that perceived inequality at work (aggregate of T1 and T2) was

Table 1

Sample Descriptive Characteristics: Midlife in the U.S. Study (Time 1 Data Collected in 1995–1996)

Characteristic	$M \pm SD$	%
Biological sex (1 = female)		52.5
Cohabitation status (1 = cohabiting)		67.6
Race/ethnicity		
European American		90.8
African American		5.2
Other		4.1
Age at Time 1 (in years)	46.86 ± 12.91	
Age at Time 2 (in years)	55.69 ± 12.41	
Age at Time 3 (in years)	63.78 ± 11.36	
Age categories (Time 1)		
35 years old and younger		22.9
36–45 years old		25.9
46–55 years old		23.7
55–75 years old		27.5
Weight status		
Overweight (BMI between 25 and 29.99)		37.5
Obese (BMI ≥ 30)		21.0
Neuroticism (scale of 1–5)	2.24 ± .66	
Negative affect (scale of 1–4)	1.54 ± .62	
Current employment status		63.2
Socioeconomic disadvantage	0.00 ± 1.00	
Educational level	6.84 ± 2.49	
Household income (in thousands of $)	56.44 ± 46.18	
Occupational prestige	40.18 ± 14.17	
Assets (in thousands of $)	120.5 ± 208.8	
Perceived work inequality at Times 1 and 2 (scale of 1–4)	1.61 ± .54	
Everyday discrimination at Times 1 and 2 (scale of 1–4)	1.44 ± .49	
Self-rated health at Time 1	3.63 ± .80	
Self-rated health at Time 3	3.53 ± .87	

Note. All descriptive statistics are reported for Time 1 unless otherwise noted. Education was assessed on a 12-point scale ranging from less than eighth grade (coded as 1) to completion of a professional degree (coded as 12). The mean score in the current sample corresponds to completion of some college. Occupational prestige was calculated from Census occupation categories using established methods (Stevens & Cho, 1985); values ranged from 9.56–80.53, with higher scores indicating greater prestige. For reference, the average occupation in the United States corresponds to a score of approximately 35 with a SD of 18 across all occupational categories (Stevens & Cho, 1985). BMI = body mass index.

significantly associated with self-rated health at T3 (B = −.092, 95% CI [−.167, −.023], $p = .011$), adjusting for self-rated health at T1 and other covariates (race, sex, age, cohabitation status). Furthermore, the indirect effect of SED on self-rated health via inequality at work was significant (B = −.022, 95% CI [−.039, −.006], $p = .011$) and explained 14.3% of the longitudinal link between SED and self-rated health (B = −.135, 95% CI [−.192, −.076], $p < .001$).

Model 4, which added everyday discrimination as a second mediator, indicated that the association between everyday discrimination and self-rated health was also significant (B = −.153, 95% CI [−.223, −.076], $p < .001$), as was the indirect effect of SED through this variable (B = −.013, 95% CI [−.020, −.007], $p < .001$). The link between SED and health (B = −.122, 95% CI [−.180, −.067], $p < .001$) was attenuated by an additional 7.8% after adding everyday discrimination (compared to the Model 2 estimate). In combination, the two discrimination measures explained 22.1% of the longitudinal SED–health association. The path model estimated in Model 4 is shown in Figure 1.

Table 2
Zero-Order Bivariate Correlations Among Study Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Male	—														
2. Cohabitation	.11***	—													
3. African American race	−.04**	−.10***	—												
4. Other race/ethnicity	.01	−.06***	−.05***	—											
5. Age	−.01	.05***	−.04	−.09***	—										
6. Overweight	.20***	.06***	−.01	.01	.06***	—									
7. Obese	−.02	−.01	.08***	−.01	.06***	−.40***	—								
8. Education	.10***	.01	−.06***	.00	−.11***	.00	−.10***	—							
9. Income	.14***	.35***	−.15***	−.03*	.07***	.04**	−.06**	.32***	—						
10. Occupational prestige	.11***	.02	−.06***	.01	−.04**	−.01	−.06**	.62***	.33***	—					
11. Assets	.14***	.22***	−.18***	−.12***	.25***	.05***	−.06***	.25***	.42***	.22***	—				
12. Socioeconomic disadvantage	−.16***	−.21***	.16***	.05***	.01	−.03	.10***	−.75***	−.75***	−.78***	−.68**	—			
13. Everyday discrimination	.00	−.14***	.31***	.17***	−.19***	−.02	.09***	−.04*	−.12***	−.06***	−.16***	.13***	—		
14. Perceived work inequality	−.01	−.10***	.05**	.05**	−.15***	.00	.05***	−.13***	−.20***	−.19***	−.18***	.24***	.24***	—	
15. T1 self-rated health	.01	.08***	−.02	−.04**	−.11***	.01	−.23***	.20***	.22***	.12***	.16***	−.25***	−.15***	−.19***	—
16. T3 self-rated health	.01	.04*	−.03	−.04*	−.08***	−.01	−.21***	.20***	.18***	.16***	.13***	−.23***	−.19***	−.19***	.48***

* $p < .05$. ** $p < .01$. *** $p < .001$.

Sensitivity analyses were also conducted to consider two alternative model specifications: (1) work inequality and everyday discrimination measured only at T2 rather than as aggregates of T1 and T2 measures and (2) SED measured as the aggregate of T1 and T2 measures rather than only at T1. In both instances, model results showed the same pattern of findings and inference as those reported above.

The role of negative affect and neuroticism. To address the possibility that predictors of discrimination and self-rated health might be confounded by a negative or pessimistic outlook on life, each outcome was adjusted for negative affect and neuroticism (Diener et al., 2003). Results of Model 5 indicated that the associations between SED and discrimination remained significant (work inequality: B = .188, 95% CI [.161, .213], p < .001; everyday discrimination: B = .046, 95% CI [.027, .065], p < .001), and indirect effects of SED on self-rated health persisted (work inequality: B = −.017, 95% CI [−.031, −.003], p = .016;
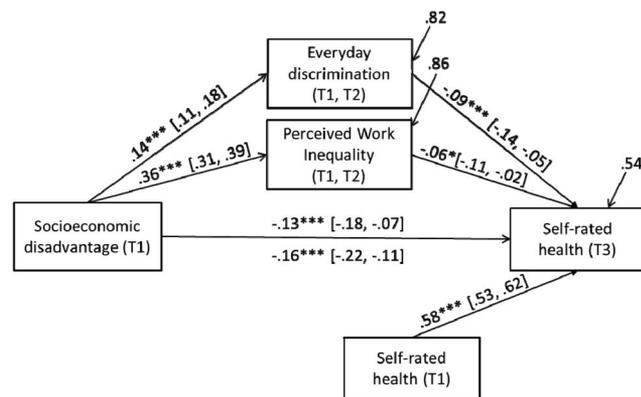

Figure 1. Path model results showing measures of perceived discrimination as mediators of the association between socioeconomic disadvantage and self-rated health. Standardized regression coefficients [95% confidence intervals] and residual variances are shown. All coefficients are from Model 4, except for the unmediated association between socioeconomic disadvantage and health (shown on underside of model path). * p < .05. ** p < .01. *** p < .001.

everyday discrimination: B = −.007, 95% CI [−.012, −.003], p = .002).

Moderation of SED-perceived discrimination associations. The association between SED and everyday discrimination was significantly moderated by age (B = −.003, 95% CI [−.004, −.002], p < .001), as was the association between SED and work inequality (B = −.003, 95% CI [−.005, .000], p = .019). To aid with the interpretation of these findings, four dichotomously coded age variables were created using T1 age and three were interacted with SED: 35 years or younger (reference category), 36–45, 46–55, and 56–75. Results for the model with SED × Age interaction terms indicated the main effects of SED were significant (everyday discrimination: B = .085, 95% CI [.038, .132], p < .001; work inequality: B = .239, 95% CI [.184, .295], p < .001), suggesting that, as expected, for the reference group (35 years old or younger), greater disadvantage is associated with more frequent experiences of discrimination. These associations were of similar magnitude for the 36- to 45-year-old and 46- to 55-year-old groups (p values of interaction terms were greater than .50). SED–discrimination associations, however, were significantly weaker for those 56 to 75 years old (everyday discrimination: B = −.094, 95% CI [−.147, −.042], p < .001; work inequality: B = −.097, 95% CI [−.175, −.018], p = .016). See Figure 2 for plotted moderation findings for everyday discrimination.

Moderation of perceived discrimination–self-rated health associations. Selected moderation tests are shown in online supplemental materials, Table S2. A significant interaction between age and perceived work inequality was evident (B = .007, 95% CI [.001, .012], p = .015), with the direction of the effects suggesting a stronger association with self-rated health at younger ages. When age categories were interacted with perceived work inequality, results showed that the overall age interaction was largely driven by the youngest age group (35 years and younger; Figure 3). Specifically, with interactions included, the main effect of perceived work inequality on health was significant (B = −.224, 95% CI [−.341, −.107], p < .001), indicating the expected inverse association with self-rated health for the reference category (35 years old and younger). However, this link was significantly weaker for those 36–45 years old (B = .186, 95% CI [.028, .345],
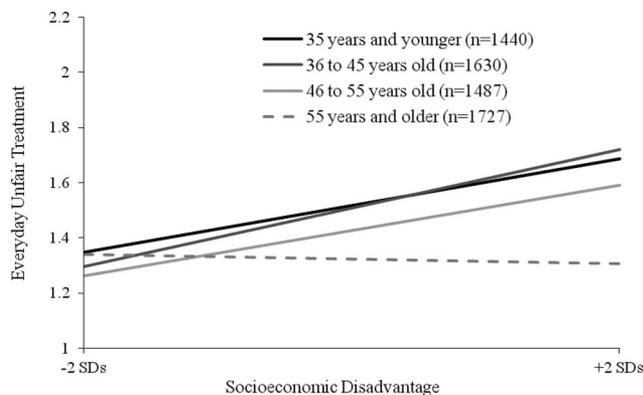
Figure 2. Fitted interaction plots depicting the association between socioeconomic disadvantage and everyday discrimination, separated by four age categories (based on age at Midlife in the United States 1).

$p = .021$), 56–75 years old (B = .217, 95% CI [.029, .404], $p = .024$), and marginally weaker for those 46–55 years old (B = .139, 95% CI [−.022, .299], $p = .090$), suggesting a weaker association between work inequality and health among these age groups. No significant age moderation was found for the association between everyday discrimination and self-rated health (B = .004, 95% CI [−.003, .008], $p = .16$). However, findings were trending in the same direction for those aged 46–55 years (B = .145, $p = .097$; relative to adults 35 years old or younger: B = −.205, $p = .001$). No significant moderation of associations was detected by race or sex.

Additional analyses were conducted to consider the degree to which the reported mediation findings varied by sex and race/ethnicity. Sex and race significantly moderated the link between SED and everyday discrimination but not the link between SED and work inequality. Although SED was associated with greater everyday discrimination for females (B = .026, 95% CI [.002, .051], $p = .034$), the SED × Sex interaction was significant (B = .062, 95% CI [.024, .100], $p = .001$) and indicated a stronger association for males. The association between SED and everyday discrimination was significant and positive for White adults (B = .064, 95% CI [.046, .082], $p < .001$), yet the SED × African American race interaction was significant (B = −.331, 95% CI [−.462, −.200], $p < .001$) and indicated an inverse association among African Americans. None of the associations between discrimination measures and self-rated health at T3 were moderated by sex or race/ethnicity (see Model S2).

Discussion

Competing ideologies within the prevailing public discourse serve to both legitimize and undermine social class structures and the preferential treatment of the more advantaged (Bourdieu, 1977; Sennett & Cobb, 1993). For example, rags to riches stories are often championed, and in some subcultures, moral working-class citizens are lauded as examples to be followed (Rank, Hirschl, & Foster, 2014). However, often outweighing these positive views of the working class are ideologies and practices (e.g., negative stereotypes and discriminatory policies) that assign less value to the lives of individuals who occupy lower rungs of the socioeco-

nomic hierarchy and place the blame primarily on the less advantaged for their own plight (Fiske, 2010; Lott, 2002; Sennett & Cobb, 1993). Examples of such points of view include those that support greater subsidies for the affluent than for the poor, advocate greater enforcement of petty crime over white-collar crime, or favor lower tax rates on investment income than on wages. Abject realities regarding growing inequality between advantaged and disadvantaged segments of society over the past three decades, along with decreased movement across class structures and increasing political influence of the rich, also underscore the current salience of social class dynamics in society (Bourguignon, 2015; Duncan & Murnane, 2011; C. Graham, 2017; Piketty, 2017; Reeves, 2017). What these growing discrepancies mean for people's everyday experiences, and perceptions of their life opportunities, is of utmost importance in understanding how class hierarchies matter for health. That is, although opportunities for healthy development have long been known to be stratified by socioeconomic status (Dowd, 1990; Massey, 2007), the specific processes and mechanisms by which inequality accumulates, and shapes discrepancies in health, requires ongoing research attention. The particular focus of this research, in that regard, is on whether those in disadvantaged positions experience more discrimination than those above them in socioeconomic standing. Such experiences illuminate the costs of inequality and may be tied to negative stereotypes about working-class individuals (Fiske, 2010; Lott, 2002; Sennett & Cobb, 1993). Findings of the current study show that perceptions of discrimination indeed contribute to socioeconomic inequalities in health across the adult years.

Specifically, the results document that discrimination is a relevant factor accounting for a portion of the longitudinal association between socioeconomic disadvantage and health across the adult years. Stated otherwise, differential treatment in workplace and community settings was found to be an important precursor to the greater health declines observed among those less advantaged socioeconomically. Although effect sizes were small to modest (likely due to autoregressive effects), 22% of the longitudinal SED–health gradient was accounted for by measures of discrimination. As such, the findings extend previous work that has examined the role of discrimination in associations between socioeconomic status and health among U.S. adolescents (Fuller-
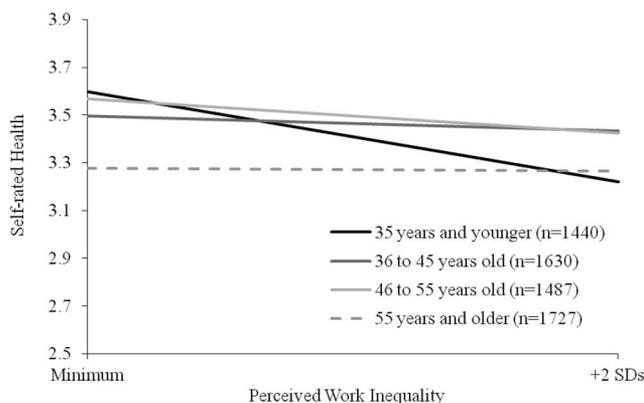

Figure 3. Fitted interaction plots depicting the association between perceived work inequality and self-rated health, separated by four age categories (based on age at Midlife in the United States 1).

Rowell et al., 2012) and adults in the United Kingdom (De Vogli, Brunner, et al., 2007; De Vogli, Ferrie, et al., 2007). In particular, the results move notably beyond cross-sectional or relatively short-term longitudinal findings to show that perceived discrimination has a longitudinal effect on self-rated health over a 17- to 19-year period, whereby the health status of less advantaged socioeconomic groups diverges from their more advantaged peers. Further adding to prior work on adult samples (De Vogli, Brunner, et al., 2007; De Vogli, Ferrie, et al., 2007), the mediation findings, based on multi-item indexes of everyday discrimination and workplace inequality, indicate that workplace-specific measures of unfairness account for important variance above and beyond the effects of general measures of discrimination.

An additional aim of this study was to consider the degree to which associations between SED and discrimination, as well as between discrimination and self-rated health, varied by age. Results indicated that SED was more strongly associated with everyday discrimination and work inequality at younger ages and was significantly weaker at older ages (56–75 at T1). This finding may reflect the shrinking social networks and increasing positivity that tends to come with age (Reed et al., 2014; Wrzus et al., 2013). Analyses also revealed that the association between work inequality and self-rated health (but not everyday discrimination and self-rated health) was stronger in the youngest age cohort (35 and younger at T1), suggesting that these individuals may be most susceptible to the health consequences of discrimination in the workplace. This finding is consistent with theory and research indicating greater emotional stability and psychological resilience at older ages (Charles & Carstensen, 2010; Ryff, 2014), which may serve to protect against unfair treatment in workplace settings. Alternatively, the stronger effects for younger compared to older adults may implicate the greater salience of occupational and work-life pursuits of younger adults that are being played out on the stage of the Great Recession, which occurred between waves of the MIDUS study. Recession hardships are known to have been disproportionately borne by less advantaged segments of society (Kirsch & Ryff, 2016) as well as by young adults, who were more likely to move back in with parents, delay marriage and family life (Davis, Kim, & Fingerman, 2016; Fry, 2013), and face the prospect of being worse off than their parents in accumulated wealth and financial security (Chetty et al., 2017). Additional research will be needed to better understand what accounts for the age differences in the obtained findings.

Although not hypothesized, the association between SED and everyday discrimination (but not work inequality) was stronger for males than for females, as well as stronger for Whites than for African Americans. This is consistent with prior research focusing on race-related discrimination, which has found more frequent experiences of discrimination among males (Seaton, Caldwell, Sellers, & Jackson, 2008; Sims et al., 2016) and more advantaged African Americans (Colen, Ramey, Cooksey, & Williams, 2017; Everson-Rose et al., 2015). No significant moderation of associations between discrimination and self-rated health was detected by race or sex. Due to the relatively small number of racial/ethnic minority participants in the analytic sample for this study, this study was not optimally suited to addressing questions relating to race, and thus our findings in this regard should be considered preliminary.

The limitations of this study should be noted. One important caveat relates to the longitudinal sample. In particular, since more advantaged segments of the population are more likely to be maintained in longitudinal studies (including in MIDUS), those with complete data at the follow-up assessment represent a more socioeconomically advantaged and disproportionately White segment of the population than participants at the initial assessment (Radler & Ryff, 2010). Thus, reported estimates of the degree to which socioeconomic health inequalities widen across the adult years, and are predicated on experiences of discrimination, are likely to be conservative. We attempted to limit bias introduced by missing data by including correlates of attrition in model estimation (FIML) procedures. Insights would be gained by longitudinal studies that oversample or reinstate less advantaged segments of the population and underrepresented racial/ethnic groups.

A second caveat relates to measurement of perceived discrimination. Although a strength of this study was that discrimination was assessed with two measures that did not rely on specific attributions (e.g., to education, income, occupation, or wealth), this strategy also has its inherent limitations. This assessment approach leaves open the question of whether discrimination is being perceived by victims as resulting from their own socioeconomic position or is attributed to other factors (e.g., obesity, dialect, clothing). Studies on this topic are needed to explicate the various forms that social class–related discrimination might take and how they are being perceived. Furthermore, it should be noted that many forms of discrimination that relate to social class may not be noticed by the victim (e.g., being looked over for promotion). Thus, some pernicious acts may not be captured on self-report measures, and thus the proportion of variance in health explained by perceptions of discrimination may underestimate the actual role of discrimination in socioeconomic health disparities. Alternatively, reports of discrimination may reflect a more negative or pessimistic outlook on life rather than actual exposure to social stress and exclusion (Diener et al., 2003; McCrae, 1990). However, our analyses adjusting for negative affect and neuroticism did not lend support to this explanation.

A third caveat relates to the fact that SED was modeled at a single point in time. Although moderate stability was observed over time, additional research will be necessary to consider whether changes in SED track with changes in discrimination and health. Such analyses will help to explicate the long-term effects of SED experienced early in life from the cumulative effects of continued SED across the adult years.

A final caveat relates to the fact that health was assessed as global and was self-reported. Important to emphasize is that self-rated health has been robustly linked to subsequent mortality and objective health outcomes (Benyamini, 2011; Ferraro & Wilkinson, 2015). For example, individuals reporting excellent health have been found to have approximately half the mortality risk of those reporting poor health, even after adjusting for functional status, depression, and comorbidity (DeSalvo, Bloser, Reynolds, He, & Muntner, 2006). The ability of self-rated health measures to predict subsequent mortality is on par with comprehensive objective health measures (Lima-Costa, Cesar, Chor, & Proietti, 2012). Furthermore, self-rated health has been found to have a graded association with a range of health biomarkers (Juster, McEwen, & Lupien, 2010; Jylhä, Volpato, & Guralnik, 2006). Future research should seek to replicate the reported findings using objective

health measures. Furthermore, the specific psychosocial and biological mechanisms by which discrimination may be leading to physical decline remain to be elucidated and will also be an important area of inquiry. In particular, consideration of longitudinal changes in specific biomarkers and their psychosocial precursors will help to instantiate the mechanisms for physiologic dysregulation resulting from socioeconomic disadvantage and related discrimination.

Overall, within the bounds of the limitations noted above, findings from this study suggest that discrimination is an important contributor to the association between socioeconomic disadvantage and health. Furthermore, age moderation effects indicate that, although exposure to unfair treatment and its injurious consequences continue across the adult years, effects may be most pronounced during the first half of the life span, particularly relating to experiences in the workplace. Going forward, additional research will be needed to replicate the findings of this study using objective health measures and to examine possible interventions. The significance of this research is underscored by accumulating evidence showing that, over the past three decades, social class hierarchies have become increasingly salient around the world—as indicated by rising income inequality and decreased movement within prevailing class structures (Bourguignon, 2015; Duncan & Murnane, 2011; Piketty, 2017; Reeves, 2017). Challenging the ideologies and beliefs that underlie social class–related discrimination and mitigating its harmful consequences are therefore both important approaches to consider.

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