

Discrimination and African American health inequities

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TAKEAWAYS

The brain processes interpersonal racism as social pain in the same regions associated with the emotional components of physical pain.

Exposure to perceived discrimination triggers a stress response; when this exposure is chronic, the stress response creates wear and tear on the body, increasing the risk of adverse health outcomes.

In part because of discrimination, African Americans are at increased risk of adverse health outcomes, including low birth weight, hypertension, obesity, and cardiovascular disease.

Health inequities begin even before birth and build over a lifetime.

This disproportionate risk of adverse health outcomes helps explain the disproportionate effect of Covid-19 on African Americans.



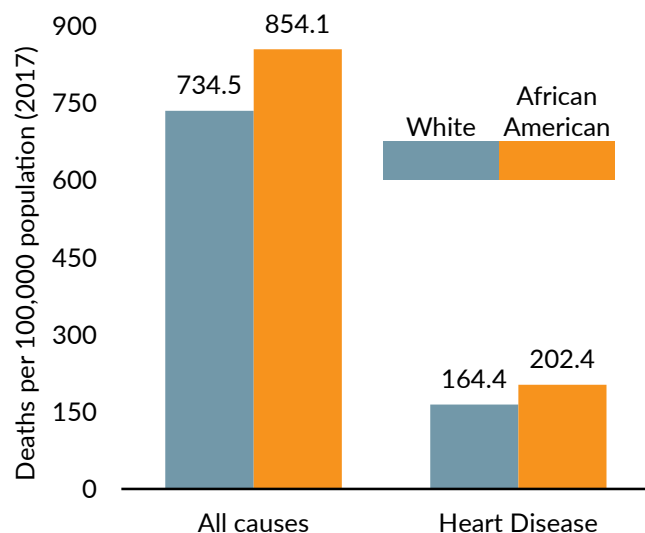
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In this article, we review research on stress-related biological mechanisms that link interpersonal discrimination to health patterns for African Americans.¹ There are longstanding and significant health inequities between African Americans and whites in the United States. African Americans are more likely to die at early ages (Figure 1). Recent data also suggest that Covid-19 has disproportionate effects on African Americans (see text box).² Although the processes through which these disparities operate are complex, they are rooted in America's historical legacy of racism. Evidence suggests that the social determinants of health—the circumstances in which people are born, grow up, live, work, and age—are as influential on health as access to health care and individual behaviors.³ Racism is one of the mechanisms through which social determinants affect health outcomes and inequities.

Figure 1. African Americans are more likely to die at early ages.



Source: 2018 Mortality data from the Centers for Disease Control and Prevention, National Center for Health Statistics, on CDC WONDER.

Our research questions include:

- What are the pathways by which health inequities emerge through interactions between the negative social experiences of interpersonal discrimination and stress biology?
- How do these interactions emerge?
- How do these interactions affect health at different periods of the life course?
- What are the policy and research implications of these interactions?

Defining interpersonal racism

Discrimination is the unjust or prejudicial treatment of a category of people. Race, while only one of many categories on which discrimination may be based, is an important dimension

along which groups of people experience systemic adverse treatment.⁴ This systematic adverse treatment with respect to race in general, and African Americans in particular, reflects racism—“categorizing and stratifying social groups into races in a way that devalues and disempowers certain groups.”⁵ Racism may be structural, reflecting the exclusion of particular groups from areas such as schools, employment, health, housing, credit, and justice.⁶ Racism may also occur at the individual level, through interpersonal discrimination—the topic of this article. Interpersonal discrimination and the social exclusion it creates is a persistent problem in the United States.⁷ In a 2017 national survey, 92 percent of African Americans reported that discrimination exists in the United States today, and 75 percent of those respondents believed that interpersonal discrimination is a significant social problem.⁸ While African Americans in the United States face a specific set of conditions that are important to consider, links between discrimination and health are not exclusive to African Americans. Many of the conclusions discussed here likely also apply to other marginalized groups who experience high rates of interpersonal discrimination and social exclusion.⁹

Discrimination and health

In this article, we consider some biosocial pathways—those that combine biology and social relationships—that link discrimination to health. In particular, we review research on neurobiology, stress physiology, and genomic factors.

The perception of interpersonal discrimination is associated with a range of mental and physical health outcomes (see text box).¹⁰ The pathways through which discrimination influences health reflect a complex set of interactions between human biology, the brain’s capacity for social interaction, and the extent to which an individual’s outcomes are affected by the actions of others. In order to process and prepare for social demands, our brains monitor, regulate, and coordinate internal systems. Discrimination, when identified by the brain as a stressor, triggers an immediate response.

In the short term, exposure to stress triggers an adaptive response that helps the body to prepare for and respond to danger, injury, or infection. However, if stress continues over the long term, the body’s capacity to process stress efficiently can decline, causing wear and tear on bodily systems that accumulates over time, and eventually causes physiological changes. These physiological changes, which increase the risk for adverse health effects, typically occur (and can be measured) well before any changes in health emerge. Measurement of these physiological changes thus provides a tool for understanding how social conditions and experiences affect health over a person’s lifetime, and at different life stages.

Disproportionate effects of Covid-19 on African Americans

The Centers for Disease Control and Prevention find that Covid-19 hospitalization and death rates are disproportionately high for African Americans compared to whites. For example, using incidence rates as a proportion of the population, August 2020 data showed that, compared to white, non-Hispanic individuals, African American non-Hispanic individuals had:

- 2.6 times higher rates of Covid-19 cases;
- 4.7 times higher rates of Covid-19 hospitalization; and
- 2.1 times higher rates of Covid-19 deaths.

Examples of adverse health outcomes associated with the perception of interpersonal discrimination

Mental health outcomes:

- Depression;
- Anxiety;
- Anger;
- Low self-esteem; and
- Negative well-being

Physical health outcomes:

- Poor self-rated health;
- Low birth weight;
- Hypertension;
- Obesity;
- High blood pressure; and
- Cardiovascular disease.

The role of social support and connection in human health has been well-documented.¹¹ Discrimination—whether intentional or not—that occurs as a result of interpersonal racism has the effect of excluding individuals from opportunities for attachment and support. People who are subject to racism and discrimination are denied the benefits of belonging and the positive emotional energy that results from successful social experiences.¹² Interpersonal discrimination contributes to health inequities on a population level by adding stress exposure to other types of social disadvantage—such as low socioeconomic status—that are also related to racism.¹³

To understand how interpersonal racism can affect health, it is important to begin not with the body, but with the brain. When an individual experiences interpersonal discrimination, the brain is the first to process it. Below we discuss some of the biosocial pathways connected to interpersonal discrimination; these pathways are also depicted in Figure 2.

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Neurobiology

People often use similar terms to describe negative social experiences and physical pain. For example, a person who has been mistreated may say they “feel hurt” by the experience.¹⁴ There is truth in these expressions; the same neural structures support both the emotional component of physical pain and the experience of social pain that results from social rejection and exclusion.¹⁵ Social connection is an important component of human survival. The mechanisms that support protection from physical threats through physical pain may have evolved to respond to social inclusion threats as threats to survival.¹⁶

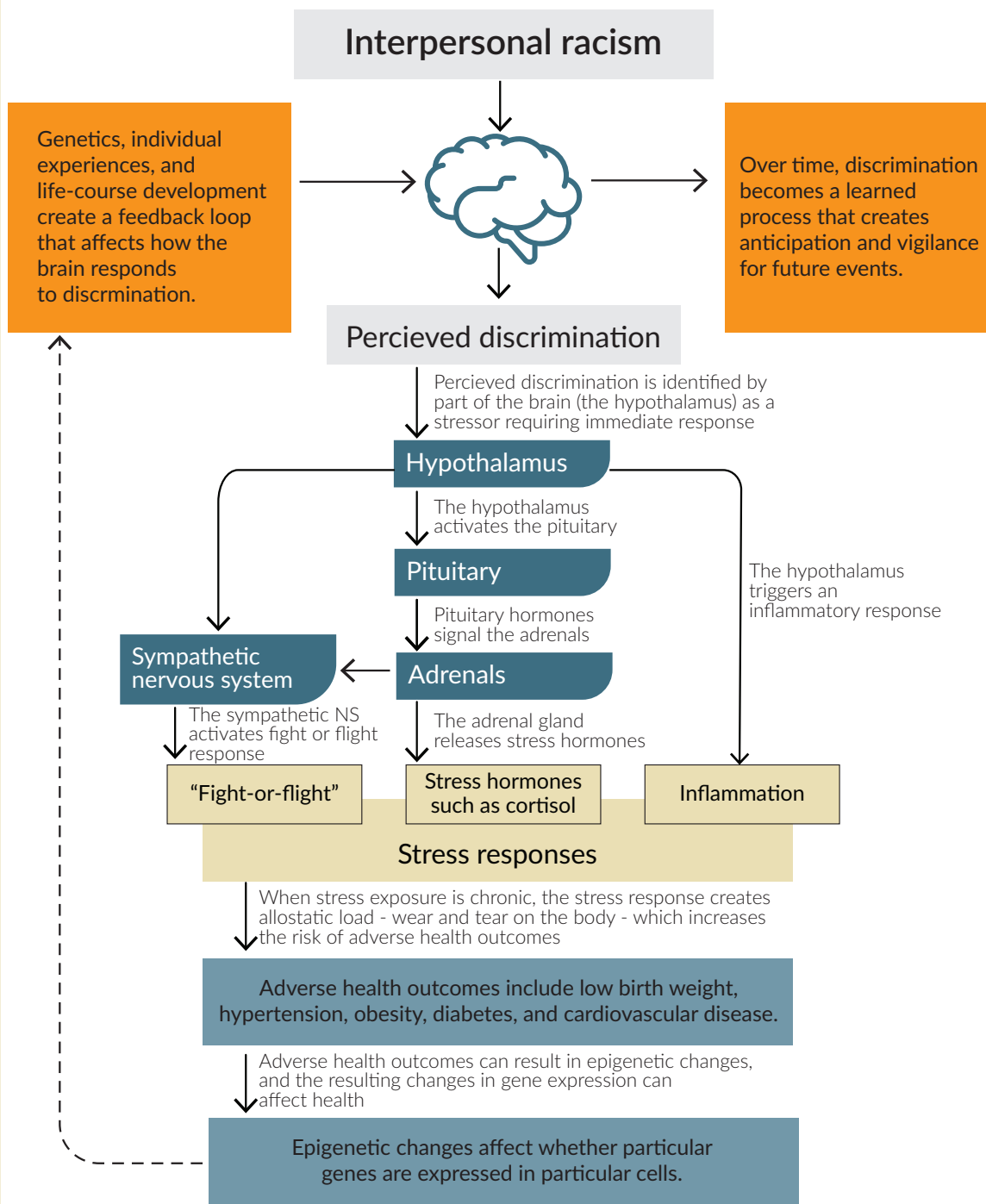
The interactions within and among these physiological systems allow the social environment to be processed and monitored, and prepare the brain and body for future social experiences and the anticipation of potential threats from those encounters.¹⁷ Thus, as shown at the top of Figure 2, while interpersonal discrimination triggers a stress response because of the immediate needs it presents, the threat of such experiences is also a learning process. These encounters shape how individuals understand their experiences, form expectations for future encounters, and consequently monitor and prepare the body for similar negative social interactions.

Neural processes monitor and recognize discrimination, the first phase in the stress-related physiological effects depicted in Figure 2. Several studies document the links between activity in the neural regions related to social exclusion and different aspects of the stress process. These regions monitor the environment for social feedback, including threats to social inclusion, and coordinate physiological responses.¹⁸

Stress physiology

Once the hypothalamus identifies a stressor, it activates the body’s stress response through physiological structures such as the sympathetic nervous system, pituitary, and adrenals. The sympathetic nervous system prepares the body to deal with the demands of the environment, including threats to social inclusion, and is responsible for the fight-or-flight response. Stressors trigger a sympathetic nervous system response, which in turn

Figure 2. Links between interpersonal discrimination and health operate through physiological responses and changes in gene expression.



Source: B. J. Goosby, J. E. Cheadle, and C. Mitchell, "Stress-Related Biosocial Mechanisms of Discrimination and African American Health Inequities," *Annual Review of Sociology*, 44 (2018), 319–340, Figure 1.

has effects on the cardiovascular system.¹⁹ The specific cardiovascular response depends on whether the stressor is positive (such as planning for an exciting but stressful event like a wedding) or negative (such as being stopped by the police). In response to a positive stressor, heart rate increases and blood vessels dilate, increasing cardiac output and keeping blood pressure relatively stable. However, when negative stressors are encountered, blood vessels contract, restricting blood flow for fast circulation

and increasing blood pressure.²⁰ High blood pressure (or hypertension, when chronic) is particularly dangerous in the presence of other stress-related conditions such as increased blood viscosity and increases in certain cholesterol particles that contribute to arterial scarring and increased cellular inflammation.²¹

Along with the sympathetic nervous system, the hypothalamic-pituitary-adrenal axis plays a key role in the body's response to stress and long-term health outcomes. As shown in Figure 2, this axis is responsible for the production of stress hormones that regulate metabolic function, immune response, and mood (such as cortisol) and the regulation of inflammatory immune function.²² Neural sensitivity to social exclusion and reactivity to negative social experiences, such as perceived interpersonal discrimination, are linked directly to activity in this axis, resulting in increased stress hormone production. While such increases help the body to respond to stress in the short term, chronic increases in cortisol production increase the risk for insulin resistance, obesity, and type 2 diabetes.²³ As with the sympathetic nervous system, increased activity in this axis also creates wear and tear on the arteries, increasing the risk of cardiovascular disease.²⁴ African Americans are at increased risk of all of these adverse health outcomes.²⁵

Gene expression depends on the environment and is sensitive to social experience.

Genomic factors

Genetic research, particularly as it relates to race, can be controversial. The fear that genetic research could be used to support racist agendas reflects a history of racism in our society.²⁶ In practice, considerably less genomic research has been done on African ancestry groups compared to European ancestry groups, despite evidence that more multiethnic research is needed.²⁷

This lack of information restricts our ability to understand how life in a racialized social system affects health through genetically influenced biological pathways. As shown in Figure 2, genetic variation contributes to variability in all the biological systems discussed above, and therefore influences the individual capacities underlying sensitivity to social exclusion, emotional and physiological reactivity, and individual differences in response to stress. Because the genome plays a key role in how the body responds to its environment, it is important to understand the relationship between genetics and biological processes. Genes may also provide information about systems for which the biological indicators are too invasive to measure, such as the systems that regulate communication within the neural networks that monitor and respond to social inclusion and exclusion.²⁸

It is useful to think in terms of genomics—the study of a person's genes, including interactions of genes with each other and with the person's environment—and not just genes alone. The gene is a predictor that can be linked to the environment, but other features of the genome also matter. As shown at the bottom of Figure 2, research indicates that social stress regulates gene expression, potentially affecting the stress response. For example, social stress is associated with an increase in pro-inflammatory immune response and a decrease in antiviral immune response.²⁹ The social stress of loneliness is also associated with changes in gene expressions.³⁰

Gene expression (which determines, for example, the production of insulin in order to signal blood glucose regulation) is also dependent on epigenetic processes, as indicated

by the dashed feedback arrow in Figure 2. Epigenetics is the study of the chromosomal alterations that affect whether particular genes are expressed in particular cells. Gene expression depends on the environment and is sensitive to social experience. For example, one study found that individuals who experience chronic social isolation have lower antiviral immune response gene activity compared to those who are socially connected, leaving them vulnerable to viral infections including the common cold.³¹ These individuals also showed increased expression of genes involved in inflammation, which underlies the progression of chronic diseases like metabolic syndrome, heart disease, certain cancers, and Alzheimer's disease.

Interpersonal discrimination is associated with epigenetic changes, including in the placentas of newborns when mothers experienced discrimination during pregnancy.³² It is well documented that all these genomic processes—from epigenetics to gene expression—are highly developmental and change throughout the life course.³³

Effects over the life course

Over their lives, individuals move from birth (when birth outcomes shape health and developmental trajectories), to childhood (when social networks remain small, and dependency on parents remains high), through adolescence (when social networks expand, and youth become more independent), and into adulthood (with its many roles, demands, and dependencies). Below, we consider how individuals' sensitivity to social rejection and exclusion varies over time, and how health deficits accumulate.³⁴ The social exclusion of interpersonal discrimination is a moment of learning that affects how future social interactions are experienced. It also contributes to a stress-response series that can have cumulative affects over time. This process is depicted in the feedback loop in Figure 2.

African Americans experience significantly worse birth outcomes compared to whites.

Disparities at birth

African Americans experience significantly worse birth outcomes compared to whites. Birth disparities have not improved significantly since the Jim Crow era, and the likelihood of low birth weight (a birth weight of less than 5.5 pounds) and preterm birth (born before 37 weeks of pregnancy are completed) for African Americans remain respectively 1.6 and 1.9 times larger than for whites, even after controlling for factors such as socioeconomic status.³⁵ African American women exposed to discrimination during pregnancy have elevated blood pressure, and their infants have lower birth weights and higher preterm delivery risks, outcomes strongly correlated with infant mortality.³⁶

The prenatal period is critical in shaping health risk trajectories. Exposure to stressful conditions influences the neural and physiological stress pathways of the fetus. Poor birth outcomes are associated with adverse health conditions in later life, including abdominal obesity, insulin resistance, hypertension, type 2 diabetes, and cardiovascular disease—all conditions for which African Americans are disproportionately at risk.³⁷ Prenatal changes in fetal stress pathways are the body's way of preparing the infant for the environmental stressors that may be experienced outside the womb. In this way, the prenatal environment mirrors maternal stress-related factors, preparing the child for the mother's social environment. For example, when women experience stress while pregnant, the fetus may be exposed to higher levels of stress hormones such as cortisol.³⁸ As noted above, over the long term, increases in cortisol production elevate the risk of negative health outcomes.

Disparities during childhood and adolescence

In many ways, African American children in the United States are not given the same opportunities to enjoy childhood that white children receive.³⁹ By the time they reach three or four years of age, young children of color are able to distinguish the members of dominant social groups and to perceive negative racial stereotypes.⁴⁰ This awareness may reflect African Americans' experiences of discrimination in the form of racial slurs and taunts, bullying and social exclusion, harassment by the police, and the disproportionate allocation of punitive treatments in school.⁴¹ As a consequence, African American children are at risk of experiencing elevated feelings of danger, social isolation, and psychological distress.⁴² Stress levels experienced due to factors such as residential segregation and other features of the United States' racial hierarchy may exceed some individuals' ability to cope and respond effectively.⁴³

Exposure to discrimination from birth through age 18 has been linked to a range of negative mental health outcomes.⁴⁴ Childhood stress is linked to higher blood pressure, blood glucose, body mass index, and pro-inflammatory immune function, thus elevating chronic disease risk as youth age and physiological wear and tear accumulates.⁴⁵ In children as young as 9 or 10 years old, exposure to discrimination is associated with elevated blood pressure, a greater degree of inflammation, and higher cortisol levels.⁴⁶

Adolescence is marked by a variety of connected physiologic and social transitions, including neural sensitivity to social exclusion.⁴⁷ As individuals experience biological changes during puberty, they become increasingly aware of their status in peer social hierarchies as peers rather than parents become the most important agents of socialization.⁴⁸ As they navigate the world more independently, they may also be increasingly exposed to discriminatory experiences, and thus become aware of institutional racism and other highly racialized systems of oppression.⁴⁹ Adolescents may also become increasingly aware of the discrimination and microaggressions experienced by themselves and others.⁵⁰ Such experiences may add to their existing stress burden, setting the stage for health inequities in later life.⁵¹

Studies examining differences in the production of the stress hormone cortisol between African Americans and whites from adolescence into adulthood suggest that African American adolescents produce more stress hormones at bedtime, and experience less of a decrease of those hormones during the day, indicating higher levels of stress activation.⁵² Adolescent reports of discrimination are also associated with higher levels of cortisol production in adulthood.⁵³

Disparities during adulthood

Adulthood is generally the time when illness manifests. Building on experiences in childhood and adolescence, stressors broaden and deepen with age, social roles become more complicated, and family and other interdependencies become more crucial.

Emerging adulthood—around ages 18 through 29—involves numerous transition points such as education, employment, parenthood, and marriage.⁵⁴ Exposure to interpersonal discrimination during these times of transition can exacerbate the stress levels typically experienced at these points.

Experimental laboratory studies have shown that exposure to discrimination for African American college students is linked to nervous system responses. Perceived discrimination among African American (but not white) college students is linked to lower heart rate variability, a cardiovascular risk factor.⁵⁵ Another study found that racial identity serves as a protective mediator in the association between blood pressure (an indicator of sympathetic nervous system activation) and racial discrimination. Racial discrimination

is associated with lower blood pressure for college students who have a strong and positive connection with the racial group they identify with. In contrast, racial discrimination is associated with higher blood pressure for students who do not feel a strong connection to their racial group.⁵⁶ These laboratory studies provide important clues regarding the physiological burdens borne by African American college students in predominantly white environments.

African Americans who become parents must consider their children's experiences with discrimination, including encounters in schools and with law enforcement.⁵⁷ Although the effect of such worries on parents' health has not been studied extensively, there is evidence that such conditions can lead to psychological stress.⁵⁸ For example, one study of college-educated adults found that African Americans' stress-response levels are 32 percent higher than those of comparable whites.⁵⁹ However, it is not clear how much of this disparity is due to the unique contributions of parenting stress, to the high probability of contact with whites for this group of relatively advantaged African Americans (and thus exposure to interpersonal discrimination), and to other factors such as structural or internalized racism and behaviors.

By middle age, African American adults show numerous signs of accelerated aging compared to white adults of the same age.

By middle age, African American adults show numerous signs of accelerated aging compared to white adults of the same age. For example, African American women between the ages of 49 and 55 are estimated to have a biological age—how old a person seems to be, taking into account health and lifestyle factors—that exceeds that of whites of comparable socioeconomic status by 7.5 years.⁶⁰ There is also recent evidence suggesting that African American adults aged 51 and older who reported very high lifetime exposures to discrimination had a higher biological age compared to those who reported low to moderate levels of lifetime discrimination.⁶¹ Discrimination among middle-age and older African Americans is also associated with other physiological indicators of chronic stress-related conditions such as diabetes, heart disease, and stroke.⁶²

African American adults have persistently higher stress-response levels relative to whites until they reach age 60–65, at which point such disparities appear to reduce in magnitude, perhaps due to earlier death among African Americans.⁶³ One study found that differences in diabetes- and cardiovascular-related mortality between African American and white adults were partially explained by differences in stress hormone levels, and that these differences were independent of socioeconomic status.⁶⁴ These findings are significant since African Americans are also more likely to experience earlier onset of age-related chronic diseases and fatal chronic conditions.⁶⁵ In fact, 28 percent of cardiovascular deaths among African Americans occur at less than 65 years of age compared to 13 percent for whites, a difference that persists after controlling for socioeconomic status.⁶⁶

When African Americans move up the socioeconomic ladder, that mobility may lead to race-related stressors. A recent study showed that African Americans who achieved a higher socioeconomic status reported higher rates of discrimination compared to those who remained at the same socioeconomic level. The same study found that these higher rates of discrimination explained the racial disparity in health outcomes among upwardly mobile adults.⁶⁷

African American health inequities contribute to the likelihood of experiencing the loss of multiple loved ones over the life course. This traumatic source of stress appears to exacerbate individual and intergenerational health risks among African American, but more study is needed to explore the long-term effects of this bereavement.⁶⁸

Sociological perspectives on stress and health

There is a tremendous need for continued collaboration between biological scientists and health inequality and discrimination researchers across a range of increasingly relevant fields, including molecular biology, immunology, and neuroscience. Sociological perspectives that emphasize the role of discrimination at multiple levels of social organization have much to offer because they recognize that discrimination reflects ongoing historical processes whose roots spread deep and wide within our culture. In the same way that sociologists are unfamiliar with the complexity of biological systems, biologists and health scientists tend not to consider the effects of social context. Just as the biological data have often been examined in white or European-ancestry samples, the vast majority of researchers in this area are white. We strongly encourage scholars of color to lend their experience, knowledge, and skills to this work, and we believe that broad and inclusive participation will help protect the future of biosocial science from the mistakes of the past.

As our country comes to terms with the effects of the pandemic, it is critical that we recognize the role of racism in shaping health inequities.

Interpersonal racism and Covid-19

Even before the Covid-19 pandemic began, African Americans were at disproportionate risk of adverse health conditions such as obesity, hypertension, high blood pressure, and cardiovascular disease. Many of these conditions appear to increase the risk of serious illness or death from Covid-19. In addition, African Americans may also be more likely than whites to be in a position to contract the virus because of inequities in access to health care, safe housing, and workplace protections. As our country comes to terms with the effects of the pandemic, it is critical that we recognize the role of racism in shaping health inequities. The mechanisms conducive to poor health are many, and broad patterns of racial inequity have long been embedded in the racist social organization of the United States. However, even if we focus instead on the smaller-scale interpersonal interactions through which discrimination occurs, differential treatment by way of exclusionary acts has large-scale consequences for population health.■

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⁶⁸This article draws on B. J. Goosby, J. E. Cheadle, and C. Mitchell, "Stress-Related Biosocial Mechanisms of Discrimination and African American Health Inequities, *Annual Review of Sociology*, 44 (2018), 319–340.

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Edited by Emma Caspar.

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This publication was supported by Cooperative Agreement number AE000103 from the U.S. Department of Health and Human Services, Office of the Assistant Secretary for Planning and Evaluation to the Institute for Research on Poverty at the University of Wisconsin–Madison. The opinions and conclusions expressed herein are solely those of the author(s) and should not be construed as representing the opinions or policy of any agency of the Federal government.



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