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Anxiety Mediates Perceived Discrimination and Health in African-American Women

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Abstract
We examined the mediational role of symptoms of anxiety in accounting for the association of discrimination and chronic health conditions among African-American women. *Methods*: Participants were 646 African-American women who completed self-report measures of perceived racial discrimination, symptoms of anxiety, and diagnosed chronic health problems. *Results*: We examined the mediation hypothesis using a path analytic procedure. Mediational analyses indicated that, above and beyond symptoms of depression, age, and education status, anxiety symptoms were associated with both racial discrimination ($\beta = .03$, SE = .01, $p < .001$) and chronic health problems ($\beta = .33$, SE = .09, $p < .001$) and significantly mediated the discrimination-health association ($\beta = -.01$, SE = .01, $p = .16$). *Conclusions*: These findings highlight the potentially vital role of symptoms of anxiety in the process that occurs from an individual's perception of discrimination to reported chronic health outcomes. Future research expanding our understanding of the interconnection of psychosocial stressors, discrimination, and their biological sequelae is needed.

Keywords
perceived discrimination, anxiety, chronic health, African-American women

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Anxiety Mediates Perceived Discrimination and Health in African-American Women

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***Objective*: We examined the mediational role of symptoms of anxiety in accounting for the association of discrimination and chronic health conditions among African-American women. *Methods*: Participants were 646 African-American women who completed self-report measures of perceived racial discrimination, symptoms of anxiety, and diagnosed chronic health problems. *Results*: We examined the mediation hypothesis using a path analytic procedure. Mediational analyses indicated that, above and beyond symptoms of depression, age, and education status, anxiety symptoms were associated with both racial discrimination (β = .03, SE = .01, p < .001) and chronic health problems (β = .33, SE = .09, p < .001) and significantly mediated the discrimination-health association (β = -.01, SE = .01, p = .16). *Conclusions*: These findings highlight the potentially vital role of symptoms of anxiety in the process that occurs from an individual's perception of discrimination to reported chronic health outcomes. Future research expanding our understanding of the interconnection of psychosocial stressors, discrimination, and their biological sequelae is needed.**

***Key words*: perceived discrimination; anxiety; chronic health; African-American women**

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African-American women disproportionately experience hypertension, diabetes, and cardiovascular disease relative to European Americans.[1] For example, the rate of diagnosed hypertension among African-American women is more than 150% that of European-American women at 44.4% versus 28.1%, respectively.[2] One possible contributing cause for these disparities is suggested by conceptual models and research findings indicating that poor psychological and physiological health outcomes are perpetuated by exposure to race-related chronic stressors, such as perceived racial discrimination.[3,4] For such accounts to be plausible, however, identification of a mechanism through which experiences of discrimination affect health needs to be explicated. One such mechanism may involve symptoms of chronic anxiety. Some studies have found that anxiety symptoms are linked to perceived racial discrimination.[5,6] However, none has: (1) examined these associations specifically for African-American women; or (2) examined anxiety symptoms' potential mediating role in the relationship between perceived racial discrimination and health outcomes. The overarching goal of the present study was to investigate the mediational role of symptoms of anxiety in the relationship between perceived racial discrimination and chronic health problems.

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Perceived Racial Discrimination and Chronic Health Problems

Repeated experiences of stress related to perceived racial discrimination is believed to result over time in physiological changes that may be deleterious to physical health.[7] Repeated stimulation of "fight or flight" responses in particular can result in substantial allostatic load as the body attempts to respond to repeated challenge. Although adaptive in the short term, continual activation of these adaptive responses can disrupt the body's regulatory systems leading to increased vulnerability to chronic disease.[8,9] Physical dysregulation (eg, increased blood pressure and decreased heart rate variability), particularly dysregulation of the hypothalamic-pituitary-adrenocortical (HPA) axis,

also has been associated with psychosocial stress and disease.[10-12] These considerations suggest that examination of the relationship between perceived racial discrimination and chronic health problems is warranted, and that psychological response linked to chronic activation of the HPA axis might be a good candidate as a mediator of the link.

Despite the abundance of research that assesses perceived discrimination, the implications of the findings are inconsistent and many of the studies examining perceived discrimination and health outcomes have significant or conditional findings that warrant further investigation.[13] For example, a literature review indicated that among the 11 studies that examined self-report indicators of health status as an outcome of perceived discrimination, 6 studies revealed significant associations to discrimination, 2 studies reported significant, but conditional associations, and 3 reported no association.[14] Possible reasons for these inconsistent findings are small sample size, variability in measurement of perceived discrimination and health status between studies, and a lack of control for other confounding factors, such as socioeconomic status.[14] Yet, a critical concern is also that none of these studies that look at the relationship between perceived discrimination and health outcomes has examined the mechanisms or plausible pathways by which this relationship occurs.

Perceived discrimination also has been studied with regard to its impact on specific types of physical health problems, such as hypertension, self-reported poor health, breast cancer incidence, as well as potential risk factors for disease, such as obesity, high blood pressure, and substance use.[15,16] However, few studies have considered the accumulation of chronic illness that may be linked to perceived discrimination.[17] Chronic and continuous stress is said to exist in the form of daily hassles.[18,19] By acknowledging that perceived discrimination is seemingly considered daily hassles in the lives of many African Americans, the risk for this population to experience the deleterious effects on health needs to be examined.

Anxiety, Perceived Discrimination, and Chronic Health Problems

Researchers note the importance of perception in racist events, as an individual's perception of a stimulus can elicit coping responses that potentially lead both to psychological and physiological stress responses.[3] One key component that may link perceived racial discrimination to symptoms of anxiety is the perceived lack of control and worry associated with experiences of racial discrimination in daily life. One study found that African-American women who reported the greatest level of perceived racism demonstrated higher levels of passive emotional and behavioral coping responses.[20] The finding highlights that certain coping responses to stress, such as passive coping, could be less adaptive for managing worry and lack of control, thereby exacerbating anxiety symptoms and potentially leading to poorer overall adjustment.[21]

Non-specific distress and depression are the most common psychological symptoms assessed in relation to perceived racial discrimination's effects on psychological health.[15,22] Few studies have examined the association of racial discrimination with symptoms of anxiety.[5,6,23] No known studies have examined anxiety as a potential mechanism that links experiences of discrimination with poor health in African-American adults, although one longitudinal study found that racial discrimination was associated with anxiety symptoms in pre-adolescent African-American girls.[24]

Depression accounts for a considerable amount of absence from work and poor work performance, and is one of the most common psychological problems assessed in relation to perceived racial discrimination.[25] However, there is a lack of research examining the potential independent and/or differential influence of affective responses (ie, anxiety and depression) on perceived racial discrimination. Taking depressive symptoms into consideration could provide information about anxiety symptoms' significance in this relationship, above and beyond the role of depressive symptoms. Furthermore, some studies of racial discrimination-health pathways have noted the connection of poor education as well as age to physiological changes in response to race-related stressors.[3,26] Whereas the influence of age and educational attainment on the relationship between perceived racial discrimination and health outcomes has been statistically significant in some studies, other studies have found that the relationship between discrimination and health is significant, even when controlling for these factors.[15,27] For example, one study found that the observed racial differences between African Americans and European Americans in health were markedly reduced when adjustments were made for education and income, important intermediate factors that should be considered when attempting to understand racial health disparities.[27] Meta-analytic review has indicated, however, that despite the inclusion of some combination of demographic covariates such as age and education, 18 of the 19 studies (95%) reviewed still showed a significant negative relationship between any form of perceived discrimination and mental or physical health outcomes, even after accounting for age and education.[15] For example, one study found that the observed racial differences between African Americans and European Americans in health were markedly reduced when adjustments were made for education and income, important intermediate factors that should be considered when attempting to understand racial health disparities.[27] Consideration of potential confounding variables, such as depression, age, and education is warranted to understand the relationship between perceived racial discrimination and health outcomes.

The connection between mood disorders and physical health has been well established.[28-30]

Emotional states such as hostility, depression, and anxiety have been considered psychosocial risk factors that potentially contribute to and influence the course of chronic health diseases.[31,32] Symptoms of anxiety, in particular, are related to chronic health conditions, and anxiety symptoms have been found to influence the development and exacerbation of physical health problems.[33] One study found that worry, and specifically, global worry about social conditions (ie, economic recession) was associated with 2-fold increases in coronary heart disease.[32] These researchers note that the perceived uncontrollability of social conditions could influence higher levels of worry, that in turn, influence cardiovascular health consequences. Researchers propose that given the somatic nature of symptoms of anxiety, African Americans in particular may be influenced by the "salience of physical illness" or the heightened attention to the perceived threat of physical illness in the interpretation of anxiety pathology.[34] Taken together, the available research suggests a model in which perceived discrimination functions as a chronic and uncontrollable stressor leading to anxiety and HPA-axis dysregulation, which ultimately results in increased chronic health difficulties. If so, better understanding the role of anxiety is an important next step to understanding health disparities among African Americans.

Present Study

The goal of this study was to examine the understudied but complex association between perceived racial discrimination and chronic health problems among African-American women. We first examine the potential meditational role of anxiety symptoms. Given the likely influence of depressive symptoms, age, and education level, we statistically control for these factors. The specific hypotheses were: (1) perceived discrimination will be related to chronic health problems such that greater perceived discrimination will be associated with more reported chronic health problems; and (2) symptoms of anxiety will mediate the relationship between perceived discrimination and chronic health problems while controlling for depressive symptoms such that higher levels of perceived discrimination will be associated with more symptoms of anxiety, which in turn, will be associated with more chronic health problems.

METHODS

We tested the hypotheses for this study using participants from the 4th wave of data, collected between March 2005 and August 2006, from the longitudinal Family and Community Health Study (FACHS), a multi-site study of neighborhood and family effects on health and development. Participants were recruited from rural, suburban, and metropolitan communities. A total of 897 African-American families, 475 in Iowa and 422 in Georgia, were recruited for participation in FACHS. In the current study, participants were 646 African-American women, all of whom were the primary caregiver for a 10- to-12 year-old child.

The mean age of the women was 37.1 years (SD = 8.18) with range of 23 to 80 years. The women's educational backgrounds ranged from less than a high school diploma (19%) to a bachelor's or advanced degree (10%); the majority of participants (71%) were high school graduates. The mean family income was $33,120.

Procedure

Using 1990 US census data (available during the first wave of FACHS recruitment), block group areas (BGAs) were identified in both Iowa and Georgia in which the percent of African-American families was high enough to make recruitment economically practical (10% or higher), and in which the percent of families with children living below the poverty line varied widely. Within each BGA, community members who agreed to serve as liaisons between the University of Georgia researchers and the neighborhood residents were identified. These community liaisons compiled rosters of children within each BGA who met the sampling criteria. In addition to their own direct knowledge, the liaisons used information from parents, teachers, pastors, youth groups, and community organizations in compiling the rosters. Families were then randomly selected from these rosters and contacted to determine their interest in participating in the research project. Families who declined participation were removed from the contact list. In Iowa, public schools contacted the families of all African-American fifth graders in the selected block group areas and study personnel subsequently contacted the families for the purpose of recruitment. Further description of the FACHS sample and recruitment is available.[35,36]

Measures

Demographic questionnaire. Demographic variables included participant age and education level and were obtained from the FACHS sample.

Anxiety (Mini-MASQ). Symptoms of anxiety were assessed using the Non-Specific Anxiety subscale of the Mini-Mood and Anxiety Symptom Questionnaire (Mini-MASQ).[35] Items asked about the intensity of each symptom in the past week on a 5-point Likert scale that ranged from 1 (not at all) to 5 (extremely). Sample items included: "How much have you felt tense or "high strung" and "How much have you…felt uneasy?" The Mini-MASQ was used previously with the current sample and showed good reliability and validity.[28] Cronbach's alpha in the current study was .76.

Perceived discrimination. The Experiences of Discrimination Scale is a modified version of the Schedule of Racist Events.[31] The scale was developed for use with the FACHS to assess perceived racial discrimination in an individual's lifetime. The revised scale contains 13 items concerning negative

Table 1
Means, Standard Deviations, and Zero-order Correlations among Measured Variables (N = 646)

	1	2	3	4	5	6	M	SD
1. Perceived Discrimination	1						23.54	8.52
2. Anxiety	.22**	1					4.24	1.43
3. Chronic Health Problems	.11**	.26**	1				2.48	2.52
4. Depression	.10**	.63**	.21**	1			6.38	1.88
5. Age	.09*	.02	.26**	-.06	1		36.54	7.16
6. Education	.13**	.04	-.05	-.11**	.02	1	12.41	2.18

$^{**}p < .01$ $^{*}p < .05$ $^{\#}p < .10$

experiences attributable to being African-American (eg, "How often have you been treated unfairly because you are African-American?" "How often has someone treated a member of your family unfairly because they were African-American?"). Respondents rated each item on a 4-point Likert scale that ranged from 1 (never) to 4 (several times). Higher scores are indicative of more perceived discrimination. Factor analyses of the measure revealed that reliability and validity coefficients were high and were similar to those reported in previous studies.[18] Cronbach's alpha in the current study was .93.

Chronic health problems. Chronic health problems were assessed using a self-report checklist of specific chronic health conditions (eg, "Has a doctor ever told you that you were suffering from diabetes?"). The participants were asked to indicate which of 27 chronic health conditions had affected them in their lifetime. Items that were endorsed by < 2% of the sample (ie, tuberculosis, Parkinson's disease, multiple sclerosis, speech impediment) were omitted to decrease the variance of endorsed items and to be more representative of the population under study.[37] As a result, 23 possible health problems comprised the final list.

Depression (Mini-MASQ). Depressive symptoms were assessed with the Nonspecific Depression subscale from the Mini-Mood and Anxiety Symptom Questionnaire (Mini-MASQ).[35] Items asked about the intensity of each symptom in the past week on a 5-point Likert scale that ranged from 1 (not at all) to 5 (extremely). Sample items included: "How much have you felt hopeless?" and "How much have you felt like a failure?" Cronbach's alpha in the current study was .82.

RESULTS

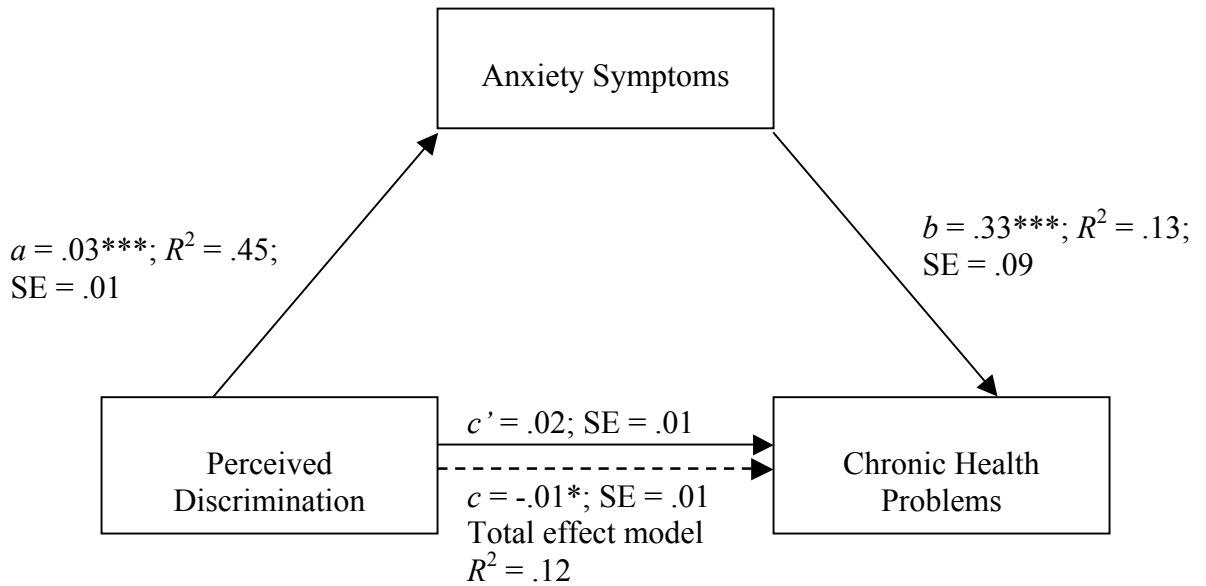
Descriptive Statistics

Table 1 presents the means, standard deviations, and intercorrelations for all measures. Age was significantly positively correlated with the number of endorsed chronic health problems, and education was significantly positively related to perceived discrimination. Perceived discrimination was significantly correlated with chronic health problems in the expected direction ($r = .11$, $p < .01$) such that African-American women who reported more perceived discrimination experienced more chronic health problems. In addition, respondents who reported more perceived discrimination were more likely to experience symptoms of anxiety ($r = .22$, $p < .01$), and depression ($r = .10$, $p < .01$), and also endorsed more chronic health problems ($r = .11$, $p < .01$). A Bonferroni correction was conducted for the simple intercorrelation for perceived racial discrimination, chronic health problems, and anxiety symptoms. The 3 simple correlations for perceived racial discrimination and anxiety symptoms ($p = .000$), anxiety symptoms and chronic health problems ($p = .000$), and perceived racial discrimination and chronic health problems ($p = .004$) were achieved at alphas <.015, denoting that all of the primary variables were significant after Bonferroni correction.

Simple Mediation

In all analyses, age, education, and depressive symptoms were entered as covariates. We examined the mediation hypothesis using a path analytic procedure.[38] To assess indirect effects we conducted bootstrapping analyses using an SPSS macro.[39] Results of our mediation analysis indicated that higher levels of perceived discrimination were associated with higher levels of anxiety symptoms (Figure 1, path *a*; $\beta = .03$, SE = .01, $p < .001$). Furthermore, higher levels of anxiety symptoms were associated with greater endorsement of chronic health problems (Figure 1, path *b*; $\beta = .33$, SE = .09, $p < .001$). Although the total effect of perceived discrimination was positively and significantly associated with chronic health problems (Figure 1, path *c*; $\beta = .02$, SE = .01, $p < .05$), when anxiety symptoms were controlled for, this association (ie, the direct effect) was no longer statistically significant (Figure 1, path *c'*; $\beta = -.01$, SE = .01, $p = .16$). A bias corrected bootstrap-

Figure 1
Path Coefficients for Simple Mediation Analysis Controlling for Symptoms of Depression, Age, and Education



Note.
Effects of control variables on dependent variable: depression (β = .15*), age (β = .10*), and education (β = - .07#). Dotted lines denoted the effect of perceived discrimination on chronic health problems when self-reported anxious symptoms are controlled for statistically.**

confidence interval (CI) was examined to assess the indirect effect of perceptions of discrimination on chronic health problems through anxious symptoms. A confidence interval for the product of the indirect paths that does not include zero provides evidence of a significant indirect effect.[39] Using the INDIRECT macro for SPSS with 1000 bootstrapped samples,[39] we found a significant positive indirect effect of perceived discrimination on chronic health problems through self-reported anxious symptoms (99% CI: .0018, 0168).

DISCUSSION

The main objective of this research was to examine anxiety symptoms as a potential mechanism in the relationship between perceptions of racial discrimination and chronic health problems among African-American women. Doing so provides insight into the mechanisms of racial discriminations' influence on health. Consistent with the hypothesis, African-American women in the current sample who perceived more racial discrimination also reported having more diagnosed chronic illnesses. This finding adds to the existing literature by providing evidence that chronic health conditions (ie, high blood pressure, diabetes, kidney disease) that disproportionally affect African Americans may be influenced substantially by the stress of discrimination. Our findings also support the accumulated evidence that, even when controlling for factors such as age and education status, the psychosocial stressor of perceived racial discrimination can have deleterious effects on physical health outcomes.[14,16] The current findings add to the literature by providing evidence that anxiety symptoms may act to mediate the discrimination-health association.

Some authorities have criticized previous research for failing to provide a more complete examination of specific mechanisms in the pathways by which perceived discrimination negatively affects health outcomes.[14] These researchers suggest that negative emotional states, such as anxiety and depression, are potential mechanisms that need to be examined. The current research findings provide theoretically driven evidence for the role of psychological factors, such as non-specific anxiety, as a mechanism influencing the pathways by which perceived discrimination relates to chronic health outcomes.

Importantly, the unique role of anxiety (above and beyond symptoms of depression) in poor health suggests that anxiety should be modeled in future examinations of race-related stressors, psy-

chological indicators, and chronic health concerns. A research study examined the role of stressful life event dimensions in predicting major depressive disorder and generalized anxiety disorder and found that stressful life event dimensions related to danger (ie, the chance that a given traumatic event will recur or the full threat or dire outcome has yet to be realized) predicted generalized anxiety disorder but not major depressive disorder.[40] Perceived racial discrimination may be viewed as a recurrent life event stressor that is viewed as uncontrollable and dangerous. Further research is warranted to examine symptoms of anxiety in comparison to other psychological symptoms in the discrimination-health association in African-American populations.

One review indicated that the negative physiological effects of exposure to stressors, such as perceived discrimination, can be triggered by the initial perception of a threat long before the actual exposure to the stressor occurs.[16] Further research examining anticipatory stress emphasizes that worry, intrusive thoughts, and hypervigilence all contribute to the unique aspects of psychophysiological responses to racial discrimination and negative health outcomes.[26,41] One study utilized the term "perseverative cognition" in conceptualizing symptoms of anxiety and anticipatory stress as cognitive processes that can lead to "prolonged physiological activation."[42] This prolonged physiological activation is said to be due to one or more psychosocial stressors and is a risk factor for dysregulation of both psychological and physiological functioning that may lead to disease conditions. The current findings denote the importance of conceptualizing anxiety as having both psychological and physiological components that can lead to negative outcomes. This research also further highlights the potential vital role of symptoms of anxiety in the process that occurs from an individual's perception of discrimination to reported chronic health outcomes.

Study Limitations and Future Directions

Although this study makes several preliminary contributions to the literature, some potential limitations should be noted. Of note, the overall effect size was low.[434] Nevertheless, it is clinically noteworthy that anxiety was associated with chronic health ratings after accounting for symptoms of depression and key demographic variables.[44] Because these findings are based on cross-sectional data, no causal associations regarding the temporal impact of racial discrimination on chronic health can be assumed. Also, perceived discrimination and health problems were assessed as lifetime experiences, whereas symptoms of anxiety and depression were assessed for a one-week segment of time. Though acute symptoms of anxiety and depression may be indicative of a chronic psychological problem, future studies should employ a prospective design to examine complex associations among racial discrimination, anxiety, and poor health over the life course. Given the timeframe in which the data for this study were collected, future studies also will reflect more contemporary responses to perceived discrimination.

In addition, the measure of discrimination may have posed some limitations. The perceived discrimination measure used in this study was a lifetime measure of self-reported discriminatory experiences which highlights the cumulative nature of the stress responses to discrimination on chronic health problems. A meta-analysis examined lifetime, recent, and chronic discrimination measurement type and found that recent discrimination had a more significant negative effect on mental health than lifetime discrimination for all ethnicities.[15] This study did not examine acute or relative recency of experiences of discrimination that could possibly affect psychological and physiological responses. Additionally, future studies might also more fully measure perceived racial discrimination by also measuring who the perpetrators were (ie, was it a person of authority and trust such as a healthcare provider or police officer) as this could influence an individual's psychological and physiological response to discrimination,[45] as well as enhance knowledge regarding how perpetrator implicit or overt racial bias can influence individual stress responses.

Coping and reappraisal processes were not examined in this study. Perceptions of racial discrimination elicit physiological arousal and anxiety symptoms (ie, worry and rumination) that can lead to complex coping responses.[20] Encounters with racial discrimination that elicit anxiety can cause individuals to utilize coping responses such as passive posture, denial of discriminatory treatment, and anger outbursts. As research has shown that worry and anxiety are frequent reactions to racial discrimination that prompt aggressive, passive, or defensive responses, it would be interesting for future studies to examine how these responses impact the mediational role of anxiety on the relationship between perceived discrimination and chronic health problems.[26,46]

Conclusion

Overall, our findings have some important implications for research, prevention, and intervention strategies. To the extent that racial discrimination produces chronic worry and anxiety and contributes to chronic health problems among African-American women, methods of increasing well-being among African Americans should be a key target of community-wide prevention and intervention. In addition to public health efforts that target discrimination sources, clinicians could provide psychoeducation for African-American women to monitor stress responses and recognize symptoms of anxiety.

Our study also highlights the need for greater acknowledgment of the presence and consequenc-

es of racist experiences as well as advancement in health policy initiatives that incorporate both the mental and physical health consequences of racism. There also may be other points of intervention secondary to the allostatic load that is produced by experiences of discrimination. These secondary interventions require additional investigation to account for persistent racial disparities in health more fully. The current results suggest that continuing efforts to reduce salient examples of discriminatory behavior could have a beneficial effect on African Americans. Additional research that expands our understanding of the interconnection of psychosocial stressors, discrimination, and their biological sequelae affecting disease, life expectancy, and mortality for African-American populations is warranted. Taking an integrative and comprehensive approach to both research and intervention strategies could potentially lead to clearly identifiable relief and resource methods for individuals suffering from discrimination; promoting effective reductions in racial health disparities for African Americans.

Human Subjects Statement

The University of Georgia human subjects review board approved the study via protocol # 2008-10546-11.

Conflict of Interest Statement

Each author acknowledges that there are no financial/non-financial interests, relationships, direct employment or any type, or paid or unpaid service on private sector or non-profit boards or advisory panels that represent a conflict of interest. There are also no conflicts of interest that may have influenced either the conduct or the presentation of research, including but not limited to close relationships with those who might be helped or hurt by the publication, academic interests and rivalries, or any personal, religious or political convictions relevant to the topic at hand.

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