Racism and Child Health: A Review of the Literature and Future Directions

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ABSTRACT: ***Objective:*** **Racism is a mechanism through which racial/ethnic disparities occur in child health. To assess the present state of research into the effects of racism on child health, a review of the literature was undertaken.** ***Methods:*** **A MEDLINE review of the literature was conducted between October and November 2007. Studies reporting on empirical research relating to racism or racial discrimination as a predictor or contributor to a child health outcome were included in this review. The definition of "child health" was broad and included behavioral, mental, and physical health.** ***Results:*** **Forty articles describing empirical research on racism and child health were found. Most studies (65%) reported on research performed on behavioral and mental health outcomes. Other areas studied included birth outcomes, cardiovascular and metabolic diseases, and satisfaction with care. Most research has been conducted on African-American samples (70%), on adolescents and on older children, and without a uniformly standardized approach to measuring racism. Furthermore, many studies used measures that were created for adult populations.** ***Conclusions:*** **There are a limited number of studies evaluating the relationship between racism and child health. Most studies, to date, show relationships between perceived racism and behavioral and mental health. Future studies need to include more ethnically diverse minority groups and needs to consider studying the effects of racism in younger children. Instruments need to be developed that measure perceptions of racism in children and youth that take into account the unique contexts and developmental levels of children, as well as differences in the perception of racism in different ethnocultural groups. Furthermore, studies incorporating racism as a specific psychosocial stressor that can potentially have biophysiologic sequelae need to be conducted to understand the processes and mechanisms through which racism may contribute to child health disparities.**

*(J Dev Behav Pediatr 30:*255–263, 2009) **Index terms:** racism, discrimination, stress, health disparities, health status, race, minority, children.

Racial and ethnic health and health care disparities refer to the differences in illness and disease, health outcomes, access to and appropriateness of health care seen between minority and nonminority populations.[1,2] With regard to maternal and child health, racial/ethnic disparities have been noted in infant mortality, rates of cesarean delivery, use of prenatal technologies, access to renal transplantation, prescribing patterns, cancer survival rates, obesity, and asthma, to name a few.[1] With regard to child mental health, differential access to mental health services,[3] as well as diagnosis and treatment for mental and behavioral health conditions[4–7] have been noted among white and minority children.

Various factors may contribute to the racial and ethnic health disparities noted above. Differences in environmental risk factors, social settings, access to quality preventive care, and genetic risk can all affect differential onset and severity of health conditions. Many of these factors are a result of social stratification, which is the process that creates a hierarchy of social positions that are unequal with regard to power, property, status, and/or psychic gratification.[8] Social stratification creates unique situations for minority children and families, which increases the likelihood of poor developmental and health outcomes.[9,10] The effects of social stratification are mediated through racism, discrimination, and oppression, which in turn create segregated environments that provide less access to the material, social, and psychological capital described above.[9]

Racism

According to the United Nations, racism is defined as "any distinction, exclusion, restriction or preference based on race, color, descent, or national or ethnic origin which has the purpose or effect of nullifying or impairing the recognition, enjoyment or exercise, on an equal footing, of human rights and fundamental freedoms in the political, economic, social, cultural or any other field of public life."[11] Racism can be more succinctly defined as the beliefs, attitudes, and actions resulting from categorizing individuals and groups based on phenotype, heritage, or culture. Racism is based on

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Received October 2008; accepted December 2008.

Supported by grant K23 HD040348 from the National Institute of Child Health and Human Development.

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racial classification, but most scientists have abandoned the concept of race as a purely biological variable. As Jones notes, "race is a social construct, a social classification based on phenotype that governs the distribution of risks and opportunities in our race-conscious society."[12] Racial discrimination is a mechanism through which unequal distribution of risks and opportunities are created.[13,14]

There are models that help to explain how racism may affect health. According to Williams et al,[15] racism creates discrepancies in socioeconomic status which can then (1) result in differential health outcomes, (2) influence the quality and quantity of medical care, and (3) adversely effect psychological and physiological functioning. Adverse health effects may be due to differential access to material needs, such as adequate nutrition, housing, environmental toxins, and hazards, as well as to discrepancies in health care.

Clark et al[16] identify reasons why racism impacts health: (1) as a stressor, racism may have negative biopsychosocial sequelae that may contribute to health disparities, (2) different exposure to racism may contribute to variability in health outcomes within minority groups, and (3) if exposure to racism is a factor related to negative health outcomes, interventions, and preventive strategies could be developed to lessen its effects. These authors and others conceptualize racism as a stressor that has the potential to affect psychological or physiological functioning.[17–19]

Racism has been studied in adults as a contributor to racial/ethnic disparities, and has shown to have effects on a number of physical, mental, and behavioral health conditions.[20–22] Little is known about the role of racism in child health and health care. The relationship between racism and child health is complex since one needs to take into account developmental effects that are unique to children, for example, differences in cognitive and socioemotional development, the effects of other family member's experiences of racism, as well as parental attitudes about raising children of color in a racially sensitive society.[23]

If the theoretical models that propose racism as a stressor are correct, then its effects on children need to be studied in the same way as other stressors that have been shown to have negative effects on health and development (for example, poverty, violence, neglect, abuse, and social upheaval). To assess the state of research into the effects of racism on child health and health care, a review of the literature was undertaken.

METHODS

A systematic search of the literature was conducted between October and November 2007. The NCBI/National Library of Medicine PubMed database was used to perform the searches. PubMed provides access to bibliographic information from MEDLINE, the National Library of Medicine's bibliographic database. MEDLINE includes references to journal articles in the life sciences with an emphasis on biomedicine, but also in nursing and other allied health areas.[24,25] The database includes articles from 1950 to the present.

Search strategy used in this review included the following string of terms: "Racism or Racial Discrimination" + "Child*" + "x . . .." The third term ("x . . .") included the following: health, health care, preventive services, screening, behavior, mental health, family, substance abuse, addiction, drug abuse, smoking, tobacco, stress, emergency, perinatal, preterm, birth weight, diabetes, asthma, pulmonary, cardiovascular, hypertension, gastrointestinal, sickle cell, genetic, screening, emergency, transplantation, renal, and obesity. This strategy was developed to search for all published data that tested the racism-as-stress models proposed by researchers and theorists and discussed above. Since our interest was in studying racism as a stressor that may have broad psychological and pathophysiological effects, "child health" was defined broadly. A child health study included those conducted on children up to college age as defined by the authors of the articles (although not including studies exclusively on college samples), as well as studies of prenatal care and pregnant women. Maternal depression was included since its effects are commonly presented in the child health literature as an important and salient contributor to child health status.

This search resulted in a list of over 4400 articles. Due to the medical subject heading algorithm use by MEDLINE, many of the search results did not actually relate to racism (for example, medical subject heading includes the general term "prejudice" when searching for "racism," and the general term "discrimination" when searching for "racial discrimination"). Our criteria for inclusion in this review were that the article had to report on an empirical (i.e., data driven) study of a child health or health care condition that included a direct measure of self-reported racism as a main exposure (independent) variable, and be in the English language. An article title, abstract, and text were reviewed for inclusion, with exclusion of articles occurring at each stage of the review. In addition, the PubMed "related links" citations for each reviewed article were also reviewed for potential inclusion. For each identified article, additional retrospective and prospective citation searches were conducted as follows: (1) reference list of each reviewed article was examined to find older articles that fit the review criteria, and (2) an ISI Web of Knowledge Citation Index search was conducted on each article to find any subsequent publications that may have cited the initial article.

RESULTS

Forty articles presenting empirical studies were identified. Twenty-six articles reported on the association of racism with behavior/mental health issues; 8 reported on racism vis-à-vis birth outcomes, 4 on cardiovascular health; 1 on satisfaction with care; and 2 on metabolic disease (1 included satisfaction with care as well). The

Table 1. Studies of Perceptions of Racism and Child Health

	References	Summary of Findings
Behavioral/mental health		
Depression	26, 28–33, 35, 37–40	Eleven of 12 studies showed association between perceptions of racism and depression
Anxiety	31, 33, 39	Association between perceptions of racism and anxiety in 3 studies
Self-esteem, self-concept	27, 28, 30, 33–36, 38	Significant negative association between perceptions of racism and components of self-esteem in all studies except one, which had sample of young children (Grades 1–3)
Behavior problems/delinquent behavior	26, 29, 33, 35, 36, 41–47	In all studies, an association between perceptions of racism and internalizing and externalizing problem behaviors, conduct problems, anger, and delinquent behaviors
Parenting, maternal depression	48, 49	Maternal perceptions of racism associated with poor parenting styles, low parenting satisfaction, and depressive symptoms
Alcohol use	46, 50	Perceived racism was associated with alcohol use in African-American and Native American youth
Tobacco use	39, 51	Perceived racism was associated with tobacco use in African-American youth
Drug use	39, 42, 46	Perceived racism was associated with drug use in African-American and Native American youth
Low birth weight, prematurity	52–59	Six of 7 studies (in 8 articles) demonstrated a positive relationship between perceptions of racism and either premature delivery of low birth weight
Cardiovascular disease (blood pressure, arterial elasticity)	62–65	No significant relationships found between racism and blood pressure in adolescents
Satisfaction with care	67	Perceptions of racism associated with low satisfaction with care
Metabolic disease	67, 68	Perceptions of racism associated with poor metabolic control, poor dietary adherence, insulin resistance

Table and following discussion summarize the findings (Table 1).

Mental/Behavioral Health

Most studies on the effects of racism on child health pertain to behavioral, emotional, and mental health:

Depression, Anxiety, Self-Esteem

Self-reported discrimination as well as expectations of discrimination were associated with depressive symptoms, low self-esteem/self-worth, and anxiety in adolescents and in preadolescents.[26–40] Only one of these studies showed no effect of racial discrimination on these outcomes.[29]

For example, a 5-year longitudinal study of 714 African-American adolescents from Iowa and Georgia who were 10 to 12 years of age at enrollment showed effects of perceived racism on depression and conduct problems.[26] The longitudinal nature of this study allowed the researchers to conclude that perceived racism led to increased depression and conduct disorder, not the reverse. Results also showed that youth from higher socioeconomic status families were more likely to have perceived racism. Furthermore, the effects of racism were lessened by nurturant parenting and having prosocial peers.

In one of the few articles reporting on racism in Latino children, mainland Puerto Rican youth in Grades 1 to 3 who perceived discrimination reported higher levels of depressive symptoms, school stress, and behavioral adjustment.[33] Forty-nine percent of Puerto Rican adolescents sampled perceived racial discrimination, and those who perceived or worried about discrimination had lower global self-worth scores. Another study in a mostly Mexican-American sample of Latino adolescents found that self-esteem partially mediated the effects of perceived discrimination on depressive symptoms.[38]

A study of African-American adolescents noted that parental racial discrimination was associated with child distress (general anxiety and depression) independent of the child's own experiences with racial discrimination.[39]

Problem Behaviors

Perceptions of racism was shown to be associated with internalizing and externalizing behaviors, anger, conduct problems, and delinquent behaviors in adolescents[26,29,33,35,36,41–46] and preadolescents.[26,33,36,41,42,45,46] One study reported on African-American mother's denial of experiences of racism and its effects on internalizing and externalizing problem behaviors in their 3 to 4 year olds.[47]

A study of 84 African-American boys aged 10 to 15 years found that personal experiences with racism were correlated with higher levels of parent-reported externalizing problems, self-reported internalizing and externalizing problems, higher levels of hopelessness, and

poorer self-esteem.[36] Some of these associations were mediated through hostile attribution bias (i.e., attributing hostile intent to situations) and trait anger. Another study with 195 Native American children in fifth through eighth grade found that perceived discrimination was associated with increased internalizing behaviors (withdrawn, somatic complaints, anxiety, and depression subscales on the Achenbach youth self-report instrument), after controlling for age, gender, and family income.[46] Daily racial hassles were associated with internalizing and externalizing behavioral problems in a group of 350 pre- and early adolescent youth (Grades 5–8).[41] These effects were mediated through general stress and lowered global self-esteem.

A study of 71 black youth aged 14 to 18 years demonstrated that increased distress over racist experiences resulted in greater internalizing and externalizing coping strategies, whereas greater perceived control over racist experiences was associated with greater use of social support and problem-solving coping strategies after controlling for gender, grade, socioeconomic status, and family structure.[43]

Parenting, Maternal Depression

Since child health, behavior, and development are embedded in larger spheres of relationships, the effects of racism on other family members may have ripple effects on children. A study of African-American families with 10- to 11-year old children showed that mothers' perceptions of racial discrimination were related to poor parental psychological function, which then adversely affected parenting satisfaction and parenting style.[48] Another study of African-American mothers found that low education, food insecurity, poor housing, lack of money in a crisis, and lack of child care were all significantly associated with maternal depression, but when everyday racial discrimination was entered into the model none of those other risk factors remained significant.[49]

Alcohol, Tobacco, Drug Use

Anger due to racial discrimination was predictive of average number of drinks per week in black adolescents (controlling for age and gender), but not of alcohol dependency.[50] A study of African-American girls aged 11 to 19 years old reported a strong correlation between perceptions of everyday racial discrimination and tobacco smoking status, which seems to be mediated through stress.[51]

Perceived discrimination was shown to influence alcohol and drug use in Native American youth aged 9 to 16 years living on tribal reservations.[46] A longitudinal study of African-American adolescents reported that racial discrimination was associated with alcohol, tobacco, and drug use.[39] Furthermore, *parental* experiences of discrimination were also associated with children's substance use (mediated through both parental and child anxiety and depression). A follow-up study showed that early perceived discrimination at ages 10 to 12 continued to be associated with drug use at 5-year follow-up.[42]

Pregnancy, Low Birth Weight, and Preterm Birth

Seven studies (in 8 articles) assessed the role of perceived racism in the occurrence of adverse pregnancy outcomes.[52–59] Six of the 7 studies showed a positive relationship between racism and adverse outcomes; 1 study found no effects.[57] Self-reported racism was associated with delivering a very low birth weight child (<1500 g)[52,53,56,58] as well as preterm birth.[54,55,58,59] Studies compared black women with white women, as well as black women who experienced racism compared with black women who did not. In one study, effects were strongest for black women with higher education levels (more than 12 years) and those between the ages of 20 and 29.[52,56] These studies also noted that discrimination in all aspects of life, not just in health care settings, had effects on birth outcome.

For example, Collins et al[53] studied a small sample of low-income African-American mothers and found an association between self-reported episodes of racism and very low birth weight. The same group conducted a larger case-controlled study of 104 African-American women who delivered very low birth weight (VLBL) (<1500 g) preterm (<37 weeks) infants, compared with African-American women who delivered non-LBW term infants. Mothers were asked about racial discrimination in 5 domains: at work, getting a job, at school, getting medical care, and getting service at a store or restaurant. The odds ratio of very low birth weight for lifetime exposure to racial discrimination was 1.9 (95% CI: 1.2–3.1), with the greatest effects seen for discrimination at work or finding a job. There was also a dose-response effect; the odds ratio for very low birth weight and racism in one or more domain was 1.9 whereas the odds ratio with 3 or more domains was 3.2 (95% CI: 1.5–6.6). These effects were strongest in women aged 20 to 29 years, as well as among women with more than 12 years of formal education.[52,56]

Another large study of 352 births showed the risk of preterm delivery for blacks was 2.54 (95% CI: 1.33–4.85) compared with whites, but when adjusting for self-reported racial discrimination the odds ratio decreased to 1.71 (95% CI: 0.84–3.48), demonstrating that for this sample, self-reported racism largely explained the black–white differential in preterm birth. Likewise, the risk of low-birth weight deliveries was reduced from 4.24 (1.31–13.67) to 2.11 (0.75–5.93) when adjusted for self-reported experiences of racial discrimination.[58]

Cardiovascular Disease

There is a literature on the effects of perceived racism on blood pressure (BP) in adults[20–22,60,61]; many of these studies show perceived racism as having a deleterious effect on BP. Interestingly, the small literature in children and adolescents does not show similar effects. In teens, perceptions of unfair treatment due to race was not associated with elevated BP readings.[62,63] One study looked at the interaction between racism and coping styles and found that neither was predictive of BP, but

BP was lower in those who perceived racism and who had an "accepting" coping style.[64]

Racism-related vigilance (the tendency to attend to *anticipated* racist events) was marginally associated with decreased large artery elasticity in black male youth in elementary and middle schools (mean age 11.4, SD 1.5), but not in females.[65] Compromised large artery elasticity is thought to be a preclinical predictor of cardiovascular dysfunction.

Chen and Matthews[66] studied cardiovascular reactivity in low socioeconomic status children to ascertain the role of coping strategies during stressful situations. They found that African-American children were more likely to appraise ambiguous social scenarios as containing hostile intent, and this in turn was related to increased cardiovascular reactivity. Although this study did not address racism per se, one could infer that perceptions of racism could be considered one such stressful "hostile intent appraisal," and thus contribute to cardiovascular reactivity.

Satisfaction With Care

None of the studies were found that investigated children's perceptions of racism and their satisfaction with care, but one study investigated this relationship in parents. A study of families of children with insulin-dependent diabetes mellitus found that perception of racism was the strongest predictor of mother's satisfaction with care, compared with other variables such as neighborhood stressors, family stress and resources, maternal education, employment status, marital status, and family income; and satisfaction with care predicted dietary adherence, child health status, and metabolic control.[67]

Metabolic Disease

In addition to the study described above, another study conducted in Barbados looked at the relationship between internalized racism (the degree to which an individual agrees with racial stereotypes regarding his or her race), body mass index, waist circumference, fasting glucose, and insulin.[68] Girls (but not boys) aged 14 to 16 years with high-internalized racism had 3.3 higher odds of insulin resistance than those with low internalized racism, after adjusting for birth weight, income, physical activity, food preference, and other variables.

DISCUSSION

This review reports on the research conducted on racism as a factor in child health and health care outcomes. Through an extensive search only 40 articles reporting empirical research on racism and children's health or health care were identified. As a comparison, a general review of empirical studies of the effects of racism on health published in 2006 found 138 articles, with over 90% of the studies conducted on adults.[20]

Most of the studies reviewed related to the associations between racism and children's health, not health care. Of the 40, 26 (65%) concerned behavioral and mental health, and 8 (20%) addressed pregnancy outcomes. Other areas of health and health care were found to be understudied, so one can not yet make inferences regarding the associations between racism and these conditions.

The study of racism and child health is a new and emerging area of investigation. All reviewed studies were all published between the years 1994 to 2007. Twenty-eight (70%) were published since 2003.

Even within this small group of studies, certain characteristics and trends became evident:

Limited Population Groups

The literature is heavily weighted toward the study of racism in only one particular minority group: African-Americans. Twenty-eight of the 40 studies (70%) were conducted in African-American (5 in comparison to white samples). Only 3 studies were conducted exclusively with Latinos,[33,37,38] one with Native Americans,[46] and one with Korean American youth.[44] Only 3 studies compared multiple ethnic minority groups (African-American/Latino/Asian[28]; African-American/Hispanic/East Asian/South Asian/white[27]; and Latin American/Asian American/West Indian[30]).

The paucity of studies with Latinos is surprising given that this is the fastest growing minority group in the United States.[69] It is also interesting that given the post-9/11 social landscape, none of the studies on the effects of racism have yet been conducted with groups from the Middle East or South Asian subcontinent.

Although all minority groups share common experiences resulting from social stratification processes inherent in modern Western society, it can also be argued that the experiences of racism may differ in diverse groups. Such discrimination may be based on skin color, cultural practices, area of origin, language, or accent, and these factors are differentially distributed among members of different groups. As the population of the United States becomes more diverse, a more inclusive approach to the study of disparities and the causes of such disparities is needed. Researchers who study racism should consider including diverse ethnic/racial groups into their study designs.

Limited Age Groups

The literature reviewed is skewed toward older children. Only 9 studies included children in elementary or middle school[33,36,40–42,45,46,48,65] (only 1 study included children in first to third grade[33]). All other studies were conducted on high-school aged or older adolescents.

Effects of Perceptions of Racism on Healthcare Decisions

Only one study addressed how perceptions of racism affected a person's interaction with the child health care system.[67] One would expect that experiences with perceived racism—by parents or children—in ambulatory offices and clinics, hospitals, and emergency depart-

ments might affect a person's satisfaction with care, trust in providers, and as a result, utilization patterns. Although there are studies showing relationships between patient/provider language and racial concordance and child health care outcomes,[70,71] perceived racism has not yet been adequately studied as a contributory factor in the determination of child health care choices, perceptions, or quality.

Measures of Racism

There is no standardized approach to the measurement of racism. In the 40 studies reviewed in this article, there were 31 different questionnaires used to measure perceptions of racism. The most commonly used instrument—the Schedule of Racist Events[72]—was used in only 5 studies.[26,39,40,42,45] Even when common instruments were used, different versions were used for different studies. For example, 4 different versions of the Racism and Life Experiences Scale were used (with a range of 4–36 items included). Seven studies created scales specifically for the study, and 5 studies used single or multiple questions specifically created for the study.

More concerning than the lack of standardization of instruments is that only 10 of the 28 studies that included data from children used instruments that were created and/or tested on children of like age.[27–29,35,36,38,41,46,63,64] Most studies used instruments that were modified versions of adult questionnaires, with questionable or unstudied validity in children. Unless researchers choose instruments that have been tested for validity and reliability in the specific study population (i.e., children), one cannot be certain whether the study taps into the latent construct (racism) in the most optimal fashion.

Future studies need to use appropriately standardized instruments. The authors of the IOM report *Children's Health, the Nation's Wealth*[73] recommend that instruments be developed to measure discrimination and racism in different age groups and different ethnicities. They also recommend that large-scale national surveys such as National Health and Nutrition Examination Survey (NHANES), National Health Interview Survey (NHIS), and the National Longitudinal Survey of Youth incorporate measures of racism and discrimination (p 149).

Evaluation of the Theoretical Models

The literature cited here supports the racism-as-stressor models described by Williams et al, Clark et al, and others.[15,16,17,19,22,61,74,75] The studies in this review show that that racism is associated with differential health outcomes and can adversely affect psychological and physiological functioning. Furthermore, they provide data to show that racism is associated with negative biopsychosocial sequelae that may contribute to health disparities, and different exposure to it contributes to variability in health outcomes within groups. This is most evident in the literature demonstrating its association with poor birth outcomes. With regard to behavior and mental health, it can be hypothesized that racism's effects are mediated through stress, but few articles specifically address this relationship. As discussed below, future studies need to assess specific physiological stress mechanisms as a potential mediators of the effects of racism and poor health outcomes.

All the studies reviewed operationalized racism as subjective perceptions of individuals. Although there is some debate on the relative benefits of the subjective versus objective approach,[19] most researchers and theoreticians view racism as a phenomenological (i.e., subjective) experience.[15–17,21,76] This places the study of racism within the model of stress that gives importance not only to the objective event itself but also on an individual's appraisal of the event and coping responses.[77]

FUTURE DIRECTIONS FOR THE STUDY OF RACISM IN CHILD HEALTH AND HEALTH CARE

To date, the study of the relationship between racism and child health and health care is limited in that most of the research has been conducted in the areas of mental or behavioral health and pregnancy outcomes. Racism needs to be studied vis-à-vis other physical health conditions where racial/ethnic disparities are seen, such as asthma and obesity for example. Furthermore, perceptions of racism may be an important contributor to poor satisfaction with care, low trust in health care providers, and lower use of services. As stated above, racial and ethnic disparities in access, diagnosis, and treatment of mental health conditions have been noted. The connections between such disparities and perceptions of racism have not yet been studied.

Below are some recommendations for future study:

Mechanisms Not Description

Many studies presented here are descriptive or correlational, showing associations between racism and health outcomes. Future investigations should attempt to go beyond the descriptive to study the processes and mechanisms through which racism affects child health outcomes. Fortunately, many of the articles cited in this review that study racism and mental and behavioral health actually do address processes. Most of these studies are published in social science journals, using analytic techniques that explore mediator and moderator effects (such as structural equation modeling). These techniques are not yet commonly used in the health and medical literature.[78]

Since racial discrimination is part of a complex nexus of psychosocial factors that may influence behavioral, mental, and physical health and development in children, researchers needs to consider including appropriate macro- and micro-level covariates into study designs so that we can learn more about the independent and interrelated effects of racism vis-à-vis factors such as age, gender, social class, socioeconomic status, neighborhood setting, family setting and composition, racial and ethnic socialization styles, racial and ethnic pride, acculturation, self-esteem, self-efficacy, and temperament, for

example. Which covariates one should include depends on the research question and theoretical model underlying the study.

Another important area for future investigation concerns the role of individual differences in response to racism. If we view racism as a stressor that may affect individuals with similar exposures differently, then understanding the factors that contribute to these differences need to be investigated. This is especially important if we want to develop interventions aimed at limiting the effect of this stressor on child health.

Also, as noted above, racism occurs at the child, family, community, neighborhood, and societal levels. Studies that look at these contexts and which investigate "nested effects"—children in families, families in neighborhoods, neighborhoods in regions, regions in larger society, with each level having interrelated and independent effects—would be helpful in determining multilevel processes and mechanisms.

The Socio-Psycho-Physiological Interface

According to the National Scientific Council on the Developing Child, toxic stress refers to ". . . strong, frequent or prolonged activation of the body's stress management system. Stressful events that are chronic, uncontrollable, and/or experienced without the child having access to support from caring adults tend to provoke these types of toxic stress responses."[79] Racism should be conceptualized as a toxic stressor. Such stress results in *allostatic load*, or the "wear and tear" in the body's homeostatic systems (e.g., neuroendocrine, cardiovascular, metabolic, autonomic nervous, and immune systems).[80,81] Allostatic load contributes to the occurrence of chronic diseases and conditions.

Studies investigating the physiological effects of racism on the sympathetic-adrenal-medullary, hypothalamic pituitary adrenal, and the immune systems, as well as brain structure and function (i.e., neural plasticity) in the developing child may provide insight into the potential mechanisms behind the relationships between perceived racism and child health.[18,82] Recent literature on racial/ethnic differences in these systems provides interesting data. For example, DeSantis et al found that minority adolescents had flatter diurnal cortisol slopes, a pattern which may be associated with poor health. Both genetic and environmental factors were likely contributors to these findings, and the authors speculate that racism may be one such environmental factor.[83] Another study of sleep patterns in adults noted that an African-American study sample had less deep sleep and more fatigue than the white sample, and perceived discrimination mediated these differences.[84] If sleep architecture, fatigue, and altered cortisol levels contribute to the wear and tear that defines allostatic load, these studies demonstrate specific physiologic mechanisms through which racism may affect health. Future research that combines the psychosocial study of racism and the neurobiophysiological study of stress will provide insights into how social phenomena such as racism affect child health and illness and contribute to racial/ethnic disparities. This integrative "neurons to neighborhoods" approach[85] is well suited to the study of racism and child health.

CONCLUSIONS

Racism is a mechanism through which racial and ethnic disparities in child health and health care may occur. This review suggests that it is an under-researched area to date. The literature has predominantly focused on behavioral and mental health conditions, older children and adolescents, and African-Americans, with few studies of the effects of racism in other minority groups. Most instruments used to measure racism in these studies were developed for adults; a more developmentally appropriate approach to measuring racism in children is needed. The future holds promise as investigators look to study racism as an agent of stress, and seek to find the biophysiological mechanisms through which this source of stress may have effects on health and illness throughout the lifespan.

ACKNOWLEDGMENTS

The authors thank Bruce A. Bernstein for his input during the preparation of this manuscript.

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