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## Racial Discrimination and the Black-White Gap in Adverse Birth Outcomes: A Review

**Carmen Giurgescu, PhD, WHNP,**

Assistant professor at the University of Illinois College of Nursing in Chicago, Illinois

**Barbara L. McFarlin, CNM, PhD, RDMS,**

Assistant professor at the University of Illinois College of Nursing in Chicago, Illinois

**Jeneen Lomax, CNM, APN,**

Certified nurse midwife at the Little Village Women's Health in Chicago, Illinois

**Cindy Craddock, RNC-OB, WHNP,** and

Women's health care nurse practitioner at Hill AFB, United States Air Force

**Amy Albrecht, CNM, APN**

Certified nurse midwife at the Lawndale Christian Health Center in Chicago, Illinois

### Abstract

**Introduction**—The purpose of this integrative review was to evaluate what is known about the relationship between racial discrimination and adverse birth outcomes.

**Methods**—A search of the Cumulative Index of Nursing and Allied Health Literature, MEDLINE, and PsycINFO was conducted. The keywords used were: preterm birth, premature birth, preterm delivery, preterm labor, low birth weight, very low birth weight, racism, racial discrimination, and prejudice. Ten research studies were reviewed. All of the studies included African American women in their samples, were conducted in the United States, and were written in English. We did not limit the year of publication for the studies. Data were extracted based on the birth outcomes of preterm birth, low birth weight, or very low birth weight.

**Results**—A consistent positive relationship existed between perceptions of racial discrimination and preterm birth, low birth weight, and very low birth weight. No relationship was found between racial discrimination and gestational age at birth.

**Discussion**—Future research should explore the effects of racial discrimination as a chronic stressor contributing to the persistent gap in birth outcomes between racial groups.

### Keywords

gestational age at birth; low birth weight; preterm birth; racial discrimination; racism; health status disparities

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Address correspondence to Barbara L. McFarlin, CNM, PhD, RDMS, FACNM, University of Illinois College of Nursing, Room 858, 845 S Damen Ave M/C 802, Chicago, IL 60612. bmcfar1@uic.edu.

### CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

## INTRODUCTION

Despite modern technology and numerous efforts to improve birth outcomes, rates of preterm birth and low birth weight (LBW) have increased in the United States. Between 1990 and 2007, preterm birth rates increased by 21%, and LBW rates increased by 19%.<sup>1</sup> In 2007, 12.7% of neonates in the United States were born prematurely (<37 completed weeks' gestation), and 8.2% of neonates were born with LBW (<2500 g).<sup>1</sup> Preterm birth and LBW are 2 of the leading causes of infant mortality.<sup>2</sup> In 2007, 6.77 of 1000 infants died during the first year of life.<sup>3</sup> Preterm birth and LBW also have been associated with pediatric health problems such as respiratory distress syndrome; vision, hearing, immunologic, neurologic, and digestive issues; cerebral palsy; and delayed brain function.<sup>1</sup> Compromised fetal development may affect cognitive development and overall health throughout the child's life.<sup>4</sup>

One of the major predictive risk factors for adverse birth outcomes in the United States is being African American.<sup>5</sup> Since 1940, a disparity in infant mortality between the African American and non-Hispanic white populations has been documented.<sup>2</sup> Compared with non-Hispanic white women, African American women are more likely to have preterm births (11.5% and 18.3%, respectively), LBW neonates (7.2% and 13.8%, respectively),<sup>1</sup> and infants who die before the first year of life (5.73/1000 live births and 12.92/1000 live births, respectively).<sup>3</sup> Researchers have examined multiple contributors to adverse birth outcomes yet have failed to explain all of the contributors influencing the racial gap. There are demonstrated relationships between adverse birth outcomes and a number of factors, including socioeconomic status,<sup>6</sup> education,<sup>7</sup> maternal health behaviors,<sup>8</sup> prenatal care,<sup>9–11</sup> social support,<sup>12</sup> spirituality,<sup>9</sup> and stress.<sup>13,14</sup> However, these factors do not account for all of the noted disparities in birth outcomes.<sup>15,16</sup>

One hypothesis that could explain this gap is that African American women experience higher lifetime exposure to chronic stressors, which increases their risk for poor pregnancy outcomes.<sup>17,18</sup> Chronic social stressors in the everyday life of many African American women, potentially mediated through the weathering of racism and racial discrimination,<sup>16</sup> may, over time, cause physiological wear and tear on the body (known as allostatic load).<sup>16</sup> Disparities in birth outcomes may be due to cumulative exposure to allostatic load over the course of the woman's life.

Racial discrimination is a unique psychosocial stressor that can influence the lives of African American women.<sup>10</sup> Compared with pregnant non-Hispanic white women, pregnant African American women experience more racial discrimination.<sup>10,19</sup> Racial discrimination has been linked to stress in the African American population<sup>20</sup> and in pregnant African American women specifically.<sup>21</sup> Stress levels experienced by pregnant women are related to preterm birth<sup>4</sup> and LBW.<sup>22</sup> Thus, racial discrimination, acting as a chronic stressor,<sup>23</sup> may potentially predispose African American women to an increased risk of adverse birth outcomes (eg, preterm birth and LBW).

We recognize that other racial or ethnic groups may experience discrimination. However, the purpose of this integrative literature review was to determine what is known about the

relationship between racial discrimination and adverse birth outcomes for African American women only. For the purpose of this article, we defined adverse birth outcomes as preterm birth, LBW, and very low birth weight (VLBW).

## Background and Definitions

The theoretical framework of this review is based on the theory of allostatic load, developed by McEwen.<sup>24</sup> The theory of allostatic load describes acute stress as an adaptive process, whereas chronic stress is described as a maladaptive process. Stress causes a cascade of physiological events, which, in the acute phase, are adaptive. Allostasis, the adaptive process used to maintain the stability of an organism, is maintained by an imperative balance between the sympathetic and parasympathetic nervous systems. Constant insults or threats to the human body create disequilibrium. This imbalance is referred to as allostatic load, which subsequently affects health outcomes.<sup>25</sup> We hypothesize that persistent encounters of racial discrimination experienced by African American women may lead to an allostatic overload as a result of chronic stress. Preterm birth and LBW may be potential outcomes of allostatic overload.

Key terms that formed the basis for this review were defined as follows: preterm birth, also known as preterm delivery and premature birth, is the birth of a neonate before the completion of 37 weeks' gestation.<sup>26</sup> Preterm labor is "the onset of labor before completion of 37 weeks' gestation."<sup>26</sup> Low birth weight is a birth weight of less than 2500 g, and VLBW is a birth weight of less than 1500 g, regardless of gestational age.<sup>26</sup>

Racism is the "assignment to racial groups based on physical characteristics; associated inferiority or superiority of designated racial groups; hereditary origins of racial groups; and definition of the group usually determined by the group in power."<sup>27</sup> Jones<sup>28</sup> notes that it is more useful to examine racism as a social construct that "captures the impact of racism," rather than a biological construct reflecting "innate differences" between races.<sup>28</sup> She further hypothesizes that 3 levels of racism exist: institutionalized, personally mediated, and internalized.<sup>28</sup> Institutionalized racism is defined as "differential access to goods, services and opportunities of society by race."<sup>28</sup> Personally mediated racism is "prejudice and discrimination, where prejudice means differential assumptions about the abilities, motives, and intentions of others" by race.<sup>28</sup> This type of racism can be demonstrated by avoidance, lack of respect, suspicion, scapegoating, and devaluation. Internalized racism is acceptance of negative messages about own abilities and worth.<sup>28</sup> Prejudice is "an irrational attitude of hostility directed against an individual, a group, a race, or their supposed characteristics."<sup>29</sup> Discrimination has been defined as the "process by which a member, or members, of a socially defined group is, or are, treated differently because of his/her/their membership of that group."<sup>30</sup>

## METHODS

For the literature review, we used the method set forth by Whittemore and Knafel.<sup>31</sup> A search of the databases Cumulative Index of Nursing and Allied Health Literature, MEDLINE, and PsycINFO was conducted by using the following search terms: preterm birth, premature birth, preterm delivery, preterm labor, low birth weight, very low birth weight, racism, racial

discrimination, and prejudice. We limited the results to English language and research studies but did not limit the years of publication. We excluded articles if they had participants who were from non-African American/black populations or who resided outside the United States. Each of the 10 articles was reviewed by 2 of the authors to construct Table 1 and develop an understanding of the results.

## RESULTS

Ten research studies were included in this review (Table 1). Some of the studies measured racism, others measured racial discrimination, whereas others used the 2 terms interchangeably. None of the studies measured prejudice. The studies were published between 1996 and 2009.

### Design

All 10 studies used quantitative designs. Eight of the studies were prospective,<sup>10,14,19,21,32–35</sup> and 2 were retrospective.<sup>12,36</sup> All of the studies used nonprobability sampling.

### Sample Characteristics

All of the study participants were English-speaking, United States residents who had singleton pregnancies. The percentage of African American (non-African born) participants ranged from 30%<sup>34</sup> to 100%<sup>12,21,32,35,36</sup> among the studies. The sample size ranged from 85<sup>12</sup> to 4966 participants.<sup>35</sup> Participants' ages ranged from 16 to 44 years; however, some of the studies did not provide an age range for the sample.<sup>12,36</sup> Incomes covered a broad range among studies and sample populations. In 1 study,<sup>12</sup> every participant's yearly family income was less than \$11,000, whereas in another,<sup>21</sup> the median family income ranged from \$18,000 to \$24,000 per year.

### Measurement

Various data collection instruments were used to assess racial discrimination. Five<sup>10,12,19,33,36</sup> of the 10 studies used the Krieger<sup>37</sup> racial and gender discrimination scale to measure racial discrimination or items from the scale. Two items from the Krieger<sup>37</sup> scale pertain to unfair treatment, and 6 items ask about experiences of racial discrimination in 6 situations: at school, getting a job, at work, getting housing, getting medical care, and from the police or in the courts. Dominguez et al<sup>33</sup> modified the Krieger scale to assess racism exposure across general life domains ("as a child," "as an adult"). None of the studies that used the Krieger instrument stated a Cronbach  $\alpha$  for their samples.

One study<sup>21</sup> used the Perceptions of Racism Scale,<sup>38</sup> a 20-item questionnaire that measures perceived racism and was developed through interviews with childbearing African American women related to pregnancy, health care, and race. The Cronbach  $\alpha$  for the study was .91.<sup>21</sup>

The remaining studies included in this review used different scales. Dailey<sup>32</sup> used the Everyday Discrimination Scale developed by Forman, Williams, and Jackson.<sup>39</sup> The Everyday Discrimination Scale consists of 9 items designed to measure the presence,

frequency, and sources of chronic and routine experiences of race-related discrimination.<sup>32</sup> The Cronbach  $\alpha$  for this study was .86.<sup>32</sup> Rosenberg et al<sup>35</sup> used 9 questions regarding experiences of discrimination: they used 3 questions, which were developed by Williams,<sup>40</sup> about unfair treatment; 5 questions about the frequency in daily life of other people's behavior toward the participant; and added 1 question about how often the participant thinks about her race. Korte<sup>14</sup> created a composite score to incorporate experiences of racial discrimination from 6 situations; no reliability of the questionnaire is reported. Finally, Shiono et al<sup>34</sup> define discrimination as experiences of 1 or more incidents of racial discrimination during pregnancy through a structured interview.

## Findings

### Preterm Birth

Three of the studies included in our review examined preterm birth as an outcome measure,<sup>10,19,35</sup> and 3 addressed gestational age at birth.<sup>14,21,33</sup> All 3 studies that measured preterm birth defined it as birth at less than 37 weeks' gestation.<sup>10,19,35</sup> Dole et al<sup>10</sup> measured racial discrimination during pregnancy, whereas Rosenberg et al<sup>35</sup> and Mustillo et al<sup>19</sup> measured racial discrimination during a lifetime. These studies reported a significant positive relationship between racial discrimination and preterm birth.<sup>10,19,35</sup> Rosenberg et al<sup>35</sup> found a 1.3-fold increased risk for preterm birth for African American women who reported unfair treatment on the job. Dole et al<sup>10</sup> found a 1.8-fold increased risk for preterm birth for African American women who reported racial discrimination. Furthermore, Mustillo et al<sup>19</sup> found that African American women who reported experiencing racial discrimination in 3 or more situations had a 3-fold increased risk of preterm birth.

The 3 studies that measured gestational age at birth did not find a relationship with racial discrimination.<sup>14,21,33</sup> Dominguez et al<sup>33</sup> measured lifetime and childhood experiences of racial discrimination. Korte<sup>14</sup> and Murell<sup>21</sup> did not specify whether racial discrimination questions were targeted to measure discrimination during pregnancy or during the lifetime. The results of this review indicate that when researchers were measuring the effects of racial discrimination on birth outcomes, using preterm birth as a dichotomous variable showed a significant effect, whereas using gestational age at birth as a continuous variable found no significant relationship.

Three studies<sup>10,19,33</sup> that examined the relationship between racial discrimination and preterm birth or gestational age at birth used the Krieger<sup>37</sup> racial and gender discrimination scale. One study<sup>35</sup> that reported small increases in preterm birth (odds ratio [OR] 1.3; 95% confidence interval [CI], 1.1–1.6) used their own scale to examine the relationship between discrimination and preterm birth. Murrell<sup>21</sup> developed her own racial discrimination scale by using non-pregnant African American women. The differences in results may be due to the inconsistent use of different instruments to measure racial discrimination.

Other factors that also were related to the incidence of preterm birth or gestational age at birth were maternal and paternal educational level,<sup>33</sup> income,<sup>14</sup> smoking,<sup>19</sup> high levels of sex discrimination, adverse life events, and pregnancy-related anxiety.<sup>10</sup> These factors

suggest a multidimensional nature to the relationship of racial discrimination and preterm birth.

### Low Birth Weight

Four studies included in the review examined LBW/VLBW,<sup>12,19,35,36</sup> and 5 studies measured birth weight as a continuous variable.<sup>14,21,32–34</sup> All 4 studies that measured LBW/VLBW found a relationship between racial discrimination and LBW/VLBW. Mustillo et al<sup>19</sup> reported that African American women who reported experiencing increased levels of racial discrimination were almost 5 times more likely to deliver LBW neonates compared with women who did not report racial discrimination.<sup>19</sup> However, when gestational age at birth was added to the model, the OR for LBW decreased to 1.56 (95% CI, 0.32–7.76). These results may suggest that the effects of racial discrimination on LBW may be mediated by gestational age at birth.

All 3 studies<sup>12,35,36</sup> that addressed VLBW showed a positive relationship between racial discrimination and VLBW. Collins et al<sup>12</sup> found a positive relationship between racial discrimination experienced in pregnancy and VLBW. A later study by Collins et al<sup>36</sup> reported a positive relationship between VLBW and racial discrimination experienced throughout the participants' lives and not merely during pregnancy.<sup>36</sup> Rosenberg et al<sup>35</sup> found that life experiences of unfair treatment on the job and people being afraid of them were related to VLBW.

Of the 5 studies<sup>14,21,32–34</sup> that examined the relationship between racial discrimination and birth weight, only that of Dominguez et al<sup>33</sup> found a significant negative relationship between birth weight and racial discrimination. Perceived lifetime and childhood-directed racism were predictors of birth weight.<sup>33</sup> Each unit increase in lifetime perceived racism was associated with an almost 40-g decrease in birth weight.<sup>33</sup> Each unit increase in childhood vicarious racism was associated with a 168-g decrease in birth weight.<sup>33</sup> No relationship was noted between racial discrimination and weight per gestational age in the other 4 studies.<sup>14,21,32,34</sup> The results of this review indicate that when researchers were measuring the effects of racial discrimination on birth outcomes, using LBW/VLBW as a dichotomous variable showed a significant effect, whereas using birth weight as a continuous variable may not be a robust indicator of adverse birth outcomes.

Of the 5 studies that found relationships between racial discrimination and LBW/VLBW or birth weight, 4 measured lifetime or childhood experiences of racial discrimination. Lifetime and childhood experiences of racial discrimination may have a greater impact on birth weight than does racial discrimination reported during pregnancy only, suggesting long-term exposure.<sup>17,18</sup>

### Factors Influencing the Relationship Between Racial Discrimination and Birth Outcomes

The reviewed studies reported various factors influencing the relationship between racial discrimination and preterm birth or LBW. In the study by Collins et al,<sup>36</sup> maternal age and a higher level of education influenced the relationship between racial discrimination and VLBW. The association between racial discrimination and VLBW was stronger among women aged 20 to 29 years compared with teenagers and women aged more than 30 years.<sup>36</sup>

For example, women aged 20 to 24 years who reported racial discrimination in more than 3 domains had an OR for VLBW of 10.8 (95% CI, 1.8–63.6).<sup>36</sup> The study domains in this case included exposure to interpersonal discrimination at work, getting a job, at school, getting medical care, and getting service at restaurants or stores.<sup>36</sup> Rosenberg et al<sup>35</sup> reported that women with less than 12 years of education who reported experiencing greater unfair treatment in housing had an unadjusted OR for preterm birth of 2.4 (95% CI, 1.2–4.6), and those who reported receiving poorer services at least once a week had an unadjusted OR for preterm birth of 3.4 (95% CI, 1.5–7.7). Collins et al<sup>36</sup> also reported that women with less than 12 years of education who reported racial discrimination in more than 3 domains had an OR for VLBW of 2.0 (95% CI, 0.4–9.8). Women with more than 16 years of education who reported unfair treatment on the job had an OR for preterm birth of 1.8 (95% CI, 1.0–3.0).<sup>35</sup> Similarly, women with more than 12 years of education who reported discrimination in more than 3 domains had an OR for VLBW of 7.3 (95% CI, 1.9–28.9).<sup>36</sup> These results suggest that maternal age and level of education may influence the relationship between racial discrimination and birth outcomes.

Obstetrical and behavioral factors also influenced the relationship between racial discrimination and LBW. Mustillo et al<sup>19</sup> reported that the association between racial discrimination and LBW was mediated by gestational age. Collins et al<sup>36</sup> reported that women who experienced racial discrimination in more than 3 domains had a higher risk of VLBW if they had higher parity (≥ 4), had late or no prenatal care, and used alcohol or drugs during the pregnancy, compared with women who did not report racial discrimination. However, Mustillo et al<sup>19</sup> reported that whether or not women smoked, the relationship between racial discrimination and LBW remained significant.

Women's social support also may influence the relationship between racial discrimination and LBW. Collins et al<sup>12</sup> reported that women who experienced racial discrimination and had inadequate social support also had a higher risk of VLBW. However, Mustillo et al<sup>19</sup> reported that depressive symptoms did not influence the relationship between racial discrimination and LBW.

## DISCUSSION

The findings of this review show inconsistencies with regard to the relationship between racial discrimination and preterm birth, LBW, and VLBW. Among the 10 studies reviewed, limitations were noted. Two studies used a retrospective design.<sup>12,36</sup> The limitations of using this type of design include potential bias in the recall of the participants or bias with regard to the researchers' interpretations of the findings. The study by Korte<sup>14</sup> was conducted as dissertation research and was never published. Studies with nonsignificant findings often do not get published, thus having the potential to impact conclusions from systematic reviews.<sup>41,42</sup> Several researchers collected data during the time that the participants were pregnant; others completed their data collection after birth. Individual reports of racial discrimination may have been influenced by the timing of the report and the type of racial discrimination they experienced. Furthermore, participants' knowledge of the birth outcome at the time of interview may have influenced reports of perceived racial discrimination.

The majority of the studies had small sample sizes, and all used convenience sampling. The sample size ranged from 85<sup>12</sup> to 4966,<sup>35</sup> and 1 study had only 25 women in the LBW group.<sup>12</sup> Two<sup>9,21</sup> of the 4<sup>9,14,21,34</sup> studies that did not show a relationship between racial discrimination and birth weight had sample sizes of less than 150. Furthermore, only 47% of the 369 women participating in the Korte<sup>14</sup> study were African American. According to the Centers for Disease Control and Prevention,<sup>1</sup> 13.8% of African American women have LBW neonates. Therefore, the sample size of these studies<sup>9,21</sup> may not be large enough to have appropriate power for the statistical tests to reach significance for LBW.

Potential bias may have existed in relation to the methods of data collection used. Self-reported data relies on accurate recall of relevant data. Various studies used questionnaires, which Dole et al<sup>43</sup> found were most likely to be completed by women who were married, had more education, and were white. Other studies obtained data via interviews, which had potential for intimidation and therefore lower reporting of experiences with racial discrimination.

Researchers used different tools to measure racial discrimination, which may impact the consistency of the findings. Of key concern is the fact that the tools used were not designed to specifically evaluate the pregnant women. Many researchers did not report reliability of the instruments for their samples. The majority of the scales used focused on the interpersonal forms of racial discrimination and failed to address institutional and internalized forms. For that reason, the scales may fail to capture features of the health care system that contribute to discrimination in the provision of prenatal care. Various studies addressed acute experiences of racial discrimination during pregnancy, and others examined chronic exposure to racial discrimination throughout participants' lives. These differences in the methodologies used among the studies to assess experiences of racial discrimination may limit the ability to compare study results.

### **Recommendations for Future Research**

McEwen's<sup>24</sup> theory of the allostatic load describes acute stress as an adaptive process, whereas chronic stress is described as a maladaptive process. We hypothesized that persistent encounters of racial discrimination experienced by African American women may lead to an allostatic overload as a result of chronic stress. Preterm birth and LBW may be potential outcomes of allostatic overload. We recommend that this theory be used for future research as a framework to examine birth outcomes related to the impact of lifetime exposure to racial discrimination.

More sensitive instruments need to be developed to specifically address racial discrimination experienced throughout the lifespan. For example, Dominguez et al<sup>33</sup> modified the Krieger scale to measure experiences of racial discrimination "as a child" and "as an adult," and they found that childhood experiences of racial discrimination were related to birth weight. These findings suggest that childhood and lifetime exposure to racial discrimination can have profound long-term health effects. In order to examine the relationship between racial discrimination and preterm birth, LBW, and VLBW, researchers need to 1) use prospective designs; 2) have an adequate sample size, with participants from a broad range of demographics such as low and high levels of education and income; prenatal care received



early, late, or not at all; and residents of urban, rural, and suburban locations; 3) use reliable instruments to measure racial discrimination in its various forms; and 4) use data collection techniques that minimize bias.

### Implications for Practice

It has been well-documented that a disparity exists between African American and non-Hispanic white women with regard to birth outcomes. Although there is insufficient evidence to demonstrate a clear relationship between racial discrimination and birth outcomes, 1 result worth noting is the consistent positive relationship between racial discrimination with preterm birth and LBW/VLBW. Health care providers need to consider reproductive health from the life-course perspective because reproductive health may be compromised well before women become pregnant.<sup>16,18</sup> Thus, clinicians should be aware of various psychosocial factors that may contribute to an increased risk of preterm birth, LBW, and VLBW, and they should consider screening all African American women both prior to conception and prenatally to ascertain experiences of racial discrimination. We recommend that clinicians ask women about their experiences of racial discrimination. Furthermore, the Krieger<sup>37</sup> discrimination scale has been shown to be reliable in other populations,<sup>44</sup> even though the studies included in this review did not report its reliability. We realize that other racial and ethnic groups may experience discrimination, but the review included studies of African American women only. Heightened awareness of an increased risk for preterm birth and LBW may require increased surveillance for growth restriction, education about the signs of preterm labor, discussion of the effects of chronic stress and racism on pregnancy, and suggestions for coping strategies.

Different strategies may be needed to cope with an acute episode of racial discrimination versus a lifetime exposure of maltreatment.<sup>45</sup> More effective coping on the individual level may contribute to a person's ability to self-regulate in the face of discrimination.<sup>45</sup> Social support such as seeking out and talking to others may be a means of coping with racial discrimination.<sup>46</sup> Providing prenatal care with a group model of care, such as CenteringPregnancy, may provide an opportunity for more social support than traditional individual care models. One randomized controlled trial of group prenatal care compared with individual care found a 33% reduction in preterm birth (OR 0.67; 95% CI, 0.44–0.99;  $P = .045$ ).<sup>47</sup> African American women in the study experienced an even greater reduction in preterm birth (OR 0.59; 95% CI, 0.38–0.92;  $P = .02$ ).<sup>47</sup> Group prenatal care may be an effective strategy to reduce the preterm birth rate, especially with African American women, and increased social support may be 1 mechanism.

Providing more culturally responsive health care is also a potential intervention of decreasing health disparities. Tailored interventions that focus on day-to-day experiences of African American women are needed<sup>45</sup> (other groups may experience racial discrimination; however, this review focused only on African American women). A greater understanding of the types of support that may be beneficial for different dimensions of the experiences of racial discrimination are needed in order to develop support-based interventions that have the potential to decrease health disparities in preterm birth.<sup>46</sup>

## CONCLUSION

This integrative literature review offers promising new insights into a long-standing problem of birth outcome disparities. The findings suggest that racial discrimination may be a potential contributor to the disparity in birth outcomes between African American women and non-Hispanic white women. Consistent exposure to racial discrimination, from childhood to the present, may be a chronic stressor that increases the allostatic load and leads to adverse health outcomes. Providers should be aware of these potential risk factors and adjust the assessment of patients who are at risk.

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**Table 1**  
Racial Discrimination and the Black-White Gap in Adverse Birth Outcomes: Review of Studies

Author, Year, Setting	Question/Purpose	Design/Sample	Instruments/Measurement	Results/Comments
Collins, David, Handler, Wall, & Andes (2004), Chicago, IL	Is there an association between exposure to interpersonal racism over a lifetime and birth outcomes of AA women?	Case-control N = 312 AA <sup>a</sup> women n <sub>1</sub> = 104 VLBW <sup>b</sup> and preterm n <sub>2</sub> = 208 normal birth weight 66% received Medicaid	Racial Discrimination Krieger racial & gender discrimination scale <sup>37</sup> McNeilly perceived racism scale <sup>48</sup> Within 72 hours of NICU admission.	Studied 5 domains: at work, getting a job, at school, getting medical care, and getting service at a restaurant or store. Lifetime exposure to interpersonal racism: 1 or more domains: OR <sup>d</sup> for VLBW 1.9 (95% CI, 1.2–3.1) 3 or more domains: OR for VLBW 3.2 (95% CI, 1.5–6.6)  Multivariate analysis for independent association of lifetime exposure to interpersonal racism (maternal age, education, cigarette smoking included in the logistic model): 1 or more domains: OR for VLBW 1.7 (95% CI, 1.0–9.2) 3 or more domains: OR for VLBW 2.6 (95% CI, 1.2–5.3)  Racism experienced during pregnancy: No association with increased rates of VLBW  Reliability of racism and discrimination scales not reported. Recall bias could influence results. Interviewers were blinded to study hypotheses.  Racism experienced during pregnancy: OR for VLBW 1.9 (95% CI, 0.5–6.6)  Maternal perception of racial discrimination during pregnancy had an OR of 4.4 (95% CI, 1.1–18) for VLBW among mothers who had: high parity, late prenatal care, or inadequate social support or who used cigarettes, alcohol, or illicit drugs. Adjusted model for these factors OR 3.3 (95% CI, 0.9–11.3). Reliability of discrimination scale not reported. Limitations: small sample size and retrospective design may not have captured earlier experiences of discrimination.  No correlations between discrimination due to race and infant birth weight. Tobacco use, number of prenatal visits, and discrimination due to age and physical disability were significant predictors of infant birth weight ( $R^2 = .25$ ; $P < .001$ ). Race (56%) and sex (44%) discrimination cited by participants. Findings suggest that the experience and effects of discrimination are multidimensional.  AA women were at a higher risk of PTB if they reported racial discrimination. RR <sub>b</sub> = 1.8 (95% CI, 1.1–2.9). Large study. No reliability of the modified scale reported. Many psychosocial variables were studied without multivariate analysis to
Collins, David, Symons, Handler, Wall, & Dwyer (2000), Chicago, IL	To determine the relationship between VLBW and the mother's perception of being exposed to racial discrimination during the pregnancy	Case control N = 85 AA women n <sub>1</sub> = 25 VLBW n <sub>2</sub> = 60 normal birth weight 100% received Medicaid	Racial Discrimination Krieger racial and gender discrimination scale <sup>37</sup> Within 72 hours of NICU admission	Racism experienced during pregnancy: OR for VLBW 1.9 (95% CI, 0.5–6.6)  Maternal perception of racial discrimination during pregnancy had an OR of 4.4 (95% CI, 1.1–18) for VLBW among mothers who had: high parity, late prenatal care, or inadequate social support or who used cigarettes, alcohol, or illicit drugs. Adjusted model for these factors OR 3.3 (95% CI, 0.9–11.3). Reliability of discrimination scale not reported. Limitations: small sample size and retrospective design may not have captured earlier experiences of discrimination.
Dailey (2009), California	To broaden knowledge of predictors of neonate birth weight in AA people by examining stress and resource factors	Prospective cohort N = 108 pregnant AA women attending public funded health clinic 14% infants < 2500 g	Everyday Discrimination Scale <sup>39</sup> Administered during prenatal appointment Cronbach $\alpha = .86$	No correlations between discrimination due to race and infant birth weight. Tobacco use, number of prenatal visits, and discrimination due to age and physical disability were significant predictors of infant birth weight ( $R^2 = .25$ ; $P < .001$ ). Race (56%) and sex (44%) discrimination cited by participants. Findings suggest that the experience and effects of discrimination are multidimensional.
Dole, Savitz, Siega-Riz, Hertz-Picciotto, McMahon, & Buekens (2004), North Carolina	To assess the association between psychosocial factors and preterm birth, stratified by race	Prospective cohort N = 1898 women (n = 724 AA) University clinic and public health clinic	Items from Krieger racial and gender discrimination scale <sup>37</sup> Administered at 24–29 wk gestation	AA women were at a higher risk of PTB if they reported racial discrimination. RR <sub>b</sub> = 1.8 (95% CI, 1.1–2.9). Large study. No reliability of the modified scale reported. Many psychosocial variables were studied without multivariate analysis to

Author, Year, Setting	Question/Purpose	Design/Sample	Racial Discrimination	Instruments/Measurement	Results/Comments
Dominguez, Dunkel-Schetter, Glynn, Hobel, & Sandman (2008), Los Angeles, CA	To examine the roles of stress—general, pregnancy, and racism—on birth weight and gestation age in AA women	AA: 12% PTB White: 11.5% PTB Prospective, repeated-measures design N = 124 women (n = 51 AA) recruited at < 18 wk pregnancy from clinic and private practices AA: 18% PTB, 10% LBW White: 3% PTB, 1% LBW	Items from racial and gender discrimination scale <sup>37</sup>		determine whether racial discrimination was an independent factor associated with preterm birth. Perceived lifetime racism was a predictor of birth weight ( $P < .05$ ). Each unit increase in lifetime perceived racism was associated with a 39.6 g decrease in birth weight. Childhood-direct racism was a marginal predictor of birth weight ( $P < .10$ ). Each unit increase associated with 137-g increase in birth weight. Childhood vicarious racism was a significant predictor of birth weight ( $P < .01$ ). Each unit increase associated with 168-g decrease in birth weight. Gestational age at birth not related to perceived racism. Perceived racism significantly correlated with stressful life events ( $P < .001$ ), perceived stress ( $P < .001$ ), and state anxiety ( $P < .001$ ). Smokers and drug users excluded from study. Krieger scale was modified; no reliability of the modified scale reported.
Korte (1999), Pittsburgh, PA	To evaluate psychosocial stress and racial discrimination and its relationship to weight for gestational age and gestational age at delivery	Prospective cohort N = 369 women (47% AA)	Composite score (yes/no) created for the study to assess experiences of discrimination in 6 situations (school, job search, medical care, work, housing, & police/court).		No significant relationship between racial discrimination and weight for gestational age; Adjusted OR $-0.04$ (95% CI, $-0.21-0.12$ ). No significant relationship between racial discrimination and gestational age at birth; Adjusted OR $-3.5$ (95% CI, $-8.1-1.2$ ). Doctoral dissertation never published. Racial discrimination score validity or reliability testing not reported.
Murrell (1996), Bay area, California	To examine the relationship of stress, self-esteem, and racism to LBW and gestational age in AA women	Prospective cohort N = 147 AA women, large HMO, majority had health insurance	Perceptions of Racism Scale <sup>21,38</sup> Cronbach $\alpha = .91$		No significant relationship between racism and birth weight or gestational age at birth. Racism accounted for 6% of variance in stress. Income accounted for 12% in birth weight. Developed and validated perceptions of racism scale in a sample of nonpregnant women aged 20–80 years.
Mustillo, Krieger, Gunderson, Sidney, McCreath, & Kiefe (2004), Multiple sites: Birmingham, AL; Chicago, IL; Oakland, CA; Minneapolis, MN	To determine whether racial discrimination, as a psychosocial stressor, may increase the risk of preterm delivery and LBW	Longitudinal epidemiological cohort / Stratified random sample of women in the CARDIA study <sup>c</sup> who gave birth between y 7 and 10 of the study (1992–1995) N = 352 births (n = 152 AA) AA: 21% PTB, 9% LBW White: 10% PTB, 2.5% LBW	Items from Krieger racial & gender discrimination scale <sup>37</sup>		Of the AA women who reported lifetime racial discrimination in more than 3 situations, 50% had PTB and 61% had LBW. AA women reporting racial discrimination in 3 or more situations had an OR for PTB of 3.05 (95% CI, 1.29–7.24). AA women reporting racial discrimination in 3 or more situations had an OR for LBW of 4.98 (95% CI, 1.43–17.39). When gestational age was added to the model, the OR for LBW decreased to 1.56 (95% CI, 0.32–7.76). No reliability reported for the racial discrimination instrument. PTB rate increased about 20% from the time data were collected and reported, making it difficult to generalize findings to present day.
Rosenberg, Palmer, Wise, Horton, & Corwin (2002), Boston, MA; Multiple sites: 13 states	To assess the relationship of perceptions of racial discrimination to preterm birth in US black women	Secondary analysis of the Black Women's Health Study (n = 64,500) age 21–69 y Majority had health insurance N = 4966 births (100% AA) n = 422 PTB n = 4544 not PTB n = 85 VLBW n = 4597 2500 g	Nine questions regarding experiences of discrimination		Women who reported unfair treatment on the job had an adjusted OR for PTB of 1.3 (95% CI, 1.1–1.6) and an unadjusted OR for VLBW of 1.4 (95% CI, 0.8–2.2). Women who reported that people acted afraid of them at least once a wk had an OR for PTB of 1.4 (95% CI, 1.0–1.9) and an unadjusted OR for VLBW of 1.2 (95% CI, 0.6–2.6). Among women with < 12 y of education, the ORs for PTB were 2.4 (95% CI, 1.2–4.6) for having been treated unfairly in housing, 3.5 (95% CI, 1.6–7.6) for receiving poorer services at least once a wk, and 3.4 (95% CI, 1.5–7.7) for people acting as if they were afraid of

Author, Year, Setting	Question/Purpose	Design/Sample	Instruments/Measurement	Results/Comments
Shiono, Rauh, Park, Lederman, & Zuskar (1997), Chicago, IL; New York, NY	To determine whether perceived racial discrimination is a risk factor for LBW and an explanation for the ethnic group disparities in birth outcomes	Prospective cohort N = 1150 from 6 clinics in Chicago and New York City (n = 346 (30%) AA) 45% receiving Medicaid	Racial Discrimination  Structured interview about racial/ethnic discrimination	them. Among women with 16 y of education, the OR for PTB was 1.6 (95% CI, 1.1–2.1) for unfair treatment on the job. No validity or reliability of discrimination instrument reported. Women were asked if they had been told the neonate was born 3 or more wk early, which may lead to potential bias.  Perceived racial discrimination during current pregnancy, physical abuse, anxiety, depression, and overall dissatisfaction with life did not show a significant association with birth weight. Living in public housing associated with an 83-g decrease in birth weight. Having a stable residence was associated with a 76-g increase in birth weight. Inter-rater agreement established. No example of questions asked during the interview.

Abbreviations: AA, African American; CI, confidence interval; HMO, health maintenance organization; LBW, low birth weight; NICU, neonatal intensive care unit; OR, odds ratio; PTB, preterm birth; RR, relative risk; VLBW, very low birth weight.

<sup>a</sup>OR and CI are significant if the proposed risk factor acts as a significant risk to disease if the odds ratio is greater than 1 and the lower bound of the CI does not go below 1.

<sup>b</sup>RR is an estimate of risk of “caseness” in 1 group compared with that in another, also called risk ratio.

<sup>c</sup>CARDIA study, Mustillo et al.<sup>19</sup>