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Personal Versus Group Experiences of Racism and Risk of Delivering a Small-for-Gestational Age Infant in African American Women: a Life Course Perspective

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Abstract The majority of studies investigating the relationship between racism/racial discrimination and birth outcomes have focused on perceived experiences of racism/racial discrimination directed at oneself (personal racism). However, evidence suggests individuals report with greater frequency racism/racial discrimination directed at friends, family members, or other members of their racial/ethnic group (group racism). We examined how much African American (AA) women report lifetime experiences of perceived racism or racial discrimination, both personal and group, varied by maternal age. We also investigated whether reports of personal and group racism/racial discrimination were associated with the risk of delivering a small-for-gestational age (SGA) infant and how much maternal age in relation to developmental life stages (adolescence [≤ 18 years], emerging adulthood [19–24 years], and adulthood [≥ 25 years]) moderated the relationship. Data stem from the Baltimore Preterm Birth Study, a hybrid prospective/retrospective cohort study that enrolled 872 women between March 2000 and July 2004 (analyzed in 2016–2017). Spline regression analyses demonstrated a statistically significant (*p* value for overall association < 0.001) and non-linear (*p* value = 0.044) relationship between maternal age and the overall racism index. Stratified analysis showed experiences of racism overall was associated with a higher odds ratio of delivering an SGA infant among AA women aged ≥ 25 years (OR = 1.45, 95% CI 1.02–2.08). The overall racism index was not associated with the SGA infant odds ratio for emerging adults (OR = 0.86, 95% CI 0.69–1.06) or adolescents (OR = 0.92, 95% CI 0.66–1.28). Multiple aspects of racism and the intersection between racism and other contextual factors need to be considered.

Keywords Life course · Emerging adults · Racism · African Americans · Adverse birth outcomes · Birth weight · Gestational age

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Abbreviations

AA   African American
BW   Birth weight
CI   Confidence interval
FRS   Family Resource Scale
GA   Gestational age
OR   Odds ratio
PNC   Prenatal care
PTB   Preterm birth
SD   Standard deviation
SGA   Small-for-gestational age

Introduction

In 2014, the United States of America (USA) reached a historic low rate in infant mortality (5.82 deaths/1000 live births) [1]; however, substantial racial disparities in infant health persist. Since the early 1970s, African American (AA) infants have had a persistent infant mortality rate more than twice the rate of Whites; 2014 data show 10.93 deaths/1000 live births for non-Hispanic Blacks/AA and 4.89 deaths/1000 live births for non-Hispanic Whites [2]. Racial disparities of similar magnitude are also seen for preterm birth (PTB; born < 37 weeks of gestation) and low birth weight (BW; born < 2500 g) [3, 4], both are leading infant mortality causes [5, 6]. Fetal growth restriction, an adverse birth outcome seen in preterm and term infants that is independently associated with infant mortality [7], also disproportionately affects AAs [8–10]. While national rates are not available, studies examining racial/ethnic disparities in fetal growth report the risk of delivering a small-for-gestational age (SGA) infant for AA women is twofold greater than that for non-Hispanic White women [8, 9, 11–13]. Most recently, Grobman et al. [13] report the frequency of SGA infant for AA women in a large multisite US study ($N = 9470$) was 2.2 times (95% confidence interval 1.9–2.6) the frequency for non-Hispanic Whites (17.2 vs 8.6%).

Considerable effort has been devoted to trying to understand the reasons behind the racial/ethnic disparity in birth outcomes. However, a relatively small portion of this disparity can be attributed to Black-White differentials in exposure to pre- and perinatal risk factors (e.g., social disadvantage, infection, medical comorbidities,

smoking, prenatal care, health insurance) that are traditionally incorporated in health disparity studies [14–18]. Despite widespread acknowledgement of race, not as a biological but as a social construct, the implications of race on health and health policy in race-conscious societies have not been fully studied [19]. In the USA, racial classification is a life course phenomenon [20–22] and a system for continued maintenance of social dominance [23]. Thus, race is a proxy for limited access to resources, systemic oppression, intergenerational social exclusion, and life challenges in marginalized communities. As a lived experience, racial hierarchies and discrimination are a common part of daily AA life experiences [21, 24].

In fact, in their most recent meta-analytic review of health literature, Paradies et al. [25] established racism as a major determinant of health for marginalized Americans with both systemic and interpersonal routes. They reported that racism is associated with poorer health overall (general, physical health, mental health, anxiety, depression, psychological stress). However, while ethnicity buffered some of the effects of racism on health outcomes for Latino and Asian populations, sadly this was not the case for AAs. In relation to birth outcomes, the literature on racism/racial discrimination provides both null and adverse findings [26–31]. Studies documenting an adverse relationship show perceived experiences of racism/racial discrimination increased AA women's risk of having an adverse birth outcome with the increase ranging from 30% to threefold. In one of the few studies investigating fetal growth specifically as a birth outcome, Hilmert and colleagues [10] found experiences of racism occurring in childhood interacted with maternal blood pressure to predict fetal growth restriction among AAs. The heterogeneity in findings for birth outcome studies may be due in part to the conceptualization and measurement of AA's lived experiences of racism/racial discrimination [30, 32].

Harrell [22], in her multidimensional conceptualization of racism-related stress, defines racism-related stress as "the race-related transactions between individuals or groups and their environment that emerge from the dynamics of racism, and are perceived to tax or exceed existing individual or collective resources or threaten well-being," (p. 44) and posits that racism may exert its influences on a person through direct and vicarious daily life experiences and micro stressors, as well as through the collective experiences of the racial/ethnic group with whom an individual self-identifies.

The majority of studies investigating racism/racial discrimination and the risk of poor birth outcomes have studied only perceived racism experiences directed at oneself (personal racism) [29, 32]. Yet, evidence suggests that individuals report with greater frequency of racism/racial discrimination directed at friends, family members, or other members of their racial or ethnic group (group racism) [29, 33–37].

Principles central to the life course perspective are concepts of age-patterned exposures, sensitive periods, and linked lives [20]. Recently, Gee et al. [20] emphasized the importance of using a life course framework to illustrate how the effects of racism on health could be minimized if lived experiences of racism/racial discrimination from birth to death and through different developmental stages are incompletely acknowledged. In reviewing the current literature on birth outcomes, we found considerable heterogeneity in timeframe when exposure to racism/racial discrimination was measured (e.g., past year, during pregnancy, lifetime) [10, 26, 29, 30, 38–42]. To our knowledge, only two studies [42, 43] have assessed whether racism/racial discrimination and its impact on birth outcomes were associated with age and time; both variables have biologic, developmental, and social significance [20]. However, both studies focused solely on women aged 14 to 21 years [42].

The purpose of this study is to examine reports of perceived racism/racial discrimination and its impact on the lives of childbearing AA women from a life course perspective. First, we examined whether AA women's reports of lifetime racism experiences (overall, personal, and group) varied by maternal age. Second, using the biopsychosocial model [44], we investigated whether personal and group racism experiences were associated with the risk of delivering an SGA infant and how much maternal age in relation to developmental life stages (adolescence [≤ 18 years], emerging adulthood [19–24 years], and adulthood [≥ 25 years]) moderated the relationship.

Materials and Methods

Study Design and Data Collection

Details about the Baltimore PTB Study have been previously published [29, 41, 45] in brief, a hybrid prospective/retrospective cohort design was utilized to enroll women over a 41-month period (March 2001–July 2004). Women were recruited either prenatally from a Johns Hopkins Medical Institution (JHMI) satellite prenatal clinic or postnatally (during the postpartum hospitalization) if they delivered a live-born infant. Eligibility was further restricted to women who resided in Baltimore City, Maryland, and self-identified as Black or African American since 95% of women receiving care at the participating JHMI satellite clinics were residents of Baltimore City, Maryland, and 90% of all JHMI deliveries were to Black or African American women.

This study was approved by the institutional review board at Johns Hopkins University. Of women who received prenatal care from participating JHMI clinics, 677 women were eligible for the study; 485 (72%) consented and were enrolled between 22 and 28 weeks of gestation. With respect to postpartum recruitment, 606 women with intermittent or no prenatal care who delivered at JHMI met study eligibility criteria; 387 (64%) consented and were enrolled during their postpartum hospitalization. Trained study staff collected information on social, psychosocial, and biomedical factors via structured interview and medical record review. Women who were enrolled prenatally were interviewed between 22 and 28 weeks of gestation and again during their postpartum hospitalization; those who were enrolled postnatally were interviewed only during their hospitalization stay, and postpartum interviews typically occurred within 24–48 h after delivery. To reduce the possibility of bias in participants' responses on interview questions related to race or racism, also known as race-of-interviewer effect, all interviewers for this study were Black or African American and female [46].

A total of 872 women consented and were enrolled and interviewed for the Baltimore Preterm Birth Study— a 68% response rate. Women served by JHMI had a median age of 20 years, their median year of education was 11.2, and the preterm birth rate was 15%. Women who were enrolled in the Baltimore Preterm Birth Study had a median age of 22 years, their median year of education was 11, and the preterm birth rate was 16.4%.

Sample

For this analysis, we excluded women who delivered a multiple birth ($n = 24$) since the birth weight-for-gestational age distributions differ for singleton and multiple births [47]. We also excluded 22 women who were enrolled and interviewed prenatally, but then lost to follow-up in 2001 when the university had a shutdown

of all research. Lastly, women with missing data on the exposure, experiences of personal or group racism ($n =$ 42), gestational age (GA; $n = 16$), or BW ($n = 8$) were excluded. The final analytic sample included 778 women. Women who were enrolled prenatally did not significantly differ from those who were enrolled postnatally on exposure or outcome variables [48].

Measures

Exposure Using methods by Caughy et al. [49] and applying them in our publication on prenatal care and racism [29], we created an index of overall racism and two sub-indices using items from the Racism and Lifetime Experience Scale (RaLES)-Brief questionnaire developed by Harrell et al. (Harrell S, Merchant M, Young S 1997. Psychometric properties of the racism and life experiences scales (RaLES). Unpublished manuscript; Harrell SP 1997. Development and initial validation of scales to measure racism-related stress. Unpublished manuscript). The RaLES-Brief questionnaire includes nine items assessing direct, vicarious, and collective experiences of racism in addition to information on the stressfulness of those experiences (Harrell S, Merchant M, Young S 1997. Psychometric properties of the racism and life experiences scales (RaLES). Unpublished manuscript; Harrell SP 1997. Development and initial validation of scales to measure racism-related stress. Unpublished manuscript). In particular, we used four items to distinguish personal experiences from group-related experiences including the following: (1) overall, during your lifetime, how much have you personally experienced racism, racial prejudice, or racial discrimination [personal]; (2) during the past year, how much have you personally experienced racism, racial prejudice, or racial discrimination [personal]; (3) how much racism had affected the life experiences of people close to them [group]; (4) and how much they thought racism affected the lives of others belonging to their racial/ethnic group [group]. Each question was answered using a 5-point Likert scale ranging from 0 ("not at all") to 4 ("extremely").

The overall racism index was created by summing women's responses on each of the four items together ranging from 0 to 16; a higher score reflected greater amounts of experienced racism. The following two sub-indices were created: one reflective of personal racism and another reflective of group racism; each ranged from 0 to 8. Internal reliability, measured using Cronbach's α, for the overall racism index and the personal and group sub-indices was 0.73, 0.82, and 0.61, respectively.

Outcome SGA was operationalized using the cut point defined for the BW ratio continuous measure [50] defined as the observed BW divided by the expected BW for the infant's GA. The expected BW was determined using a sex-specific U.S. fetal growth curve by Talge et al. [51].

Potential Effect Modifier Our cohort included adolescents in substantial numbers ($\sim 11\%$, ≤ 18 years) as there was no lower limit for age eligibility. It has been reported that age may influence reporting about racism experiences; younger individuals are more likely to state they have not experienced racism or racial discrimination [20]. Hence, maternal age (continuous) was examined as a potential modifier. Maternal age was also stratified into three groups which align with the developmental literature and the concept of emerging adulthood [52, 53]: adolescence (≤ 18 years), emerging adulthood (19–24 years), and adulthood (≥ 25 years).

Covariates Potential confounding variables considered for inclusion were parity (number of live births), recruitment status (prenatal or postnatal), and socioeconomic variables as follows: years of education, employment during pregnancy (yes/no), receipt of Medicaid insurance during pregnancy, maternal height (cm), and the Family Resource Scale (FRS) [54]. The 25-item FRS assesses the adequacy of household resources in relation to time and money (e.g., having enough money to "buy food for 2 meals/day" and to "pay the rent/mortgage" and/or having "time to socialize with friends and family") [51]. Women responded using a 5-point Likert scale ranging from 1 ("almost always") to 5 ("almost never"). The FRS theoretically ranges from 25 to 125; a lower score reflects greater adequacy in household resources. The FRS has three subscales: essential money, non-essential money, and leisure time [29, 55]. The internal reliability, estimated by Cronbach's α, was high (≥ 0.80) for the FRS and its subscales. Each covariate was assessed for missing values. Due to the degree of missing data exhibited in the analytic sample for maternal height (12.6%), the FRS (5%), and Medicaid status (5%), expectation-maximization algorithm [56] was used to impute missing values for these items.

Statistical Analysis

Stata version 14 (College Station, TX) was used to conduct statistical analyses (June 2016–May 2017).

Bivariate analyses were used to compare the mean and SD for each racism index and maternal characteristics of the analytic sample and by age group. As mentioned previously, one's age may influence the reporting and exposure to racism or experiences of unfair treatment related to race. Hence, we used spline regression to assess the age-racism association and examine the relationship for any non-linearities. We used restricted cubic spline transformations as they permit a high degree of flexibility when modeling potential non-linear relationships between two variables; they also administer constraints that ensure a smooth curve as well as linearity in the tails of the function [57, 58]. Spline transformation of maternal age with 4 *df* was employed using the Stata package POSTRCSPLINE [59] and knots placed at the 5th, 35th, 65th, and 95th percentiles of maternal age [60]. The spline transformations were then incorporated as predictor variables into linear regression models where the racism measure served as the outcome.

Logistic regression was used to assess associations between each racism measure and SGA odds ratio, allowing for calculation of ORs and their corresponding 95% CIs. To account for the possibility of maternal age moderating the relationship between racism and delivery of an SGA infant, an interaction term between the racism measure and maternal age, as a continuous variable, was included into the regression model. Significance of the interaction term was evaluated using the likelihood ratio test; a *p* value < 0.10 was used for a level of statistical significance. Next, regression models were stratified by maternal age (≤ 18, 19–24, and ≥ 25 years) to further explore interactions. The final age-stratified models were adjusted for maternal education, Medicaid status, essential money, parity, and recruitment status.

Results

Sample Characteristics

Table 1 displays maternal characteristics for this study's 778 AA women. Women were relatively young with a mean age of 23.3 years (SD 5.7), and nearly half (48.1%) had ≤ 12 years of education and no diploma/GED. In terms of household resources for themselves and their family, more than half (54.1%) reported having unmet or inadequate needs met for essential resources.

Personal Versus Group Racism and Maternal Age

Table 1 also provides the sample distribution for the overall racism index and the personal and group racism sub-indices. The personal-group discrimination discrepancy was exhibited in our sample (Fig. 1); women acknowledged with more frequency items representing group racism than items representing personal racism. Two thirds (67%) of the women stated they had experienced both types of group racism: vicarious and collective, whereas only 34% acknowledged all items representing personal racism. Less than 10% of these women reported having never experienced group racism, while 43.7% reported having never experienced personal racism. The personal-group discrimination discrepancy was also exhibited within each age group in varying degrees (Fig. 1).

Spline regression analyses demonstrated a statistically significant (*p* value for overall association < 0.001) and non-linear (*p* value = 0.04) relationship between maternal age and overall racism. Figure 2a illustrates this non-linear relationship showing the predicted overall racism index score steeply increases until about 20 years, then plateaus until approximately 30 years of age, then continuously increases. Similar patterns were demonstrated between maternal age and the racism sub-indices (Fig. 2b, c). However, the non-linear relationship was only marginally significant for the sub-indices.

Perceived Racism and SGA

The SGA prevalence in the sample was 18.6%, with younger women having the highest SGA prevalence (Table 1). Table 2 presents results from the logistic regression examining the association between perceived racism and SGA. In the full sample, unadjusted main effects models showed neither the overall racism index nor the sub-indices were significantly associated with the odds ratio of SGA. Next, we tested for effect modification by maternal age. In separate models, the overall racism-maternal age and the group racism-maternal age interaction terms were deemed statistically significant (*p* = 0.03 and *p* = 0.01, respectively). However, the personal racism-maternal age interaction term was not statistically significant (*p* = 0.17).

We further explored effect modification via stratification by developmental age groups: ≤ 18, 19–24, and ≥ 25 years. Overall racism was not associated with SGA among women aged ≤ 18 years (OR = 0.92, 95% CI

Table 1 Distribution of racism indices and maternal characteristics for the Baltimore Preterm Birth Study (*N* = 778), Baltimore City, Maryland, 2001–2004

Sample characteristics	Total sample (*N* = 778)	Maternal age			*p* value[c]
	N (%)	≤ 18 years (*n* = 167) *n* (%)	19–24 years (*n* = 354) *n* (%)	≥ 25 years (*n* = 257) *n* (%)	
Overall racism index					
Mean (SD)	2.5 (1.2)	2.2 (1.2)	2.5 (1.3)	2.7 (1.2)	< 0.01
0 item acknowledged	48 (6.2)	15 (9.0)	22 (6.2)	11 (4.4)	
1 item acknowledged	127 (16.3)	32 (19.2)	61 (17.2)	34 (13.2)	
2 items acknowledged	205 (26.4)	53 (31.7)	83 (23.5)	69 (26.9)	
3 items acknowledged	169 (21.7)	32 (19.2)	77 (21.8)	60 (23.4)	
4 items acknowledged	229 (29.4)	35 (21.0)	111 (31.4)	83 (32.3)	
Personal racism sub-index					
Mean (SD)	0.9 (0.9)	0.7 (0.8)	0.9 (0.9)	1.0 (0.9)	0.01
0 item acknowledged	333 (42.8)	87 (52.1)	149 (42.1)	97 (38.5)	
1 item acknowledged	181 (23.3)	37 (22.2)	80 (22.6)	64 (24.9)	
2 item acknowledged	264 (33.9)	43 (25.8)	125 (35.3)	96 (37.4)	
Group racism sub-index					
Mean (SD)	1.6 (0.6)	1.5 (0.7)	1.6 (0.6)	1.7 (0.6)	0.02
0 item acknowledged	55 (7.1)	18 (10.8)	25 (7.1)	12 (4.7)	
1 item acknowledged	195 (25.1)	47 (28.1)	86 (24.9)	62 (24.1)	
2 items acknowledged	528 (67.9)	102 (61.1)	243 (68.6)	183 (71.2)	
Recruitment status					0.30
Prenatal	429 (55.1)	74 (44.3)	150 (42.4)	125 (48.6)	
Postpartum	349 (44.9)	93 (55.7)	204 (57.6)	132 (51.4)	
Maternal age (years)					
Mean (SD)	23.3 (5.7)	17.0 (1.3)	21.4 (1.6)	29.8 (4.4)	–
Maternal education					< 0.001
Mean grade level (SD)	11.2 (1.7)	10.3 (1.5)	11.3 (1.4)	11.7 (1.9)	
≤ 12 years, no diploma/GED[a]	374 (48.1)	123 (73.5)	155 (43.8)	96 (37.4)	
≤ 12 years, diploma/GED[b]	326 (41.9)	41 (24.7)	169 (47.7)	116 (45.1)	
> 12 years	78 (10.0)	3 (1.9)	30 (8.5)	45 (17.5)	
Family Resource Scale					
Essential money					
Mean (SD)	20.1 (6.9)	19.0 (5.9)	20.5 (6.7)	20.3 (7.7)	
Quartile 1 (more)	154 (19.8)	37 (22.2)	52 (14.7)	65 (25.3)	0.01
Quartile 2	203 (26.1)	45 (27.0)	101 (28.5)	57 (22.2)	
Quartile 3	219 (28.2)	52 (31.1)	101 (28.5)	66 (25.7)	
Quartile 4 (less)	202 (26.0)	33 (19.8)	100 (28.3)	69 (26.9)	
Non-essential money					
Mean (SD)	13.7 (5.2)	13.1 (4.9)	14.0 (5.1)	13.5 (5.6)	
Quartile 1 (more)	145 (18.6)	29 (17.4)	57 (16.1)	59 (23.0)	0.01
Quartile 2	235 (30.2)	67 (40.1)	105 (29.7)	63 (24.5)	
Quartile 3	198 (25.5)	39 (23.4)	92 (26.0)	67 (26.1)	
Quartile 4 (less)	200 (25.7)	32 (19.2)	100 (28.3)	68 (26.5)	
Marital status					< 0.001
Single/separated/divorced	428 (55.0)	44 (26.4)	164 (46.3)	142 (55.3)	
Married/cohabitating	350 (45.0)	123 (73.7)	190 (53.7)	115 (44.8)	

Table 1 (continued)

Sample characteristics	Total sample ($N = 778$)	Maternal age			p value[c]
		≤ 18 years ($n = 167$)	19–24 years ($n = 354$)	≥ 25 years ($n = 257$)	
	N (%)	n (%)	n (%)	n (%)	
Previous live births					< 0.001
Nulliparous	279 (35.9)	143 (85.6)	111 (31.4)	25 (9.7)	
Primiparous	206 (26.3)	20 (12.0)	139 (39.3)	47 (18.3)	
≥ 2 live births	293 (37.7)	4 (2.4)	104 (29.4)	185 (72.0)	
Medicaid (yes)	509 (65.4)	106 (63.5)	246 (69.5)	157 (61.1)	0.08
Maternal height (cm)					
Mean (SD)	162.7 (7.6)	162.2 (7.1)	162.2 (7.3)	163.9 (8.2)	0.02
Preterm birth	125 (16.1)	25 (15.0)	60 (17.0)	40 (15.6)	0.82
SGA	147 (18.9)	35 (21.0)	75 (21.2)	37 (14.4)	0.08

[a] Only 13 women had 12 years of education and no diploma or GED

[b] Thirty-six women had less than 12 years of education but had obtained a GED

[c] p values estimated with the chi-square test, except for the racism measures which were estimated with ANOVA

0.66–1.28) and women aged 19–24 years (OR = 0.86, 95% CI 0.69–1.06); however, among women aged ≥ 25 years, one-unit increase in the overall racism index was associated with a higher SGA odds ratio (OR = 1.45, 95% CI 0.1.02–2.08).

With the personal racism sub-index, age-stratified models did not show a significant association between personal racism and the SGA odds ratio among women aged ≤ 18 years (OR = 0.96, 95% CI 0.58–1.58) and 19–24 years (OR = 0.86, 95% CI 0.64–1.18). In women aged ≥ 25 years, again there was no association seen, but the trend was suggestive (OR = 1.33, 95% CI 0.86–2.09). For the group racism sub-index, age-stratified models showed an increase in SGA odds ratio associated with the group racism among women aged ≥ 25 (OR = 2.84, 95% CI 1.10–
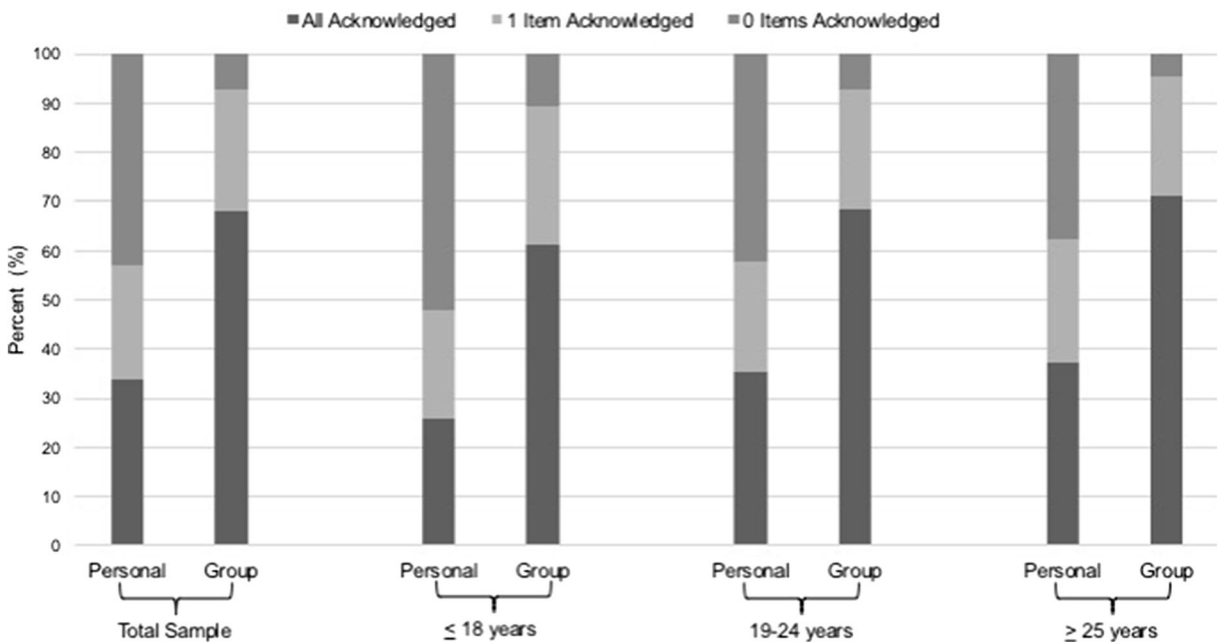

Fig. 1 Distribution of personal and group experiences of racism stratified by maternal age group in the Baltimore Preterm Birth Study, 2001–2004
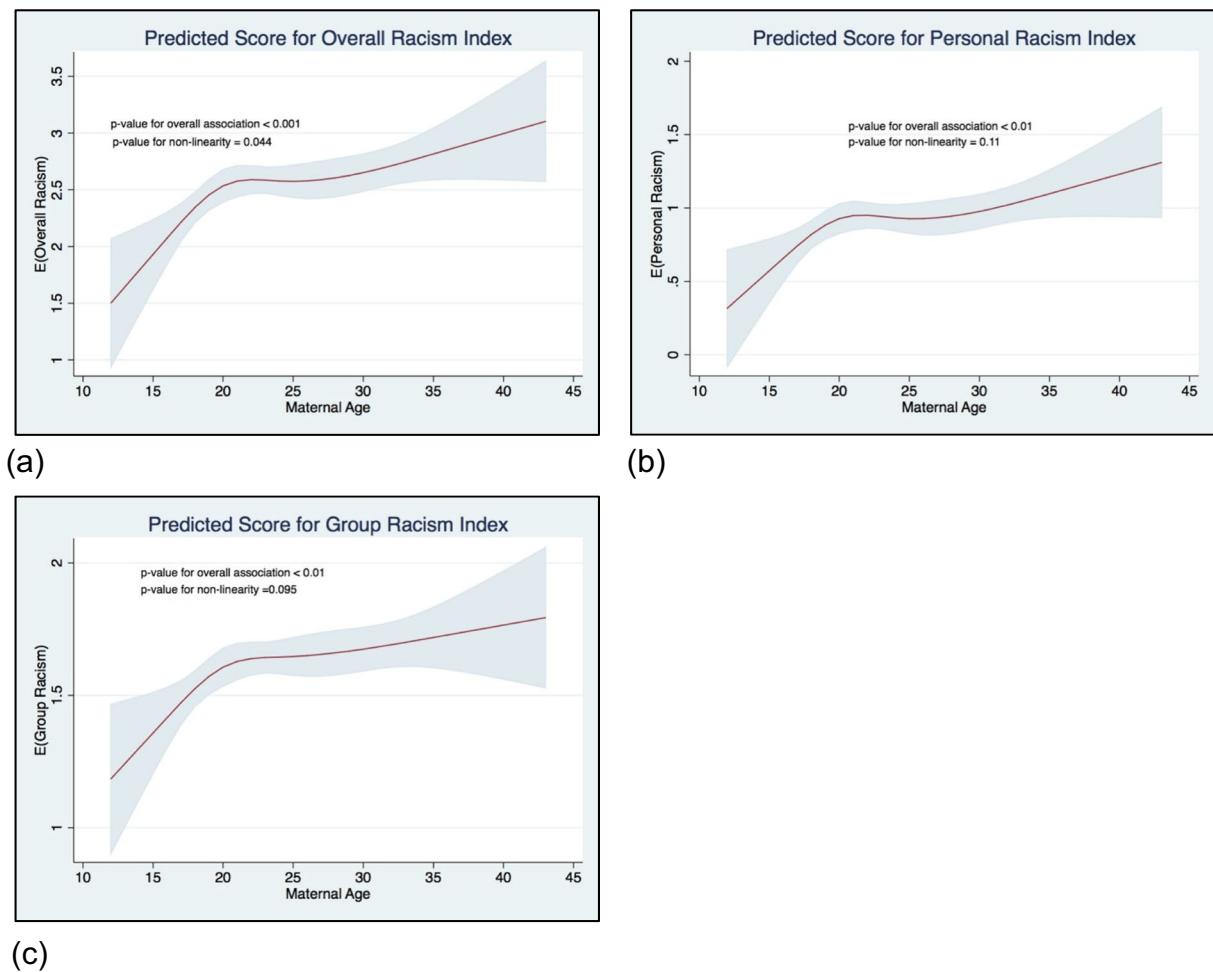
(a)

(b)

(c)

Fig. 2 Relationship between maternal age and reports of perceived racism. **a** Overall racism index. **b** Personal racism. **c** Group racism. The *X*-axis represents the maternal age (years). The *Y*-axis represents the predicted score for the racism index. *Red line* represents the predicted score for each racism index. *Gray fill* represents the 95% confidence interval

7.32). However, group racism was not significantly associated with SGA odds ratio in women aged ≤ 18 years (OR = 0.83, 95% CI 0.48–1.45) or in women aged 19–24 years old (OR = 0.72, 95% CI 0.47–1.10).

Discussion

Few investigators have examined the importance of personal versus group exposure to racism or racial discrimination in relation to health outcomes, much less with regard to birth outcomes. We examined the personal-group discrimination discrepancy in a cohort of urban low-income AA women. We found that AA women were less likely to acknowledge that racism affects them through direct personal experiences than to acknowledge that racism affects the lives of other AAs, family, and friends. We also showed, in varying degrees, that this pattern of differential reporting is present across major developmental stages that intersect with women's childbearing period. The personal-group discrepancy found in our study may be the result of people's ability to perceive racism occurring on multiple levels and in multiple contexts with equal ability [22]. Researchers have also suggested this discrepancy may reflect maladaptive strategies that individuals use to minimize the distress of acknowledging and coping with discrimination [22, 34, 35].

As noted in the "Introduction" section, age may influence the experience and/or reporting of racism for self or vicariously. However, few studies about

Table 2 Personal and group racism and SGA stratified by maternal age (≤ 18, 19–24, and ≥ 25 years)

Measure	Total sample ($N = 778$)	Interaction p value[a]	Maternal developmental age group		
	Unadjusted OR (95% CI)		≤ 18 years[b] ($n = 167$) OR (95% CI)	19–24 years[b] ($n = 354$) OR (95% CI)	≥ 25 years[b] ($n = 257$) OR (95% CI)
Overall racism	0.95 (0.82, 1.10)	0.03	0.92 (0.66, 1.28)	0.86 (0.69, 1.06)	1.45 (1.02, 2.08)
Personal racism	0.92 (0.74, 1.13)	0.17	0.96 (0.58, 1.58)	0.86 (0.64, 1.18)	1.33 (0.86, 2.09)
Group racism	0.97 (0.73, 1.30)	0.01	0.83 (0.47, 1.45)	0.72 (0.47, 1.10)	2.84 (1.10, 7.32)

racism, much less studies about racism and health, have reported on the distribution of racism by age. In all of our analyses, we found a lower endorsement of racism scale items in both the personal and group domain for the younger mothers in our cohort. Late adolescence through emerging adulthood are periods of rapid developmental change [53]. These developmental shifts impact individuals' perception of racism and parenting attitudes and behaviors [61]—two salient factors in the context of Black Motherhood. When our data were stratified (i.e., informed by a developmental life course perspective), findings demonstrated that maternal developmental stage ($\leq$ 18 years, adolescence; 19–24 years, emerging adulthood; $\geq$ 25 years, adulthood) served as a moderator for perceived racism and racial life experiences [22, 51]. Moreover, the significant interaction between group racism and SGA, when stratified by developmental stage of the mother, may demonstrate the impact that an increased awareness of race may have on birth outcomes. This confirms prior evidence for emerging adults as a distinct developmental group in maternal and child health research [61].

For some of the comparisons, the proportion of women not reporting racism in the younger age groups is substantial. This could suggest that fewer reports of racism or racial discrimination may be more normative for younger women. This would be consistent with the effect modification we report by maternal age for the apparently protective effect of racism on fetal growth. Alternatively, differences in reports of racism and subsequent effect modification by maternal age could be due to generational changes in the sociopolitical climate of the USA [62]. Comparison of our findings with other published studies on racism and birth outcomes is somewhat difficult. First, we appear to have the only such study that recruited women with maternal ages spanning across

adolescence, emerging adulthood, and adulthood (Maryland law considers minors emancipated if pregnant). Second, even among adult cohorts, the published studies on racism and birth outcomes have not reported on whether maternal age moderated the impact of racism on the risk of adverse outcomes.

More broadly, our results suggest that context is important when considering the impact of psychosocial exposures. Maternal age appears to be an important contextual factor. Community and time may be other factors; however, our study could not explore these factors. As noted above, very few studies have been published on racism and birth outcomes. Among the pregnancy cohorts reporting on racism, the women have been recruited from the Baltimore, MD [29, 41]; Chicago, IL [63, 64]; and Central NC [65, 66]. The studies of racism in which women retrospectively reported their birth outcomes include a wider range of communities—the Black Women's Health Study (a national sample) and the CARDIA study (Birmingham, AL; Chicago, IL; Oakland, CA; Minneapolis, MN). Future studies might more explicitly examine how differences or changes in community and sociopolitical context over time relate to the impact of racism.

Limitations

As with every study, ours has some limitations which should be considered. As have most birth outcome studies, we used BW-standardized growth curves to assess fetal growth; these curves can be biased at the lower end of the distribution [67]. The use of SGA as an indicator of poor fetal growth implies that every infant in the tail of end of the BW-for-gestational age distribution experienced impaired fetal growth, yet some infants may be just constitutionally small [51]. Our hybrid prospective/retrospective design could be

perceived as a limitation. However, recruitment of women prenatally and postnatally may increase the generalizability of our study findings to urban low-income AA women since we were able to include women with late, interrupted, or sporadic PNC. Indeed, prospective pregnancy cohorts often report lower PTB or lower BW rates than those reported for the general population [68, 69].

In relation to our racism measures, the difference in reports of personal and group experiences of racism may be confounded by the difference in phrasing of items. For example, personal items ask women about the amount of racism, but group items ask women to report on an effect of racism. Furthermore, the sub-index of group racism is limited, as Cronbach's α was somewhat low; this may be related to the fact that each item represented a different type of potential group-level racism-related stress. Future research should focus on increasing the reliability of this measure by incorporating additional questions representative of vicarious and collective racism.

Conclusions

Rates of reported racism among women in the Baltimore PTB Study were higher for group than for personal experiences of racism overall and by maternal developmental age group. In our sample of low-income urban AA women, racism, whether personal or group, had a consistently adverse impact, increasing the SGA risk among the women aged ≥ 25 years though not among emerging adults or adolescents. Future studies should examine maternal age as a contextual factor in the study of racism and consider the role of domain-specific race-related stress [70] in SGA and other perinatal health outcomes. Similarly, contributing factors to racial awareness such as racial identity [71], racial socialization [72, 73], and race-based traumatic stress [74, 75] should be assessed to identify stronger pathways for public health interventions.

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