The unique contribution of gendered racial stress to depressive symptoms among pregnant Black women

Lasha S Clarke[1,2] (ID)**, Halley EM Riley[2], Elizabeth J Corwin[3], Anne L Dunlop[4] and Carol J Rowland Hogue[2]**

Abstract

Introduction: Pregnant Black women are at disproportionate risk for adverse birth outcomes, in part associated with higher prevalence of stress. Stress increases risk of depression, a known risk factor for preterm birth. In addition, multiple dimensions of stress, including perceived stress and stressful life events, are associated with adverse birth outcomes, independent of their association with prenatal depression. We use an intersectional and contextualized measure of gendered racial stress to assess whether gendered racial stress constitutes an additional dimension to prenatal depression, independent of stressful life events and perceived stress.

Methods: In this cross-sectional study of 428 Black women, we assessed gendered racial stress (using the 39-item Jackson Hogue Phillips Reduced Common Contextualized Stress Measure), perceived stress (using the Perceived Stress Scale), and stressful life events (using a Stressful Life Event Index) as psychosocial predictors of depressive symptoms (measured by the Edinburgh Depression Scale). We used bivariate analyses and multivariable regression to assess the association between the measures of stress and prenatal depression.

Results: Results revealed significant bivariate associations between participant scores on the full Jackson Hogue Phillips Reduced Common Contextualized Stress Measure and its 5 subscales, and the Edinburgh Depression Scale. In multivariable models that included participant Perceived Stress Scale and/or Stressful Life Event Index scores, the Jackson Hogue Phillips Reduced Common Contextualized Stress Measure contributed uniquely and significantly to Edinburgh Depression Scale score, with the burden subscale being the strongest contributor among all variables. No sociodemographic characteristics were found to be significant in multivariable models.

Conclusion: For Black women in early pregnancy, gendered racial stress is a distinct dimension of stress associated with increased depressive symptoms. Intersectional stress measures may best uncover nuances within Black women's complex social environment.

Introduction

Prenatal depression, potentially associated with stress both preceding and during pregnancy, is common and poses significant health risks to pregnant women and their children.[1–3] Mothers with elevated depressive symptoms during pregnancy are more likely to give birth preterm or to low birthweight infants, and to report higher psychosocial stress.[3–5] In the United States, Black women are over 50% more likely to give birth preterm than White women

[1]Morehouse School of Medicine, Atlanta, GA, USA
[2]Rollins School of Public Health, Emory University, Atlanta, GA, USA
[3]Columbia University School of Nursing, New York, NY, USA
[4]School of Medicine, Emory University, Atlanta, GA, USA

*Halley EM Riley is now newly affiliated to Georgia State University, Atlanta, GA, USA.

Corresponding author:
Lasha S Clarke, Morehouse School of Medicine, 720 Westview Drive, Atlanta, GA 30310, USA.
Email: lsclarke@msm.edu

(14.13% vs 9.09%), and more than twice as likely to deliver a low birthweight infant (14.07% vs 6.91%).[6] In addition, Black pregnant women report greater psychosocial stress than their White counterparts, in part due to social factors including racism and discrimination.[7–10] Prenatal psychosocial stress, which occurs when a pregnant woman feels unable to cope with her demands, can be embodied physiologically and expressed behaviorally.[11] Among the complex mechanisms purported to underlie birth outcomes, stress-induced immune dysregulation is one pathway that has received considerable attention.[12] Research also indicates that chronic racial stress may prematurely weather Black women's stress response, leading to increased allostatic load.[13,14] Prenatal psychosocial stress, which is commonly measured with self-reported measures of stressful life events and/or perceived stress,[15,16] is associated with poor birth outcomes.[17–19] Specifically, adverse earlier life experiences (as measured by stressful life events inventories) and appraisal of experiences as stressful (as measured by perceived stress scales) may independently increase risk for depression,[19,20] and adverse birth outcomes.[19,21,22] Considerable evidence further suggests that depression-causing stress may contribute to Black-White racial disparities in adverse birth outcomes,[23–28] though some mixed results suggest the link is unclear.[29] Given the potential impact of prenatal depression on Black maternal and infant health, it is critically important to identity the unique dimensions of stress that may cause depression among Black women.

The most widely used stressful life event and perceived stress instruments may not adequately assess chronic stress associated with racial discrimination,[30] and thus may not capture that integral part of American Black women's historical and contemporary social context.[31] Researchers have found that racism is a stressor for pregnant Black women,[10,32,33] and that racial stress is linked with depression and adverse birth outcomes.[34–37] Moreover, for Black women, additional exposure to stress over the lifecourse may not only be due to race, but both race and gender.[38–40] This type of stress—contextualized in Black women's intersecting social identities—is known as gendered racial stress, and is brought on by gendered racism, a hybrid form of oppression.[38,41,42] Gendered racial theory states that, by virtue of being both Black and women, Black women uniquely experience psychosocial stressors that go beyond reports of perceived instances of racism,[43] and which may operate independently of other known sources of stress.[8] Some studies of Black individuals have demonstrated that gender moderates the link between particular types of racism and mental health, such that women who report interpersonal racism experience worse mental health outcomes than men.[44] Compared to Black men, Black women may also experience racism via a wider range of potential sources, inclusive of microaggressions, personal slights, and invalidations.[45] Thus, gender is a salient factor in determining the impact of race-related stress on mental health.[46] Research also supports that Black women appraise experiences of gendered racism as stressful due to the simultaneous experience of racism and sexism, and not just due to one or the other.[40] Furthermore, experiences with gendered racism related to Black women's sexuality and their gendered role as mothers are associated with greater pregnancy-specific stress.[47] Thus, it is necessary to understand the contribution of gendered racial stress to Black women's total burden of stress.

Studies of contextualized gendered racial stress to date offer support for positive associations with psychosocial stress,[39,40,43,48–54] and adverse birth outcomes among Black women.[25,47] While some earlier research on gendered racism adapted unidimensional measures of sexism,[40] scholars of intersectionality theory call for the use of multidimensional measures that explore experiences of racism and sexism together, without disentangling them.[39,55–62] Although empirical research on gendered racism is becoming more prevalent, only a few intersectional instruments for gendered racism exist to our knowledge, including (1) the Gendered Racial Microaggressions Scale,[48] and (2) the Jackson Hogue Phillips (JHP) Contextualized Stress Measure©.[63] Given that the JHP© was developed using a grounded theory approach in collaboration with nearly 500 metropolitan Black women, and was later validated for use in pregnancy (Cronbach's alpha=.89),[43] that instrument was selected for use in the present Atlanta-based study. We examined the association of gendered racial stress with depression, and pose the following questions:

1. Among a sample of urban, socioeconomically diverse pregnant Black women, is there a significant association of gendered racial stress with depressive symptoms?
2. Does gendered racial stress constitute an additional dimension to stress-associated depressive symptoms beyond stressful life events and perceived stress?

Methods

Study population

This cross-sectional study uses first trimester prenatal data from the first consecutively enrolled participants in the prospective Biobehavioral Determinants of the Microbiome and Preterm Birth in Black Women study (n=485), which aims to provide a biopsychosocial understanding of within-race risk for adverse birth outcomes among a socioeconomically diverse sample of Black women.[64] At enrollment, participants were receiving prenatal care at either Grady Memorial Hospital or Emory

University Hospital Midtown—two Atlanta-area facilities (public and private, respectively) that see approximately 10% of Georgia's singleton live births to Black women. Eligible women were between 18 and 40 years of age, identified as African-American (i.e., US-born and of African-American or Black race), were carrying a singleton pregnancy between 8 and 14 weeks' gestation, and had no reported chronic medical conditions or conditions requiring long-term prescription management. During the baseline study visit, sociodemographic, psychosocial, and other health information was collected via self-report. This study was reviewed for ethical and safety considerations by the Internal Review Boards (IRB00068441) of both Emory University and Grady Memorial Hospital and was approved by both Boards. All participants provided written informed consent, and received financial compensation for their participation. Fifty-seven women were excluded from these analyses due to missing data on gendered racial stress and/or depression, leaving an analytic sample of 428. Sample size was based on the available data from the Biobehavioral Determinants of the Microbiome and Preterm Birth in Black Women study, for which a power analysis has been published previously.[64]

Measures

Depression. The Edinburgh Depression Scale (EDS) is a 10-item self-report questionnaire ascertaining symptoms of depression in the last 7 days.[65] While originally developed for use in the postnatal period, the scale has been used and validated in studies of pregnant women and shows high sensitivity and specificity for the detection of prenatal major depressive disorder.[66–68] The EDS maintains high internal consistency reliability in studies of Black pregnant populations.[69,70] We summed items, coded 0 to 3, where higher scores indicate greater depressive symptomology. In our sample, scores range from 0 to 25. Using generally recommended thresholds, an EDS score ≥ 10 indicates the presence of depressive symptomology, and a score ≥ 13 may further indicate clinical depression.[65,71,72] While some reports indicate that an EDS score of ≥ 15 should be used antenatally,[73] studies of the EDS in urban and low-income pregnant women, and studies of prenatal depression screening across trimesters, suggest that lower cutoff scores may most effectively identify women in early pregnancy in need of diagnosis and treatment.[69,74,75] Thus, we present an array of EDS score categories in our descriptions of participant characteristics, and use EDS score as a continuous variable in linear regression analyses.[76] In this sample, Cronbach's alpha for the EDS was .85.

Gendered racial stress. To operationalize gendered racial stress, we use continuous scores from the 39-item JHP©, which we call the JHP-Reduced Common (JHP-RC©; see Supplemental Table 1). This reduced scale includes items from the original 68-item JHP[63,77] that were found to be most commonly experienced by Black women who worked at one of two public hospitals and were enrolled in a federally funded worksite fitness study.[78] The JHP-RC© assesses specific exposure to chronic racial and gendered stress among Black women, and consists of four subscales measuring stressors (burden, personal history, racism, and work) and one measuring stress mediators (coping), with 5-level Likert-type scoring from greatest agreement to greatest disagreement. The burden subscale includes 10 items that measure gendered role strain, and distress due to inadequate resources to meet demands. It includes 3 of the 4 items from the original JHP Scale referred to as "stress states."[63,77] The personal history subscale includes 5 items that assess experiences with emotional, physical, and substance abuse by a family member or partner. The 5 racism items capture racial stereotypes, White privilege, and the perceived impact of racism on children's lives. The 5-item work subscale assesses racism and sexism in the workplace. The 14 coping items measure coping resources (including support from and belonging to one's community) and capacity for coping based on race and gender. To calculate total and subscale JHP-RC© scores, we coded items 1–5 and reverse coded items, as necessary, so higher values for each item indicated greater gendered racial stress. In our sample, total JHP-RC© score ranges from 47 to 159. Ranges for the subscales are: burden = 10–50, coping = 16–66, personal history = 3–25, racism = 4–25, and work = 2–25. Confirmatory factor analysis (CFA) was conducted on the JPH-RC©. The hypothesized factor structure was found to be an adequate fit to our data (root mean square error of approximation = 0.042, comparative fit index = 0.93, and Tucker–Lewis index = 0.91). Cronbach's alpha coefficient for the full JHP-RC© was .86 in the present study. The subscales had the following alpha coefficients: burden = .84, coping = .82, personal history = .87, racism = .75, and work = .82. These values indicate acceptable to high internal reliability consistency.

Covariates. We considered sociodemographic and psychosocial health covariates. Along with gendered racial stress, the psychosocial factors are independent variables, considered covariables for the purpose of determining the independent association of gendered racism to psychosocial risks. Psychosocial health factors include:

1. Perceived stress: Cohen's 14-item Perceived Stress Scale (PSS) assesses "the degree to which individuals appraise situations in their lives as stressful" over the last month.[79] We summed items, coded 0 to 4, where higher values indicate greater perceived stress. In our sample, scores ranged from 0 to 45. The PSS is among the most widely used instruments of perceived stress, and demonstrates

acceptable internal consistency in this sample (Cronbach's alpha = .72).

2. Stressful life events: A 13-item Stressful Life Events Inventory (SLEI) assessed whether particular life events (e.g. death of a loved one, loss of home, loss of employment) had occurred over the life course.[80] We scored stressful life events dichotomously as either present (1) or absent (0), and computed an index by summing the total number of events present (range: 0–12, in our sample). Cronbach's alpha in this sample was .74.

Sociodemographic factors include:

1. Age (years).
2. Education: participants reported whether they had completed less than high school, high school, some college, or college graduate or more (coded 0, 1, 2, or 3, respectively). For adjusted regression analyses, we used dummy coding, with "less than high school" as the referent group.
3. Insurance status: participants reported whether they were privately or publicly insured (i.e., receiving Medicaid). We coded these responses as either 0 (public insurance) or 1 (private insurance).
4. Relationship status: participants reported whether or not they were married or cohabiting. We coded these responses as either 0 (not married or cohabiting) or 1 (married or cohabiting).

Statistical analyses

We performed preliminary testing to check for the conditions required for our statistical analyses (e.g., normally distributed dependent variable and absence of multicollinearity); results indicated that analytic assumptions were met. Using univariate analyses, we tabulated descriptive statistics for all variables of interest among the analytic dataset and, separately, among participants excluded from our analyses due to missing data. We conducted a sensitivity analysis to determine whether there were any statistically significant differences in variables of interest between included and excluded participants. For the included sample, we assessed bivariate relationships between JHP-RC$^©$ scores, EDS scores, and all covariates, using Pearson correlation coefficients, *t*-tests, or analyses of variance (ANOVAs). We used simple linear regression to assess the association between scores on each psychosocial measure of stress (PSS, SLEI, and JHP-RC$^©$) and depressive symptoms. We then used stepwise regression to estimate any additional variance in depressive symptoms explained by the inclusion of additional psychosocial data (particularly, JHP-RC$^©$ data) and covariates. We included all covariates significantly associated with JHP-RC$^©$ score or EDS score on the bivariate

level. Finally, in order to identify a parsimonious model that explained the most variance in depression, we performed stepwise backward elimination, in which a model including all psychosocial and sociodemographic data was reduced to include only those variables with a statistically significant contribution to the model. These regression analyses were repeated separately for each of the five JHP-RC$^©$ subscales (burden, coping, personal history, racism, and work). In addition to parameter estimates, we report standardized estimates, which remove the units of measurement, given that our dependent and independent psychosocial variables are scored on different scales. We considered $p \leqslant 0.05$ statistically significant on two-tailed tests. CFA was conducted using Stata SE 17.0, and we used SAS 9.4 for all other analyses.

Results

Descriptive and bivariate analyses

We present characteristics of our analytic sample of 428 Black women in early pregnancy (8–14 weeks' gestation) in Table 1. Mean (SD) age was 25 (4.8) years. Across education categories, the highest proportion of participants (38.6%) completed high school only. Nearly 80% were insured through Medicaid during pregnancy, and nearly 50% were married or cohabiting. In all, 53.7% had previously given birth. Mean JHP-RC$^©$ score was 95.6 (20.5). Mean EDS score was 7.2 (5.5), with about 31% of participants scoring 10 or higher. Mean PSS and SLEI scores were 23.6 (7.5) and 4.0 (2.7), respectively. Relationship status was the only characteristic for which there was a significant difference between the 428 included and 57 excluded participants (Chi-square = 7.4, p < .01; Supplemental Table 2). Among participants excluded from analysis due to missing data, 68.4% were married or cohabiting.

Scatterplots in Figure 1 illustrate the relationships between the EDS, the JHP-RC$^©$, and its subscales. The full JHP-RC$^©$ and EDS were moderately correlated (r = .53, p < .0001). EDS score was significantly correlated with each of the JHP-RC$^©$ subscales; Pearson correlation coefficients (r) ranged from .21 (coping) to .58 (burden). In Table 2, we compare mean JHP-RC$^©$ scores (full and subscale) across EDS score categories. Given no statistically significant differences in mean JHP-RC$^©$ or any of its subscales between the 13–14 and ≥ 15 EDS score categories (Supplemental Table 3), we present mean JHP-RC scores across 3 EDS score categories: 0–9, 10–12, and ≥13. In general, full and subscale JHP-RC$^©$ scores increased as EDS score increased. F-tests for overall differences in JHP-RC$^©$ score across EDS categories were each statistically significant (p-values < .0001; data not shown). For the JHP-RC$^©$ and all subscales, mean scores in the highest EDS score category (≥13) were statistically significantly

Table 1. Characteristics of Atlanta-area Black women in the study sample (N = 428).

	Mean (SD)	n (%)
Sociodemographic factors		
Age	25.0 (4.8)	
Education		
Less than high school		71 (16.6)
High school		165 (38.6)
Some college		120 (28.0)
College graduate or more		72 (16.8)
Insurance status		
Public (Medicaid)		342 (79.9)
Private		86 (20.1)
Parity	0.9 (1.0)	
0		198 (46.3)
$\geqslant 1$		230 (53.7)
Relationship status		
Married or cohabiting		211 (49.3)
Not married or cohabiting		217 (50.7)
Psychosocial factors		
JHP-RC[©a]	95.6 (20.5)	
Burden	28.3 (8.4)	
Coping	33.0 (8.9)	
Personal History	10.5 (5.4)	
Racism	13.3 (4.5)	
Work	10.5 (4.1)	
EDS[a]	7.2 (5.5)	
0–9		295 (68.9)
10–12		53 (12.4)
13–14		29 (6.8)
$\geqslant 15$		51 (11.9)
PSS[a, b]	23.6 (7.5)	
SLEI[a, b]	4.0 (2.7)	

[a]JHP-RC[©]: 39-item Jackson Hogue Phillips Reduced Common Contextualized Stress Measure; EDS: 10-item Edinburgh Depression Scale; PSS: 14-item Perceived Stress Scale; SLEI: 13-item Stressful Life Events Index.
[b]Variable (n, % missing): PSS (13, 3.0%), SLEI (6, 1.4%). There were no missing data for variables without this superscript.

higher than mean scores in the lowest EDS score category (0–9). For the full JHP-RC[©], and its burden and personal history subscales, mean scores across the 3 EDS score categories were all statistically significantly different from each other. The differences in mean gendered racial stress between the highest and lowest EDS score category were as follows: JHP-RC[©]=24.4; burden=10.4, coping=4.1, personal history=4.3, racism=2.7, and work=2.8.

In Table 3, we show Pearson's correlation coefficients between the JHP-RC[©] and its subscales, the PSS, and SLEI. The JHP-RC[©] and all subscales were positively and significantly (p < .05) correlated with the PSS. The full scale showed the strongest correlation with the PSS (r = .50), with burden being the most strongly correlated of the subscales (r = .47). The burden subscale measures

gendered role strain, and distress due to inadequate resources to meet demands (e.g. "I am taking care of everyone else, but no one is taking care of me"). The full JHP-RC[©] and all subscales were positively correlated with the SLEI; however, neither the coping nor work subscales were significantly correlated with the SLEI. Of the statistically significant relationships with the SLEI, the personal history subscale showed the strongest correlation (r = .40). The PSS and SLEI were moderately correlated (r = .23, p < .0001).

Regression analyses

In simple linear regression (Table 4), JHP-RC[©] score explained 27% of the variance in EDS; perceived stress explained 45% of the variation in EDS score. Because none of the sociodemographic covariates contributed significantly to any of the models to which they were added, our final model included only JHP-RC score, SLEI score, and PSS Score. The final model explained 52% of the variance in EDS score. As shown by the standardized estimates, for every 1-standard deviation increase in JHP-RC[©] score, EDS score increases by .22 standard deviations, with all other variables held constant. This increase is higher than the contribution of a 1-standard deviation increase in SLEI score (standardized b = .17), but lower than the contribution of a 1-standard deviation increase in PSS score (standardized b = .52).

Table 5 shows regression analyses for each JHP-RC[©] subscale. In simple linear regression, each subscale explained between 4% (coping) and 34% (burden) of the variance in EDS score. For each subscale, multivariable modeling with backward selection identified stressful life events and perceived stress, but no sociodemographic covariates, as significant covariates in the relationship between JHP-RC[©] and EDS score. Coping was the only subscale that was not retained in backward selection model. When the burden subscale was added to a model that included SLEI and PSS scores (R^2 = .49, p < .0001; Table 4), R^2 increased from .49 to .56 (p < .0001). In separate models, coping, personal history, racism, and work increased the explanation of variance in depressive symptoms by 0 to 1 percentage points (as compared to the model that only included stressful life events and perceived stress).

Discussion

While a few studies have tested the association of the JHP[©] with depression and/or perceived stress, to our knowledge ours is the first to: (1) use the 39-item version of the JHP[©] (i.e. the JHP-RC[©]), which may offer moderate time-saving benefits over longer versions of the scale as well as insight into intersectional stresses common to most Black women; (2) examine these associations in a socioeconomically
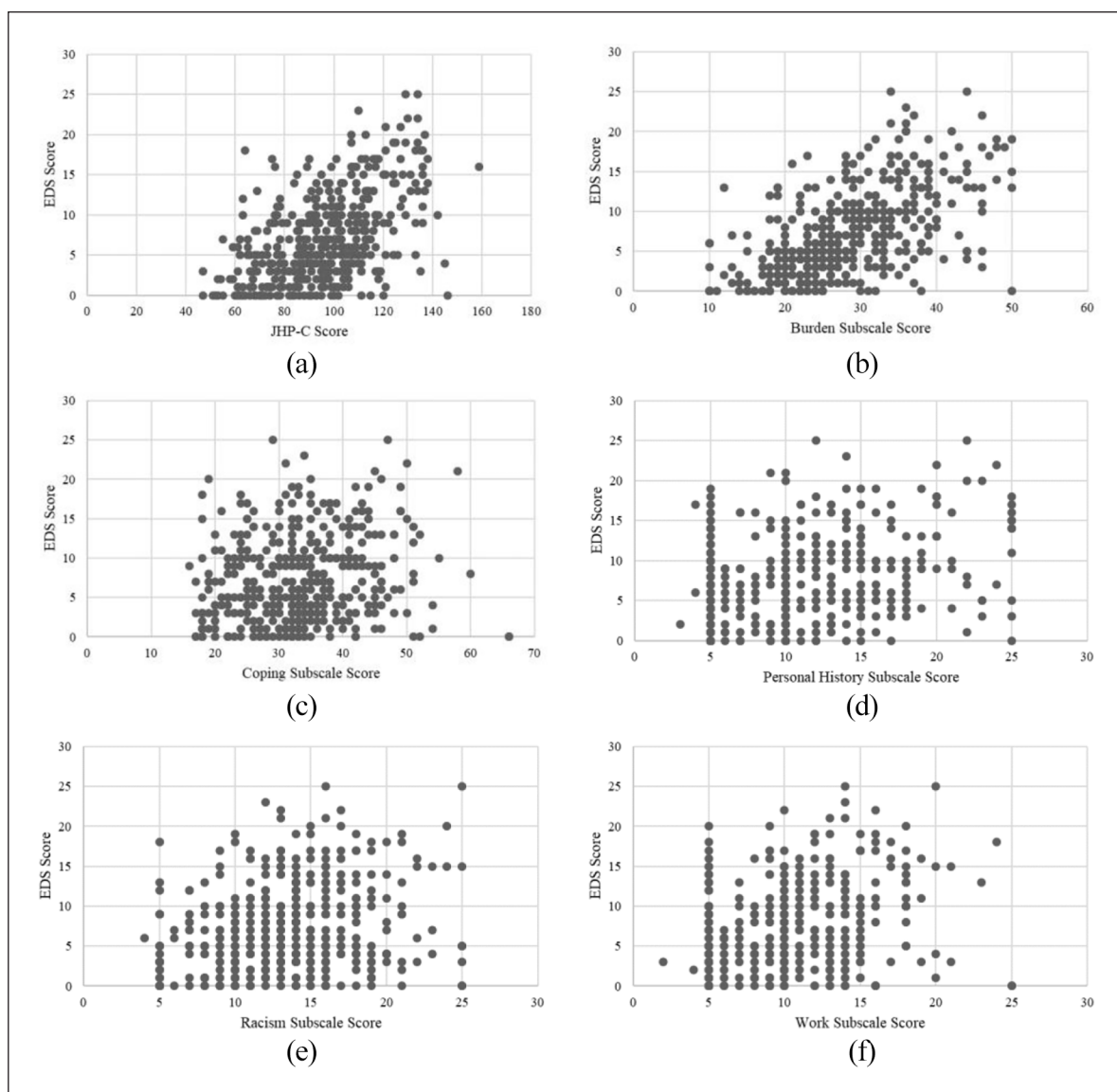
Figure 1. Correlations of the Edinburgh Depression Scale (EDS) with the full Jackson Hogue Phillips Reduced Common Contextualized Stress Measure (JHP-RC) and JHP-RC subscales. EDS Scores are along the horizontal axis, and gendered racial stress scores are along the vertical axis. The correlation of the full JHP-RC is shown in panel A. Panels B-F show correlations with the five JHP-RC subscales: burden, coping, personal history, racism, and work. (a) JHP-RC©: r = .53, p < .0001. (b) Burden: r = .58, p < .0001. (c) Coping: r = .21, p < .0001. (d) Personal history: r = .34, p < .0001. (e) Racism: r = .24, p < .0001. (f) Work: r = .29, p < .0001.

diverse sample of pregnant Black women, as compared to studies of non-pregnant,[63] highly educated pregnant,[43,54] or predominately low-income pregnant Black women;[52] (3) examine whether the JHP-RC© added significantly to the variance in depressive symptoms beyond both perceived stress and stressful life events, as compared to beyond perceived stress alone;[43] and (4) report on these associations across the instrument's subscales. Our results coincide with findings that contextualized gendered racial stress is prevalent among pregnant Black women.[43,54] Furthermore, we found that higher gendered racial stress was not only

associated with increased depressive symptoms but was also a distinct dimension of psychosocial stress contributing to depressive symptoms among Black women in early pregnancy.

Gendered racial stress and depression

Concurrent with previous research on depression and the JHP©,[43] this study adds to a growing consensus that gendered racism can deleteriously affect Black women's psychosocial health.[40,47,52,63]. Beyond extant studies, we

Table 2. Mean full and subscale-specific Jackson Hogue Phillips Reduced Common Contextualized Stress Measure (JHP-RC©) scores across Edinburgh Depression Scale (EDS) score categories (3 levels).

	Mean (standard deviation)					
	JHP-RC©	Burden	Coping	Personal history	Racism	Work
EDS score category						
0–9	89.7[bc]	25.8[bc]	32.0[c]	9.5[bc]	12.7[c]	9.7[bc]
	(18.4)	(7.4)	(8.9)	(4.9)	(4.6)	(3.8)
10–12	100.3[ac]	30.7[ac]	33.3	11.4[ac]	13.5[c]	11.4[a]
	(17.0)	(6.3)	(7.7)	(5.0)	(3.7)	(3.9)
⩾13	114.1[ab]	36.2[ab]	36.1[a]	13.8[ab]	15.4[ab]	12.5[a]
	(18.2)	(7.9)	(9.1)	(6.2)	(4.1)	(4.5)

[a]Significantly different (p ⩽ .05) from the mean JHP-RC© score (full or domain-specific) in the 0-9 EDS score category.
[b]Significantly different (p ⩽ .05) from the mean JHP-RC© score (full or domain-specific) in the 10-12 EDS score category.
[c]Significantly different (p ⩽ .05) from the mean JHP-RC© score (full or domain-specific) in the ⩾13 EDS score category.

Table 3. Pearson's correlation coefficients for the Jackson Hogue Phillips Reduced Common Contextualized Stress Measure (JHP-RC©) and its subscales with the Perceived Stress Scale (PSS) and Stressful Life Events Index (SLEI).

	PSS	SLEI
Total JHP-RC©	0.50	0.33
	<.0001	<.0001
	n = 415	n = 422
Burden	0.47	0.34
	<.0001	<.0001
	n = 415	n = 422
Coping	0.31	0.07
	<.0001	n.s.
	n = 415	n = 422
Personal history	0.30	0.40
	<.0001	<.0001
	n = 415	n = 422
Racism	0.16	0.15
	<.001	<.01
	n = 415	n = 422
Work	0.29	0.07
	<.0001	n.s.
	n = 415	n = 422
PSS	1.00	0.23
		<.0001
	n = 415	n = 410

n.s. connotes not statistically significant at p ⩽ .05.

postulated that differences in correlations with depression across the JHP-RC© subscales may shed light on nuanced pathways between pregnant Black women's stress and health during a particularly vulnerable time in their life course. We found that burden may be among the most salient depression-causing components of commonly experienced gendered racial stress for pregnant Black women (r = .58, p < .0001). For example, pregnant women may have greater family burdens than women who are not mothers or women whose childrearing days have passed.[81]

The importance of burden may extend beyond pregnancy, as well. In addition to assessing perceived lack of material and personal resources, the burden subscale captures the "imposed and embraced nurturing and caretaker roles associated with gender identity."[63] As such, items associated with burden may approach measurement of some components of the Superwoman Schema (SWS), which describes Black women's sociocontextually derived obligations to (1) exhibit strength, (2) suppress emotions, (3) resist vulnerability, (4) succeed independently and against any odds, and (5) prioritize care for others over self-care.[82] Specifically, burden subscale items like "I am taking care of everyone else but no one is taking care of me" may reflect Black women's obligation to nurture others at their own expense (i.e. (e) above), which was found to be most strongly correlated with depression.[83] Recent empirical studies highlight pertinent findings, namely: (1) a significant association between internalization of the SWS and psychological distress,[84] including depression, anxiety, and loneliness,[85,86] and (2) the stress burden of Black women's obligation to help others may worsen the negative physiological effect that experiencing racial discrimination has on their allostatic load.[87] Still, further study is needed to directly quantify the associations of SWS with intersectional gendered racial stress measures, including the JHP©, with the SWS.[83]

Dimensions of psychological stress

Prior research supports that measures of perceived stress and stressful life events assess largely independent dimensions of stress.[16] The PSS was designed to measure how "unpredictable, uncontrollable, and overloading" respondents find their lives.[79] Stressful life events are discrete events that can disrupt normal psychosocial functioning.[88] The correlation between the PSS and SLEI in our study (r = .23, p < .001) matched that found by Kingston et al.,[16] implying that each instrument assesses

Table 4. Regression analysis models for depressive symptoms (measured by the Edinburgh Depression Scale) and the full Jackson Hogue Phillips Reduced Common Contextualized Stress Measure (JHP-RC©).

	Model parameter(s)	R^2	Standardized estimate	Parameter estimate (standard error)	Parameter estimate 95% CI	p-value
JHP-RC© only model	JHP-RC©[a]	0.27	0.53	0.14 (0.01)	0.12, 0.16	<.0001
PSS only model	PSS[a]	0.45	0.67	0.49 (0.03)	0.44, 0.54	<.0001
SLEI only model	SLEI[a]	0.13	0.36	0.74 (0.09)	0.55, 0.93	<.0001
SLEI & PSS model	SLEI	0.49	0.22	0.45 (0.07)	0.30, 0.59	<.0001
	PSS		0.62	0.45 (0.03)	0.40, 0.51	<.0001
Stepping JHP-RC© into SLEI model	JHP-RC©	0.32	0.46	0.12 (0.01)	0.10, 0.15	<.0001
	SLEI		0.21	0.43 (0.09)	0.26, 0.60	<.0001
Stepping JHP-RC© into PSS model	JHP-RC©	0.50	0.27	0.07 (0.01)	0.05, 0.09	<.0001
	PSS		0.54	0.39 (0.03)	0.34, 0.45	<.0001
Stepping JHP-RC© into SLEI + PSS model	JHP-RC©	0.53	0.22	0.06 (0.01)	0.03, 0.08	<.0001
	SLEI		0.17	0.35 (0.07)	0.21, 0.50	<.0001
	PSS		0.52	0.38 (0.03)	0.32, 0.44	<.0001
Stepping covariates into SLEI + JHP-RC© model	JHP-RC©	0.34	0.47	0.13 (0.01)	0.10, 0.15	<.0001
	SLEI		0.22	0.46 (0.09)	0.28, 0.64	<.0001
	Age		−0.11	−0.12 (0.06)	−0.23, −0.02	0.02
	Education[b] (Level 2 vs. Level 1)		0.01	0.13 (0.66)	−1.2, 1.4	n.s.
	Education[b] (Level 3 vs. Level 1)		0.06	0.73 (0.71)	−0.66, 2.12	n.s.
	Education[b] (Level 4 vs. Level 1)		−0.06	−0.91 (0.87)	−2.61, 0.80	n.s.
	Parity		−0.003	−0.04 (0.47)	−0.97, 0.89	n.s.
Stepping covariates into PSS + JHP-RC© model	JHP-RC©	0.50	0.26	0.07 (0.01)	0.05, 0.09	<.0001
	PSS		0.54	0.39 (0.03)	0.33, 0.46	<.0001
	Age		−0.02	−0.02 (0.05)	−0.12, 0.07	n.s.
	Education[b] (Level 2 vs. Level 1)		−0.01	−0.11 (0.57)	−1.23, 1.00	n.s.
	Education[b] (Level 3 vs. Level 1)		0.06	0.83 (0.61)	−0.37, 2.03	n.s.
	Education[b] (Level 4 vs. Level 1)		0.01	0.28 (0.75)	−1.19, 1.76	n.s.
	Parity		0.05	0.44 (0.41)	−0.37, 1.25	n.s.
Stepping covariates into SLEI + PSS + JHP-RC© model	JHP-RC©	0.53	0.21	0.06 (0.01)	0.04, 0.08	<.0001
	SLEI		0.18	0.36 (0.08)	0.19, 0.50	<.0001
	PSS		0.52	0.38 (0.03)	0.31, 0.43	<.0001
	Age		−0.04	−0.05 (0.04)	−0.11, 0.07	n.s.
	Education[b] (Level 2 vs. Level 1)		0.01	0.13 (0.57)	−1.08, 1.16	n.s.
	Education[b] (Level 3 vs. Level 1)		0.05	0.66 (0.61)	−0.66, 1.81	n.s.
	Education[b] (Level 4 vs. Level 1)		0.01	0.19 (0.75)	−1.58, 1.65	n.s.
	Parity		0.06	0.66 (0.41)	−0.15, 1.47	n.s.
Backward regression	JHP-RC©	0.53	0.22	0.06 (0.01)	0.04, 0.08	<.0001
	SLEI		0.17	0.35 (0.07)	0.21, 0.50	<.0001
	PSS		0.52	0.38 (0.03)	0.33, 0.44	<.0001

[a]JHP-RC©: 39-item Jackson Hogue Phillips Reduced Common Contextualized Stress Measure; PSS: 14-item Perceived Stress Scale; SLEI: 13-item Stressful Life Events Index.
[b]Levels of education: 1 = less than high school, 2 = high school, 3 = some college, 4 = college graduate or more.
n.s. connotes not statistically significant at p ⩽ .05.

Table 5. Unadjusted and adjusted backward regression models for depressive symptoms (measured by the Edinburgh Depression Scale) and Jackson Hogue Phillips Reduced Common Contextualized Stress Measure (JHP-RC©) subscales.

JHP-RC© subscale	Model parameter(s)	R^2	Standardized estimate	Parameter estimate (standard error)	Parameter estimate 95% CI	p-value
Burden	Burden only	.34	0.58	0.38 (0.03)	0.33, 0.43	<.0001
	Adjusted model:	.56				
	Burden		0.30	0.20 (0.03)	0.15, 0.25	<.0001
	SLEI[a]		0.14	0.30 (0.07)	0.15, 0.44	<.0001
	PSS[a]		0.49	0.36 (0.03)	0.31, 0.42	<.0001
Coping	Coping only	.04	0.21	0.13 (0.02)	0.07, 0.18	<.0001
	Adjusted model:	.49				
	Coping[b]		0.007	0.004 (0.02)	−0.04, 0.04	n.s.
	SLEI		0.22	0.45 (0.07)	0.30, 0.60	<.0001
	PSS		0.62	0.45 (0.03)	0.40, 0.51	<.0001
Personal history	Personal history only	.12	0.34	0.34 (0.05)	0.25, 0.43	<.0001
	Adjusted model:	.50				
	Personal history		0.10	0.10 (0.04)	0.02, 0.18	.01
	SLEI		0.18	0.38 (0.08)	0.22, 0.53	<.0001
	PSS		0.60	0.44 (0.03)	0.39, 0.49	<.0001
Racism	Racism only	.05	0.24	0.29 (0.06)	0.17, 0.40	<.0001
	Adjusted model:	.50				
	Racism		0.10	0.12 (0.04)	0.04, 0.21	.004
	SLEI		0.21	0.42 (0.07)	0.28, 0.57	<.0001
	PSS		0.61	0.45 (0.03)	0.39, 0.50	<.0001
Work	Work only	.08	0.29	0.38 (0.06)	0.26, 0.50	<.0001
	Adjusted model:	.50				
	Work		0.10	0.13 (0.05)	0.04, 0.23	.005
	SLEI		0.22	0.45 (0.07)	0.30, 0.59	<.0001
	PSS		0.59	0.43 (0.03)	0.38, 0.49	<.0001

[a]JHP-RC©: 39-item Jackson Hogue Phillips Reduced Common Contextualized Stress Measure; PSS: 14-item Perceived Stress Scale; SLEI: 13-item Stressful Life Events Index.
[b]Though not significant, the coping subscale was forced into this model to yield estimates, given it is a parameter of interest.
n.s. connotes not statistically significant at p ⩽ .05.

distinct stress dimensions in racially heterogeneous pregnant populations.

We found the JHP-RC© to be more strongly correlated with perceived stress than stressful life events (r = .50 vs .32, p < .0001), which could be explained by the chronicity, recency, and type of stress each measure captures. For example, some life events we measured (like, "I was homeless") may be considered acute or chronic stressors, depending on how frequently they happened or how intensive the experience was.[88] However, stress measures that are not contextualized in Black women's lived experience may be limited in their ability to assess the unique chronic and acute stress exposure associated with gendered racism.[63]

Our findings suggest that intersectional measures of gendered racial stress, like the JHP-RC©, may capture a component of pregnant Black women's stress milieu that is distinct from both perceived stress and stressful events. Research has shown that lack of control over one's life circumstances, in addition to stressor severity, can exacerbate the negative effects of stress on health.[88] Exposure to

gendered racism creates an environment in which Black women feel they must be persistently vigilant in anticipation of racist events against themselves and their children.[63] Race-related vigilance is associated with feelings of helplessness in Black populations.[89,90] For pregnant Black women, helplessness associated with gendered racial stress may increase susceptibility to depression.[91–95]

Improved prediction of depression using multiple stress measures

Over 31% of women were experiencing depressive symptoms (EDS scores ⩾ 10), supporting suggestions from other studies of gendered racial stress in Black women[52] that depression may be more prevalent in this group than among the general US female population (21.8%).[96] To identify underlying and potentially treatable causes of depression among pregnant Black women, our study supports measuring gendered racial stress to provide context when used in conjunction with generalized stress appraisal and general lifecourse stressors. Notably, of the JHP-RC©

subscales, burden was most strongly correlated with perceived stress, and personal history was most strongly correlated with stressful life events. In recent work on the Superwoman Schema, Black women's obligation to suppress emotions was most strongly associated with perceived stress ($r = .40$, $p < .05$), further implying that Black women's gendered racial stress burden may be linked to cognitive and emotional stress appraisal, and to internalization of the superwoman identity.[83] The personal history subscale captures discrete stressors associated with a history of physical and mental abuse and neglect,[63] which were also captured in our stressful life events checklist.

When measures of perceived stress, stressful life events, and gendered racism were assessed in the same study, we found that the magnitude of the relationship between measures of prenatal psychosocial stress and depressive symptoms varied based on the stress measure. These findings suggest that, when considered collectively, each aspect of stress may uniquely contribute to depression. In our study, the contribution of gendered racial stress to depressive symptoms was generally greater than that of stressful life events, but smaller than that of perceived stress. The only other report of the JHP© measure's relative contribution to variance in prenatal depression in the context of other stress measures found that when added to a model containing the PSS and covariates, the 68-item JHP© increased the explanation of variance in Black women's EDS scores from roughly 42% to 46%.[43] In our study, the 39-item JHP-RC© improved the explanation of variance in EDS scores over perceived stress alone, from 45% to 50%. Furthermore, when added to a model including both perceived stress and stressful life events, gendered racial stress contributes similarly, adding 3 percentage points to the total explanation of variance in EDS scores. Previously, researchers found that gendered racism (operationalized specifically as racialized sexual harassment) was not independently associated with depressive symptoms among non-pregnant, mostly low-income Black women, but that a model containing gendered racism, racist events, sexual objectification, and coping via internalization explained 42% of the variance in depression.[50]

Of note, the JHP-RC© burden subscale contributed most to predicting depressive symptoms in multivariable regression, perhaps for aforementioned reasons. Our backwards selection models dropped all sociodemographic covariates (i.e. age, education, and parity), indicating that those variables did not contribute significantly to predicting depressive symptoms over and above the combination of perceived stress, stressful life events, and gendered racial stress. Given the limited number of covariates we considered, additional investigation is needed to clarify which variables pose the greatest threat to pregnant Black women's psychosocial health, and to identify whether sociodemographic factors like education alter one's experience of embodiment of gendered racial stress.

Future research

Arguments that Black women's depression may not be accurately detected by conventional tools (particularly, those originally developed in non-Black populations, like the EDS) may warrant use of a lower EDS cut-off score.[43,69,73] While not the focus of these analyses, future work may further investigate the sociodemographic factors associated with gendered racial stress and depression. There is evidence that poor social support from intimate partner relationships[97] and lower socioeconomic position[98] are linked to stress and poor outcomes in pregnancy. These factors may influence the role of gendered racism on maternal and infant outcomes.[54]

Limitations

In this cross-sectional analysis, we examined the relative contribution of gendered racial stress to comorbid depression in early pregnancy but could not test an hypothesis that gendered racial stress predated depressive symptoms. Furthermore, our reliance on self-report of gendered racial stress, stressful life events, perceived stress, and depression introduces the possibility of recall and social desirability bias. This issue is inherent in efforts to understand Black women's lived experiences centered on Black women's own accounts. Psychometrically sound self-report measures may thus be viewed as helpful tools rather than drawbacks in analyzing constructs related to intersectionality. Last, previous research indicates that Black women appraise their obligation to protect children in their community from racism as stressful.[42] Our 39-item version of the JHP© excludes four items in the original JHP© pertaining to Black women's own children.[42] Because 46% of our sample of pregnant women were nulliparous, these questions could not be considered to be "common" intersectional stresses. The JHP-RC© contains one of two original items regarding discriminatory practices that may affect one's own children as well as infants once born (i.e. "The African American youth in my community are more likely than other youth to have a negative experience with law enforcement"). Jackson, et al. (2017) found this item to be significantly associated with prenatal depressive symptoms among all women in their study, as well as higher associations among pregnant women with a preschool-aged male child in the household. Additional analyses stratified by parity may point to components of gendered racial stress that are most troubling for Black mothers.

Conclusion

This study adds to a growing literature on the impact of psychosocial stress on depression among pregnant Black women. Our findings not only highlight that gendered racial stress may have important and distinct associations

but also demonstrate the advantages of using intentionally intersectional stress measures to uncover nuances within Black women's complex social environment. Disproportionate rates of adverse birth outcomes and their stress-related correlates among Black women are troubling and untenable, particularly given far-reaching physiological and psychosocial consequences for women and children. Furthermore, though most Black women may experience gendered racism, homogeneity among its causes and consequences is unlikely even within-race. While we did not investigate birth outcomes here, future work can expand upon our findings to: (1) investigate the distinct contribution of gendered racial stress to preterm birth, for instance, and (2) explore factors that may offer protection for pregnant Black against the detrimental effects of stress on health. Concerted investigation of Black women's unique psychosocial experiences holds promise to highlight and mitigate etiological sources of the Black-White disparity in reproductive health.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical approval and consent to participate

This study was reviewed for ethical and safety considerations by the Internal Review Boards (IRB00068441) of both Emory University and Grady Memorial Hospital and was approved by both Boards. All participants provided written informed consent, and received financial compensation for their participation.

Consent for publication

Not applicable.

Author contribution(s)

Lasha S Clarke: Conceptualization; Formal analysis; Methodology; Writing—original draft; Writing—review & editing.
Halley EM Riley: Conceptualization; Formal analysis; Writing—review & editing.
Elizabeth J Corwin: Conceptualization; Funding acquisition; Investigation; Writing—review & editing.
Anne L Dunlop: Conceptualization; Funding acquisition; Writing—review & editing.
Carol J Rowland Hogue: Conceptualization; Supervision; Writing—review & editing.

Availability of data and materials

Supporting information is available as supplementary material, and further supporting data may be available from the authors on request.

Guarantor

C.J.R.H. is the guarantor of this article.

ORCID iD

Lasha S Clarke (iD) https://orcid.org/0000-0003-4043-9870

Supplemental material

Supplemental material for this article is available online.

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