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Superwoman Schema, Racial Identity, and Cellular Aging Among African American Women

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Abstract

Background and Objectives: African American women experience faster telomere shortening (i.e., cellular aging) compared with other racial–gender groups. Prior research demonstrates that race and gender interact to influence culturally specific norms for responding to socially-relevant stress and other stress-coping processes, which may affect healthy aging.
Research Design and Methods: Data are from African American Women's Heart & Health Study participants who consented to DNA extraction (n = 140). Superwoman Schema (SWS) was measured using 5 validated subscales: presenting strength, emotion suppression, resisting vulnerability, motivation to succeed, and obligation to help others. Racial identity was measured using 3 subscales from the Multidimensional Inventory of Black Identity: racial centrality, private regard, and public regard. Relative telomere length (rTL) was measured using DNA extracted from blood samples. Path analysis tested associations and interactions between SWS and racial identity dimensions with rTL.
Results: For SWS, higher resistance to being vulnerable predicted longer telomeres. For racial identity, high private regard predicted longer telomeres while high public regard predicted shorter telomeres. Interactions were found between public regard and 2 SWS dimensions: among women with high public regard, emotion suppression (β = 0.20, $p < .05$) and motivation to succeed (β = 0.18, $p < .05$) were associated with longer rTL. The interaction between high centrality and emotion suppression predicted shorter rTL (β = −0.17, $p < .05$).
Discussion and Implications: Culturally specific responses to gendered racism and racial identity, developed early in life and shaped over the life course, are important psychosocial determinants of cellular aging among African American women.

Keywords: Coping, Gendered racism, Premature aging, Telomere length, Weathering

For African American women, the intersections of race and gender are mutually constitutive (Bowleg, 2008). Like race, gender is a lived experience, a process that occurs in day-to-day interactions between individuals and within larger social, political, and cultural systems. Individuals who are at the intersection of multiple marginalized social identities experience unique stressors at the nexus of multiple forms of social inequality over the life course, such as experiences of racial *and* gender discrimination (i.e., gendered racism) for African American women (Pearlin et al., 2005; Woods-Giscombé & Lobel, 2008).

Gendered racism—experiences of oppression that are particularly salient to the racial and gender identities and roles of African American women (Jackson et al., 2001)—is a unique social stressor for African American women. Gendered racism creates and perpetuates systemic barriers to opportunities and resources to help cope with social obligations and roles that differentially affect African American women (e.g., contemporary economic hardships rooted in slavery; Pearlin et al., 2005). Likewise, the "double-jeopardy" of gendered racism (King, 1988), reflected in the negative attitudes of individuals and societal institutions and perpetuated by collective ideology, compounds the social stress experienced by African American women (Greenman & Xie, 2008), increasing the likelihood of poor health (Jackson et al., 2001; Woods-Giscombé & Lobel, 2008).

Premature Aging Among African American Women

Telomere length (TL), a marker of cellular aging, has been associated with diverse age-related disease processes (e.g., neuroendocrine dysregulation, immuno-inflammatory dysfunction, oxidative stress), numerous diseases of aging (e.g., cardiovascular and pulmonary disease, diabetes), and early all-cause and cause-specific mortality (Demissie et al., 2006; Effros, 2011; Fitzpatrick et al., 2007). By midlife, African American women exhibit an average of 7.5 years of premature aging relative to chronologically equivalent White women (Geronimus et al., 2010). Consistent with Geronimus' *weathering* hypothesis, robust evidence shows that African American women experience a higher rate of telomere attrition over time compared with other race–gender groups (Diez Roux et al., 2009; Rewak et al., 2014). Hence, the unique intersectional experiences of African American women in inducing biological changes may have implications for healthy aging.

Gendered Racism, Culturally Responsive Coping, and Premature Aging Among African American Women

Like other forms of chronic social stress, gendered racism has been linked to premature aging in African American women. For example, ethnic minority women with low socioeconomic status who report chronic racism-related stress have higher sustained levels of cortisol (Gehlert, 2011). High and sustained levels of cortisol result in *telomere shortening*—the erosion of protective caps on the end of chromosomes leading to genomic instability of the cell—which has been linked to accelerated cellular aging (Shalev et al., 2013). Consistent with this finding, self-reported racial discrimination has predicted faster 10-year telomere shortening for African American young adults of all genders (Chae et al., 2020). Experiences of racial discrimination have also been linked to shorter telomeres in midlife African American women (Thomas et al., 2021). Together, these findings suggest that chronic stress due to gendered racism may help explain, in part, the disproportionate cellular aging (i.e., weathering) observed among African American women.

While research supports an association between gendered racism and premature biological aging, the modifying role of culturally responsive coping is not well studied but plays a central role in the biological stress response (Kemeny, 2003). Researchers posit that both gender and racial identity influence the process of coping with racism-related stress among African American women (Jackson et al., 2001; Thomas et al., 2011). Superwoman Schema (SWS) is a multidimensional framework for understanding culture-specific stress responses that have been validated for African American women (Woods-Giscombe et al., 2019). It is hypothesized that African American women adopt this distinct cultural orientation and response to the social world to survive the economic and social hardships associated with their membership in a dually oppressed group (Woods-Giscombe et al., 2019). Indeed, African American women may rely on a wide-range of strategies to manage gendered racism-related stress, including SWS, that are not assessed using mainstream coping measures (Nuru-Jeter et al., 2009; Utsey et al., 2000).

The SWS framework is comprised of five dimensions of culturally empowering coping responses related to presenting strength, suppressing emotions, motivation to succeed, resisting vulnerability, and helping others. In prior qualitative studies, African American women have described unique ways in which they manage racism-related stress, some of which have been described as a liability (Jackson et al., 2001; Nuru-Jeter et al., 2009; Woods-Giscombé, 2010) that may exacerbate maladaptive stress responses (Woods-Giscombe et al., 2019). For example, SWS dimensions have shown both positive and negative associations with allostatic load (i.e., biological weathering; Allen, Wang et al., 2019). This growing evidence suggests that the biological embedding of gendered racism through culturally specific coping is complex, though the mechanism is not well understood.

Similarly, other culturally specific modifiers shown to be sources of resilience for African Americans may help delineate the degree to which such experiences are appraised as threatening and are therefore harmful or protective

of health (Cohen et al., 1983; Kemeny, 2003). One such factor is racial identity, which has previously been shown to buffer the negative health effects of racial discrimination (Chae et al., 2017; Sellers et al., 2003; Sellers & Shelton, 2003). Racial identity also has implications for adoption of the Superwoman role because it has been described by African American women as stemming, in part, from their awareness of the historical legacy and contemporary manifestations of racial and gender oppression and inequality (Jackson et al., 2001; Woods-Giscombé, 2010).

Racial Identity, SWS, and Health

Drawing on the Multidimensional Model of Racial Identity (MMRI), racial identity refers to the significance and meaning of race for one's self-concept (Sellers et al., 1997). MMRI speaks to both the salience *and* qualitative meaning of being African American situated within the varying degrees of significance of other social identities (e.g., gender). Given that the majority of African Americans report chronic experiences of racial discrimination over their life course (Cozier et al., 2006; Krieger & Sidney, 1996), racial identity is a strong predictor of stress-related physical and psychological health among African Americans (Lee & Ahn, 2013) as it influences individuals' situational appraisals and consequent coping styles (Burrow & Ong, 2010; Sellers et al., 1998; Szymanski & Lewis, 2016). Moreover, studies of SWS show differential associations with health outcomes across racial identity dimensions (Burrow & Ong, 2010; Szymanski & Lewis, 2016). Understanding the modifying role of racial identity on SWS–TL associations may help elucidate the conditions that exacerbate premature aging and those that can be leveraged to promote the health and well-being of African American women.

Study Hypotheses

We investigated associations between various SWS dimensions and TL, and whether aspects of racial identity, those of particular relevance for the experience of gendered racism, modify associations between SWS dimensions and TL. Given the limited research in this area, we hypothesized the same pattern of associations for TL as shown in prior research on SWS and allostatic load (Allen, Wang et al., 2019): positive associations for presenting strength and suppressing emotions, and negative associations for motivation to succeed and helping others. We refrained from stipulating directionality for resisting vulnerability: African American women have described resisting vulnerability as a form of self-protection (Woods-Giscombé, 2010); however, resisting vulnerability is reflective of high-effort coping that can diminish one's coping capacity for future stressors (Gallo & Matthews, 2003). In terms of racial identity, African American women note their awareness of both racial and gender oppression and stereotyping as reasons for adopting the Superwoman role as a form of protection. Previous evidence also shows worse health among those who engage in self- versus system blame and among those experiencing internalized racism (Allen, Thomas et al., 2019; LaVeist et al., 2001). Hence, we hypothesized that centrality (i.e., extent of race as core to one's identity), public regard (i.e., perception of whether others view African Americans positively/negatively), and private regard (i.e., one's own positive/negative feelings toward African Americans as a group and about being African American) would be important predictors of TL and modify various SWS–TL associations, though directionality is unclear.

Research Design and Methods

Data and Sample

Data were drawn from a subsample of participants from the African American Women's Heart & Health Study (AAWHHS) who consented to DNA extraction (n = 140). AAWHHS is an observational cross-sectional study designed to investigate associations between social–environmental stress and mental and physical health among a community sample of midlife (aged 30–50) African American women residing in the San Francisco Bay area. Data were collected from March 2012 through March 2013. Study design and study procedures have been described in detail elsewhere (Allen, Thomas et al., 2019; Thomas et al., 2020). Briefly, purposive sampling using multiple recruitment strategies was employed to maximize variability in key exposures of interest (e.g., socioeconomic factors, racism experiences). Study participants included those who self-identified as U.S.-born African American women and had U.S.-born parent(s)/primary caregiver(s) who also self-identified as African American. Participation consisted of an interviewer-administered survey, computer-assisted self-interview, physical examination, and venous blood draw. The study was approved by the Committee for the Protection of Human Subjects at the University of California Berkeley.

Measures

Dependent variable (TL)

DNA extraction and measurement.—Genomic DNA (gDNA) was extracted from blood biospecimens using a commercially available DNA extraction kit (Qiagen, Germantown, Maryland, USA). The quantity and purity of the gDNA were determined using a NanoDrop 2000 Spectrophotometer (Thermo Fisher Scientific, Waltham, Massachusetts, USA). The absorbance at 260 nm and the A_{260}/A_{280} ratio were used to quantify gDNA and assess its purity. The A_{260}/A_{280} ratios for DNA samples were approximately 1.8. The gDNA was run in a 1% agarose gel stained with ethidium bromide for visualization to determine integrity before obtaining telomere measurements.

Relative telomere length measurement. —Each participant's relative telomere length (rTL) was measured using previously described protocols adapted for this study (Ramirez et al., 2017). Briefly, 1× Power and Fast SYBR Green Master Mixes, primers, and 20 ng of DNA per reaction well were used for quantitative polymerase chain reaction assays. A standard curve was created using threefold serial dilutions of standardized reference gDNA ranging from 81 to 1 ng. The abundance of telomere sequence (T) and single copy gene hemoglobin (S) was calculated using the standard curve method. The rTL was measured as the ratio of telomere repeat to single-gene products (T/S). To make the scale of rTL more interpretable, we multiplied the rTL score by 10.

Independent variable (SWS)

The Giscombe Superwoman Schema Questionnaire is a 35-item instrument comprised of five subscales (Woods-Giscombe et al., 2019): (a) $SWS_{strength}$: obligation to present an image of strength (six items, e.g., "The struggles of my ancestors require me to be strong," $\alpha = 0.70$); (b) $SWS_{emosupp}$: obligation to suppress emotions (seven items, e.g., "My tears are a sign of weakness," $\alpha = 0.87$); (c) $SWS_{succeed}$: intense motivation to succeed (six items, e.g., "No matter how hard I work, I feel like I should do more," $\alpha = 0.75$); (d) SWS_{vuln}: resistance to being vulnerable (seven items, e.g., "I do things by myself without asking for help," $\alpha = 0.84$); and (e) SWS_{help}: obligation to help others (nine items, e.g., "There is no time for me, because I am always taking care of others", $\alpha = 0.90$). Relevant items were reverse-coded for consistent valence. Responses for each subscale were coded on a 4-point Likert scale ranging from 1 (*This is not true for me*) to 4 (*This is true for me all the time*). Scores across items were summed to generate the five SWS subscale scores.

Effect modifier (racial identity)

The Multidimensional Inventory of Black Identity (MIBI) was used to measure participants' sense of racial identity (Sellers et al., 1997, 1998). Three dimensions of racial identity were assessed: (a) centrality (eight items, e.g., "Overall, being Black [or African American] has very little to do with how I feel about myself," $\alpha = 0.71$), which captures the degree to which race is a core part of one's self-concept; (b) private regard (six items, e.g., "I feel good about Black people," $\alpha = 0.72$), which captures how positively one feels toward African Americans as a group and about their membership in the group; and (c) public regard (six items, e.g., "Overall, Blacks are considered good by others," $\alpha = 0.78$), which captures the extent to which an individual feels that others hold a positive view of African Americans. Relevant items were reverse-coded for consistent valence. Responses for each subscale were coded on a 6-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) with higher scores reflecting a stronger Black identity. Scores across items for each subscale were summed to generate the three MIBI subscale scores.

Covariates

Candidate covariates were chosen based on theoretical confounders and confounders informed by the extant literature: participants' age in years; educational attainment (0 = *high school diploma or lower*, 1 = *greater than high school diploma*); employment status (0 = *unemployed*, 1 = *employed*); marital/domestic partnership status (0 = *not married/no domestic partnership*, 1 = *married/domestic partnership*); and poverty status defined according to household income adjusted for household size (0 = *below or equal to 100% of the federal poverty threshold (FPT)*, 1 = *above 100% of FPT*). Smoking, physical activity, and diet were conceptualized as mediators and therefore excluded to avoid overcontrolling, given our primary interest in total effects (Supplementary Figure 1).

Analytic Plan

All primary analyses were conducted in Mplus 8.5 (Muthén & Muthén, 1998). Descriptive analyses consisted of univariate distributions and bivariate associations to assess associations between primary study variables, distributions of primary variables by sample demographics, confounders of main associations between SWS dimensions and rTL, and any potential collinearity.

Path analysis assessed how each SWS subscale was associated with participants' rTL, and how these associations were modified by each MIBI subscale. Compared with regression, path analysis is more flexible with statistical assumptions (i.e., does not assume normally distributed or homoscedastic residuals; Kline, 2015) and can handle missing data. We used a maximum likelihood estimator with robust standard errors that yields robust estimates for nonnormal distributions (Yuan & Bentler, 2000). Missing data were handled using full-information maximum likelihood (FIML) estimation, a preferred method that generates estimations using all available data (Graham, 2009). Given both theory and the robust literature documenting age as a predictor of TL, age was included in all models regardless of significance. Other candidate confounders were retained if significant at $p < .05$, given the modest sample size.

Path analysis was conducted as follows: First, we examined the association between each SWS subscale and rTL in separate models given prior evidence of functional differences across other health indicators (Allen, Wang et al., 2019; Woods-Giscombe et al., 2019). Each subscale was evaluated without conditioning on the other subscales. Next, a singular MIBI subscale was added to each SWS model to assess main effects. Finally, we tested for interactions between each SWS and MIBI subscale (e.g., $SWS_{strength} \times$ Centrality) on rTL. Each interaction was tested in a separate model to preserve power. Simple slopes analysis was conducted for each significant interaction to estimate SWS–rTL associations when racial identity was low, moderate, and high (Aiken et al., 1991). Predictors (including age) were mean-centered before creating interaction terms

to obtain unstandardized coefficient estimates. Predictors were *z*-transformed to obtain standardized coefficient estimates.

Results

Data Preparation and Descriptive Analyses

One participant whose score for rTL was 3 *SD* away from the mean was excluded from final analyses (*n* = 139). Additionally, two scores for SWS$_{strength}$ and three scores for private regard were 3*SD* away from their means respectively and were coded as missing. FIML estimation accounted for 1%–8% of missing values.

Descriptive statistics and correlations for primary study variables are reported in Table 1. On average, participants were 41.57 years old (range 31–51 years; *SD* = 5.90). Two thirds of the study sample had more than a high school diploma, approximately half were employed, 29% were married or in a domestic partnership, and 80% were not in poverty. Bivariate distributions of primary variables by sample demographics are displayed in Supplementary Table 1.

Multivariable Analyses: SWS, Racial Identity, and rTL

Among the four candidate confounders, only poverty was significant in some models (Supplementary Table 2). Compared with results with only poverty and age, the inclusion of candidate confounders did not change the results. Hence, all models include adjustments for age and poverty to maximize power. Table 2 presents main effects of each SWS subscale on rTL. Table 3 presents further adjustment

of each MIBI subscale. We observed a positive association for one of the five subscales: participants who reported higher SWS$_{vuln}$ (i.e., resistance to vulnerability) had longer rTL. SWS$_{vuln}$ remained significant when centrality and private regard were added in respective models but became nonsignificant in models adjusted for public regard. There were also significant main effects for each MIBI subscale. Private regard also showed positive associations with rTL, although it only reached significance for SWS$_{emosupp}$. Higher public regard was significantly associated with shorter rTL across all SWS models.

Table 4 presents interactions between each of the SWS subscales and each of the racial identity subscales on rTL. Three significant interactions were observed: SWS$_{emosupp}$ × Centrality, SWS$_{emosupp}$ × Public regard, and SWS$_{succeed}$ × Public regard. Simple slope analyses are shown in Figure 1. High

Table 2. Coefficient Estimates for the Main Effects of SWS on rTL

rTL	B [95% CI]	SE B	β	Power
SWS$_{strength}$	0.06 [−0.10, 0.22]	0.08	0.06	0.29
SWS$_{emosupp}$	0.03 [−0.08, 0.15]	0.06	0.06	0.25
SWS$_{succeed}$	0.11 [−0.03, 0.24]	0.07	0.13	**0.86**
SWS$_{vuln}$	0.11 [0.01, 0.20]*	0.05	0.17	**0.97**
SWS$_{help}$	0.05 [−0.03, 0.12]	0.04	0.10	0.66

Notes: SWS = Superwoman Schema; rTL = relative telomere length; *B* = unstandardized coefficient; CI = confidence interval; β = standardized coefficient. Bolded numbers indicate that, when the sample size is 500, the proportion of replications for which the null hypothesis that an estimate is equal to zero is rejected at the .05 level is above 0.80 (i.e., the estimate is likely to be significant). Adjustments include age and poverty status.
*p < .05.

Table 1. Correlations and Descriptive Statistics of Primary Study Variables

Variables	1	2	3	4	5	6	7	8	9
1. SWS$_{strength}$	—								
2. SWS$_{emosupp}$	0.15	—							
3. SWS$_{succeed}$	0.44***	0.41***	—						
4. SWS$_{vuln}$	0.25**	0.62***	0.61***	—					
5. SWS$_{help}$	0.24**	0.48***	0.58***	0.62***	—				
6. Centrality	0.52***	−0.09	0.23**	0.12	0.09	—			
7. Private regard	0.24**	−0.03	0.15	0.07	0.05	0.42***	—		
8. Public regard	−0.07	0.00	−0.24**	−0.35***	−0.17	−0.16	0.10	—	
9. rTL	0.04	0.02	0.10	0.13	0.09	0.14	0.13	−0.23**	—
N	136	138	138	137	135	131	128	131	139
Mean	20.07	16.14	17.48	18.15	22.99	34.40	33.60	20.12	9.15
Standard deviation	3.35	5.23	4.02	5.20	7.35	7.24	3.54	6.12	3.21
Min	10.00	7.00	6.00	7.00	9.00	13.00	21.00	6.00	3.29
Max	24.00	28.00	24.00	28.00	36.00	48.00	36.00	32.00	18.90
Skewness	−0.80	0.21	−0.42	0.06	0.06	−0.47	−1.75	−0.51	0.82
Kurtosis	0.10	−0.70	−0.10	−0.77	−0.96	0.38	2.45	−0.35	0.25

Notes: SWS = Superwoman Schema; rTL = relative telomere length. Correlations and descriptive statistics were estimated in SPSS. Correlations coefficients of | *r* | > 0.70 indicate collinearity (Dormann et al., 2013).
**p < .01, ***p < .001.

Table 3. Coefficient Estimates: Path Analysis for Multivariable Regression of rTL on SWS and Racial Identity

Variables	Centrality				Private regard				Public regard			
	B [95% CI]	SE B	β	Power	B [95% CI]	SE B	β	Power	B [95% CI]	SE B	β	Power
SWS$_{strength}$	−0.03 [−0.22, 0.15]	0.10	−0.04	0.11	0.03 [−0.13, 0.20]	0.08	.03	.11	0.04 [−0.11, 0.20]	0.08	.05	.18
MIBI	0.08 [−0.01, 0.17]†	0.05	0.18	0.94	0.12 [−0.01, 0.25]†	0.07	.13	.82	−0.12 [−0.21, −0.03]**	0.05	−.23	1.00
SWS$_{emosupp}$	0.05 [−0.06, 0.15]	0.06	0.08	0.40	0.04 [−0.07, 0.15]	0.06	.06	.28	0.04 [−0.07, 0.14]	0.06	.06	.26
MIBI	0.07 [−0.002, 0.15]†	0.04	0.17	0.97	0.12 [0.001, 0.24]*	0.06	.14	.87	−0.12 [−0.21, −0.03]**	0.05	−.23	1.00
SWS$_{succeed}$	0.08 [−0.05, 0.22]	0.07	0.11	0.66	0.09 [−0.04, 0.23]	0.07	.12	.76	0.07 [−0.07, 0.20]	0.07	.09	.49
MIBI	0.06 [−0.02, 0.14]	0.04	0.13	0.85	0.11 [−0.02, 0.23]†	0.06	.12	.76	−0.11 [−0.20, −0.02]*	0.05	−.21	1.00
SWS$_{vuln}$	0.10 [0.002, 0.19]*	0.05	0.16	0.94	0.10 [0.01, 0.20]*	0.05	.16	.96	0.06 [−0.04, 0.17]	0.05	.10	.61
MIBI	0.06 [−0.01, 0.14]†	0.04	0.14	0.90	0.11 [−0.01, 0.23]†	0.06	.12	.81	−0.10 [−0.20, −0.004]*	0.05	−.19	.99
SWS$_{help}$	0.04 [−0.04, 0.11]	0.04	0.09	0.53	0.04 [−0.03, 0.12]	0.04	.10	.61	0.03 [−0.04, 0.10]	0.04	.07	.33
MIBI	0.07 [−0.01, 0.14]†	0.04	0.15	0.92	0.12 [−0.01, 0.24]†	0.06	.13	.84	−0.11 [−0.2, −0.03]*	0.05	−.22	1.00

Notes: rTL = relative telomere length; SWS = Superwoman Schema; MIBI = Multidimensional Inventory of Black Identity; B = unstandardized coefficient; CI = confidence interval; β = standardized coefficient. Bolded numbers indicate that, when the sample size is 500, the proportion of replications for which the null hypothesis that an estimate is equal to zero is rejected at the 0.05 level is above 0.80 (i.e., the estimate is likely to be significant). All models included adjustments for age and poverty.

†$p < .10$, *$p < .05$, **$p < .01$.

emotion suppression was associated with shorter rTL for participants reporting high racial centrality ($B = −0.001$; 95% confidence interval [CI] = [−0.030, −0.002]; $SE = 0.01$; $p = .010$; standardized [std.] β = −0.17). High emotion suppression was associated with longer rTL for participants reporting high public regard ($B = 0.020$; 95% CI = [0.003, 0.040]; $SE = 0.01$; $p = .029$; std. β = 0.20). High SWS$_{succeed}$ was also associated with longer rTL for those reporting high public regard ($B = 0.020$; 95% CI = [0.001, 0.050]; $SE = 0.01$; $p = .013$; std. β = 0.18).

Sensitivity Analyses

We conducted three sets of sensitivity analyses to examine the robustness of study findings. First, we repeated an examination of theoretically and empirically informed candidate confounders together with each SWS subscale on rTL. Once again, only poverty and age were relevant and retained in final models.

The second set of analyses repeated the primary analysis while examining the five SWS subscales simultaneously in the same model. There were no significant main associations for any of the SWS subscales on rTL (Supplementary Table 3). For the main associations of racial identity (MIBI) on rTL (Supplementary Table 4), findings were similar to our primary analyses albeit marginally significant. However, in the primary analyses, each MIBI subscale was added to each SWS model one at a time: evaluating how subscales operate in relation to a specific dimension of SWS without the added conditions changes the meaning of the coefficient. We opted for a more theoretically informed investigation for our primary analyses that provided more information that was masked in the sensitivity results.

For the interactions between SWS and MIBI on rTL (Supplementary Table 5), the previously observed SWS$_{emosupp}$ × Centrality interaction and SWS$_{emosupp}$ × Public regard interaction approached but did not reach statistical significance ($p < .10$), whereas SWS$_{succeed}$ × Public regard became nonsignificant. However, SWS$_{help}$ × Centrality became significant. Again, we opted for the theoretically informed primary analyses focused on understanding specific interactions without the additional conditions caused by adding MIBI subscales and SWS × MIBI interactions, a different equation altogether.

Finally, given the modest sample size ($n = 139$), we conducted a series of Monte Carlo (MC) simulation studies in Mplus to evaluate whether the nonsignificant findings we observed in the primary analyses were due to insufficient power of the analytic sample. This was done by examining the power of observed estimates in the current study in a larger sample (Muthén & Muthén, 2002). Power was indicated by the proportion of 10,000 replications for which the null hypothesis is rejected at α = 0.05 (Tables 2–4: MC simulations for SWS subscales in separate models; Supplementary Tables 3–5: MC simulations for SWS subscales in the same model). The pattern for

Table 4. Path Analysis Coefficient Estimates for the Interaction Between SWS and Racial Identity on rTL

Variables	Centrality				Private regard				Public regard			
	B [95% CI]	SE B	β	Power	B [95% CI]	SE B	β	Power	B [95% CI]	SE B	β	Power
SWS$_{strength}$ × MIBI	0.002 [−0.02, 0.03]	0.01	0.02	0.08	0.01 [−0.03, 0.04]	0.02	0.02	0.08	0.01 [−0.02, 0.05]	0.02	0.08	0.30
SWS$_{strength}$	−0.03 [−0.24, 0.18]	0.11	−0.03	0.10	0.04 [−0.14, 0.21]	0.09	0.04	0.14	0.04 [−0.12, 0.20]	0.08	0.04	0.18
MIBI	0.08 [−0.01, 0.17]†	0.05	0.18	**0.94**	0.12 [−0.01, 0.25]†	0.07	0.13	**0.84**	−0.14 [−0.23, −0.05]**	0.05	−0.26	**1.00**
SWS$_{emosupp}$ × MIBI	−0.01 [−0.03, −0.002]*	0.01	−0.17	**0.99**	0.004 [−0.02, 0.03]	0.01	0.02	0.09	0.02 [0.003, 0.04]*	0.01	0.20	**1.00**
SWS$_{emosupp}$	0.04 [−0.07, 0.15]	0.06	0.06	0.29	0.04 [−0.07, 0.15]	0.06	0.06	0.28	0.03 [−0.08, 0.13]	0.06	0.04	0.16
MIBI	0.07 [−0.003, 0.14]†	0.04	0.15	**0.94**	0.12 [−0.001, 0.25]†	0.06	0.13	**0.87**	−0.13 [−0.22, −0.04]**	0.05	−0.25	**1.00**
SWS$_{succeed}$ × MIBI	−0.001 [−0.02, 0.02]	0.01	−0.01	0.06	0.01 [−0.01, 0.03]	0.01	0.04	0.24	0.02 [0.001, 0.05]*	0.01	0.18	**0.97**
SWS$_{succeed}$	0.08 [−0.07, 0.24]	0.08	0.10	0.61	0.11 [−0.04, 0.26]	0.08	0.13	**0.83**	0.06 [−0.08, 0.19]	0.07	0.07	0.36
MIBI	0.06 [−0.02, 0.14]	0.04	0.14	**0.86**	0.11 [−0.01, 0.23]†	0.06	0.12	**0.81**	−0.15 [−0.24, −0.06]**	0.05	−0.28	**1.00**
SWS$_{vuln}$ × MIBI	−0.01 [−0.02, 0.003]	0.01	−0.08	0.49	0.01 [−0.01, 0.02]	0.01	0.03	0.12	0.01 [−0.002, 0.03]†	0.01	0.12	**0.82**
SWS$_{vuln}$	0.09 [−0.01, 0.19]†	0.05	0.14	**0.90**	0.10 [0.01, 0.20]*	0.05	0.16	**0.96**	0.05 [−0.06, 0.15]	0.05	0.08	0.41
MIBI	0.07 [−0.003, 0.15]†	0.04	0.16	**0.95**	0.12 [−0.004, 0.24]†	0.06	0.13	**0.84**	−0.12 [−0.22, −0.02]*	0.05	−0.23	**1.00**
SWS$_{help}$ × MIBI	0.003 [−0.01, 0.01]	0.01	0.05	0.27	0.01 [−0.01, 0.03]	0.01	0.07	0.38	0.001 [−0.01, 0.01]	0.01	0.02	0.07
SWS$_{help}$	0.04 [−0.04, 0.11]	0.04	0.09	0.51	0.04 [−0.03, 0.12]	0.04	0.10	0.59	0.03 [−0.05, 0.10]	0.04	0.06	0.32
MIBI	0.07 [−0.01, 0.14]†	0.04	0.15	**0.91**	0.13 [0.002, 0.25]*	0.06	0.14	**0.89**	−0.12 [−0.21, −0.02]*	0.05	−0.22	**1.00**

Notes: rTL = relative telomere length; SWS = Superwoman Schema; MIBI = Multidimensional Inventory of Black Identity; *B* = unstandardized coefficient; CI = confidence interval; β = standardized coefficient. Bolded numbers indicate that, when the sample size is 500, the proportion of replications for which the null hypothesis that an estimate is equal to zero is rejected at the 0.05 level is above 0.80 (i.e., the estimate is likely to be significant). Models are adjusted for age and poverty status.

†$p < .10$, *$p < .05$, **$p < .01$.
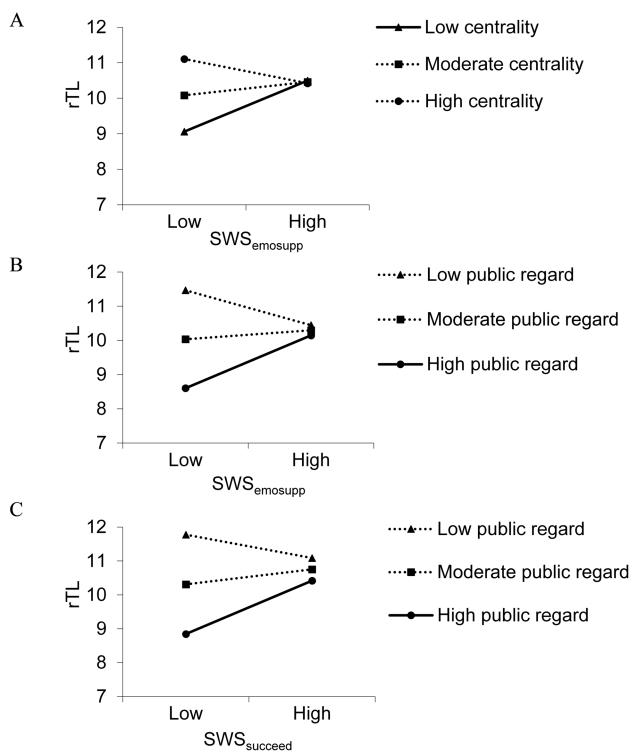
Figure 1. Two-way interaction effects of SWS subscales by racial identity for rTL. Solid lines indicated significant slopes, while dashed lines indicated insignificant slopes. Low and high SWS subscales were 1 *SD* below and above mean. Low, moderate, and high public regard were 1 *SD* below mean, mean, and 1 *SD* above mean. (A) Interaction between $SWS_{emosupp}$ and centrality for rTL; (B) interaction between $SWS_{emosupp}$ and public regard for rTL; (C) interaction between $SWS_{succeed}$ and public regard for rTL. *Notes:* SWS = Superwoman Schema; rTL = relative telomere length; MIBI = Multidimensional Inventory of Black Identity.

the results emerging from MC simulations was consistent for both approaches such that the observed significant associations would remain significant when a larger sample size is assumed ($n = 500$). Additionally, those coefficients that were marginally significant ($p < .10$) would become significant. Overall, the MC simulations indicate that the nonsignificant findings were unlikely to be due to a lack of power in the analytic sample, thus lending support for the observed significance patterns from the primary analyses.

Discussion

Previous studies have documented accelerated cellular aging among African American women relative to other race–gender groups; however, little is known about the factors underlying this phenomenon. Aligned with the weathering hypothesis, early health decline among African American women may be attributed to culturally specific coping with chronic stress associated with having multiple marginalized social statuses (Geronimus et al., 2006). In this study of midlife African American women, we examined SWS and the MMRI as frameworks for understanding the intersectional experiences of living in a race

and gender conscious society, and its implications for premature aging for African American women. Specifically, we investigated associations between SWS and TL, and the degree to which racial identity modifies SWS–TL associations. Of the five SWS dimensions, resisting vulnerability was the only dimension showing a significant independent association with rTL, whereas emotion suppression and motivation to succeed showed significant interactions with racial identity dimensions. Regarding racial identity, we found that participants reporting high public regard had shorter telomeres. As hypothesized, racial centrality and public regard both modified SWS–TL associations. Among those reporting lower centrality and those reporting higher public regard, feeling a stronger obligation to suppress emotions ($SWS_{emosupp}$) predicted longer telomeres. Higher public regard was also protective for those reporting a higher motivation to succeed.

In previous research, when asked about the perceived benefits of the Superwoman role, African American women described it as a form of self-preservation, for themselves and for their families and African American community more broadly (Woods-Giscombé, 2010). Consistent with our findings, the perceived benefits of resisting vulnerability are many (e.g., greater self-independence, self-worth, dignity) and appear to outweigh the perceived liabilities (e.g., postponing self-care, strain in relationships; Woods-Giscombé, 2010) in part by thwarting additional physiological distress related to gendered racism (Szymanski & Lewis, 2016). As shown previously, in a gendered racist society, African American women's experiences and struggles are invisible and delegitimized, creating inadequate spaces for vulnerability (Accapadi, 2007). Therefore, under these circumstances, resisting vulnerability may avoid adverse conditions, thereby protecting against psychological stress and telomere attrition. Our findings remained robust after accounting for racial identity. However, previous work found no association between SWS_{vuln} and allostatic load, another measure used to operationalize weathering among African American women (Allen, Wang et al., 2019). Together, these findings suggest that culturally specific coping processes may differentially affect allostatic load and TL for African American women. Future work must stipulate clearly the specific pathways and biological processes underlying various models of healthy aging.

We did not find significant independent associations for the other four SWS dimensions. Given the limited research in this area, we hypothesized the same pattern of associations for TL as shown in prior research on SWS and allostatic load (Allen, Wang et al., 2019). Notably, the focus previously has been on interactions rather than independent associations. Specifically, $SWS_{strength}$, $SWS_{emosupp}$, $SWS_{succeed}$, and SWS_{help} each moderated the association between self-reported racial discrimination and allostatic load. Similarly, the association we see here for emotion suppression and motivation to succeed is interactive rather than independent. This is consistent with prior qualitative research describing

the salience of social–contextual factors in contributing to African American women's adoption of the Superwoman role (i.e., historical legacy of racial and gender stereotyping and oppression, lessons from foremothers, personal history of mistreatment, and spiritual values; Woods-Giscombé, 2010), which prior research shows is associated with perceived stress (Woods-Giscombe et al., 2019).

The positive association we found between emotion suppression and TL, within the context of lower racial centrality, is not surprising. Researchers suggest that higher centrality may increase racism-related vigilance and increased awareness of racism and how it operates among those for whom race is a core aspect of their identity (Burrow & Ong, 2010; Hope et al., 2021). For example, Black adolescents with high (vs. low) centrality experienced worse anticipatory threat of experiencing racism (Hope et al., 2021). Additionally, African American women commonly describe emotion suppression within the context of being angry which, despite being associated with poor health (Watson & Hunter, 2016), results in intentional efforts to avoid the angry Black woman stereotype (Nuru-Jeter et al., 2009). Hence, within the context of coping with racism, emotion suppression is health-protective for African American women (Allen, Wang et al., 2019). Consistent with the stereotype threat literature (Steele, 2018), avoidance efforts, such as emotion suppression, will likely be higher among those whose race is central to their identity. However, African American women for whom race is not central, emotion suppression is also protective. Therefore, emotion suppression may point to gendered aspects of social identity rooted in the process of socialization to be a strong Black woman (Thomas et al., 2011).

Our finding that emotion suppression was protective within the context of high public regard is also consistent with prior research. Public racial regard reflects perceptions of the degree to which others view African Americans positively or negatively. Expressing emotions within the context of high public regard may result in self-blame that has previously been associated with poor health (Blodorn et al., 2016). It follows that suppressing emotions, within the context of high public regard, would be health-protective, relative to low emotion suppression. These and other potential hypotheses should be further explored in representative longitudinal cohorts to elucidate mechanisms linking SWS, racial identity, and telomere shortening.

Methodologic Considerations

The current study should be interpreted within its limitations. The analytic sample size was modest and lower-powered. We addressed this using multiple approaches, including carefully selecting both theoretical and empirically informed covariates and conducting MC simulation to explore the significance patterns in larger samples. Sensitivity analyses provided strong support for the observed findings; however, unmeasured confounding certainly exists. Given

the cross-sectional design among Bay Area women, temporality and causality cannot be inferred, and generalizability is restricted. Finally, our study participants were sampled from the San Francisco Bay Area, where residents have among the highest incomes and education levels in the United States. Notably, the distribution of SES indicators closely reflected the distribution of the 2013 American Community Survey for the Bay Area (U.S. Census Bureau, 2014). Residing in the Bay Area may have differential implications for higher SES African American women than in other areas. On the one hand, higher SES is generally health-protective. On the other hand, African Americans comprise less than 6% of the Bay Area population, plausibly leading to higher SES African American women being in more homogenously White spaces (e.g., workplaces) and greater exposure to racism, which is health-damaging.

Implications

The study findings add to a growing body of evidence further delineating the complex psychosocial mechanisms that may contribute to premature aging among African American women. These findings also confirm the importance of intersectionality frameworks to avoid the common biases inherent in strategies leading to monolithic interpretations of racial health disparities. Future studies examining the role of discrimination on premature aging among African American women should consider how multiple forms of discrimination (e.g., racial and gender) operate simultaneously to affect mechanisms underlying (un)healthy aging. Additionally, most studies of racial discrimination and biomarkers of aging use a stress framework but neglect to consider how coping and its associated inputs (e.g., racial identity) may either attenuate or exacerbate the negative effects of discrimination. Our study demonstrates that traditional coping scales may be inadequate for understanding the role of culture-specific coping for stress and aging. In addition to measuring coping, identifying the factors that affect adaptive and maladaptive coping may inform future efforts to promote healthy aging among African American women.

Supplementary Material

Supplementary data are available at *The Gerontologist* online.

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Conflict of Interest

None declared.

Acknowledgments

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