Published in final edited form as:
Psychosom Med. 2024 May 01; 86(4): 315–323. doi:10.1097/PSY.0000000000001296.

Financial Hardship and Sleep Quality among Black American Women with and without Systemic Lupus Erythematosus

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Abstract

Objective: To compare dimensions of financial hardship and self-reported sleep quality among Black women with vs. without Systemic Lupus Erythematosus (SLE).

Methods: Participants were 402 Black women (50% with validated diagnosis of SLE) living in Georgia between 2017 and 2020. Black women with SLE were recruited from a population-based cohort established in Atlanta, and Black women without SLE were recruited to be of comparable age and from the same geographic areas as SLE women. Financial hardship was measured using three different scales: financial adjustments, financial setbacks, and financial strain. Sleep was assessed continuously using the Pittsburgh Sleep Quality Index (PSQI) scale. Each dimension of financial hardship was analyzed separately in SLE-stratified multivariable linear regression models and adjusted by sociodemographic and health status factors.

Results: Dimensions of financial hardship were similarly distributed across the two groups. Sleep quality was worse in Black women with, versus without, SLE ($p<.001$). Among Black women with SLE, financial adjustment was positively associated with a 0.40 unit increase in poor sleep quality (95% CI: 0.12, 0.67, $p=0.005$). When accounting for cognitive depressive symptoms, financial setbacks and strain were somewhat attenuated for Black women with SLE. Overall, no associations between financial hardships and sleep quality were observed for the women without SLE.

Conclusions: Black women with SLE who experience financial hardships may be more at risk for poor sleep quality than Black women without SLE. Economic interventions targeting this population may help improve their overall health and quality of life.

Keywords

Systemic lupus erythematosus; sleep disparities; health inequities; Black women’s health; chronic stress; financial stress

INTRODUCTION

Systemic Lupus Erythematosus (SLE) is a chronic, potentially debilitating, multisystem, autoimmune condition with a prevalence estimate of 72.8/100,000 in America (1). Age of onset varies, but some reports indicate that incidence rates of SLE tend to be highest during the prime years of productivity—between the ages of 20 and 50 (2–5). Despite its relatively low prevalence, there are substantial inequities in the incidence and prevalence of SLE. Specifically, females are 9 times more likely than males to develop SLE, and Black women in the U.S. have rates up to 3 times greater than women from other racial/ethnic groups (1,6). SLE is characterized by periods of acute disease activity with periods of remission (7). However, research suggests that Black women have more chronic disease activity than patients from other racial/ethnic backgrounds (8,9). Health inequities in disease prognosis also exist, with Black women having less favorable outcomes, compared to women from other racial/ethnic groups (2,3).

Ongoing symptoms associated with SLE are heterogeneous including fatigue, pain, skin rashes, arthritis, involvement of kidneys, heart, lungs and nervous system; however, depression, pain, and fatigue are among the most frequent and distressing (10). While not a hallmark symptom of SLE, studies have found that poor sleep in SLE is common (11), with evidence that over half of women with SLE experience some form of sleep disturbance (11–14). As an important biological process, sleep plays a pivotal role in the overall quality of life for patients with SLE. In studies examining self-reported sleep quality among patients with SLE, poor sleep has been found to complicate disease management, decrease patients' quality of life, aggravate fatigue, and worsen depression (15,16). Despite this, not much is known about the contributing factors to sleep quality in SLE. In 2005, Da Costa and colleagues were the first to explore determinants of self-reported sleep quality among women with SLE, reporting associations between poor sleep and prednisone use, lack of exercise, and depression (14). Since then, only a handful of studies have explored the underlying mechanisms of sleep dysfunction in this population and linked it to factors such as depression, pain, inflammatory cytokines, disease duration, and disease activity (12,17–22). The correlation between depression/anxiety and sleep outcomes is documented in SLE (14,18,20,22,23); however, no other psychosocial factors have been examined in relation to sleep. More importantly, Black women have been almost completely absent from this literature.

In the general population, studies have found that Black women have poorer sleep outcomes compared to women from other racial/ethnic backgrounds (24,25). For example, in a seminal study of midlife women, Martica Hall and colleagues (2009) examined the associations among socioeconomic status (SES)-related factors, race/ethnicity and sleep in Black, White, and Chinese women from the SWAN study (25). Study findings documented an independent effect for race/ethnicity, with Black women reporting the lowest sleep quality compared with other racial/ethnic groups. SES-related factors examined included self-reported educational attainment and financial strain, however, only financial strain was independently associated with lower sleep quality in this study. Consistent with this initial work, other studies have found similar effects for race and SES-related factors on sleep outcomes (26,27).

Aside from Hall and colleagues' work on financial strain (22, 25), studies examining SES-related factors and sleep quality generally rely on traditional definitions of SES, which include income, educational attainment, and/or occupation (see El-Sheikh et al. (29) for an exception to this). However, regardless of one's income and/or educational attainment, financial hardship may be important to consider. Financial hardship is a complex construct that requires multidimensional facets to properly capture people's unique economic experiences, setbacks, and struggles (30). In general, the extant literature on sleep quality has not examined economic and/or financial hardship in depth, which could include financial adjustments, financial setbacks, and financial strain (i.e., difficulty paying for basic needs). These factors can be quantified objectively as an individual's economic circumstances or conceptualized subjectively as potential sources of stress. Thus, examining such factors may be important to better understand how economic challenges impact pivotal health factors, such as sleep quality (31,32).

For Black women with SLE, stressors, such as financial hardship, may be particularly relevant. Black women, irrespective of SLE status, report more financial strain and higher unemployment relative to women from other racial/ethnic backgrounds (33,34). For individuals with SLE, the added costs of managing a chronic illness and the potential for disability-related unemployment can worsen financial hardship, particularly due to the disease's early onset, hindering their income potential (35–37). Although little knowledge is currently available on self-reported financial hardships and sleep quality among Black women with SLE, it is conceivable that this stressor may be especially salient for this population.

Given that sleep is an important component in understanding SLE health outcomes along with the poorly understood link between stressors and sleep quality for this underrepresented population, the objective of this study is to examine the association between dimensions of financial hardship and self-reported sleep quality among Black women with vs. without SLE. Also, considering the added burden of their chronic condition and the unique rate of unemployment, we hypothesized that Black women with SLE would report poorer sleep quality and worse financial hardship. We also expected that dimensions of financial hardship would be associated with sleep quality among Black women with and without SLE, but we anticipated that the effect sizes would be larger among women with SLE.

METHODS

Study Participants and Data Collection

The participants for this cross-sectional analysis were recruited for the Vascular Aging, Inflammation, and Stress in African-American Women's Health research Study (VISTA). VISTA is an ongoing longitudinal project that investigates whether aspects of the Black-American lived experience, such as psychosocial stressors, contribute to cardiovascular risk among Black women living with and without SLE. Black women with SLE were recruited from the Georgians Organized Against Lupus (GOAL) cohort between 2017 – 2020 (38). Described in detail elsewhere, the GOAL cohort was derived from the Georgia Lupus Registry (GLR) (2). GLR was established by the CDC as a population-based registry of patients with validated SLE from around the Atlanta, Georgia, metropolitan area. The

GOAL cohort was established as a natural history study of SLE to prospectively follow patients recruited from GLR. To meet the eligibility criteria for the VISTA study, GOAL participants had to report the following characteristics: 1) self-reporting as a Black American woman; 2) age 50 or under with at least one intact ovary; 3) not pregnant or lactating; 4) free of cardiovascular diseases and other relevant chronic illnesses such as end stage renal disease; 5) no current drug (e.g., marijuana, cocaine) or alcohol misuse; and 6) no cognitive impairment (which might impact the ability to obtain informed consent). Black American women without SLE formed the VISTA comparison group and were drawn from the same or nearby geographic areas as women with SLE using voting registration records and a range of residential listings. In addition to not having a diagnosis of SLE, these women who formed the comparison group also had to meet the above inclusion criteria that women from the GOAL cohort met. Drawing the comparison group from similar geographic areas allowed for controlling some of the environmental and/or contextual factors across the two groups. Additionally, the use of a within-group design for this study allows for focusing on Black female participants (and Black women in particular) and centering the complexity and diversity of their experiences while combating assumptions of homogeneity (39,40). Study participants for this analysis completed an in-person baseline visit consisting of clinical tests, medical history, and laboratory evaluations as well as a face-to-face interviewer-administered questionnaire. The overall sample size was determined based on power calculations aimed at detecting differential associations between psychosocial stressors and cardiovascular risk among Black women with SLE, compared to those without SLE. Thus, a total of 402 participants were recruited, 201 with SLE and 201 without SLE. Participants were excluded from the current analysis if they were missing data on any of our primary variables. Variables with missing data included: PSQI scale (N=10), household size (N=7), financial strain (N=3), financial setbacks (N=3), income (N=2), and SLAQ score (N=1). The final analytic sample size varied depending on the exposure but the lowest was 190 for women with SLE and 188 for women without SLE. The 190 Black women with SLE who were included in the analysis did not differ significantly from the N=11 missing women on sociodemographic nor clinical factors (BMI, cognitive depression, disease activity, and disease duration). Among Black women without SLE, those excluded from the analyses differed on income levels (p=0.0092) but were similar on other sociodemographic and clinical factors (BMI, cognitive depression). All participants were compensated for their time and effort; written, informed consent was obtained prior to study initiation. Approval for this study was obtained from the Emory University Institutional Review Board and the data supporting the findings of this study will be made available upon participant consent.

Measures

Dimensions of Financial Hardship: financial adjustment, financial setbacks, and financial strain—Three separate measures were operationalized as dimensions of financial hardship in this study. *Financial adjustments* were measured as a summed score of 12-items asking about adjustments to household finances made over the past twelve months to meet needs (e.g., changing residence to save money, eliminating medical insurance, postponing care, declaring bankruptcy). The scale has a range of 0 – 12 with higher scores indicating more financial adjustment events. The internal consistency of this scale had a Cronbach's alpha value of 0.74.

Financial setbacks were assessed via a single-item measure that queried current financial status in relation to the past year by asking: “Compared to the current year, were your finances better off, the same, or worse-off in the past year?”. Respondents reporting ‘worse-off’ were considered to have experienced financial setback(s). Responses were coded categorically with ‘the same’ as the referent group.

Financial strain was measured as in Hall et al (2009) with a single item measure that operationalizes difficulties with paying for basics like food, housing, medical care, and/or heating (25). There were three categorical responses for financial strain: very hard, somewhat hard, and not hard at all. The latter category formed the referent group.

Although the three dimensions were analyzed separately, correlations between them were examined using spearman correlations. Financial adjustment was significantly, but only moderately correlated with financial strain (ρ=0.40, p<.0001), and was not corelated with financial setbacks (ρ= 0.09, p= 0.065). Likewise, financial strain was also not associated with financial setbacks (ρ= −0.03, p= 0.57). These correlations were also run separately for Black women with, compared to those without SLE and the associations were similar. For the women with SLE, financial adjustment was significantly, but only moderately correlated with financial strain (ρ=0.40, p<.0001), and was not correlated with financial setbacks (ρ= 0.08, p= 0.23). Likewise, financial strain was also not associated with financial setbacks (ρ= −0.03, p= 0.64). For the women without SLE, financial adjustment was significantly, but only moderately correlated with financial strain (ρ=0.40, p<.0001), and was not correlated with financial setbacks (ρ= 0.11, p= 0.13). Likewise, financial strain was also not associated with financial setbacks (ρ= −0.03, p= 0.68).

Outcome: Sleep quality—Sleep quality was measured using the validated and widely-used Pittsburgh Sleep Quality Index (*PSQI score*), which consists of 19-items that asses several components of sleep quality over the past 30-days including subjective sleep quality, sleep duration, sleep latency, habitual sleep efficiency, sleep disturbance, sleep medication status, and daytime dysfunction (41–43). Scale scores include a continuous measure referred to as the global PSQI score ranging from 0–21 with higher scores indicating poorer sleep quality. A PSQI score of >5 indicates poor sleep quality. For descriptive purposes, we report the percent in our population classified as having poor sleep quality. However, given the limited number of women with SLE reporting “normal” sleep (PSQI score ≤5), only the continuous scale was used in the analyses. The internal consistency of this scale had a Cronbach’s alpha value of 0.77.

Covariates—Several factors known to be associated with sleep quality were adjusted for in this study (44–47). Categorical, self-reported sociodemographic measures include *marital status* (married/partnered vs. no partner), *household income* (<$35,000, $35,000- $49,999, $50,000 - $74,999, and ≥ $75,000 [reference]), and *employment status* (unemployed, part-time employment, full-time employment [reference]). Continuous sociodemographic variables include *age, years of education*, and *household size*. Health factors associated with sleep outcomes include *current smoking status* (yes vs. no) and *BMI* (kg/m^2). The *Beck Depression Index (BDI)* was collected to measure depressive symptoms. This scale contains 21-items, however, only the 14-item *BDI-cognitive scale* was utilized in the analyses to avoid possibly inflating estimates for study participants who live with a medical illness, since somatic depression (which includes sleep impairment) can be conflated with some of the underlying disease symptoms of SLE (48,49). The internal consistency of the cognitive scale had a Cronbach's alpha value of 0.89, while the somatic scale had a Cronbach's alpha value of 0.79. For descriptive purposes only, we report the 8-item *somatic BDI score*.

For women with SLE, in exploratory analyses, we also adjusted for disease-related factors utilizing the Systemic Lupus Activity Questionnaire (SLAQ). This is a self-reported, weighted composite score, consisting of 24-items and ranging from 0–44 that assesses disease activity across various physical, mental, and cognitive symptoms including depressive symptoms, fatigue, myalgias, pulmonary events, skin and joint symptoms, and more (50). Higher scores indicate more SLE disease flare and activity over the past 3 months. Finally, disease duration (i.e., number of years living with SLE) was also collected and included in the analyses as a continuous variable.

Statistical Analysis

We calculated descriptive statistics to examine sociodemographic factors for our cohort, and differences by SLE status were performed using chi-squared tests for the categorical variables, studentized T-tests for normally distributed continuous variables (age, educational years, PSQI scale, household size, BDI somatic), and nonparametric Wilcoxon Rank Sum Test to account for violations in the normality assumption in our ordinal as well as some of our continuous variables (financial adjustment, BMI, BDI cognitive). To examine the association between dimensions of financial hardship and sleep quality, each dimension was tested using separate linear regressions performed over three models. Regression analyses were tested in SLE-status specific strata. This allowed us to account for differential confounding by the variables of interest within the SLE status groups, because of differences between the two groups in terms of income, employment, and education as well as disease-related differences for the SLE group (disease activity and duration) that would have otherwise been difficult to account for in an interaction model. Model 1 only adjusted for age. Model 2 adjusted for age and additional sociodemographic variables: age, partner status, income, employment status, household size, and educational years. We adjusted for traditional measures of SES early on to examine the associations of financial hardship with sleep independent of these factors. Model 3 adjusted for the variables from model 2 and added health factors associated with sleep outcomes: current smoking status and BMI. Model 4 adjusted for the cognitive depressive symptoms in addition to the covariates from model 3. Additional exploratory models among women with SLE only adjusted for SLAQ disease activity and disease duration. Since the SLAQ disease activity scale accounts for depressive symptoms, the BDI cognitive domain scale was not included in those separate models. Lastly, since employment may play a role in how stress from financial hardships is perceived and prior studies have documented differences in stress and sleep associations by employment status (47), we ran a sensitivity analysis that stratified by full-time employment vs. other employment within each stratum to compare results. A two-sided p-value of <0.05 was considered statistically significant and 95% confidence intervals were reported. We used SAS version 9.4 for the analyses.

RESULTS

Descriptive Statistics

Table 1 presents descriptive data. The sample consisted of 201 Black American women with SLE and 201 without SLE who were aged between 19–50 years old with a mean age of 36 years (SD=6.9). The study population primarily consisted of non-smokers (94%), with full-time employment (57%), and full-or mostly full insurance coverage (75%). Approximately 35% of the study population reported being married/partnered and 47% reported a family income of $50,000 or more. The average PSQI sleep score was 8.2 (SD=4.3) with 68% reporting poor sleep quality. In terms of dimensions of financial hardship, 38% reported financial strain or having trouble paying for basic needs and 25% reported financial setbacks that were worse this year compared with the past year. The average BMI was 32.2 (SD=9.8), the average Somatic BDI score was 3.6 (SD=3.4), and the average Cognitive BDI score was 5.0 (SD=5.8). For patients living with SLE, moderate disease activity was reported (mean=18.4; SD=7.7) with average disease duration exceeding ten years (mean=10.6; SD=7.7).

The results of the bivariate analysis comparing characteristics across the SLE vs. No SLE groups are also presented in Table 1. Both groups were similar in terms of age, smoking prevalence, marital/partner status, parental status, insurance status, cognitive BDI, financial adjustment score, financial setbacks, and financial strain. However, women living with SLE had fewer years of education (14.5 (SD=2.4) vs. 15.1 (SD=2.4), p=0.008), lower employment rate (60% vs. 87%, p<.0001), lower income levels (63.5% vs. 35.5% reporting below $50K, p<.0001), and lower BMIs (30.7 (SD=8.4) vs. 33.8 (SD=10.9), p=0.0099) compared to those without SLE. They also reported higher somatic depression symptoms (4.5 (SD=3.6) vs. 2.7 (SD=2.8), p<.0001) and worse PSQI scores (9.5 (SD=4.7) vs. 6.9 (SD=3.6), p<.0001).

Regression Analyses

Table 2 presents beta coefficients examining the associations between each dimension of financial hardship and sleep quality stratified by SLE status. For the financial adjustment dimension in model 1 which adjusted only for age, there was a statistically significant association with sleep quality among women with SLE (β=0.61 [95% CI: 0.35, 0.87], p<.0001) as well as among those without SLE (β=0.23 [95% CI: 0.01, 0.45], p=0.037). However, the size of the estimate in women with SLE was 2.65 times larger than for the women without SLE. In model 2, which adjusted for additional sociodemographic characteristics, including traditional SES measures, there was a significant association with sleep quality among women with SLE but not among those without SLE. Each unit increase in model 2 for financial adjustment corresponded to a 0.57 unit increase in the PSQI score (p<0.0001) among those with SLE (95% CI: 0.29, 0.85). In model 3, which further adjusted for factors associated with sleep quality, the association remained significant for women with SLE (β=0.56 [95% CI: 0.28, 0.83], p<0.0001). In model 4, after adjusting for cognitive depressive symptoms, the coefficient was attenuated by 29% but still statistically significant among women with SLE (β=0.40 [95% CI: 0.12, 0.67], p=.005). It remained non-significant for women without SLE (β= −0.11 [95% CI: −0.34, 0.11], p=0.32).

The financial setback dimension is also presented in Table 2. In the basic model 1 which only adjusted for age, there were significant associations between financial setbacks and poor sleep among women with SLE, but not among women without SLE. Although again, the estimate was much larger (>5 times) among women with SLE. After adjusting for traditional measures of SES and other sociodemographic factors in model 2, there were significantly worse PSQI scores among those who reported being worse-off financially compared to those who reported having the same financial circumstances as the previous year within the SLE group (β=2.31 [95% CI: 0.65, 3.98], p=0.007). The association was nearly 1/6th the size and not significant among those without SLE (β=0.42 [95% CI: −0.91, 1.74], p=0.53). This association remained significant for those with SLE when adjusting for sleep-related health factors in model 3 (β=2.25 [95% CI: 0.60, 3.91], p=0.008). After adjusting for cognitive depressive symptoms in model 4, the relationship was attenuated by 12% but remained significant for the SLE group (β=1.99 [95% CI: 0.43, 3.55], p=.013). Overall, across the four models, the size of the coefficient was much weaker and not statistically significant among those without SLE (p>.05).

The third dimension of financial hardship, financial strain (i.e., difficulty paying for basic needs), demonstrated a similar patterning of results. In model 1, for both groups, there was a statistically significant association between financial strain and poor sleep for those reporting that it was “somewhat and/or very hard” to pay for basics compared to those reporting that it was “not hard at all.” However, in model 2, the results were no longer significant for the women without SLE. Among the women with SLE, model 2 indicated that for those reporting that it was “somewhat hard” to pay for the very basics compared to those reporting “not hard at all,” the beta coefficient indicated a 1.96 point higher score for poor sleep quality ([95% CI: 0.43, 3.49], p=.012). Those reporting “very hard” to pay for basics compared to no strain at all had a 3.91 point higher score for poor sleep quality ([95% CI: 1.47, 6.35] p=.002). This significance remained after adjusting for sleep-health covariates in model 3. In model 4, when adjusting for cognitive depression symptoms, the association was attenuated and no longer significant for those reporting that it was somewhat hard compared to those reporting not hard at all (β=0.83 [95% CI: −0.69, 2.35], p=.28). As for those reporting that it was very hard vs. not hard at all, the relationship was attenuated by 33% but remained significant (β=2.49 [95% CI: 0.08, 4.91], p=.043). For those without SLE, the relationship was weaker and not statistically significant across the three models (p>.05).

Exploratory models among women with SLE are presented in Table 3. Models 1–3 in this table are similar to those in table 2. For model 4, when removing cognitive depressive symptoms and replacing it with SLAQ total score and number of years living with SLE, similar results are observed as those in table 2; however, there was less attenuation (i.e., smaller reduction in the beta coefficients). For example, when examining the association between financial strain and sleep quality, among those reporting that it is somewhat hard vs. not hard at all to pay for basic needs, the effect remained significant in model 4 (β= 1.67 [95% CI: 0.26, 3.08], p=.021) in contrast to what was seen in model 4 in table 2 among the women with SLE (β=0.83 [95% CI: −0.69, 2.35], p=.28).

DISCUSSION

To our knowledge, this is the first study examining associations between any psychosocial factor and sleep quality among Black women living with SLE, with a unique emphasis on different dimensions of financial hardship. A major contribution of our study is the inclusion of Black women without SLE, which allowed us to examine how financial hardship and sleep quality differs by SLE status in Black women, and the extent to which dimensions of financial hardship are associated with poor sleep within each group. In our cohort, Black women living with SLE reported worse sleep quality and a higher percentage met criteria for poor sleep, defined as a PSQI score >5, than Black women without SLE. However, the hypothesis that Black women with SLE would report significantly more financial hardship than women without was not substantiated; both groups reported similar levels of financial hardship. Despite this, more financial adjustments, more financial setbacks in the current year, and more financial strain were associated with worse sleep quality in women with, but not without, SLE. For women with SLE, adjusting for cognitive symptoms of depression attenuated some associations for the moderate levels of financial strain (e.g., effect sizes for somewhat hard versus not very hard to pay for basic needs were smaller) and financial setbacks (e.g., a better-off vs. the same financial situation compared to the previous year), but associations remained significant for those who had worse-off financial setbacks and those who reported great difficulty in paying for basic needs. Among Black women with SLE only, results held when accounting for disease activity and duration in the separate analyses.

Our study findings that sleep quality was poorer among women with SLE, compared to women without SLE, was not surprising and was in the hypothesized direction. Wu and colleagues (2020) conducted a meta-analysis of 18 case-control studies and found that SLE patients had worse sleep quality than those without SLE. Their study also indicated that study scores differed by region, race, and disease duration, but findings were limited to White and “non-White” groups, making it difficult to ascertain how Black women with SLE fared in comparison to other groups (51). Future research should further explore differences between racial/ethnic groups. In our cohort, the prevalence of poor sleep among Black women with SLE was relatively high (77%) compared to prior studies that reported closer to 50%; however, it falls within range of one small study of 60 women with and without SLE in Egypt that found nearly 80% of women with SLE reported poor sleep (17). For Black women without SLE, both the PSQI scores and prevalence of poor sleep were similar to more recent sleep studies on Black women (52,53).

Our results showing that dimensions of financial hardships were associated with sleep quality for Black women with SLE were also consistent with our hypotheses. In her 2009 study on SES, financial strain, and sleep quality among women, Martica Hall and colleagues also found that ongoing financial strain had more of an impact on sleep quality than SES (25). Our study expands on this by further examining more dimensions of financial hardship and focusing on Black women with SLE. Other research studies have also established associations between financial strain and sleep quality (28,54–56). It is worth noting that there are variations in how financial strain is defined across these studies, and future research would benefit from more unified and standardized approaches.

Why were none of the dimensions of financial hardship associated with sleep quality among the Black women without SLE? The women without SLE had higher incomes, more years of education, and a greater likelihood of employment compared to their counterparts with SLE. These factors may be predictors of financial hardship, and yet, Black women without SLE reported similar levels of financial hardships as Black women with SLE and appeared to be somewhat buffered against the potential negative impact of this stressor on sleep quality. A couple of plausible theories may explain this phenomenon. The weathering hypothesis contends that accumulated life experiences lead to accelerated physiological aging, or wear and tear on the body which may compound adverse outcomes (e.g. sleep quality), particularly for high risk, disadvantaged, populations such as Black women with SLE, as opposed to our healthy comparison group (57). It is also possible that there are additive, or even synergistic, stress effect, stress effects, where being jointly exposed to financial hardship and the chronic challenges of SLE leads to greater dysregulation in sleep quality (58,59). Finally, threshold effects (60), may also provide another explanation for these findings. For example, it is possible that individuals with a chronic illness, such as SLE, may have a lower threshold at which stress impacts their health, such that the impact on sleep quality occurs at lower levels of financial hardship for women with SLE compared to women without. Aside from these theories, it is also plausible that the perception of stress from financial hardships may differ for individuals with and without SLE. Since Black women without SLE were more likely to be employed, had higher incomes, and attained more education compared to their SLE counterparts, it’s possible that they experience less disruption from financial strain or setbacks because they possess current or anticipated future financial resources to mitigate potential issues (e.g., I can recuperate monetary losses next week or next month). In other words, any level of financial hardship may be more sensitively experienced by individuals who do not have the financial security afforded by full-time employment. To investigate this further, we tested the hypothesis that employment status might modify the impact of various dimensions of financial hardship, especially for women without SLE, albeit in an exploratory manner. In sensitivity analyses conducted among Black women without SLE, stratified by employment status (i.e., employed full-time versus all others), we discovered that more financial adjustments and financial strain were associated with poorer sleep quality for those women who did not have full-time jobs. However, this trend was not observed for financial setbacks, and the associations weakened when we accounted for cognitive symptoms of depression. Nonetheless, the sensitivity analysis was exploratory and the small percentage of women who were unemployed (versus reporting part-time employment) made it difficult to compare employed to unemployed women which would have been more salient for this hypothesis. Moreover, measures that examine financial security or feelings of financial threat were not captured in our study, but may provide explanations for differences in vulnerability to financial hardship between Black women with SLE compared to those without SLE, as it is possible that women with SLE feel more financial threat in the face of financial hardships than their counterparts without SLE. Women who feel more financial threat may also have more day-to-day or night-to-night worry about their finances, which might subsequently impact their sleep. These psychological differences may modify the effect of financial hardship; thus, further enquiry is encouraged. More research is also required to better understand the mediating pathways between financial stressors and sleep quality for future interventions.

Limitations and Strengths

The findings of this study must be considered in light of some limitations. First, although the PSQI scale is a widely used and validated measure (41), future studies should incorporate gold-standard methods for objectively measuring sleep quality. We should also note that despite being self-reported, subjective sleep quality remains an important measure of sleep health. Furthermore, inherently, given the cross-sectional design of this study, we were unable to assess the temporality of the identified associations. Future studies should incorporate longitudinal designs. Cognitive symptoms of depression were treated as confounders of poor sleep in this study since they were assessed concurrently with sleep quality; however, cognitive symptoms can potentially play an intermediary role in the causal pathway between stress exposure and sleep. Thus, the direct and indirect effects of mental health would benefit from prospective designs that would allow for a determination of temporality. Our study did not collect data on perceived stress, however, given its potential role in mediating the relationship between financial hardship and sleep quality, future studies would benefit from examining its indirect effects. The generalizability of the study findings for other Black women in the US (with and without SLE) may also be limited given that our study focused on women in Atlanta, GA. Additionally, other co-morbidities such as cardiovascular events and chronic conditions were exclusion criteria for this sample, further limiting generalizability. Finally, two of the dimensions of financial hardship examined here, financial strain and setbacks, were measured categorically which limits our abilities to capture gradients and/or variability in the construct assessed. Broadly speaking, it is also crucial to acknowledge that this study focused on individual-level financial hardships, but systemic inequalities in the US create contexts where such hardships can be particularly challenging for Black women, especially those dealing with chronic disease. Previous research has established that systemic inequalities contribute to more severe chronic illnesses, worse disease progression, and poorer survival among historically disadvantaged populations (61,62), thus these factors will be important to consider in future research.

Despite these limitations, study strengths include the novel contribution of examining financial stressors on sleep quality for an understudied population and comparing the findings to a group that was geographically sampled to account for some environmental confounders. Pertinent to this study, given the racial and geographical similarities of both groups, was the broad application of an intersectional lens to deepen our understanding of how the simultaneous impact or intersection of several identities (e.g., race, gender, disease status, class, etc.) influence health experiences and needs (40,63). Finally, although sampling from Atlanta, GA limits the generalizability of our findings, it remains an ideal location given its large and socioeconomically diverse Black American population (64), which allows for examining variability within the dimensions of financial hardships.

Conclusion

In conclusion, this study of Black American women living in the southeastern US identified a positive association between financial hardships and worse subjective sleep quality for women with SLE but not for those without SLE. For women with SLE, associations between most dimensions of financial hardships and sleep remained significant but were not completely independent of cognitive symptoms of depression. Knowing the association with cognitive symptoms of depression may provide points for intervention; however, more direct effects were also observed which emphasizes the importance of examining psychosocial factors and incorporating a bio-psychosocial approach in the treatment of sleep disorders for this population (15). Although it is fairly common for individuals living with SLE to experience sleep disturbance, it is a potentially modifiable and not permanent condition (19). Moving forward, future research can continue building on these findings to address the unmet healthcare needs of Black women with SLE.

Conflicts of Interest and Source of Funding:

The authors report no conflicts of interest. Funding for this manuscript was provided by the National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institutes of Health (NIH) with grant number: R01AR070898. Khadijah Abdallah and Nicole Fields received additional support from T32 HL130025; Tené T. Lewis received additional support from K24HL163696 and Raphiel Murden received support from R01HL158141; Data collection for the GOAL study was funded under the following cooperative agreements: Georgia Lupus Registry: DP08806. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Abbreviations:

SLE	Systemic Lupus Erythematosus
BMI	Body Mass Index
SES	Socioeconomic Status
PSQI	Pittsburgh Sleep Quality Index

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Table 1.

Study Participant Characteristics (N=402)

Characteristic	Overall, N (%)	No SLE, N (%)	SLE, N (%)	P-value
Age (mean, SD)	36.48 (6.9)	36.98 (5.9)	35.98 (7.7)	0.15
Education Years (mean, SD)	14.80 (2.4)	15.11 (2.4)	14.48 (2.4)	0.008
Income				<.0001
<$35,000	131 (32.8)	37 (18.5)	94 (47.0)	
$35,000 - $49,999	67 (16.8)	34 (17.0)	33 (16.5)	
$50k - $74,999	93 (23.3)	61 (30.5)	32 (16.0)	
≥$75,000	95 (23.8)	65 (32.5)	30 (15.0)	
Refused	4 (1.0)	1 (0.5)	3 (1.5)	
Don't Know	10 (2.5)	2 (1.0)	8 (4.0)	
Current Smoking Status (% Yes vs. No)	24 (6.0)	10 (5.0)	14 (7.0)	0.40
Partner Status (%Yes vs. No)	142 (35.3)	75 (37.3)	67 (33.3)	0.40
Household size (mean, SD)	3.57 (1.8)	3.56 (1.7)	3.58 (1.8)	0.90
Insurance Status (%)				0.94
Fully Covered	94 (23.4)	45 (22.4)	49 (24.4)	
Mostly Covered	208 (51.7)	107 (53.2)	101 (50.3)	
Partly Covered	50 (12.4)	24 (11.9)	26 (12.9)	
Unknown	50 (12.4)	25 (12.4)	25 (12.4)	
Current Employment Status (%)				<.0001
Unemployed	106 (26.4)	25 (12.4)	81 (40.3)	
Part-Time	67 (16.7)	40 (19.9)	27 (13.4)	
Full-Time	228 (56.7)	135 (67.2)	93 (46.3)	
Other	1 (0.3)	1 (0.5)	0 (0.0)	
BMI (mean, SD)	32.20 (9.8)	33.75 (10.9)	30.65 (8.4)	0.0099
Somatic Beck Depression (mean, SD),	3.60 (3.4)	2.67 (2.8)	4.52 (3.6)	<.0001
Cognitive Beck Depression (mean, SD)	5.04 (5.8)	4.72 (5.7)	5.37 (5.8)	0.16
SLAQ Disease Activity (mean, SD)	---	---	18.36 (7.7)	---
Disease Duration (mean, SD)	---	---	10.61 (7.7)	---
Global PSQI Scale, (mean, SD)	8.20 (4.3)	6.94 (3.6)	9.45 (4.7)	<.0001
PSQI dichotomized: Poor Sleep (%)	268 (68.4)	116 (59.5)	152 (77.2)	<.001
PSQI Sleep Duration Hours (mean, SD)	5.81 (1.5)	5.84 (1.4)	5.79 (1.6)	0.76
PSQI Habitual Sleep Efficiency (%) (mean, SD)	80.71 (0.2)	83.16 (0.2)	78.28 (0.2)	0.011
Financial Adjustment Score, (mean, SD)	2.30 (2.3)	2.33 (2.3)	2.27 (2.4)	0.71
Financial Setbacks				0.37
Worse-off	101 (25.3)	45 (22.6)	56 (28.0)	
Better-off	141 (35.3)	70 (35.2)	71 (35.5)	
The same	157 (39.4)	84 (42.2)	73 (36.5)	
Financial Strain				0.29

Characteristic	Overall, N (%)	No SLE, N (%)	SLE, N (%)	P-value
Not hard at all	248 (62.2)	129 (64.8)	119 (59.5)	
Somewhat hard	119 (29.8)	58 (29.2)	61 (30.5)	
Very hard	32 (8.0)	12 (6.0)	20 (10.0)	

Table 2.

Dimensions of Financial Hardships and Sleep Quality Among Black Women with and without Systemic Lupus Erythematosus (N=379)

	Black Women with SLE, N=191		**Black Women without SLE, N= 188**	
	β (95% CI)	**P-value**	**β (95% CI)**	**P-value**
Financial Adjustments				
Model 1	0.61 (0.35, 0.87)	<.0001	0.23 (0.01, 0.45)	0.037
Model 2	0.57 (0.29, 0.85)	<.0001	0.19 (−0.04, 0.43)	0.11
Model 3	0.56 (0.28, 0.83)	<.0001	0.18 (−0.05, 0.42)	0.13
Model 4	0.40 (0.12, 0.67)	0.005	−0.11 (−0.34, 0.11)	0.32
Financial Setbacks				
Better-off vs. The same				
Model 1	1.37 (−0.16, 2.89)	0.079	0.26 (−0.91, 1.44)	0.66
Model 2	1.10 (−0.48, 2.67)	0.17	0.23 (−0.94, 1.39)	0.70
Model 3	1.28 (−0.29, 2.86)	0.11	0.27 (−0.90, 1.45)	0.65
Model 4	0.91 (−0.58, 2.39)	0.23	0.20 (−0.84, 1.23)	0.71
Worse-off vs. The same				
Model 1	2.12 (0.49, 3.74)	0.010	0.49 (−0.85, 1.82)	0.47
Model 2	2.31 (0.65, 3.98)	0.007	0.42 (−0.91, 1.74)	0.53
Model 3	2.25 (0.60, 3.91)	0.008	0.45 (−0.88, 1.78)	0.51
Model 4	1.99 (0.43, 3.55)	0.013	0.23 (−0.94, 1.41)	0.70
Financial Strain				
Somewhat hard vs. Not hard at all				
Model 1	1.98 (0.57, 3.40)	0.0063	1.27 (0.17, 2.37)	0.025
Model 2	1.96 (0.43, 3.49)	0.012	1.08 (−0.11, 2.28)	0.075
Model 3	1.78 (0.25, 3.30)	0.023	1.11 (−0.09, 2.31)	0.070
Model 4	0.83 (−0.69, 2.35)	0.28	0.50 (−0.59, 1.60)	0.36
Very hard vs. Not hard at all				
Model 1	3.77 (1.61, 5.92)	0.0007	2.53 (0.45, 4.62)	0.017
Model 2	3.91 (1.47, 6.35)	0.002	2.07 (-0.24, 4.38)	0.079
Model 3	3.69 (1.23, 6.15)	0.004	2.16 (−0.17, 4.49)	0.069
Model 4	2.49 (0.08, 4.91)	0.043	−0.84 (−3.12, 1.44)	0.47

Model 1 adjusts for: age

Model 2 adjusts for: age, educational years, partner status, household size, employment status, income

Model 3 adjusts for: sociodemographic covariates from model 2 + smoking status, BMI

Model 4 adjusts for: model 2 covariates + Beck Depression Inventory-Cognitive Domain

Table 3.

Dimensions of Financial Hardships and Sleep Quality Among Black Women with Systemic Lupus Erythematosus (N=190)

	Black Women with SLE, N=190	
	β (95% CI)	**P-value**
Financial Adjustments		
Model 1	0.61 (0.35, 0.87)	<.0001
Model 2	0.57 (0.29, 0.85)	<.0001
Model 3	0.56 (0.28, 0.83)	<.0001
Model 4	0.46 (0.20, 0.72)	0.001
Financial Setbacks		
Better-off vs. The same		
Model 1	1.37 (−0.16, 2.89)	0.079
Model 2	1.10 (−0.48, 2.67)	0.17
Model 3	1.28 (−0.29, 2.86)	0.11
Model 4	0.89 (−0.58, 2.36)	0.24
Worse-off vs. The same		
Model 1	2.12 (0.49, 3.74)	0.010
Model 2	2.31 (0.65, 3.98)	0.007
Model 3	2.25 (0.60, 3.91)	0.008
Model 4	1.80 (0.25, 3.35)	0.022
Financial Strain		
Somewhat hard vs. Not hard at all		
Model 1	1.98 (0.57, 3.40)	0.0063
Model 2	1.96 (0.43, 3.49)	0.012
Model 3	1.78 (0.25, 3.30)	0.023
Model 4	1.67 (0.26, 3.08)	0.021
Very hard vs. Not hard at all		
Model 1	3.77 (1.61, 5.92)	0.0007
Model 2	3.91 (1.47, 6.35)	0.002
Model 3	3.69 (1.23, 6.15)	0.004
Model 4	3.60 (1.32, 5.88)	0.002

Model 1 adjusts for: age

Model 2 adjusts for: age, educational years, partner status, household size, employment status, income

Model 3 adjusts for: sociodemographic covariates from model 2 + smoking status, BMI

Model 4 adjusts for: model 3 covariates + SLAQ Total Score, disease duration