Conclusions The burden of CVD remains very high in this SLE cohort. This is the first study in SLE to find that psychosocial stressors (perceived stress and discrimination) independently predict incident CVD events controlling for race/ethnicity, traditional CVD risk factors, and other sociodemographic and disease- related factors. High stress is known to contribute to the development of atherosclerosis in the general population. The disproportionate burden of negative social determinants of health in communities of color may be a significant driver of CVD and other disparities described in SLE. Further research into related causal pathways, mitigating factors, and biologic mechanisms is needed.

Lay Summary The burden of cardiovascular disease (CVD) remains very high in this systemic lupus erythematosus (SLE) cohort. This is the first study in SLE to find that psychosocial stressors (perceived stress and discrimination) independently predict incident CVD events controlling for race/ethnicity, traditional CVD risk factors, and other sociodemographic and disease-related factors. High stress is known to contribute to the development of atherosclerosis in the general population. The disproportionate burden of negative social determinants of health in communities of color may be a significant driver of CVD and other disparities described in SLE. Further research into related causal pathways, mitigating factors, and biologic mechanisms is needed.

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504 PERSONALIZING CARDIOVASCULAR RISK PREDICTION FOR SLE PATIENTS

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Objective The risk of cardiovascular disease (CVD), including myocardial infarction (MI) and stroke, is increased in SLE patients and is underestimated by current prediction algorithms designed for the general population including the 10-year atherosclerotic cardiovascular disease (ASCVD) risk score. The American College of Cardiology/American Heart Association now considers systemic inflammatory diseases such as SLE as risk enhancers for CVD. The purpose of this study was to develop an SLE-specific prediction tool to provide a more accurate estimate of CVD risk by including both traditional and SLE-related CVD risk factors.

Methods We included SLE patients enrolled in the Brigham and Women's Hospital SLE Cohort and collected one-year baseline data on traditional CVD risk factors, demographic and clinical features from the electronic medical record at cohort enrollment. Disease activity was rated using a modified physician global assessment (PGA) tool and SLE-related variables including autoantibodies, complement levels, and SLE manifestations were also collected. All subjects were required to have one or more visits for SLE during the baseline period. A up to ten-year follow-up period for CVD events began day +1 at end of baseline period (index date). The primary outcome was first major adverse cardiovascular events (MACE) defined as composite of first myocardial infarction (MI), stroke, or cardiac death, in the follow-up period. These were identified by ICD-9/10 codes and adjudicated by medical record review by board-certified cardiologists as either definite or probable events (not meeting all the criteria for MI or stroke definition). The secondary outcome was boarded to include first event of: carotid artery occlusion or stenosis, transient ischaemic attack, atrial fibrillation/flutter, heart failure, peripheral vascular disease, or angina pectoris. We excluded subjects with CVD events prior to the index date. Three Cox regression risk prediction models that categorized patients into low risk <7.5% risk, moderate risk 7.5-20%, and >20% risk over 10 years were derived: 1) primary outcome with definite/probable events, 2) combined model 1 and secondary outcomes, and 3) primary outcome with definite events only. We performed least absolute shrinkage and selection operator (LASSO) regression for variable selection and required one of the candidate predictors to be the 10-year ASCVD risk score. We assessed model performance using integrated time-dependent area under the curve, Harrell's C statistic, optimism corrected C- statistic, integrated discrimination (IDI), and net reclassification index (NRI) using bootstrap resampling.

Results We included 1243 patients; 93.0% female and mean age of 41.6 (SD 13.3) years. There were 90 definite and probable MACEs (46 MIs, 36 strokes, and 19 cardiac deaths) and 211 secondary events over the follow-up period. The variables selected included: ASCVD risk score, disease activity (PGA at most recent baseline visit), disease duration, creatinine level, presence of anti-dsDNA, anti-RNP, lupus anticoagulant, anti-Ro60/SSA, and low C4 (table 1). Models 1 (primary outcomes with definite and probable events) and 3 (primary outcomes with definite events only) performed similarly and outperformed model 2 (combination of model 1 and secondary events) (table 2). Model performance improved in comparing risk predicted by ASCVD risk score alone vs. ASCVD risk score combined with selected SLE variables by LASSO regression for models 1 and 2, particularly at year 1. For these models, the number of SLE patients who were classified as high risk (>20%) more than doubled

Abstract 504 Table 1 Beta Coefficients of ASCVD risk score and SLE Variables Selected by LASSO regression

Variable	Model 1 (Primary Outcome, Definite + Probable Events)	Model 2 (Combined Model 1 and Secondary Events)	Model 3 (Primary Outcome, Definite Events Only)
Model with ASCVD risk score only			
ASCVD	6.42	5.09	6.51
Model with ASCVD risk score and SLE-Selected Variables			
ASCVD	5.44	4.58	5.40
Disease activity	0.31	0.33	0.34
Disease Duration	0.04	0.02	0.04
Creatinine Level	0.17	0.23	0.17
Anti-dsDNA Positive	0.35	0.03	0.33
Anti-RNP Positive	0.22	0.12	0.41
Lupus Anticoagulant	0.47	0.30	0.40
Anti-Ro60/SSA Positive	0.31	0.23	0.15
Low C4	0.49	0.40	0.51

Abbreviations: ASCVD, atherosclerotic cardiovascular disease

Abstract 504 Table 2 Performance of three cardiovascular risk prediction models

Model	Integrated Time- Dependent AUC		Harrell's C-statistic	Optimism	Optimism- Corrected Harrel's C-statistic	Year 1 AUC		Year 10 AUC	
	ASCVD only	ASCVD and selected SLE variables				ASCVD only	ASCVD and selected SLE variables	ASCVD only	ASCVD and selected SLE variables
1	0.71	0.77	0.76	0.02	0.73	0.60	0.68	0.65	0.69
2	0.65	0.67	0.67	0.01	0.66	0.60	0.60	0.64	0.64
3	0.69	0.76	0.76	0.03	0.73	0.60	0.68	0.65	0.70

Abbreviations: ASCVD, atherosclerotic cardiovascular disease; AUC, area under the curve

Abstract 504 Table 3 Risk classification according to ASCVD risk score alone and ASCVD risk score + selected SLE variables*

Model	ASCVD Only n (%)			ASCVD + Selected SLE Variables n (%)		
	Low Risk (<7.5%)	Moderate Risk (7.5%-20%)	High Risk (>20%)	Low Risk (<7.5%)	Moderate Risk (7.5%-20%)	High Risk (>20%)
1	746 (60.02)	480 (38.62)	17 (1.37)	885 (71.2)	316 (25.42)	42 (3.38)
2	281 (23.59)	281 (23.59)	629 (52.81)	290 (24.35)	549 (46.1)	352 (29.55)
3	1076 (86.56)	154 (12.39)	13 (1.05)	973 (78.28)	241 (19.39)	29 (2.33)

Abbreviations: ASCVD, atherosclerotic cardiovascular disease
* The SLE variables selected by LASSO included ASCVD model, disease activity (PGA at most recent visit), disease duration, creatinine level, presence of anti-dsDNA, anti-RNP, lupus anticoagulant, anti-Ro60/SSA, and low C4.

when selected SLE variables were added to the ASCVD model compared to the ASCVD model alone (table 3). The ten-year IDI and NRI were significant in the improvement direction.

Conclusion Our novel SLE-specific cardiovascular risk prediction scores enhanced the performance of the traditional ASCVD risk algorithm and identified a greater number of SLE patients (at least two-fold) at high-risk for CVD events over 10 years. These models will need to be validated in a larger and more diverse population of SLE patients.

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601 ASSOCIATION OF SLEEP DEPRIVATION AND THE RISK OF DEVELOPING SYSTEMIC LUPUS ERYTHEMATOSUS AMONG WOMEN

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Objective Sleep deprivation has been associated with risk of autoimmune diseases. We investigated whether it was associated with risk of developing SLE using the Nurses' Health Study (NHS) (1986-2016) and NHSII (1989-2017) cohorts.

Methods Average sleep duration in a 24-hour period was reported in the NHS (1986-2014) and in NHSII in (1989-2009). Lifestyle, exposure and medical information was collected on biennial questionnaires. Adjusted Cox regression analyses modeled associations between cumulative average sleep duration (categorical variables) and incident SLE (figure

Abstract 601 Table 1 Age-standardized baseline characteristics in the Nurses' Health Study (NHS) in 1986 and the NHSII in 1989 by sleep duration (n=186,072)

Characteristic	<=5 hours (n=9609)	>5-6 hours (n=47131)	>6-7 hours (n=76202)	>7-8 hours (n=45269)	>8 hours (n=7861)
Sociodemographic					
Mean age, years (SD)	46.4 (12.4)	45.6 (11.8)	45.5 (11.7)	46.1 (12.3)	49.8 (13)
White,%	88.5	91.7	94.1	94.0	92.7
Census-tract median household income by zip code <$60,000, %	25.2	23.6	22.7	23.3	23.9
Mean BMI, kg/m^2 (SD)	26.3 (6.1)	25.4 (5.4)	24.8 (5.0)	24.8 (5.0)	25.8 (5.8)
BMI <25 kg/m^2, %	43.4	43.6	43.5	41.6	41.5
Mean alcohol consumption, g/day (SD)	3.7 (7.2)	4.3 (7.6)	4.7 (7.8)	5.0 (8.6)	5.9 (10.3)
Alcohol >= 5 g/day,%	20.7	25.3	27.6	28.5	28.5
Never or past smokers (quit >4 years),%	77.1	77.5	79.7	80.7	78.7
Regular exercise[1] (>= 19 MET- hrs/week),%	36.1	33.5	33.4	33.8	31.4
Highest 40 percentile of the AHEI,%	36.0	36.4	36.8	37.5	33.8
Shiftwork[2] >0-5.9 yrs',%	38.4	40.8	41.5	40.5	39.3
Shiftwork[2] >=6 yrs',%	23.7	17.6	13.3	12.2	13.5
History of Depression[3]	30.9	24.9	22.5	23.8	31.6
SF36 Bodily Pain[4] ~0-60 (most pain)',%	24.9	20.3	17.5	17.4	21.9
SF36 Bodily Pain[4] ~60-75',%	15.6	17.6	18.0	17.4	15.8
SF36 Bodily Pain[4] ~75-85',%	17.8	22.1	24.5	23.1	20.2