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

[1,2]May Y Choi, [1]Susan Malspeis, [1]Jeffrey A Sparks, [1]Jing Cui, [1]Kazuki Yoshida, [1]Karen H Costenbader. *[1]Brigham and Women's Hospital and Harvard Medical School, Boston, MA, USA; [2]University of Calgary, Calgary, Alberta, Canada; [3]Harvard T.H. Chan School of Public Health, Boston, MA, USA*

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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

SF36 Bodily Pain[4] ~85-100 (least pain)',%	14.1	16.3	18.5	20.3	18.7
Medications and Reproductive Factors					
Oral contraceptive use,%	66.7	66.5	66.5	66.0	66.2
Age at menarche <=10 years, %	9.9	7.7	6.3	6.1	6.1
Pre-menopausal,%	57.9	59.1	60.2	60.9	60.3
Post-menopausal, never used post-menopausal hormones,%	16.6	16.7	15.3	15.0	14.0
Post-menopausal, ever used post-menopausal hormones,%	21.5	21.0	21.5	21.2	22.8

AHEI, Alternative Healthy Eating Index; BMI, body mass index; MET, metabolic equivalent; SD, standard deviation; yrs, years.
1. Regular exercise defined as at least 19 metabolic equivalent (MET) hours per week, corresponding to at least 30 minutes of brisk walking every day
2. Shiftwork questionnaire started in 1988/1989
3. History of depression questionnaire started in 1996/1997
4. SF36 Bodily Pain Questionnaire started in 1992/1993, the cut-offs for each quartile are approximated

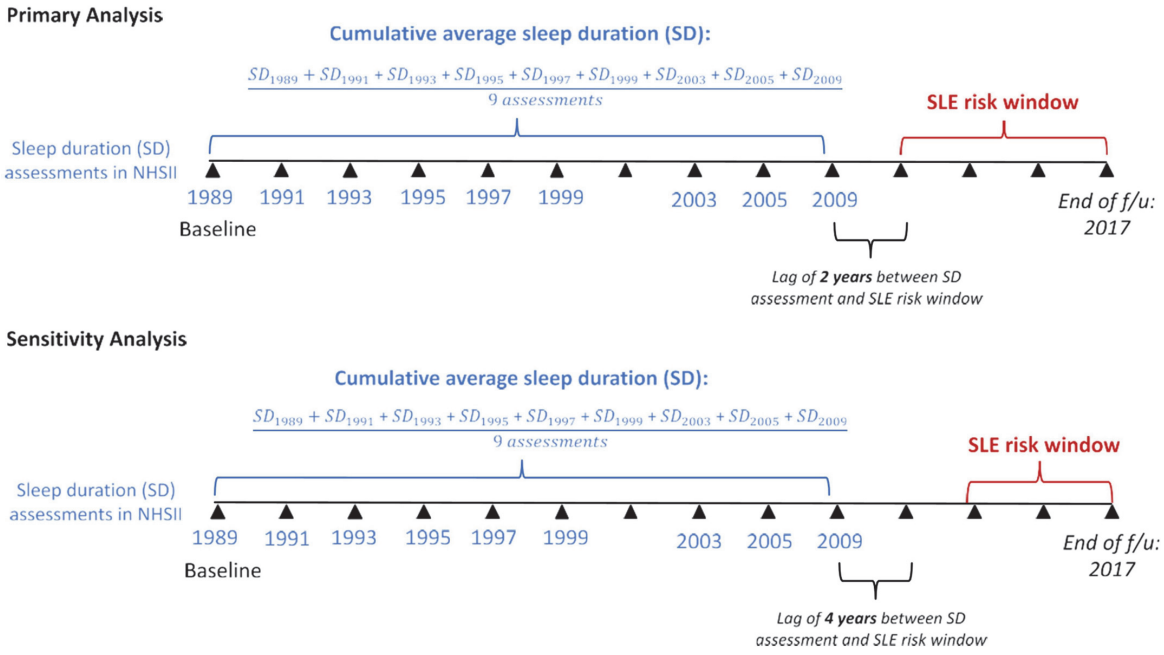
1). Interactions between sleep duration and shiftwork, bodily pain (Short-Form 36 questionnaire) and depression were examined.

Results We included 186,072 women with 187 incident SLE cases during 4,246,094 person- years of follow-up (table 1). Chronic low sleep duration (≤5 hours/night vs reference >7-8 hours) was associated with increased SLE risk (adjusted HR 2.47, 95%CI:1.29-4.75) (table 2), which persisted after the analysis was lagged (4 years, adjusted HR 3.14, 95%CI1.57-6.29) and adjustment for shiftwork, bodily pain, and depression (adjusted HR 2.13, 95%CI:1.11-4.10) (table 3). We detected additive interactions between low sleep duration and high bodily pain (SF-36 <75) with an attributable proportion (AP) of 64% (95%CI:40%-87%) and HR for SLE of 2.97 (95%CI:1.86-4.75) for those with both risk factors compared to those with neither. Similarly, there was an interaction between low sleep duration and depression with an AP of 68% (95%CI:49%-88%) and an HR for SLE of 2.82 (95% CI:1.64-4.85).

Abstract 601 Table 2 Hazard ratios (95% confidence intervals) for risk of incident SLE in Nurses' Health Study NHS (1986-2016) and NHSII (1989-2017) by sleep duration (n=186,072)

	<=5 hours	>5-6 hours	6-7 hours	>7-8 hours	>8 hours
No. of cases/person- years	12/119522	38/792679	83/1798274	45/1299088	9/236532
Multivariable model[a]	**2.47 (1.29- 4.75)**	1.22 (0.78-1.89)	1.22 (0.84-1.75)	**Ref**	1.20 (0.58-2.45)
Multivariable model[a] + shiftwork, depression, and pain	**2.13 (1.11-4.10)**	1.14 (0.73-1.77)	1.23 (0.85-1.78)	**Ref**	1.08 (0.52-2.21)

CI, confidence interval
[a]Adjusted for age, race, smoking, BMI and census tract household income, alcohol, mets exercise, oral conceptive use, menopausal status and hormone use, and AHEI



Abstract 601 Figure 1 Study schematic illustrating the prospective cohort design for NHSII. The primary exposure was cumulative average sleep duration and the outcome was SLE onset at least 2 years after last sleep duration assessment. The primary analysis was conducted so that there was always at least 2 years between the last sleep duration exposure assessment and the outcome date of SLE diagnosis that occurred in the SLE risk window. The analysis for NHS was similar except for the years of sleep duration assessment (1986-2014). The sensitivity analysis was lagged by another follow-up cycle of two years so that there was at least 4 years between the last sleep duration exposure assessment and the outcomes dates of SLE diagnosis. *NHS, Nurses' Health Study, NHSII, Nurses' Health Study II, SD, sleep duration, SLE, systemic lupus erythematosus.*

Abstract 601 Table 3 Hazard ratios (95% confidence intervals) for risk of incident SLE in Nurses' Health Study and NHSII by sleep duration (n=180,359) with lag (at least 4 years between sleep measurement and SLE risk window)

	<=5 hours	>5-6 hours	6-7 hours	>7-8 hours	>8 hours
No. of cases/person- years	11/110155	29/719055	73/1592723	34/1113861	7/191905
Multivariable model[a]	**3.14 (1.57-6.29)**	1.22 (0.74-2.01)	1.39 (0.92-2.10)	**Ref**	1.26 (0.56-2.87
Multivariable model[a] + shiftwork, depression, and pain	**2.43 (1.21-4.90)**	1.09 (0.66-1.81)	1.38 (0.92-2.08)	**Ref**	1.05 (0.46-2.39)

CI, confidence interval
[a]Adjusted for cohort, questionnaire cycle, age, race, smoking, BMI and census tract household income, alcohol, mets exercise, oral conceptive use, menopausal status and hormone use, and AHEI

Conclusion Chronic low sleep duration was associated with higher SLE risk, with stronger effects among those with bodily pain and depression, highlighting the potential role of adequate sleep in disease prevention.

602 CHILDHOOD-ONSET SYSTEMIC LUPUS ERYTHEMATOSUS: LONG-TERM OUTCOMES IN A LARGE MULTI-ETHNIC ONTARIO COHORT

[1]Steve Jeoung, [2]Roberta A Berard, [3]Janet E Pope, [4]Johannes Roth, [5]J Carter Thorne, [6]Earl D Silverman, [6]Deborah M Levy. *[1]University of Toronto, Kuan Liu, University of Toronto; [2]Children's Hospital of Western Ontario, Wesley Fidler, St. Joseph's Hospital; [3]St. Joseph's Health Care, University of Western Ontario; [4]University of Ottawa; [5]Southlake Regional Health Centre; [6]The Hospital for Sick Children, University of Toronto; [7]The Hospital for Sick Children and University of Toronto*

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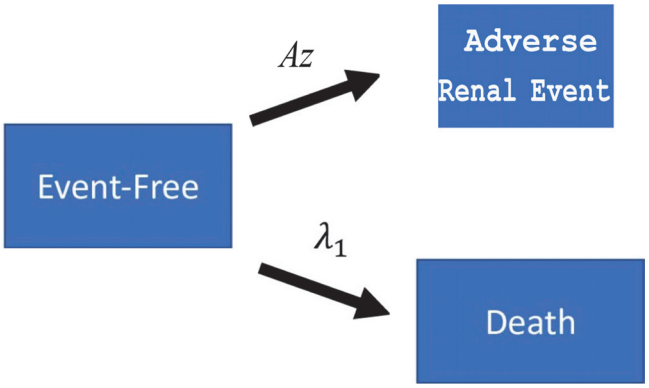
Background/Purpose The long-term morbidity and mortality of childhood-onset SLE (cSLE) after transition to adult care is not well documented. The present study aims to fill this knowledge gap by analyzing outcomes in a large province-wide cSLE clinical cohort linked to multiple administrative healthcare databases. Our objectives were to: 1) determine all-cause and cause-specific mortality rates, adverse renal event rates, cardiovascular event rates, and cancer rates in cSLE; and 2) determine baseline characteristics associated with higher rates of transition between 3 different states: event-free (entry), adverse renal event, and death.

Methods Clinical data were abstracted for cSLE patients (<18 years at diagnosis) diagnosed between January 1990 and March 2011 and followed for ≥1 year after contacting all pediatric and adult rheumatologists and nephrologists practicing in Ontario. Data and Ontario Health Insurance Plan (OHIP) numbers were securely transferred to the Institute for Clinical and Evaluative Sciences (ICES). OHIP numbers were transformed into an encrypted ICES key number (IKN) used to link the cohort to multiple administrative datasets to determine the outcomes of interest. We examined descriptive summaries of major outcomes including death, adverse renal events (end-stage kidney disease [ESKD] requiring chronic dialysis and renal transplant), cardiovascular events (including angina, transient ischemic attack, endocarditis, myocardial infarction, pericarditis, stroke), and cancer. In addition, we modeled the disease progression with a multi-state Cox model (figure 1) to determine baseline demographic and clinical characteristics that were significantly associated with higher rates of transition from being event-free to experiencing an adverse renal



Abstract 602 Figure 1 Multi-state model diagram

Abstract 602 Table 1 Baseline table stratified by death status

Variables	Alive (n=577)	Deceased (n=38)	Log-Rank P-Value
Age at Diagnosis, (mean(SD))	13.34 (3.18)	12.97 (3.23)	0.487
Male (%)	109 (18.9)	6 (15.8)	0.7
Self-reported Ethnicity (%)			0.09
White	220 (38.1)	9 (23.7)	
Asian	142 (24.6)	8 (21.1)	
Black	83 (14.4)	10 (26.3)	
South Asian	80 (13.9)	6~10*	
Other or Missing	52 (9.0)	<6 (<15.8) **	
Income Quintile at Baseline (%)			0.2
1 or 2	219 (39.4)	17 (48.6)	
3	136~141*	<6 (<15.8) **	
4 or 5	199~203*	13~17*	
Distance to the Nearest Tertiary Center in Quartiles (%)			0.6
1	137 (24.6)	11 (31.4)	
2	138~142*	6~10*	
3	143~148*	<6 (<15.8) **	
4	138 (24.8)	10 (28.6)	
Renal Involvement within 1 Year of diagnosis (%)	203 (35.2)	17 (44.7)	0.7
# of ACR Classification Criteria at diagnosis (mean(SD))	5.60 (1.45)	6.45 (1.55)	0.001

ACR, American College of Rheumatology; SD, standard deviation
*exact values not given as small cell sizes were suppressed
**cell sizes <6 suppressed