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INTRODUCTION

- Circadian rhythm influences immune responses, modulating innate and adaptive immunity¹⁻².
- Patients with sleep disorders have a higher incidence of autoimmune diseases³.
- An underappreciated complaint observed in patients with SLE is poor sleep quality⁴, but the relationship between poor sleep and SLE disease activity is unclear⁵⁻⁹.
- **We hypothesize that poor sleep quality associates with higher SLE disease activity.**

METHODS

- SLEEPS is a prospective observational study assessing the relationship between sleep quality and SLE disease activity.
- 151 adult patients with classified SLE (using 1997 ACR or 2012 SLICC criteria) from the Lupus Clinic at Washington University were enrolled.
- SLE disease activity was measured by the SLEDAI2K Responder Index-50 (S2K RI-50) instrument.
- Sleep surveys used:
 - Pittsburgh Sleep Quality Index (PSQI)
 - Epworth Sleepiness Scale (ESS)
 - Patient Reported Outcomes Measurement Instrument System (PROMIS) Sleep Related Impairment (SRI) and Sleep Disturbance (SD).

RESULTS

- 78% of all subjects enrolled had poor sleep quality (PSQI).
- Higher PROMIS SRI and SD scores (i.e. worse sleep quality) were observed in subjects with active compared to inactive SLE.
- Subjects with active SLE were more depressed and more likely to be on supraphysiologic doses of prednisone.
- Subjects with worse sleep quality experienced a 2.5-fold increase in clinically meaningful deterioration within the following 12 months compared to those with with better sleep quality.

DISCUSSION

- The relationship between sleep quality and SLE disease activity is complicated and establishing causality will be challenging.
 - Is there a directionality in the association between worse sleep quality and active SLE? Does poor sleep, and subsequent circadian dysfunction, drive immune response signatures seen in active SLE? Or does active SLE induce confounding variables (i.e. depression, prednisone use) that then drive poor sleep?
 - Is the relationship between poorer sleep quality and clinically meaningful deterioration in the future simply due to the increased likelihood of having more activity disease in poor sleepers? Or is there a mechani
- We are confirming these results using actigraphy, an objective assessment of sleep quality.

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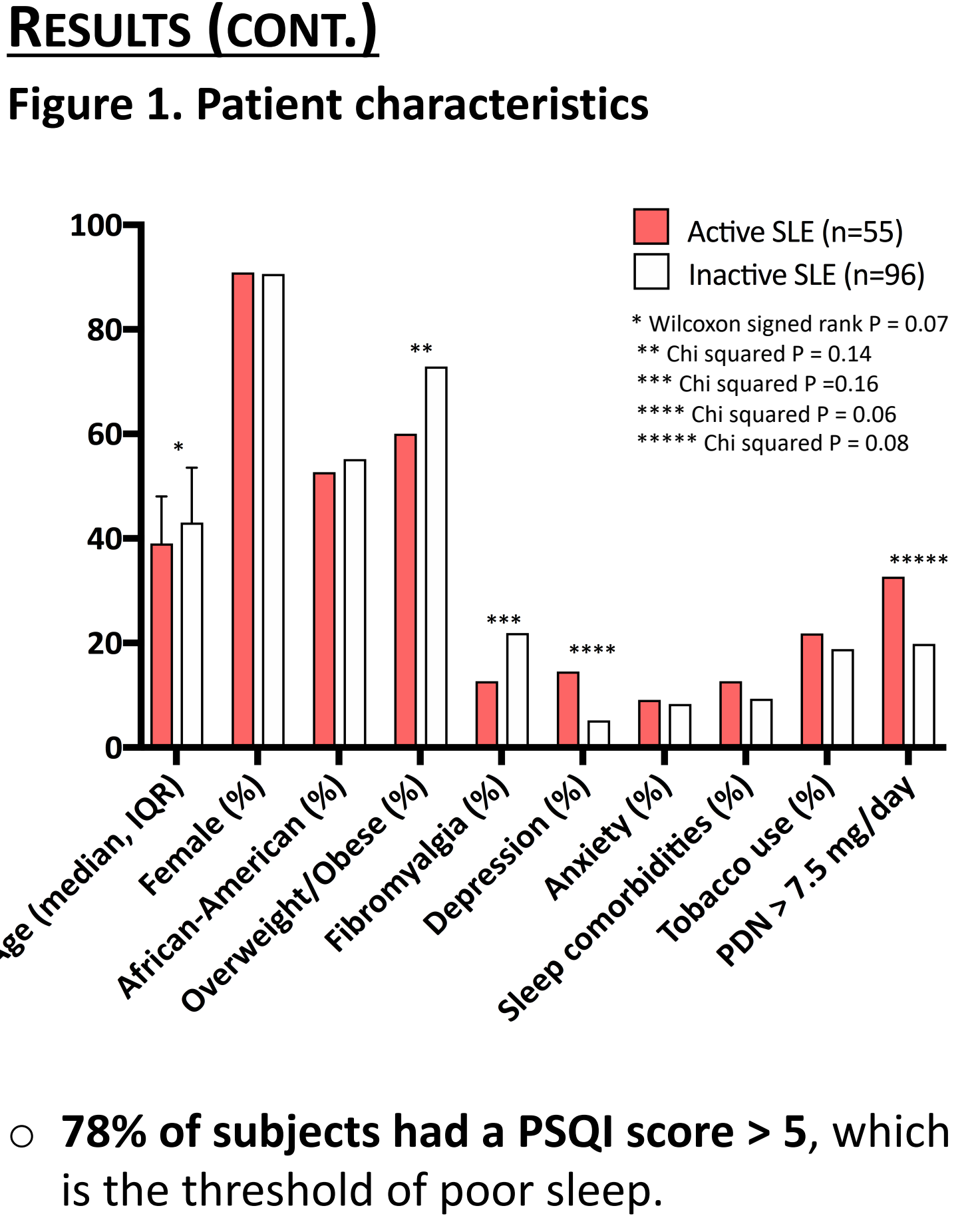
Patients with SLE generally experienced poor subjective sleep quality (78%), which is worsened with increased disease activity. Poorer sleep quality also increased the likelihood of future clinical worsening by 2.5-fold.



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METHODS (CONT.)

- Exclusion criteria included those with blood borne infectious diseases (i.e. Hep B or C, HIV), cirrhosis, ESRD, or who were pregnant or breastfeeding.
- Patients with active disease are considered to have a S2K RI-50 score > 4. Clinically meaningful deterioration is defined as an increase in S2K RI-50 score ≥ 4 from prior visit.
- Sleep surveys used:
 - **Pittsburgh Sleep Quality Index (PSQI)**: Evaluates multiple components. Score > 5 considered poor sleep (max score 21).
 - **Epworth Sleepiness Scale (ESS)**: Evaluates daytime sleepiness. ESS score >9 indicates hypersomnolence (max score 24).
 - **Patient Reported Outcomes Measurement Instrument System (PROMIS)**: General population standardized to a mean score of 50 and standard deviation of 10, maximum 100.
 - **Sleep Related Impairment (SRI)** evaluates perceptions of alertness, sleepiness, and perceived functional impairments during usual waking hours.
 - **Sleep Disturbance (SD)** evaluates perceptions of staying asleep, satisfaction with sleep.
- Depression is assessed using the Center for Epidemiologic Studies Depression Scale Revised (CESD-R) survey, with a score > 24 defined as major depressive disorder.



○ 78% of subjects had a PSQI score > 5, which is the threshold of poor sleep.

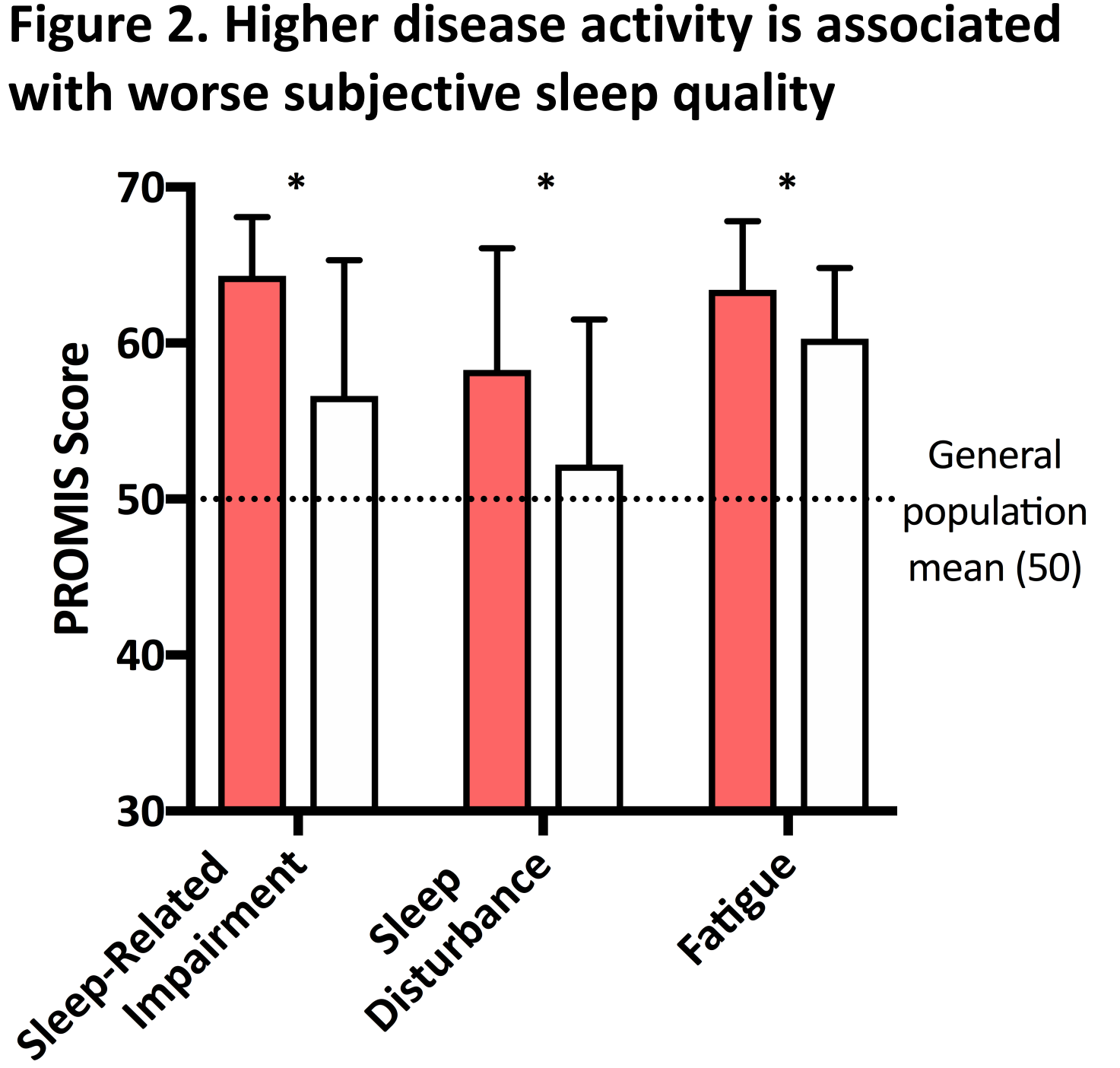


Figure 3. Worse sleep quality associated with increased future disease activity

- Receiver operator curve sensitivity analysis was performed to identify a PROMISE SRI threshold score associated with clinically meaningful deterioration. The Youden index identified a SRI = 63.8 (sensitivity = 0.59, specificity = 0.68).

