



# The Role of Sunlight Exposure in Tasks of Inhibition in Patients with Systemic Lupus Erythematosus

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## Abstract

In this project, we examine the potential negative impacts that sunlight exposure has on inhibition task performance and physical and cognitive symptoms in participants with systemic lupus erythematosus (SLE). This study is a continuation of a longitudinal experiment we completed in Summer 2018. In this study, participants with SLE completed daily surveys measuring sunlight exposure, cognitive and physical symptoms, and performance on a variety of inhibition tasks, including the Stroop test, go/no go paradigm, and the Flanker test. The longitudinal design of this study allows us to further investigate fluctuations in cognitive performance and physical and cognitive symptom reporting by looking at the variations in sunlight exposure over time. In this presentation, we examine the differences between one participant's Summer 2018 and Winter 2019 data.

## Method

In our full study, we surveyed 6 participants, 4 of which self reported being diagnosed with SLE. Participants completed daily surveys for ten weeks, including surveys of physical and cognitive symptoms, and also completed several inhibitory tasks, including the Stroop test, the go/no go paradigm, and the Flanker test. Participants also self reported the number of minutes they had been exposed to sunlight on a given day, with sunlight exposure being defined as any outdoor exposure to the sun during daytime hours, even when there is significant cloud coverage. We also asked participants to report sunlight exposure when they were near open windows, doors, or driving in the car.

In this presentation, we are focusing on the differences between Summer 2018 and Winter 2019 data for one participant that participated in both studies. The method between the two studies are identical. The participant we are focusing on is diagnosed with SLE and is 21 years of age.

## Discussion

- Our Winter 2019, like our Summer 2018, data showed that there is a significant correlation between amount of time exposed to sunlight and the experience of cognitive and physical symptoms, but our data did not show a significant relationship between scores on a task of inhibition and sunlight exposure.
- Differences between the two data sets, including differences between specific symptoms, indicates a seasonal effect.
- There are differences in the strength of correlations between the seasons. This suggests that there may be acute or long-term effects associated with sunlight exposure in that exposure could cause long term, accumulated damage for one measure but only acute effects for another.
- More research is desperately needed to understand the complex relationship between sunlight exposure and disease effects.
- Our current, strongest hypothesis for why sunlight exposure causes disease exacerbations is that the circadian rhythm is disrupted.

## Introduction

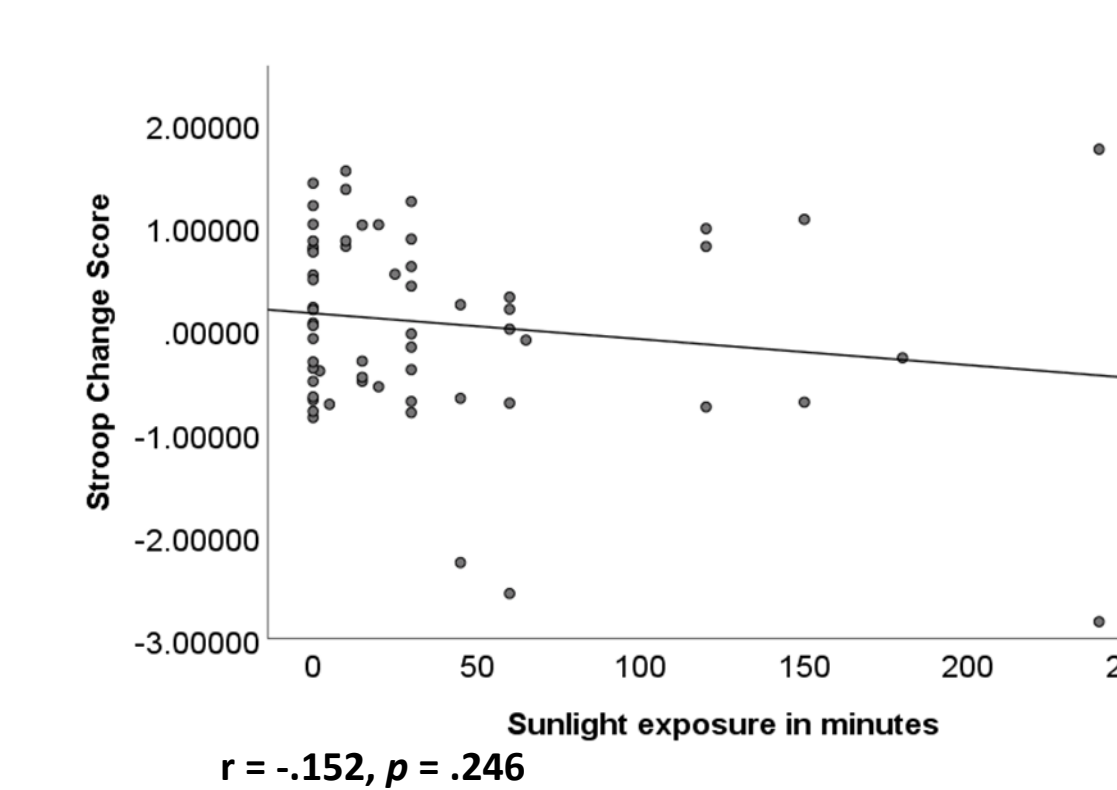
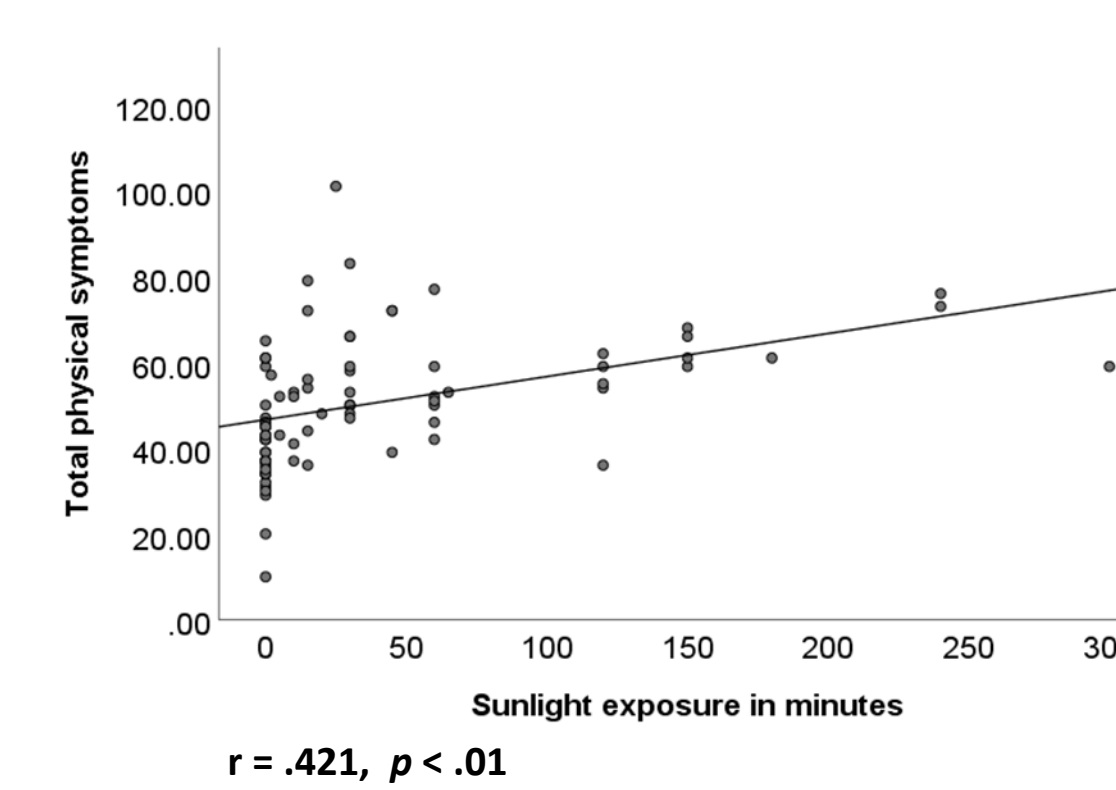
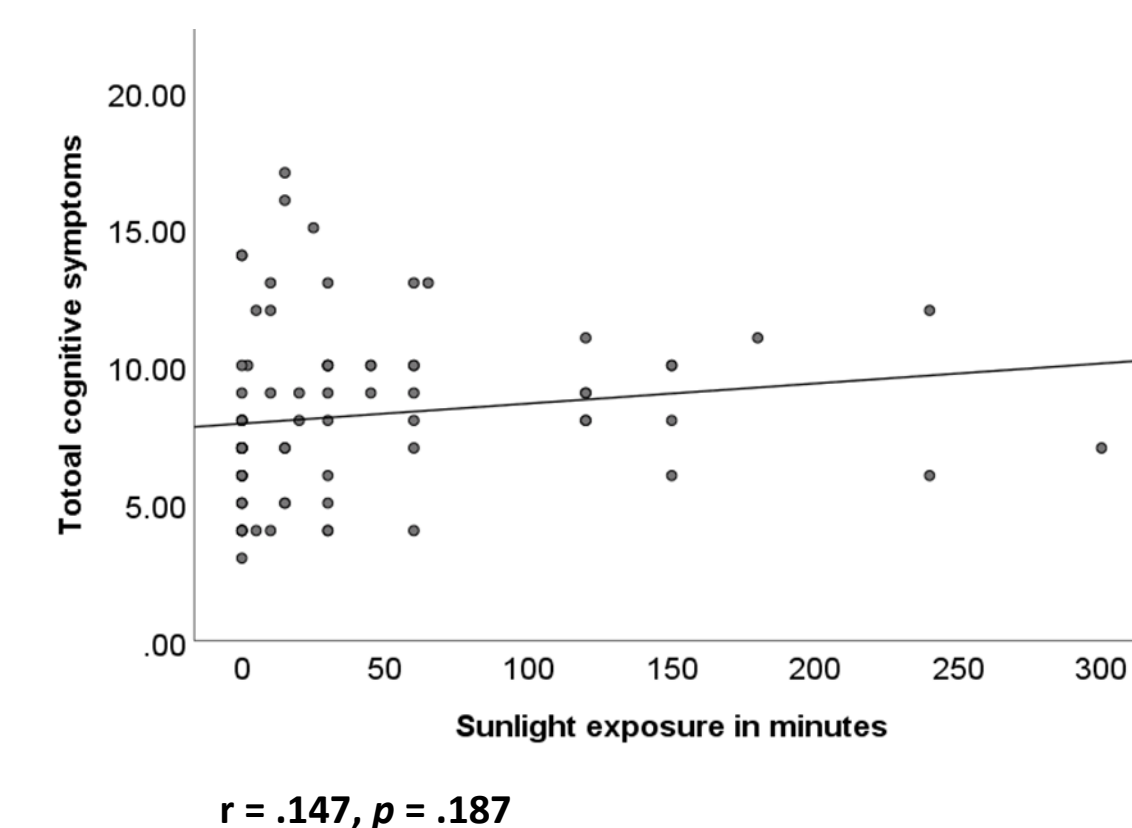
- Systemic Lupus Erythematosus (SLE) is a chronic, inflammatory autoimmune disease that can affect any system in the body, including the central nervous system.<sup>1</sup>
- People with SLE have noted cognitive deficits, such as deficits in working memory, executive function, and inhibition, although there is disagreement in the field about what cognitive symptoms are most and routinely impacted by disease activity.<sup>2,3,4</sup>
- Sunlight exposure can cause exacerbation in disease symptoms and activity in people with SLE.<sup>5,6</sup>
- Our previous work has demonstrated that sunlight exposure worsens physical and cognitive symptoms in people with SLE as well as worsens performance on tasks of inhibition in the summer months.<sup>7</sup>

## Hypotheses

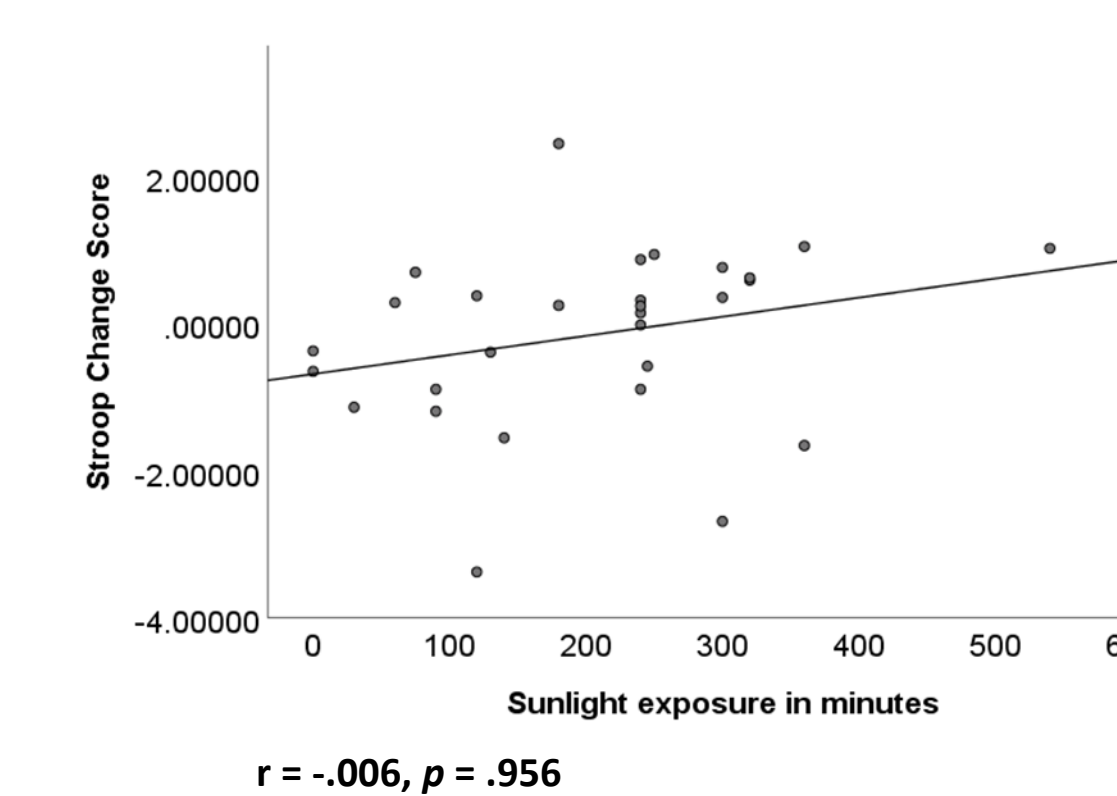
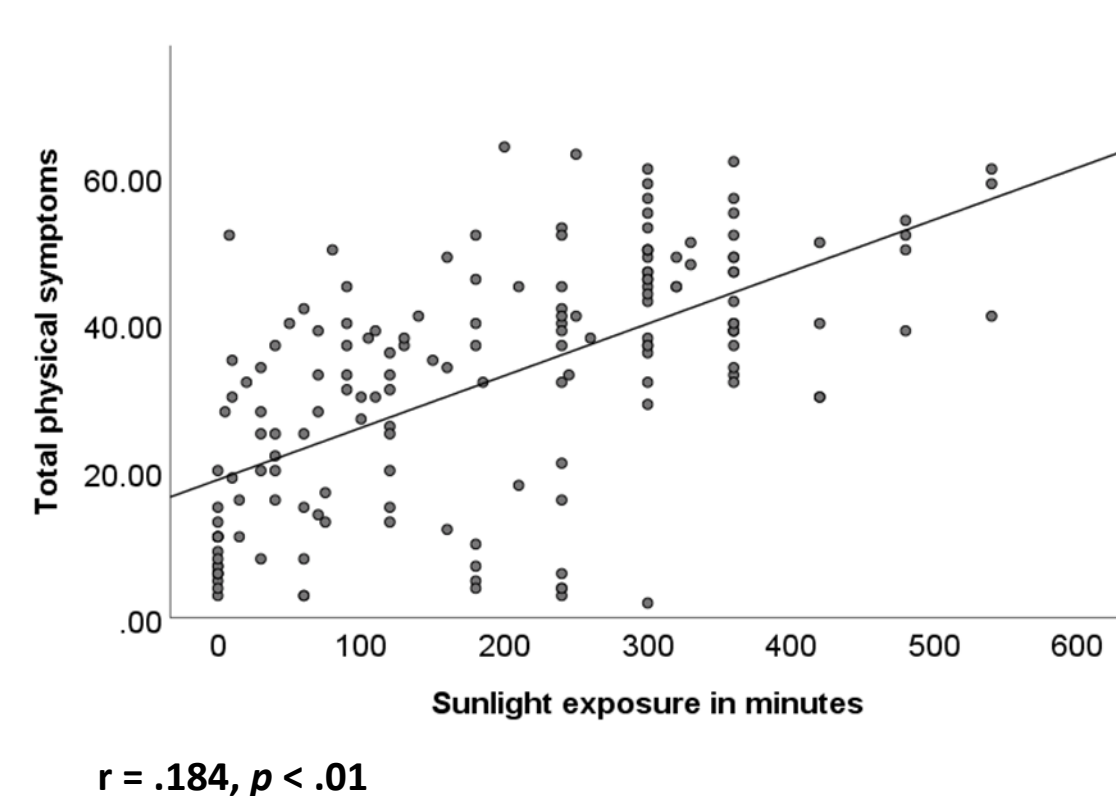
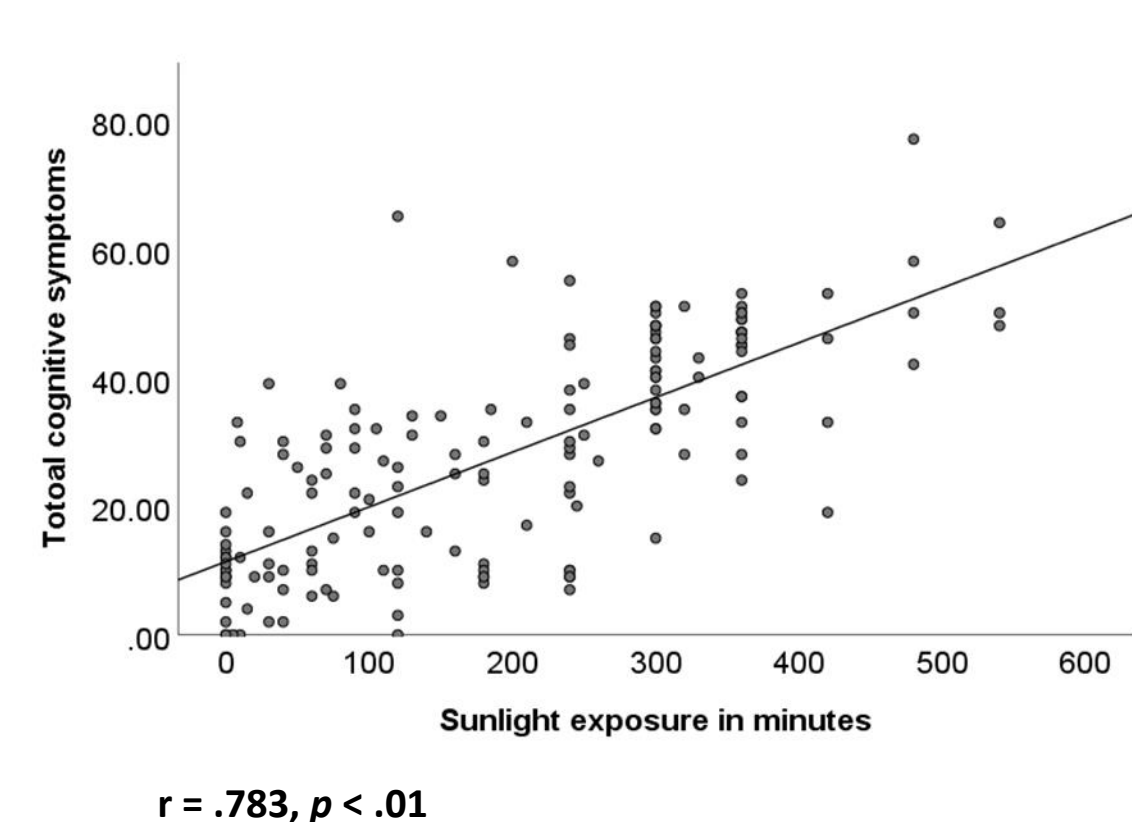
- Increased sunlight exposure will negatively impact patients' experience of both cognitive and physical symptoms.
- Increased sunlight exposure will negatively impact patient's performance on tasks of inhibition.

## Results

Summer 2018



Winter 2019



Summer 2018 vs Winter 2019

Using a one-way ANOVA, we determined that there were statistically significant differences between our two datasets, including differences between total cognitive symptoms reported ( $F = 113.336$ ,  $p < .001$ ), total physical symptoms reported ( $F = 68.250$ ,  $p < .001$ ), and the total amount of sunlight exposure ( $F = 85.240$ ,  $p < .001$ ). Differences in Stroop task score failed to reach significance ( $F = .886$ ,  $p = .349$ ). We additionally found significant differences between specific physical and cognitive symptoms.

## References

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