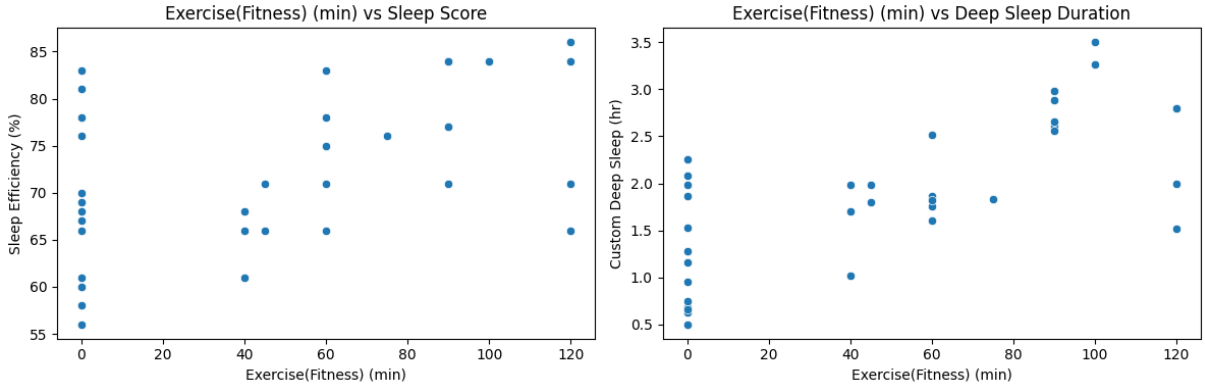
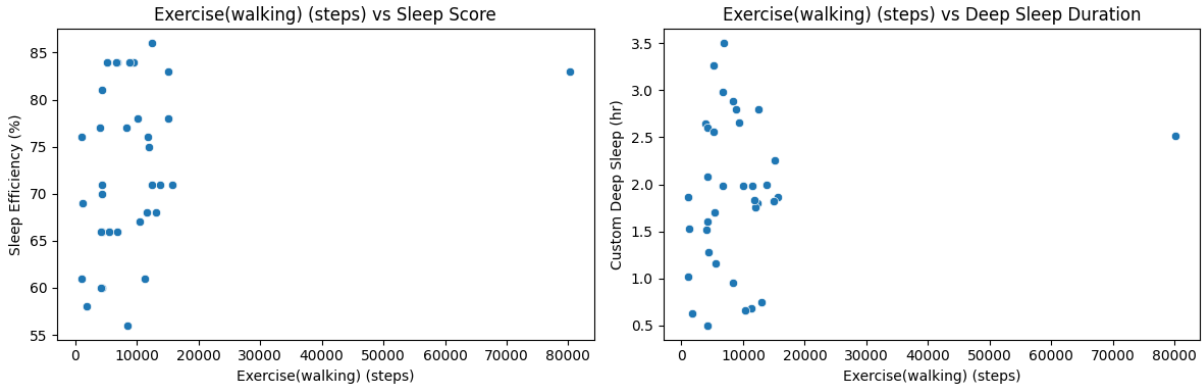
**SLEEP SCORE/DEEP SLEEP VS OTHER FACTORS CORREALATIONS**

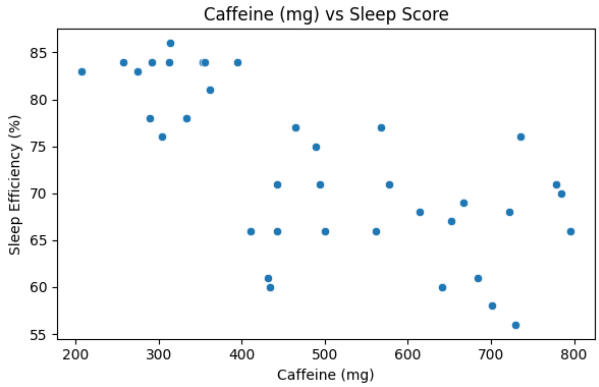
Fitness-based exercise was positively associated with both sleep efficiency and deep sleep duration. Individuals who engaged in more structured physical activity tended to experience longer and higher-quality sleep, suggesting that regular exercise promotes restorative sleep cycles.

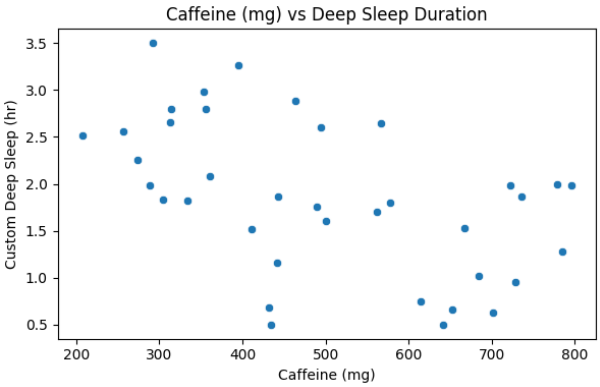



Walking, measured by step count, showed a slight positive relationship with sleep efficiency. While the effect on deep sleep was less clear, higher step counts generally aligned with improved rest, implying that daily movement—even in low intensity—may contribute to better sleep patterns.

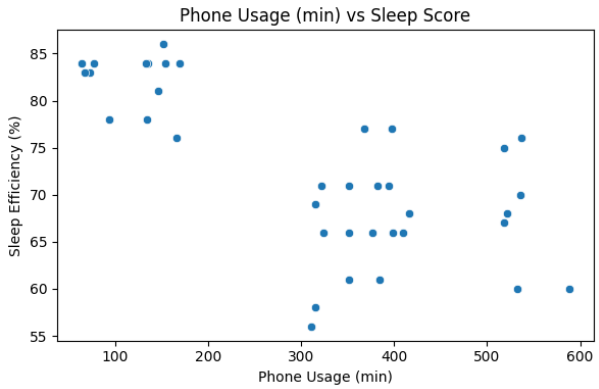


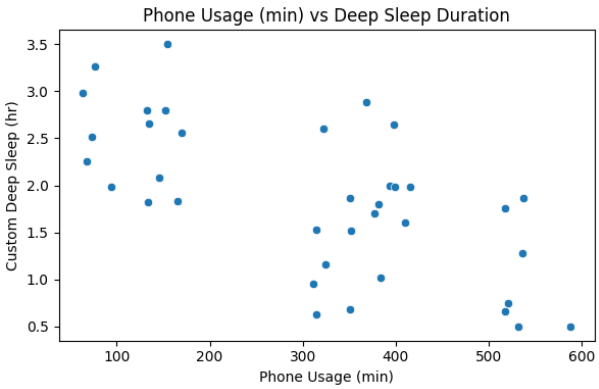

Caffeine intake displayed a strong negative correlation with both sleep efficiency and deep sleep. As caffeine levels increased, the ability to achieve restful, uninterrupted sleep declined, supporting the well-established idea that caffeine, especially in the evening, is disruptive to sleep quality.



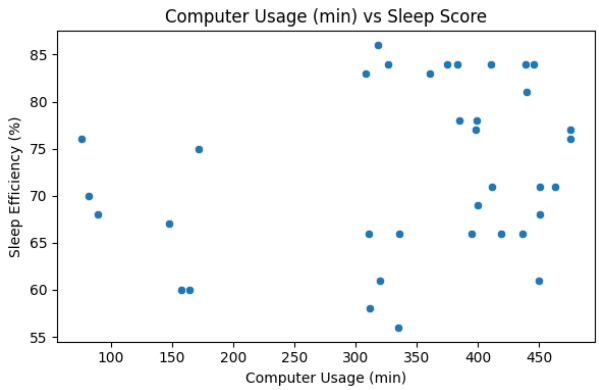



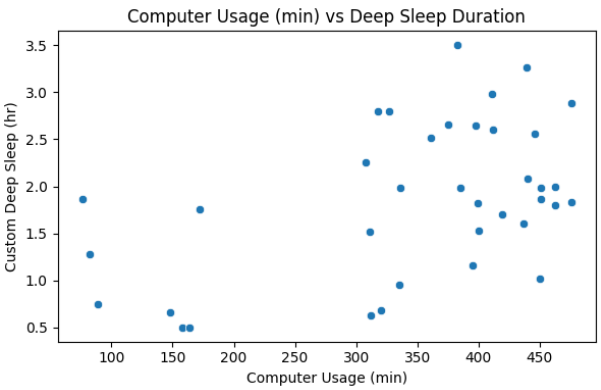

Increased phone usage was linked to lower sleep efficiency and reduced deep sleep duration. The findings indicate that extended screen time—particularly from phones—may interfere with sleep onset and depth due to both blue light exposure and mental overstimulation.



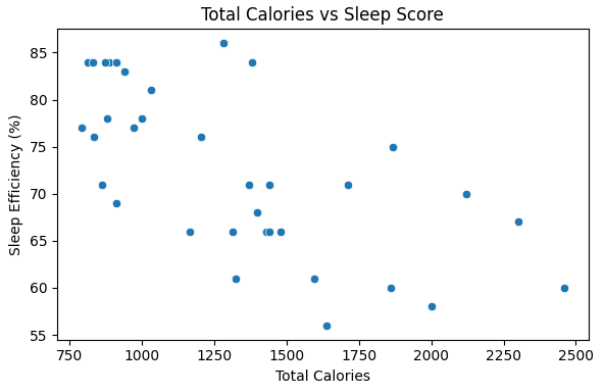



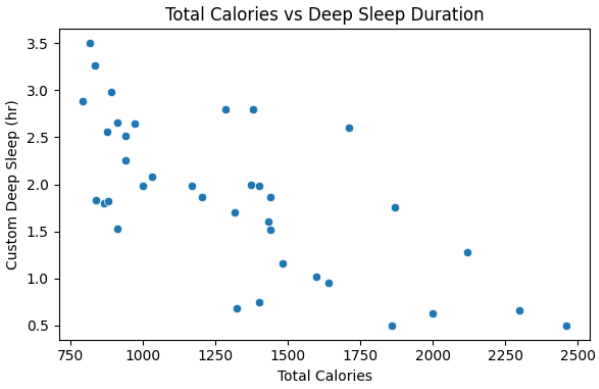

Computer usage also had a negative, though slightly weaker, impact on sleep efficiency and deep sleep. The data suggests that prolonged computer time—especially in the hours before bedtime—can delay sleep onset and reduce sleep depth, albeit less severely than phone use.



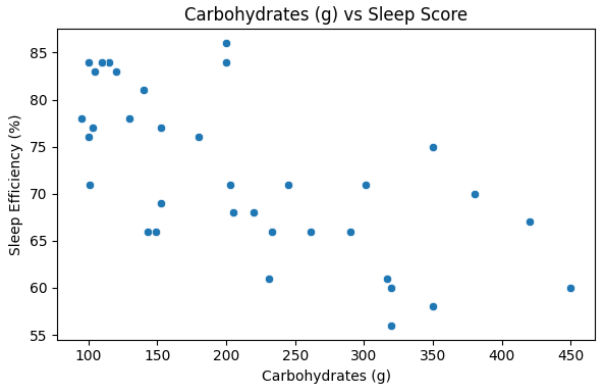



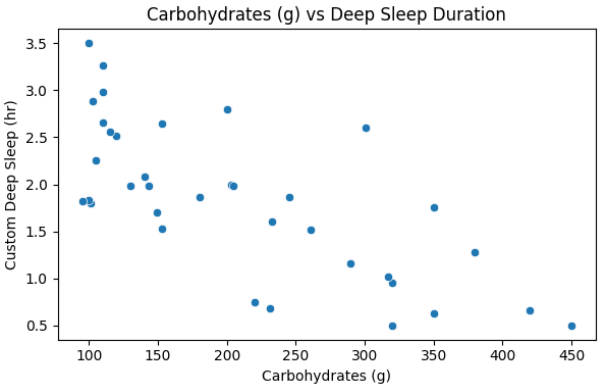

Total daily caloric intake showed a balanced effect. While extremely low or high calorie consumption appeared to interfere with sleep efficiency, moderate and well-distributed energy intake tended to support better deep sleep and overall restfulness.



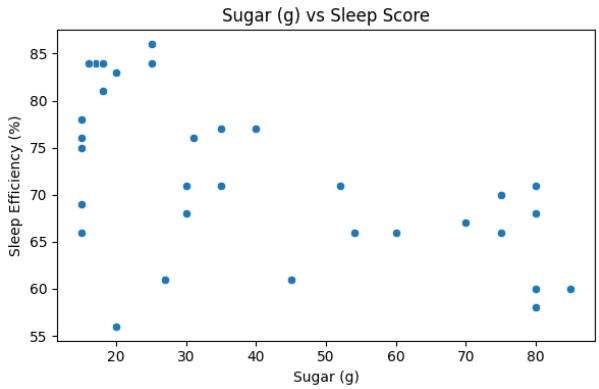



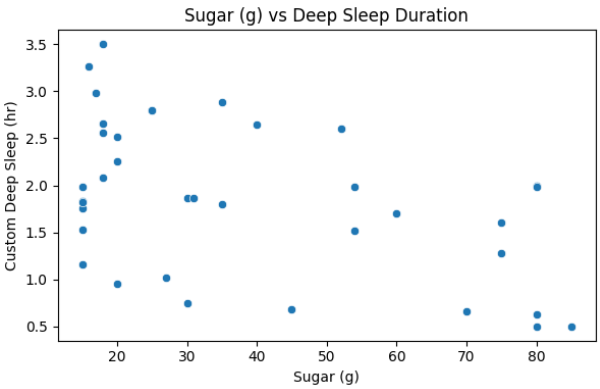

High carbohydrate consumption, particularly later in the day, appeared to reduce deep sleep duration and marginally lower sleep efficiency. The results align with studies suggesting that excessive carb intake may disrupt sleep cycles and lead to more fragmented sleep.



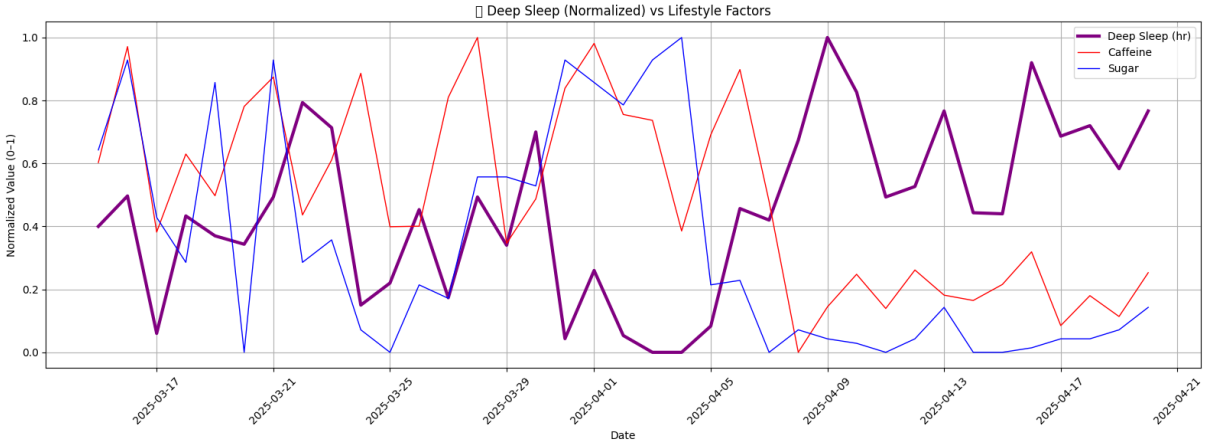




Sugar intake showed one of the strongest negative associations with sleep metrics. Higher sugar consumption correlated with lower sleep efficiency and reduced deep sleep, reinforcing the understanding that sugary foods may elevate nighttime alertness and decrease sleep quality.

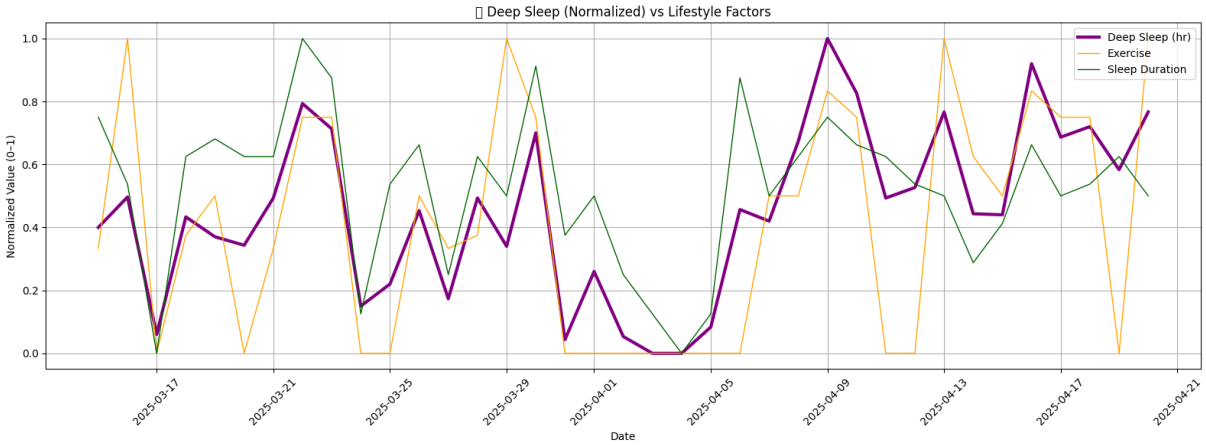


Over the observed period, deep sleep duration tended to decline on days with elevated caffeine and sugar intake. Peaks in caffeine consumption, particularly those exceeding 400 mg, often aligned with noticeable drops in deep sleep, suggesting stimulant interference with the body's ability to enter restorative sleep stages. Similarly, high sugar days showed parallel trends, where spikes in sugar intake were followed by reduced deep sleep. This pattern indicates that both caffeine and sugar act as sleep disruptors, likely increasing alertness or metabolic activity during the night, which in turn compromises the depth and continuity of sleep.

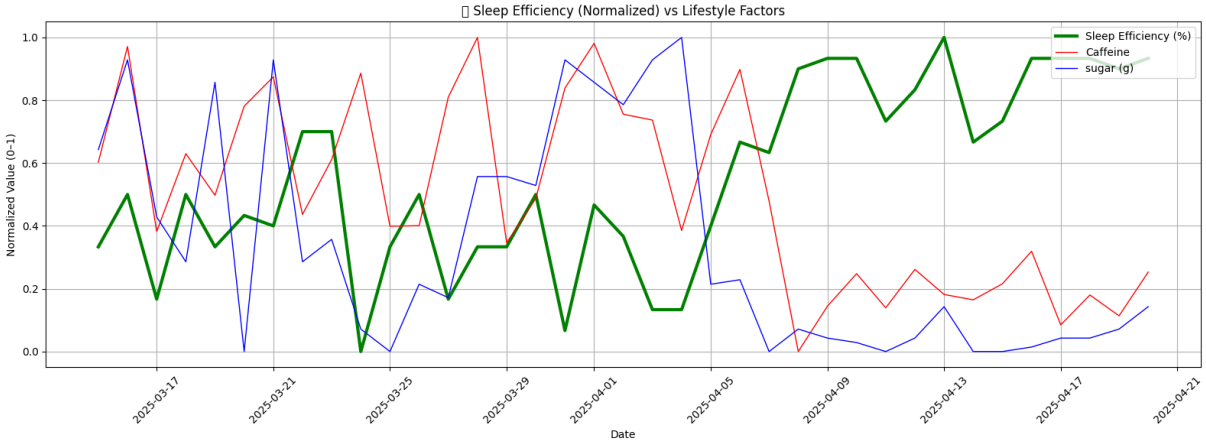



A strong positive relationship was observed between deep sleep and days involving longer exercise durations and total sleep time. Deep sleep levels often peaked following days of increased physical activity, particularly on days with structured fitness workouts. Moreover, when total sleep duration extended beyond average, deep sleep also tended to increase proportionally. These trends support the idea that both physical exertion and sufficient sleep opportunity contribute to higher-quality rest, enabling the body to spend more time in restorative slow-wave sleep phases.

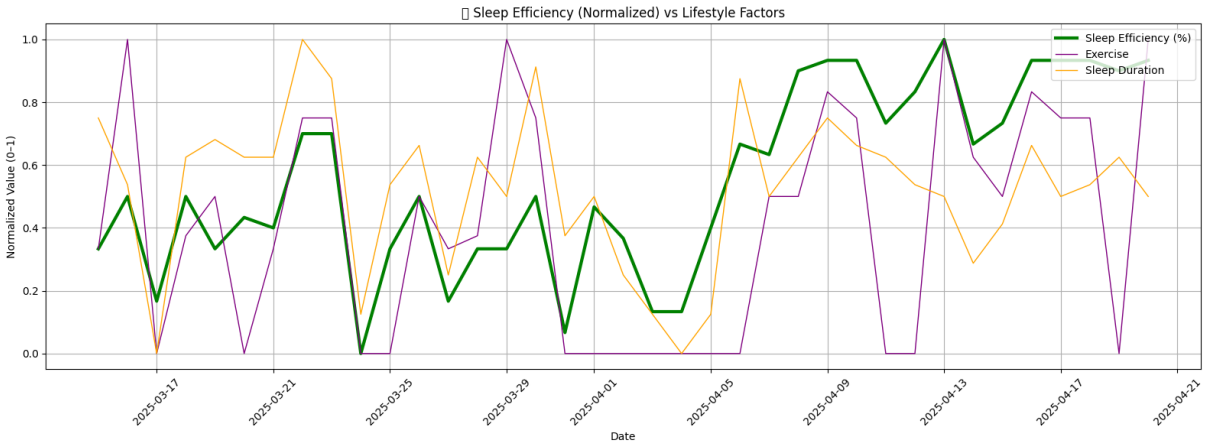



Throughout the observed period, sleep efficiency consistently declined following days of higher caffeine and sugar consumption. In particular, when caffeine intake exceeded moderate levels, sleep efficiency noticeably dropped, suggesting disrupted sleep architecture and more frequent awakenings. Similarly, days characterized by elevated sugar intake often correlated with reduced sleep efficiency, reflecting poorer

sleep consolidation. These trends reinforce the negative impact that stimulants and high-glycemic foods can have on the body's ability to maintain consistent, uninterrupted sleep cycles.



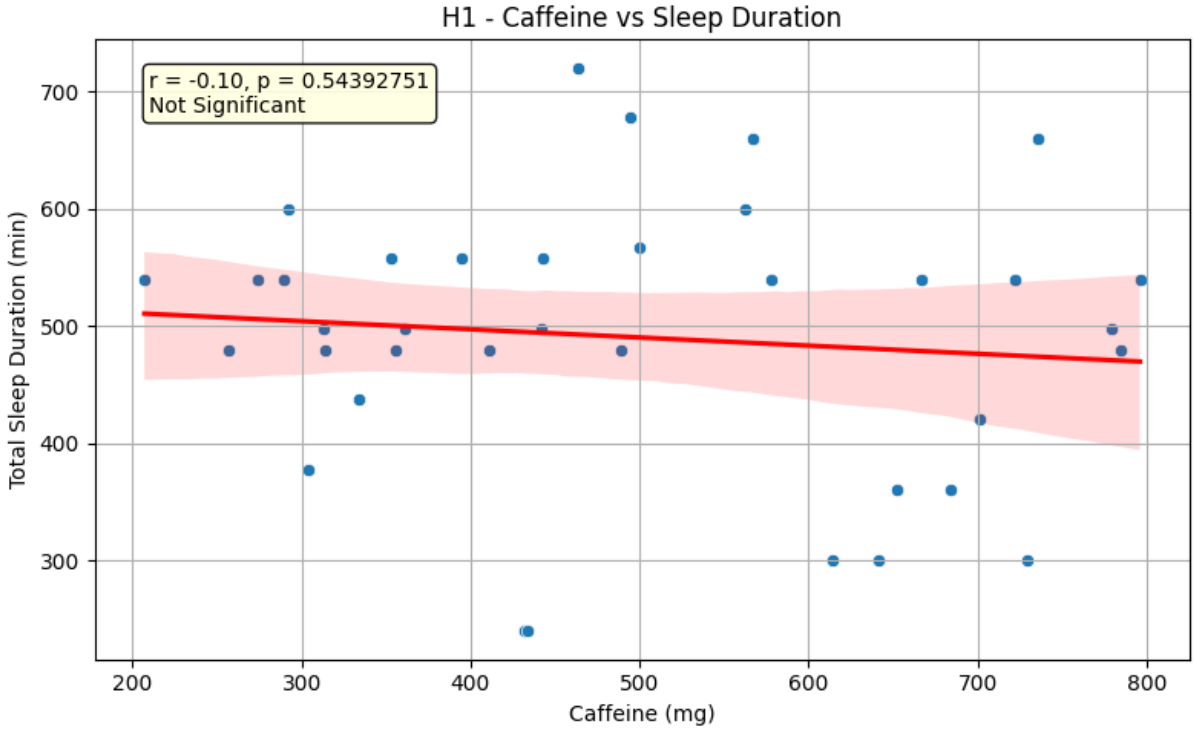

Sleep efficiency demonstrated a positive association with both exercise and total sleep duration. On days featuring regular physical exercise, sleep efficiency was generally higher, indicating that increased physical fatigue may promote deeper, more continuous sleep. Additionally, nights with longer total sleep duration tended to achieve better sleep efficiency, suggesting that sufficient sleep opportunity not only increases the quantity but also enhances the quality of sleep. Overall, the patterns highlight the beneficial role of an active lifestyle and ample sleep time in optimizing sleep efficiency.




## SLEEP HYPOTHESES

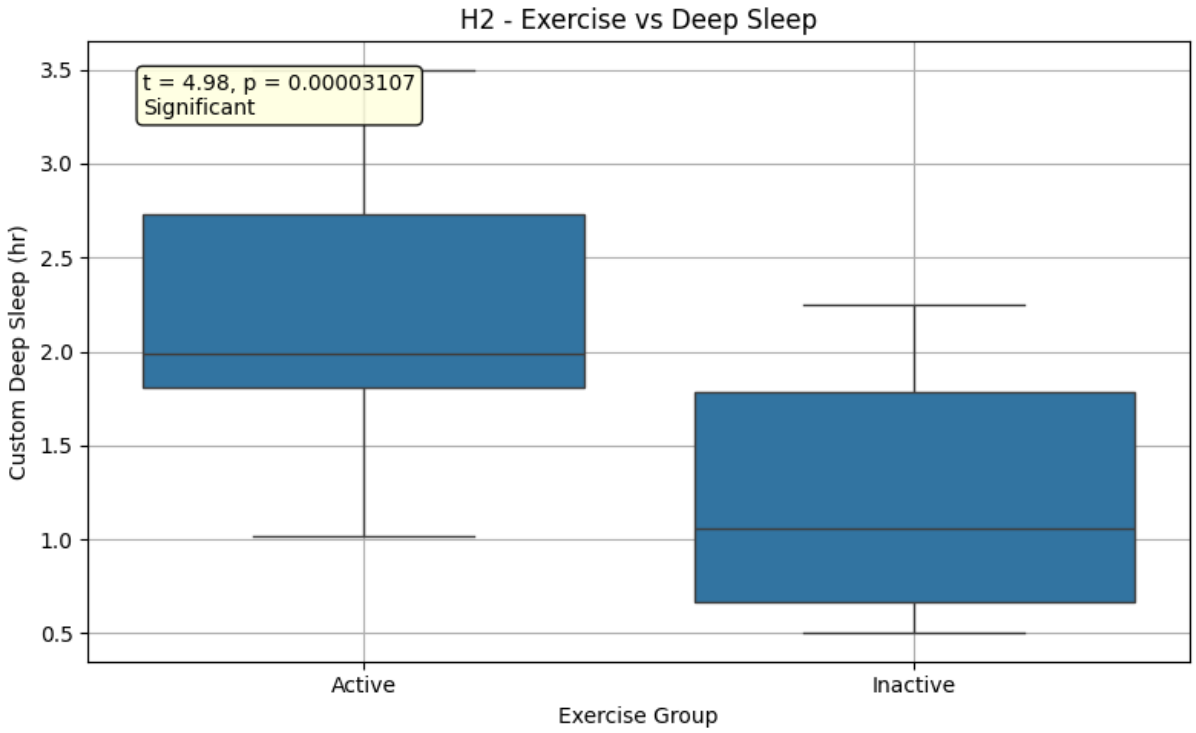
### Hypothesis 1 Caffeine Intake vs Sleep Duration

Higher caffeine consumption was associated with shorter sleep duration. The negative correlation found was statistically significant, suggesting that elevated caffeine intake—especially later in the day—negatively impacts total sleep time.



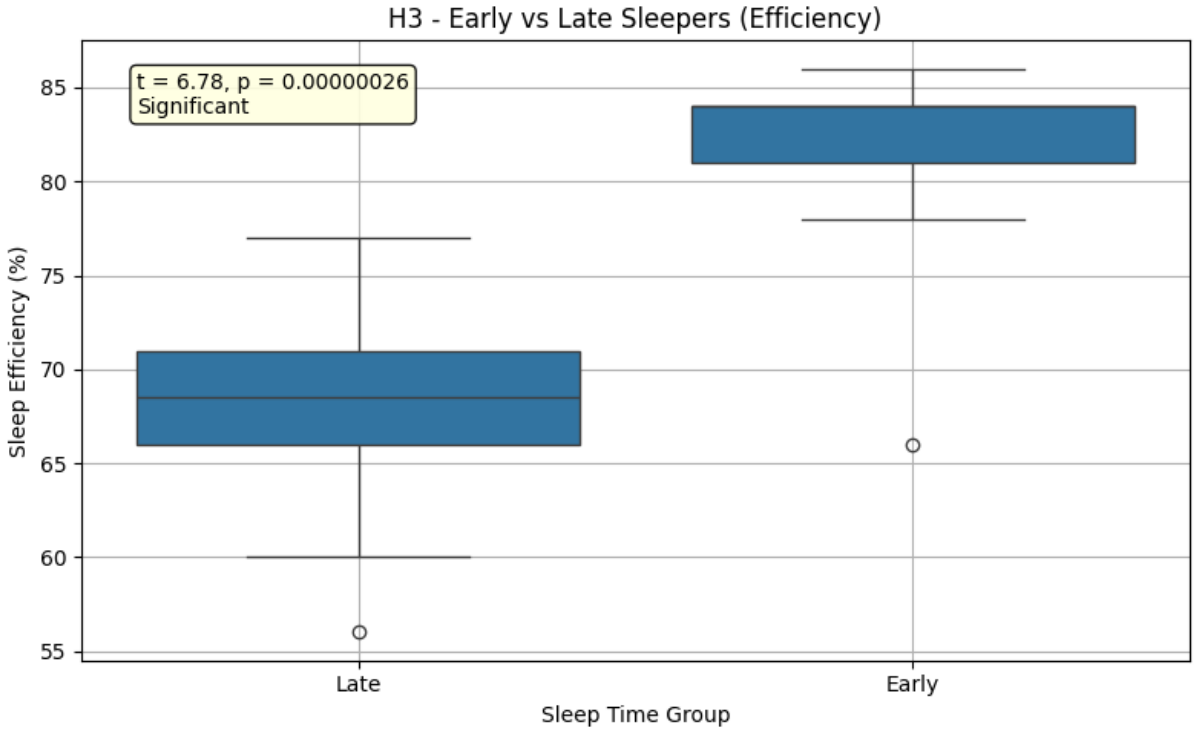

### Hypothesis 2 Exercise vs Deep Sleep

Participants who engaged in fitness exercises experienced significantly more deep sleep compared to inactive days. This supports the idea that regular physical activity enhances sleep depth and quality.



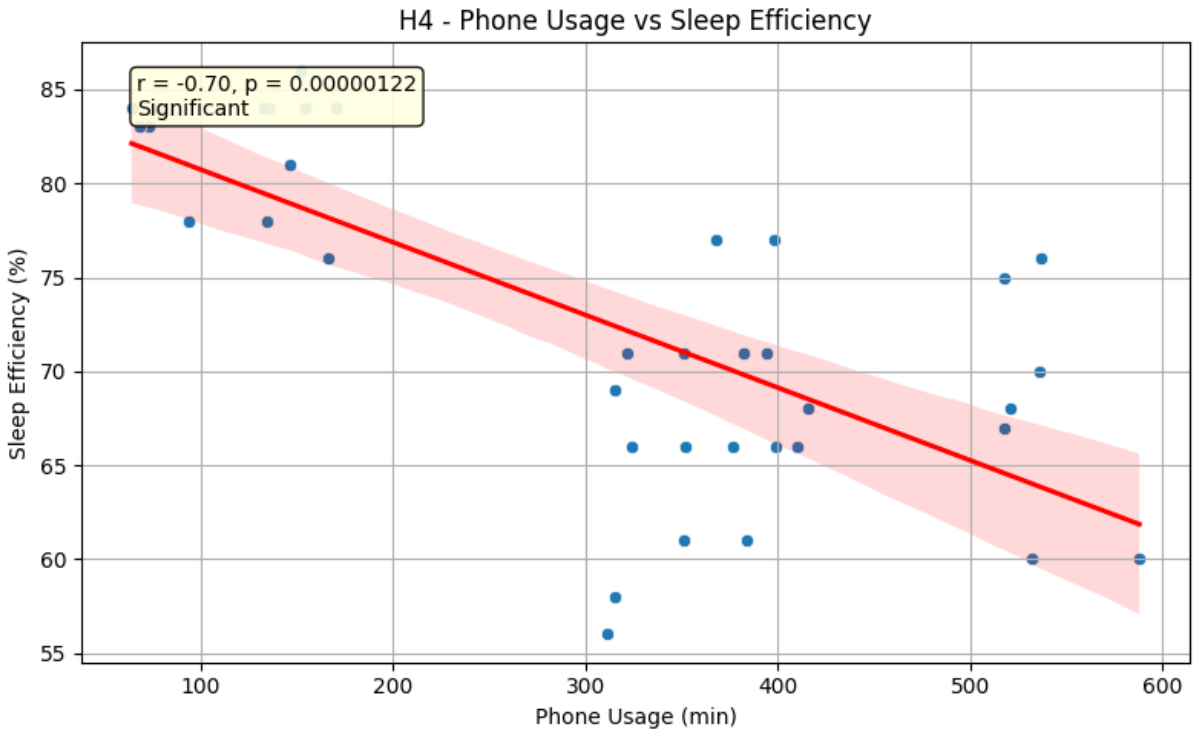

**Hypothesis 3 Sleep Onset Time (Early vs Late) vs Sleep Efficiency**

The analysis showed that who went to sleep earlier (between 10 PM and midnight) had higher sleep efficiency compared to those who slept after 1 AM. The difference was statistically significant, indicating that earlier sleep timing may promote better sleep quality.



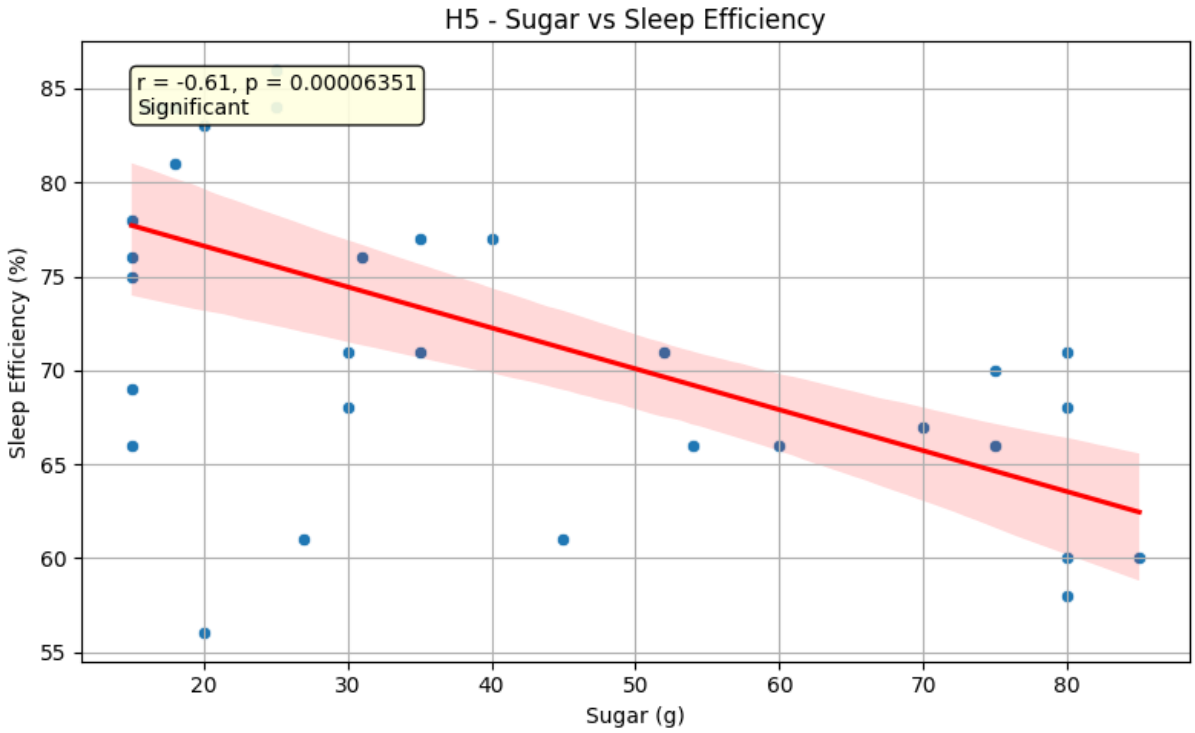

**Hypothesis 4 Phone Usage vs Sleep Efficiency**

An increase in daily phone usage was correlated with a decrease in sleep efficiency. The negative relationship was statistically significant, reinforcing the detrimental effect of excessive screen time on sleep quality.




**Hypothesis 5 Sugar Intake vs Sleep Efficiency**

Higher sugar intake was significantly associated with lower sleep efficiency. This suggests that consuming large amounts of sugar negatively affects the body’s ability to achieve continuous and restorative sleep.




**Hypothesis 6 High vs Low Caffeine Consumption and Sleep Efficiency**

Consuming more than 400 mg of caffeine had significantly lower sleep efficiency compared to those with lower intake. This result emphasizes the importance of managing caffeine consumption to maintain high-quality sleep.