The Effects of Different Types of Light at Night on Learning and Memory

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Introduction

- New technological advancements have increased light pollution at night (Navara & Nelson, 2007)
- Exposure to light at night alters the circadian rhythm leading to poor sleep quality and cognitive dysfunction (LeGates et al., 2014)

Hypothesis

The control group would perform better than both the blue and white light groups.

Method

24 SD rats split into three different lighting conditions: control, blue and white light

Control | Blue light | White light

Results

- Rats traveled shorter distances during the second phase of testing compared to the first phase of testing $F(1,21) = 81.34$, $p < 0.001$.
- Control group spent more time in the platform quadrant than the blue light group ($p = 0.026$).

Figure 2

Mean Distance to Platform

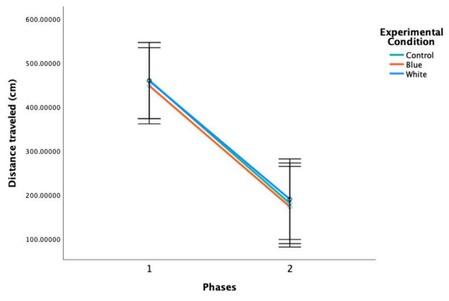
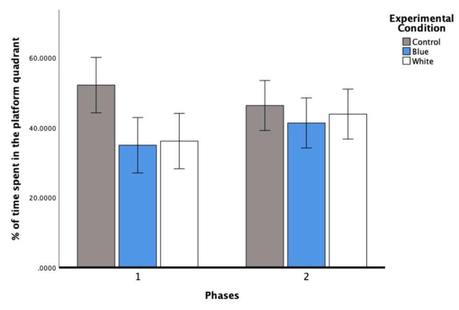


Figure 5

Mean Percentage of Duration in the Platform Quadrant



- Rats preferred the platform quadrant over other quadrants for both percentage of entries $F(3,23) = 32.87$, $p < 0.001$ and percentage of duration $F(3,23) = 55.97$, $p < 0.001$.

Figure 6

Mean Percentage of Frequency of Entries into Each Quadrant

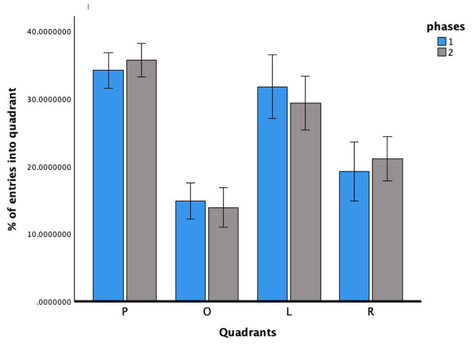
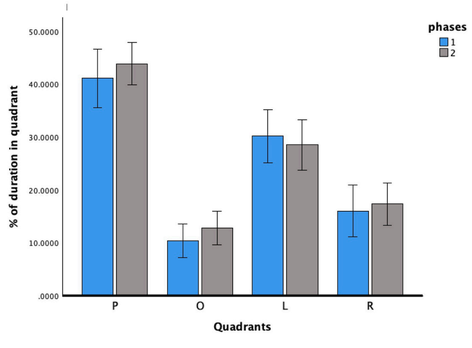


Figure 7

Mean Percentage of Duration in Each Quadrant



Conclusion

- Exposure to light at night did not strongly impact learning and memory performance
- Recovery sleep may restore some cognitive function following sleep deprivation

Future Work

- Increase the sample size
- Engagement (Legaspi, 2025)
- Other types of light, different wavelengths, viewing distance, light intensities, and duration of exposure

References

- LeGates, T. A., Fernandez, D. C., & Hattar, S. (2014). Light as a central modulator of circadian rhythms, sleep and affect. Nature Reviews Neuroscience, 15(7), 443–454.
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- Navara, K. J., & Nelson, R. J. (2007). The dark side of light at night: physiological, epidemiological, and ecological consequences. Journal of Pineal Research, 43(3), 215–224.