The Impacts of Caffeine Tolerance and Sleep Deprivation on Visuospatial Performance

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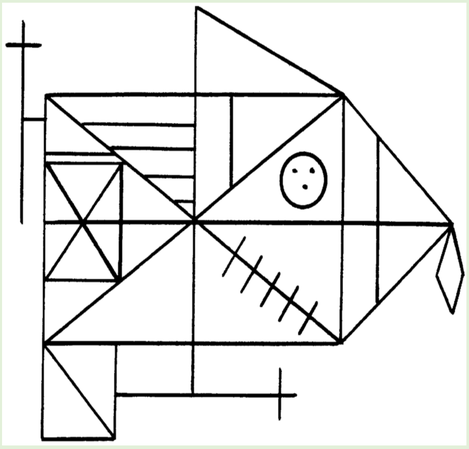
Introduction

- Caffeine intake and quality of sleep are two important factors for college students.
- As reported by the American Psychological Association, “Lower-quality sleep is associated with cognitive problems, as well as a host of physical problems” (Neylan, see Weir, 2017).
- A great deal of research suggests that performance is best for moderate levels of alertness and researchers disagree about whether caffeine helps or hinders our performance on complex tasks (Rogers, Heatherley, Mullings, and Smith, 2012).
- In a study conducted by Hansen, Ramakrishnan, Satterfield, Wesensten, Layton, Reifman, and Van Dongen (2019), the effects of caffeine on creative thinking and problem solving were assessed. In a randomized, placebo-controlled, between-subject, double-blind design, the study investigated the effects of moderate caffeine consumption on creative problem solving and creative idea generation. Participants who consumed 200mg of caffeine, compared to the placebo group, showed significantly enhanced problem-solving abilities.



Rey Figure

Hypotheses

- It is anticipated that individuals who have too little or too much caffeine, relative to their tolerance level, will perform differently on long-term recall of the Rey Figure.
- Main effects of sleep deprivation and caffeine use will also be assessed.

Methods

Participants

- Methodist University Psychology students.

Scales

- Rey Figure: A standardized test that accurately measures working memory and visuospatial abilities.
- Subjects copy and recall the complex figure.
- Epworth Sleep Scale: A widely used measure of sleepiness.
- Caffeine Expectancy Questionnaire: This predicts various caffeine associated features of substance dependence.

Results

- Correlational analyses of the figure recall scores, caffeine survey, Epworth sleep scale, sleep ratings, and tiredness ratings will be performed.
- A repeated measures t-test will assess figure score differences between the copy and recall phases (a control analyses).
- A one-way ANOVA will be performed to assess the Impact of Caffeine level (below tolerance, at tolerance, above tolerance) on figure recall scores.

Key References

- Hansen, D.A., Ramakrishnan, S., Satterfield, B.C., Wesensten, N.J., Layton, M.E., Reifman, J., and Van Dongen, H.P.A. (2019). Randomized, double-blind, placebo-controlled cross over study of the effects of repeated dose caffeine on neurobehavioral performance during 48h of total sleep deprivation. *Psychopharmacology, 236,* 1313-1322. https://doi.org/10.1007/s00213-018-5140-0.
- Rogers, P.J., Heatherley, S.V., Mullings, E.L., and Smith, J.E. (2013). Faster but not smarter: Effects of caffeine and caffeine withdrawal on alertness and performance. *Psychopharmacology, 226,* 229-240. DOI 10.1007/s00213-012-2889-4.
- Weir, K. (2017). The power of restorative sleep. *Monitor on Psychology, 48 (9),* 39, https://www.apa.org/monitor/2017/10/cover-sleep.

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