The Effects of Stress on Working Memory

Kayley Crooke

Introduction

Stress

- Lazarus and Folkman (1984) defined stress as the body’s reaction to life’s demands, which in this reaction the body adapts by adjusting physiologically, emotionally, and behaviorally (as cited by Amirkhan, Urizar, and Clark, 2015).

Effects and Causes of Stress

- Schoenfeld, Brailovskaja, Bieda, Zhang, and Margraf (2015) found that daily stressors can have a powerful effect in causing negative mental health. The researchers found that perceived self-worth can mediate the relationship between stress and mental health, suggesting buffers to reduce negative effects (Schoenfeld et al., 2015).
- Dobbs, Furham, and McClelland (2011) studied test performance under different noise conditions. The researchers found that there was greater performance in complete silence than there was in situations with background noise and music (Dobbs et al., 2011).

Working Memory

- Researchers have discovered evidence supporting the fact that unpleasant disruptions affect information in people’s working memories (Garcia-Pacios, Del Rio, and Maestu, 2014).
- Vasques, Garcia, and Galera (2016) found that visuospatial working memory can be impaired due to extraneous sensory influences. Specifically, the visual-noise interference affected the ability for participants to perform as well in the Matrix Pattern Recall Task, which uses your working memory (Vasques, Garcia, and Galera, 2016).

Stress and Working Memory

Oliver, Pinney, Maruff, and Norman (2015) studied the effects of psychosocial stress on healthy college student’s working memory. The researchers found that their stress procedure, which was public speaking, did have impairments on their spatial working memory (Oliver et al., 2015).

Hypothesis

It is hypothesized that the alarm sound stressor that is played during the second Spatial Span Memory test will cause the scores to decrease from the first test scores without the stressor.

Method

Participants

- \( N = 10 \) students from Eastern Connecticut State University
- 40% Male (\( n = 4 \)), 60% Female (\( n = 6 \))
- 10% Freshman (\( n = 1 \)), 40% Sophomore (\( n = 4 \)), 20% Junior (\( n = 2 \)), 30% Senior (\( n = 3 \))
- 90% Caucasian (\( n = 9 \)), 10% Hispanic/Latino/Latina (\( n = 1 \))
- Mean Age: 19.75 (SD = 1.44)

Materials

- Cambridge Brain Science’s Spatial Span Memory Test (online)
- Test visuospatial memory (working memory)
- Higher score will demonstrate better working memory on the task
- The mean difference between the first and second scores were .40
- Alarm Sound Video from Youtube (modern alarm)
- A continuous alarm sound played during the second test

Procedure

- Enter room and go to computer
- Give brief directions
- Read instructions and begin the Spatial Span test until finished
- Record score for the memory test
- Then do the Spatial Span test again while alarm is played in the room
- Record score for the second memory test

Results

- IBM SPSS 22
- Mean Values: Spatial Span Memory Test: Score 1. \( M = 6 \) (SD = .47); Score 2. \( M = 5.6 \) (SD = .84).
- A Wilcoxin Signed Ranks Test was calculated
- There was not a statistically significant difference between the first and second memory scores (\( Z = -1.63, p = .10 \)).

Discussion

Summary

- There was not a statistically significant different found between the first and second Spatial Span Memory Test scores.
- Therefore the alarm sound stressor did not have a statistically significant impact on working memory.

Limitations

- Small sample size
- The Spatial Span Memory Test scored the results very generally.
- The alarm sound that was chosen may not have been annoying and stressful enough to effect the performance on the Spatial Span Memory Test.
- Time available

Future Directions

- Use a larger sample size
- The scoring of the Spatial Span Memory Test could be adjusted to gain more specific scores, such as levels that the errors occurred. Also instead of having three opportunities for incorrect responses, the test could be scored after one incorrect response.
- Could also use a different type of memory test
- A more intrusive and stress inducing noise could be used, such as a video of other communication.

References