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A Replication and Analysis of Tetris Intervention for Intrusive Memories

Intrusive trauma memories are a common yet distressing symptom of posttraumatic stress disorder (PTSD). In an attempt to find accessible early interventions for PTSD, researchers have recently investigated ways to disrupt the formation of these memories soon after trauma occurs. One promising approach, led by Professor Emily Holmes and her colleagues, involves using the video game Tetris as an intervention. The theory is that playing Tetris, a game that heavily relies on visuospatial processing, will compete with and potentially prevent the consolidation of traumatic sensory-perceptual memories.

Summary of the Study

The original study, titled *Reducing intrusive memories after trauma via a brief cognitive task intervention in the hospital emergency department (Kanstrup, Singh, & Holmes, 2021)*, tested whether a visuospatial task could reduce the frequency of intrusive memories in recently traumatized individuals by setting up a randomized controlled trial was conducted in a Swedish hospital's emergency department. The researchers recruited 41 adults who had experienced a Criterion A traumatic event and presented to the emergency room within the prior 72 hours.

Participants were required to be fluent in Swedish, over 18, alert and oriented, and physically able to use a smartphone, which was the delivery method for both the intervention and control tasks. Participants were randomly assigned to one of two groups: 22 received the Tetris-based intervention, while 19 listened to a neutral podcast on a Swedish radio app. The intervention consisted of a brief reminder of the traumatic event, followed by 20 minutes of Tetris gameplay. Participants tracked the number of intrusive memories they experienced each day using a diary during week one (the primary outcome) and again at week five (a secondary outcome), with other PTSD symptoms recorded as additional measures.

Why I Chose this Study

I chose this study for replication because it was well-suited for reproduction and analysis. Its smaller sample size and the two-condition design made it easier to manage. I also personally contacted Professor Emily Holmes, who directed me to publicly available datasets and materials used in the original study, which was especially helpful given that many psychological studies do not share their original data. The article also specified that data analyses were conducted in R, with power and sample size estimations performed using STATA. Importantly, the study connects well with course concepts like randomization, blocking, factorial designs, and the analysis of variance.

Results of the Study

Results showed that participants in the Tetris condition reported fewer intrusive memories at both time points, so the findings support the theory that visuospatial cognitive interference can disrupt the consolidation of traumatic memories, potentially offering a scalable early intervention for post-traumatic stress symptoms. The Tetris group reported significantly fewer intrusive memories than the control group; at week 1, they averaged 3.85 vs. 7.37 intrusions (48% difference, $d = 0.43$), and at week 5, they reported 0.28 vs. 2.89 (a 90% reduction, $d = 0.57$).

Step by Step of My Analysis

To replicate and explore the findings of Kanstrup et al. (2021), I began by loading the original dataset, which was provided in SPSS (.sav) format. I used the haven package in R to read the file and converted it to a CSV. From there, I worked in R using tidyverse tools (dplyr, psych) and additional packages like effsize for effect size calculation. After importing the data, I first verified that group assignments were correctly labeled by converting the Condition variable into a factor: “1” for the intervention group (Tetris) and “2” for the control group (podcast). I then explored the dataset to identify the main outcome variables of interest:

Intrusions_diary_w1_total (the number of intrusive memories recorded during the first week) and Intrusions_diary_w5_total (at week five).

I calculated descriptive statistics for each group using the describe() function from the psych package. This gave me the sample size, mean, and standard deviation per condition. I then

used the `cohen.d()` function from the `effsize` package to compute standardized mean differences (Cohen's d) and their 95% confidence intervals.

To efficiently analyze multiple psychological and clinical outcome variables such as anxiety (HADS-A), depression (HADS-D), sleep (SRHR), concentration disruption, and the IES-R subscales, I created a custom R function called `compute_summary()`. This function automated the process of calculating descriptive statistics (mean, standard deviation, sample size), Cohen's d, and its confidence intervals for each outcome. Importantly, the function used variable-specific listwise deletion, meaning that participants with missing data for a given variable were excluded only from that specific analysis, not from all others. This approach ensured consistency across analyses while maximizing the use of available data. The results showed a consistent pattern: participants in the Tetris intervention group generally reported better mental health outcomes than those in the control group.

One challenge I encountered was the small sample size ($N = 41$), which limited the statistical power and widened confidence intervals. Additionally, because the primary outcome relied on self-reported daily diaries, it assumed that participants recorded intrusive memories consistently and honestly, which can be a limitation. However, the fact that I could reproduce the key patterns and replicate the descriptive and inferential findings reinforces the reliability of the original study's methodology and shows how experimental psychology data can be handled effectively in R. The output summary statistics table replicated the original study's results, including means, standard deviations, group sizes, and effect sizes for all reported outcome variables. This exact match suggests that the data were processed and analyzed consistently with the procedures described by Kanstrup et al. (2021). For week 1 intrusions, the intervention group

had fewer intrusions ($M = 3.85$, $SD = 8.57$) than the control ($M = 7.37$, $SD = 7.88$), with a small to medium effect size ($d = 0.43$). At week 5, the difference was even larger: intervention ($M = 0.28$, $SD = 0.57$) vs. control ($M = 2.89$, $SD = 6.43$), a medium effect size ($d = 0.57$).

Critical Reflection

A key strength of the study is its real-world applicability. By testing a simple cognitive task in an emergency department setting, the intervention has the potential to offer an immediate, scalable solution for mitigating intrusive trauma memories. It was encouraging to see that, despite working independently with raw data, my R-based analysis could recreate the core statistical results, lending further credibility to the intervention's effect and to the reproducibility of psychological research when proper documentation and materials are provided. However, there are limitations to consider. One of the major drawbacks is the short follow-up period. The study only collected data on intrusive memories at weeks 1 and 5 post-trauma. A longer follow-up would help determine whether the intervention has sustained effects or whether the reduction in intrusive memories is temporary. Future studies with larger samples and longer follow-ups could solidify its clinical relevance and explore generalization to other trauma populations. This study also ties into course concepts, particularly with its emphasis on statistical analysis in R. Through the use of functions for calculating descriptive statistics, Cohen's d, and confidence intervals, the study allowed me to practice the application of R to real-world data analysis. Moreover, by using a custom R function to streamline the analysis and handle missing data through listwise deletion, I was able to deepen my understanding of data cleaning, statistical computation, and the importance of reproducibility in scientific research. This project reinforced

the course's focus on utilizing R as a tool for conducting rigorous and transparent analysis in experimental psychology.

Works Cited

Kanstrup, Marie, Lalitha Singh, Karin E. Göransson, and Emily A. Holmes. "Reducing Intrusive Memories after Trauma via a Brief Cognitive Task Intervention in the Hospital Emergency Department: An Exploratory Pilot Randomised Controlled Trial." *Translational Psychiatry*, vol. 11, no. 1, 2021, article 30.
<https://doi.org/10.1038/s41398-020-01124-6>.