INTERNATIONAL GRADUATE COLLOQUIUM

i-SPEAK 2025

SPORTS AND PHYSICAL EXERCISE ASSEMBLY OF KNOWLEDGE SHARING

COLLOQUIUM PROCEEDINGS

EXTENDED ABSTRACT

EDITOR | ADAM LINOBY

IMPACT OF COGNITIVE TAXING TASK TOWARDS WORKING MEMORY OF VIDEO GAMERS AND NON-GAMERS

Amielia Natasya Mohd Zaid, Muhammad Ariff Munshir Mohd Pozi, Muhammad Haiqal Zainuddin, Muhammad Hariz Mohd Nizam, Muhammad Isamuddin Zani, Mardiana Mazaulan, & Muhamad Noor Mohamed*

Faculty of Sports Science and Recreation, Universiti Teknologi MARA, Negeri Sembilan Branch, Seremban Campus, Negeri Sembilan, MALAYSIA

*Corresponding author: muhamad_noor@uitm.edu.my

Keywords: Action video games, Working memory, Cognitive taxing tasks, Gamers vs. non-gamers, Cognitive resilience

I. Introduction

This study examines the effects of cognitive taxing tasks on working memory among gamers and non-gamers. By investigating performance disparities between these groups, the research highlights the potential cognitive advantages linked to gaming by emphasizing working memory as a critical cognitive function, this study aims to uncover how gaming experience may shape resilience to mental fatigue induced by demanding tasks [1].

II. Methods

The present study utilized a pre-and-post experimental design to compare gamers (n = 15) and non-gamers (n = 15) under cognitive fatigue and control conditions. Participants experienced two conditions: cognitive fatigue induced by the 45-minute modified Stroop Test and the control condition, watching a documentary entitled 'NASA's Cassini Mission' for 45 minutes. The N-back test was utilized to seek differences between groups to indicate memory status by evaluating the number or correct, incorrect and miss answers between different time frame. Paired Sample T-test was conducted to seek the effect of time within groups with statistical significance was set at ($p < 0.05$). A magnitude of mean difference was further assessed to seek differences between groups.

III. Results and Discussion

A. Mean gamers and non-gamers

A significant difference between the performance of gamers (-0.95 ± 2.20) and non-gamers (-1.09 ± 2.44), was found only in answering the correct value. Although significant, both group showed a decrement of post performance compare to pre, indicating memory disruption do occurs after a cognitive taxing task [2]. Figure 1 indicates the performance of gamers and non-gamers in three categories, correct, incorrect, and miss, both before (*pre*) and after (*post*) the n-back task. Correct answers: although showing a decremental pattern, gamers consistently had more accurate answers than non-gamers in both pre and post-conditions. For the incorrect answers, incorrect answers are similar between gamers and non-gamers. Missed results of non-gamers show a noticeable increase in missed answers after the task compared to gamers. Gamers have fewer missed answers overall, indicating better-sustained attention. The conclusion for the bar graph is that gamers perform better than non-gamers in maintaining accuracy and focus even after mentally taxing tasks. Non-gamers show more decline, particularly in missed answers, suggesting they are more affected by cognitive fatigue.

B. Significant level

The table presents the t-scores and significance values for three conditions (correct, incorrect, and miss) among two group:, gamers and non-gamers.Gamers: t = 2.436, p = 0.02, while for non-gamers, t = 2.217, p = 0.038. These were the only significant changes occurs, suggesting that gamers and non-gamers do affected by cognitive taxing task, further analysis showed that non-gamers were affected more.

TABLE I
Paired Sample TestWithin Group of Gamers and Non-gamers

		Gamers	Non-Gamers
Correct	t	2.436	2.217
	p-value	0.024*	0.038*
Incorrect	t	0.420	2.217
	p-value	0.678	0.244
Missed	t	1.191	-1.127
	p-value	0.247	0.272

*($p < 0.05$).

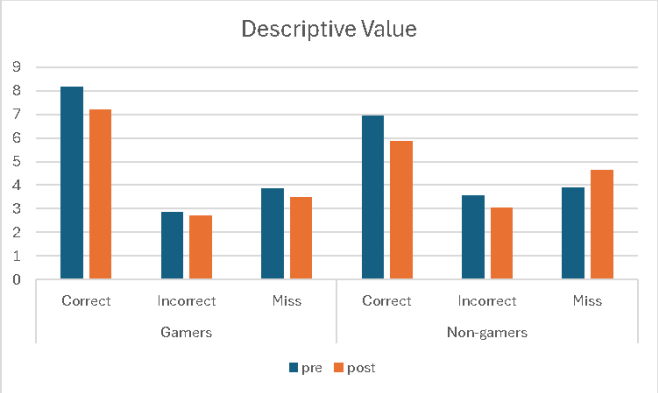

Fig. 1 Mean differences of N-back test between gamers and non-gamers.

IV. Conclusions

The current study indicated that there is a significant difference in terms of memory between gamers and non-gamers. It has been shown that gamers' correct answers are slightly significantly higher compared to non-gamers'.

Acknowledgment

The authors gratefully acknowledge the participation of students from Universiti Teknologi MARA, Negeri Sembilan, Malaysia, in this research.

References

[1] Anandhi, A., Frei, A., Pierson, D. C., Schneiderman, E. M., Zion, M. S., Lounsbury, D., & Matonse, A. H. (2011). Examination of change factor methodologies for climate change impact assessment. *Water Resources Research*, 47(3).

[2] Engelhard, I., van Uijen, S., & van den Hout, M. (2010). The impact of taxing working memory on negative and positive memories. *European Journal of Psychotraumatology*, 1(1), 5623.