

INTERNATIONAL GRADUATE COLLOQUIUM

i-SPEAK **2026**

**SPORTS AND PHYSICAL EXERCISE
ASSEMBLY OF KNOWLEDGE SHARING**

SERIES 1. 2026

COLLOQUIUM PROCEEDINGS

EXTENDED ABSTRACT



Malaysia, 10 February 2026



eISBN 978-629-7989-01-3



A Comparison Between Action Video Game Players and Non-Players on Working Memory Abilities

Nur Ain Abd Ghani¹, Raja Nurul Jannat Raja Hussain¹, Muhamad Noor Mohamed¹, Muhamad Safiq Saiful Annur¹, Mardiana Mazaulan¹, Maisarah Shari², & Noor Azila Azreen Md Radzi^{1*}

¹Faculty of Sports Science and Recreation, Universiti Teknologi MARA Negeri Sembilan, Seremban Campus, Malaysia

²Faculty of Sports Science and Recreation, Universiti Teknologi MARA Shah Alam, Malaysia

*Corresponding author: azila_azreen7172@uitm.edu.my

Keywords: Video Gaming, Gamers, Non-Gamers, Verbal Working Memory, Visual-Spatial Working Memory, Cognitive Performance

I. INTRODUCTION

Working memory is a fundamental component of higher-order cognitive functioning. It enables the temporary storage and manipulation of information required for learning, problem-solving, and decision-making [1]. The system includes verbal working memory, which processes language and numerical information, and visual-spatial working memory, which supports visual and spatial processing. Attention plays a critical role in maintaining and updating relevant information during cognitive tasks [2]. Action video games place high demands on attention, rapid information processing, and simultaneous management of multiple stimuli, all of which are closely related to working memory [3]. Although some studies report cognitive benefits associated with action video game play, findings remain inconsistent, particularly for verbal working memory. In addition, many studies do not clearly distinguish between game genres or specific working memory components [4]. Therefore, the present study aimed to compare verbal and visual-spatial working memory performance between action video game players and non-players.

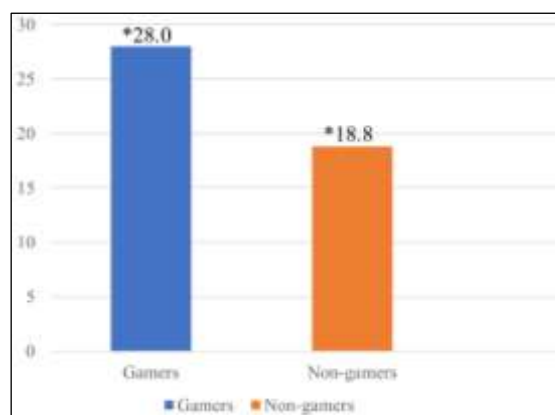
II. METHODS

A total of 42 male participants aged between 18 and 25 years were recruited for this study, comprising 21 action video game players and 21 non-players. Participants were screened before enrolment using a video game experience questionnaire. Individuals were classified as gamers if they reported playing video games for at least 1 hour per day, 5 days per week, for a minimum of 1 year. Weekly gaming duration was further assessed using a self-report multiple-choice questionnaire with five response options ranging from none or less than 1 hour to 4 hours or more per day on weekdays. Participants who did not meet these criteria were assigned to the non-gamer group. All participants reported being free from cognitive and physical impairments. Working memory performance was assessed using two standardised measures. Verbal working memory was evaluated using the Digit Span Test, while visual-spatial working memory was measured using the

Corsi Block Tapping Test. Each test was administered with two trials under standardised conditions. independent samples t-tests were performed to compare verbal and visual-spatial working memory performance between gamers and non-gamers.

III. RESULTS AND DISCUSSION

Figure 1 indicates that gamers ($M = 28.0$) achieved significantly higher scores than non-gamers ($M = 18.8$) on the verbal working memory task ($p < 0.05$), demonstrating a clear group difference. This finding suggests that regular engagement in action video games is associated with an enhanced ability to recall and manipulate verbal information.

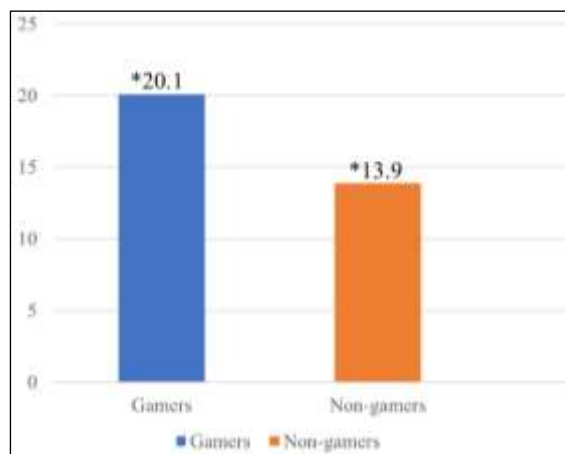


* $p < 0.05$

Fig. 1. Comparison of mean verbal working memory scores between gamers and non-gamers

One plausible explanation relates to the cognitive demands inherent in action video games. These games require players to follow complex instructions, process auditory cues, and retain sequences of objectives in real time. Such demands may strengthen the central executive component of working memory, particularly attentional control and information updating processes. In addition, frequent multitasking and rapid attentional shifts during gameplay may promote cognitive flexibility and more efficient encoding strategies. These adaptations may transfer to improved performance on verbal

working memory measures such as the Digit Span Test. This interpretation aligns with previous research reporting that action video game players demonstrate superior attentional control and faster cognitive processing, both of which are linked to enhanced memory performance [3][5].



* $p < 0.05$

Fig. 2. Comparison of mean visual-spatial working memory scores between gamers and non-gamers

Similarly, Figure 2 shows that gamers ($M = 20.1$) outperformed non-gamers ($M = 13.9$) on the visual-spatial working memory task ($p < 0.05$). This finding indicates stronger spatial information processing and manipulation among gamers. Action video games often require navigation through complex environments, tracking multiple moving objects, and making rapid spatial decisions under time constraints. These repeated demands may enhance visual attention, spatial awareness, and the ability to update spatial representations. Improved reaction time and hand-eye coordination developed through gameplay may also support more efficient spatial processing. This pattern aligns with previous research reporting enhanced visual attention and visual-spatial working memory among action video game players [4].

IV. CONCLUSIONS

The findings indicate that experience with action video games is associated with enhanced core cognitive functions, particularly working memory across both verbal and visual-spatial domains. These results suggest that repeated exposure to cognitively demanding gaming environments may contribute to improvements in attentional control, information updating, and memory processing efficiency. Future research should include larger and more diverse samples to improve generalisability. Longitudinal and experimental designs are also needed to determine whether gaming experience directly enhances cognitive performance and to examine the long-term stability of these effects.

ACKNOWLEDGMENT

The author would like to express sincere appreciation to all participants who took part in this study and completed the assessments. Special thanks are also extended to the university management, lecturers, and Universiti Teknologi MARA (UiTM) for their cooperation, guidance, and support throughout the data collection process.

REFERENCES

- [1] Baddeley, A. D. (2003). Working memory: Looking back and looking forward. *Nature Reviews Neuroscience*, 4(10), 829–839.
- [2] Cowan, N. (2014). Working memory underpins cognitive development, learning, and education. *Educational Psychology Review*, 26(2), 197–223.
- [3] Green, C. S., & Bavelier, D. (2012). Learning, attentional control, and action video games. *Current Biology*, 22(6), R197–R206.
- [4] Bediou, B., Adams, D. M., Mayer, R. E., Tipton, E., Green, C. S., & Bavelier, D. (2018). Meta-analysis of action video game impact on perceptual, attentional, and cognitive skills. *Psychological Bulletin*, 144(1), 77–110.
- [5] Boot, W. R., Kramer, A. F., Simons, D. J., Fabiani, M., & Gratton, G. (2008). The effects of video game playing on attention, memory, and executive control. *Acta Psychologica*, 12