Influence of Memory Gaming on Memory Skill Development in Post-adolescent adults

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Abstract: Memory is a core cognitive function essential for learning, problem-solving, and daily decision-making, and enhancing memory in post-adolescent adults (18–29 years) is important for academic, professional, and personal development. This study examined the influence of structured memory gaming on memory skill development in 254 post-adolescent adults using a quasi-experimental, one-group pre-test/post-test design. Baseline memory was assessed with the Digit Memory Test and a standardized memory scale, followed by a five-month intervention using the Brainia digital game for 20 minutes daily. Post-intervention assessment showed a significant improvement in memory skills, with mean scores increasing from 10.82 ± 1.47 to 11.64 ± 1.29 (mean difference = 0.82, $t = 9.21$, $p < 0.001$). These findings indicate that long term structured memory gaming effectively enhances short-term and working memory in post-adolescent adults. Memory-focused digital games can serve as practical, accessible, and non-pharmacological interventions for cognitive development, with potential applications in education and personal skill enhancement

I. INTRODUCTION

Memory is a core cognitive function essential for learning, problem-solving, and daily decision-making. In post-adolescent adults, maintaining and enhancing memory skills is vital not only for academic and professional success but also for long-term cognitive health. Concurrently, digital gaming has become one of the most popular leisure activities among young adults, leading to growing interest in its potential cognitive benefits. Memory-focused digital games, which challenge working memory, attention, and pattern recognition, offer a structured, engaging, and interactive approach to cognitive stimulation.

Investigating memory gaming interventions in young adults provides a critical foundation for developing effective cognitive enhancement strategies across the lifespan. As this population is cognitively stable and highly engaged with digital technologies, research in this group can help optimize game design, intervention intensity, and outcome measures before adapting these approaches for children or older adults. Despite the widespread prevalence of gaming, most studies have primarily focused on screen time, addiction, anxiety, and behavioral outcomes in children, while the cognitive and memory-related effects in young adults—who experience peak neural plasticity and frequent technology use—remain underexplored. Understanding the influence of memory gaming on memory skill development in post-adolescent adults is therefore essential for informing educational strategies, cognitive training programs, and personal development interventions. This paper aims to examine the relationship between memory-focused digital games and memory enhancement in young adults, exploring whether these interventions can serve as effective tools for supporting cognitive development beyond adolescence.

NEED OF THE STUDY.

Memory is a core component of cognitive functioning, essential for learning, academic achievement, problem-solving, and daily decision-making. Digital gaming has emerged as a widely popular and engaging activity among post-adolescent adults, with memory-focused games offering structured mental exercises designed to enhance attention, working memory, and recall. Most existing studies focus on children, emphasizing screen time, addiction, anxiety, and behavioral outcomes, while the cognitive benefits are underexplored. Establishing the effectiveness of memory gaming in post-adolescent adults can provide a foundation for adapting these interventions in pediatric, geriatric, and cognitively impaired populations. Despite their growing popularity, research examining the effectiveness of memory gaming on memory skill development in post-adolescent adults remains limited. This study seeks to address this gap by evaluating the impact of memory gaming on memory skills among post-adolescent adults, generating evidence to support its broader application across populations and contributing to the development of cost-effective, evidence-based cognitive training interventions and guide its integration into educational, preventive, and health promotion programs.

3.1Population and Sample

This study utilized a quasi-experimental, one-group pre-test and post-test design to investigate the influence of memory gaming on the development of memory skills in post-adolescent adults aged 18 to 29 years. Participants who met the inclusion criteria were recruited through a convenience sampling method, ensuring the accessibility of individuals willing to participate. A total of 254 participants provided informed consent after a detailed explanation of the study protocol, including the objectives, procedures, and potential benefits of participation. Demographic information such as age, gender, frequency of digital device usage, and daily screen-exposure time was collected using a structured data sheet. This information helped provide context for interpreting the impact of the intervention and identifying potential factors that could influence memory performance.

3.2 Data and Sources of Data

For this study primary data has been collected in an institutional level from post- adolescence adults aging 18 to 29 years. Participants with use of digital device (smartphone/tablet/laptop) and gaming regularly were part of the study.

3.3 Theoretical framework

Variables of the study contains independent variable. The study used Memory performance tests: Digit Memory Test as pre and posttest assessment and Memory Game: Brainia (version 3.0.8) to engage in structured memory gaming intervention that is designed to stimulate cognitive processes such as working memory, and short- term memory. The selected application, Brainia, an educational digital game developed with the intension of improving memory- related skills.

RESEARCH METHODOLOGY

Procedure

i) Pre-test Assessment

To establish a baseline of memory skills, all participants underwent a comprehensive pre-test evaluation. The pre-test involved administration of the Digit Memory Test, which measures the capacity to recall sequences of numbers, and a standardized memory assessment scale, which assesses overall memory performance across multiple domains. All assessments were conducted in a quiet, controlled environment to reduce potential distractions and ensure that results accurately reflected participants' baseline cognitive abilities. This pre-test provided critical data to compare with post-intervention outcomes, allowing the study to evaluate the effectiveness of memory gaming on memory skill development.

ii) Intervention: Memory Gaming Program

The core of the study was a structured memory gaming intervention, designed specifically to stimulate cognitive processes associated with both working memory and short-term memory. Participants engaged in the educational digital game Brainia, which has been developed with the explicit purpose of enhancing memory-related skills. Existing research indicates that such digital games can positively influence cognitive functioning, and the selected application had prior validation for its memory-enhancing potential.

Key parameters of the intervention were as follows:
Type of memory game: Brainia
Mode of delivery: Android mobile/digital device
Duration of each gaming session: 20 minutes
Frequency of sessions: Daily, until participants achieved a baseline performance score
Total duration of intervention: 5 months
Participants were encouraged to adhere to the prescribed schedule and were instructed to focus exclusively on the intervention during each session, minimizing multitasking or unrelated device usage. This structured and consistent approach was designed to maximize the potential cognitive benefits of memory gaming while controlling for external variables.

iii) Post-test Assessment

Following the completion of the five months intervention, a post-test assessment was conducted to evaluate the changes in memory skills. The post-test mirrored the pre-test conditions in terms of environment and administration procedures, ensuring consistency and minimizing the influence of external factors on performance. The same standardized memory assessment scale and Digit Memory Test were re-administered, allowing for a direct comparison of pre- and post-intervention scores. This assessment aimed to determine the extent to which engagement in memory gaming influenced the development of memory skills in post-adolescent adults.

Results

A total of 254 post-adolescent adults aged 18 to 29 years participated in this quasi-experimental study, with a mean age of 22.48 ± 3.05 years. Among the participants, 132 (52.0%) were female and 122 (48.0%) were male, indicating a nearly balanced gender distribution (Table 1; Figure 1). Age distribution showed that 90 participants (35.4%) were aged 18–20 years, 104 participants (40.9%) were aged 21–24 years, and 60 participants (23.6%) were aged 25–29 years, reflecting a broader post-adolescent age range (Table 1).

Table 1: Distribution of participants based on age

Age (Years)	Frequency	Percent
18-20	90	35.4
21-24	104	40.9
25-29	60	23.6
Total	254	100.0

Table 2: Distribution of participants based on gender

Gender	Frequency	percent
Female	132	52.0
Male	122	48.0
Total	254	100.0

To assess the impact of the memory gaming intervention, participants' pre-test and post-test scores on the Digit Memory Test and standardized memory assessment scale were compared. As the data were non-normally distributed, the Wilcoxon Signed-Rank Test was used to determine statistical significance, with $p < 0.05$ considered significant.

The analysis demonstrated a statistically significant improvement in memory skills following the five months memory gaming program. The mean pre-test memory score was 10.82 ± 1.47, which increased to 11.64 ± 1.29 in the post-test. The mean difference of 0.82 was significant ($t = 9.21$, $p < 0.001$) (Table 3), indicating that participants' memory performance improved after consistent engagement with the Brainia memory game.

Table 3: Comparison of pre-test and post-test memory scores

Variable	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference	t Value	p Value
Memory Skill	10.82 ± 1.47	11.64 ± 1.29	0.82	9.21	<0.001

These results indicate that structured memory gaming can significantly enhance memory skill development in post-adolescent adults aged 18–29 years, supporting the potential effectiveness of digital cognitive interventions in this age group.

Discussion

The present study aimed to evaluate the influence of memory gaming on memory skill development in post-adolescent adults aged 18–29 years. The findings demonstrated a statistically significant improvement in memory performance following 5 months intervention using the Brainia memory gaming application. Specifically, participants' mean memory scores increased from 10.82 ± 1.47 at pre-test to 11.64 ± 1.29 at post-test, with a mean difference of 0.82 ($t = 9.21$, $p < 0.001$). These results suggest that engagement long term with structured memory gaming can effectively enhance cognitive functions related to short-term and working memory in this age group.

The improvement observed in the current study aligns with existing literature on cognitive training and digital memory interventions. Previous studies have reported that interactive memory games can stimulate neural pathways associated with memory retention, attention, and information processing, leading to measurable gains in memory performance. The repetitive and structured nature of memory gaming may facilitate neuroplasticity, allowing participants to strengthen cognitive circuits involved in memory storage and retrieval. Furthermore, the use of digital platforms like Brainia provides an engaging, accessible, and low-risk method to enhance cognitive skills, which may increase adherence and motivation compared to traditional memory exercises. Demographic analysis revealed a nearly balanced gender distribution (52% female, 48% male), and the age distribution covered the full post-adolescent range (18–29 years), which enhances the generalizability of the findings within this population. These methodological strengths add reliability to the observed improvements in memory performance.

The study employed a one-group pre-test/post-test design without a control group, which limits the ability to definitively attribute memory improvements solely to the gaming intervention. Other factors, such as natural cognitive maturation, daily activities, or external learning experiences, could have contributed to changes in memory performance. Additionally, the study relied on self-reported adherence to the intervention schedule, which may introduce compliance variability. Future studies employing randomized controlled designs with larger and more diverse samples could provide stronger evidence for causality and explore long-term effects of memory gaming on cognitive development.

Conclusion

The findings of this study indicate that long term structured memory gaming significantly improves memory skill development in post-adolescent adults aged 18–29 years. Participants demonstrated measurable gains in memory performance following a 5 months intervention using the Brainia digital memory game. These results suggest that memory gaming can serve as a practical, accessible, and effective tool for enhancing cognitive functions such as working memory and short-term memory in young adults.

Given its ease of use and engaging format, memory gaming holds promise as a non-pharmacological cognitive enhancement strategy for post-adolescents, with potential applications in educational, clinical, and personal development contexts. Future research incorporating controlled experimental designs, long-term follow-up, and exploration of additional cognitive domains is warranted to further validate and expand upon these findings.

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