



# Usage of brain training application among healthy subjects.



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## ABSTRACT

**Objectives:** The beneficial effects of brain training application(BTA) are expected to improve cognitive functions. It was hypothesized that brain training would result in improving perceptions of memory and memory functioning compared with the baseline visit.

**Methods:** We conducted randomized controlled trial by using brain training game (Lumosity). 66 Volunteers enrolled in the study ,51 volunteers only used BTA(Lumosity), that target a range of cognitive functions including attention, processing speed, visual memory and executive functions for about 15 minutes per day, at least 5 days per week, for 3 weeks. They performed Cambridge neuropsychological Test automated battery (CANTAB) test before and after three weeks training for cognitive functions assessment. Measures of the cognitive functions fell into categories (flexibility, memory, attention, speed and problem solving). Blood samples were taken to study Brain-derived growth factor (BDNF), Apolipoprotein E (APOE) markers.

**Results:** statistically significant difference was found after the training in terms of attention switching task (AST) latency (P=0.000), AST (congruent) (P=0.000), AST (incongruent) condition (P=0.000), and motor speed (P=0.000). There was a positive correlation between pattern recognition memory (PRM) and ApoE.

**Conclusion:** This is the first report to study BTA in KSA that warrants further research to determine the role and its possible link to cognitive functions. Our results do not indicate that everyone should play brain-training games.

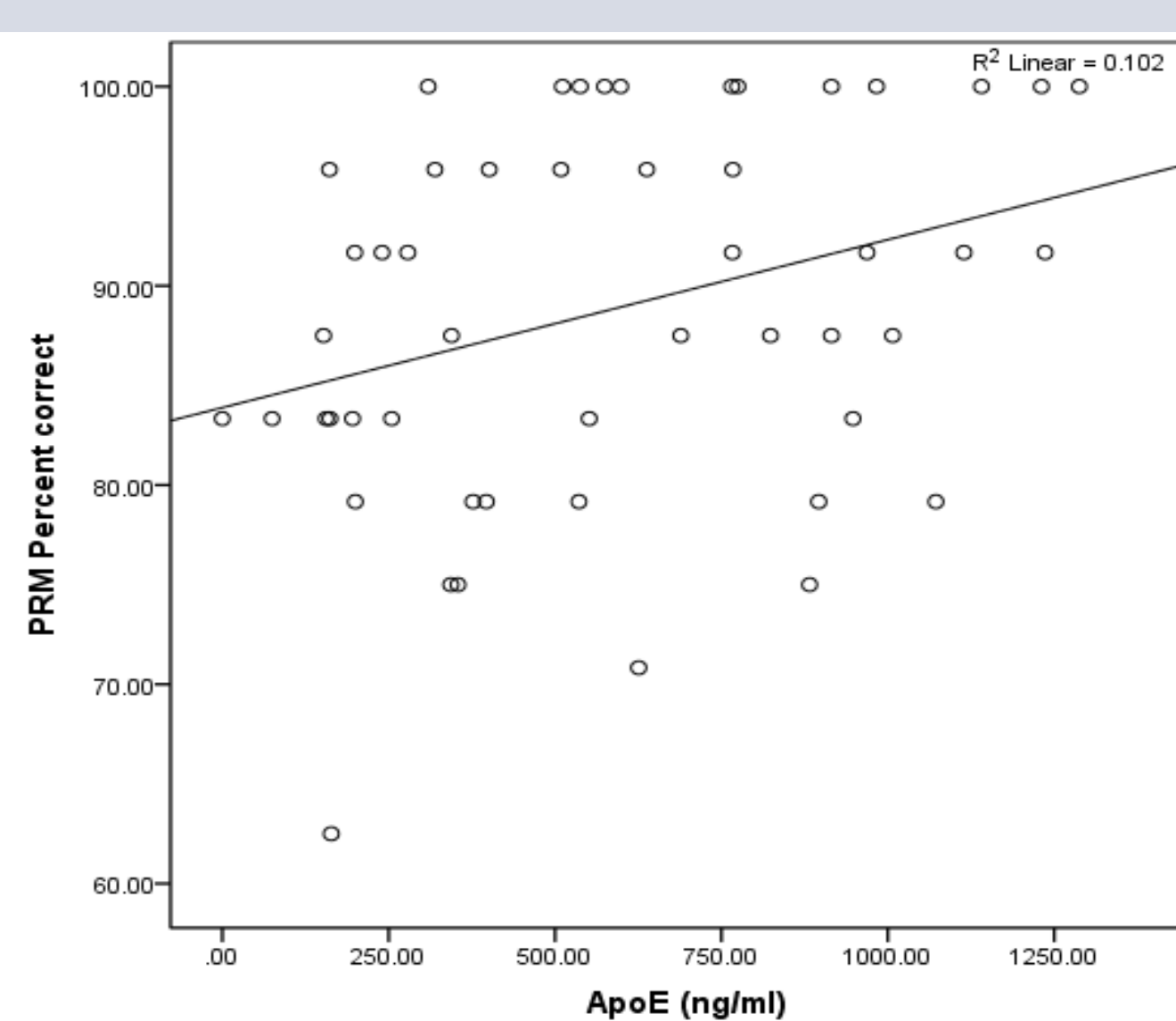
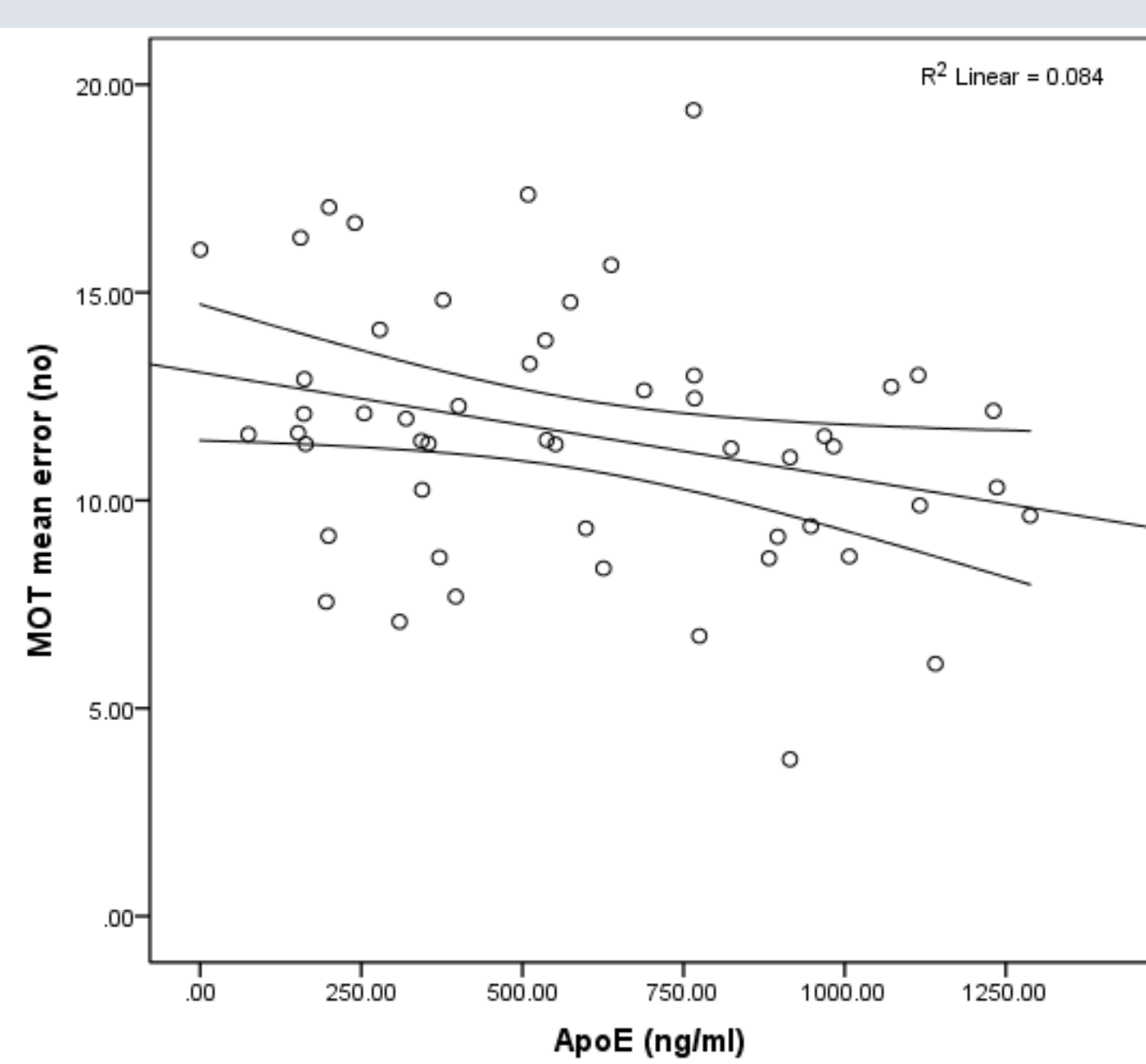
## Objective

- 1-To determine the effects of brain training application in healthy groups.
2. To determine brain training positively influence subjective wellbeing and the cognitive function.

## METHODS AND MATERIALS

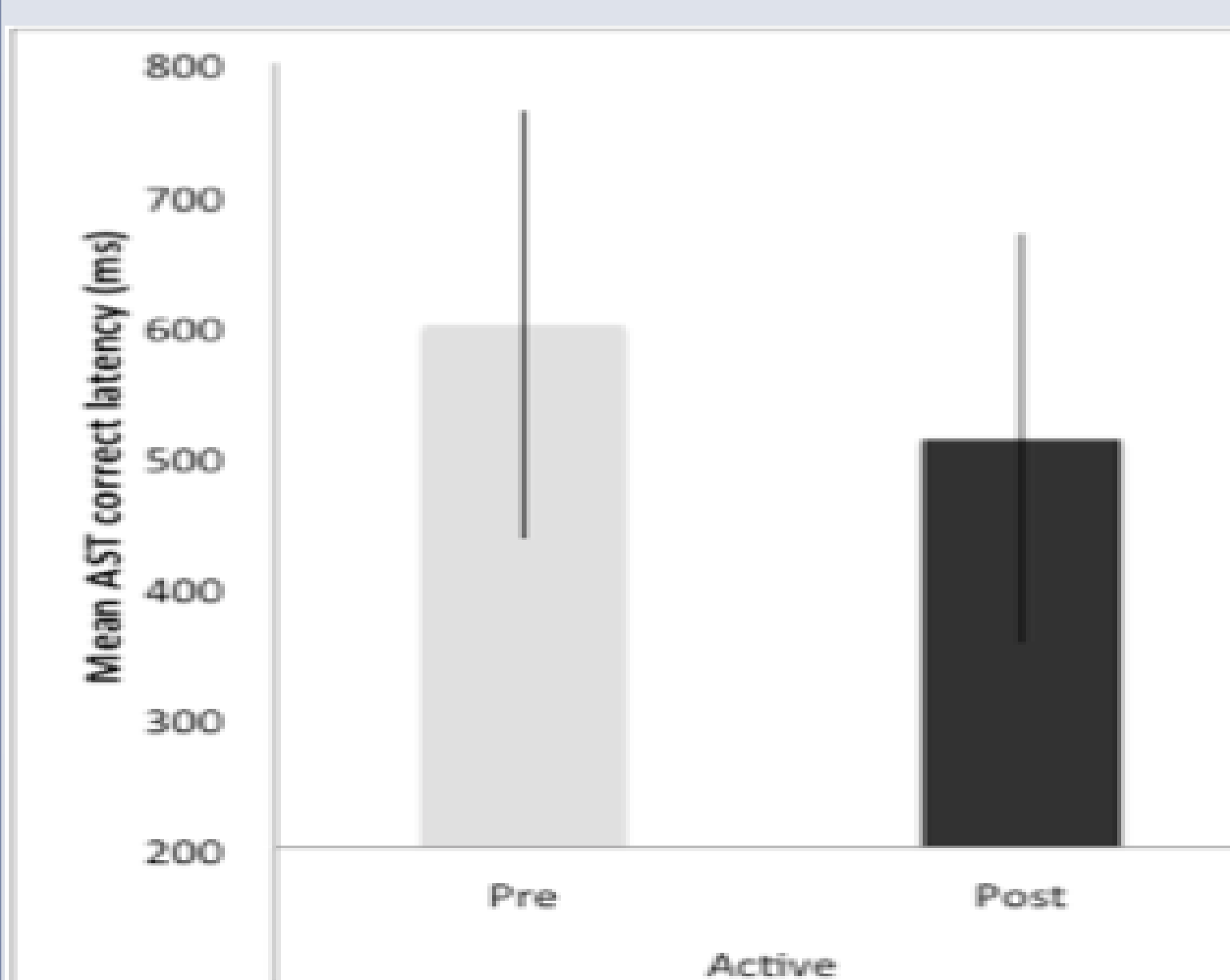
This study was conducted in the Department of Physiology, College of Medicine and King Khalid University Hospital (KKUH), Riyadh, Saudi Arabia. 66 Volunteers were recruited and randomly assigned to either of two groups (active) and (control).

Brain training application had been used by the active group only for a period of time that ranged from 10-21 days, 10-15 minutes per day. Cognitive functions were evaluated by CANTAB test to assess executive functions and memory in both groups. All the participants were matched for age and BMI. Subjects included had the age range between 18 to 65 years. We used mini mental state examination(MMSE) for quantitative assessment of cognitive function. Fatigue levels were evaluated by Fatigue Severity Scale (FSS) and a Visual Analogue Fatigue Scale (VAFS). Plasma BDNF and APOE concentrations were measured by competitive enzyme immunoassay using Human BDNF and APOE ELISA kits. Data was analyzed by using SPSS (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp).

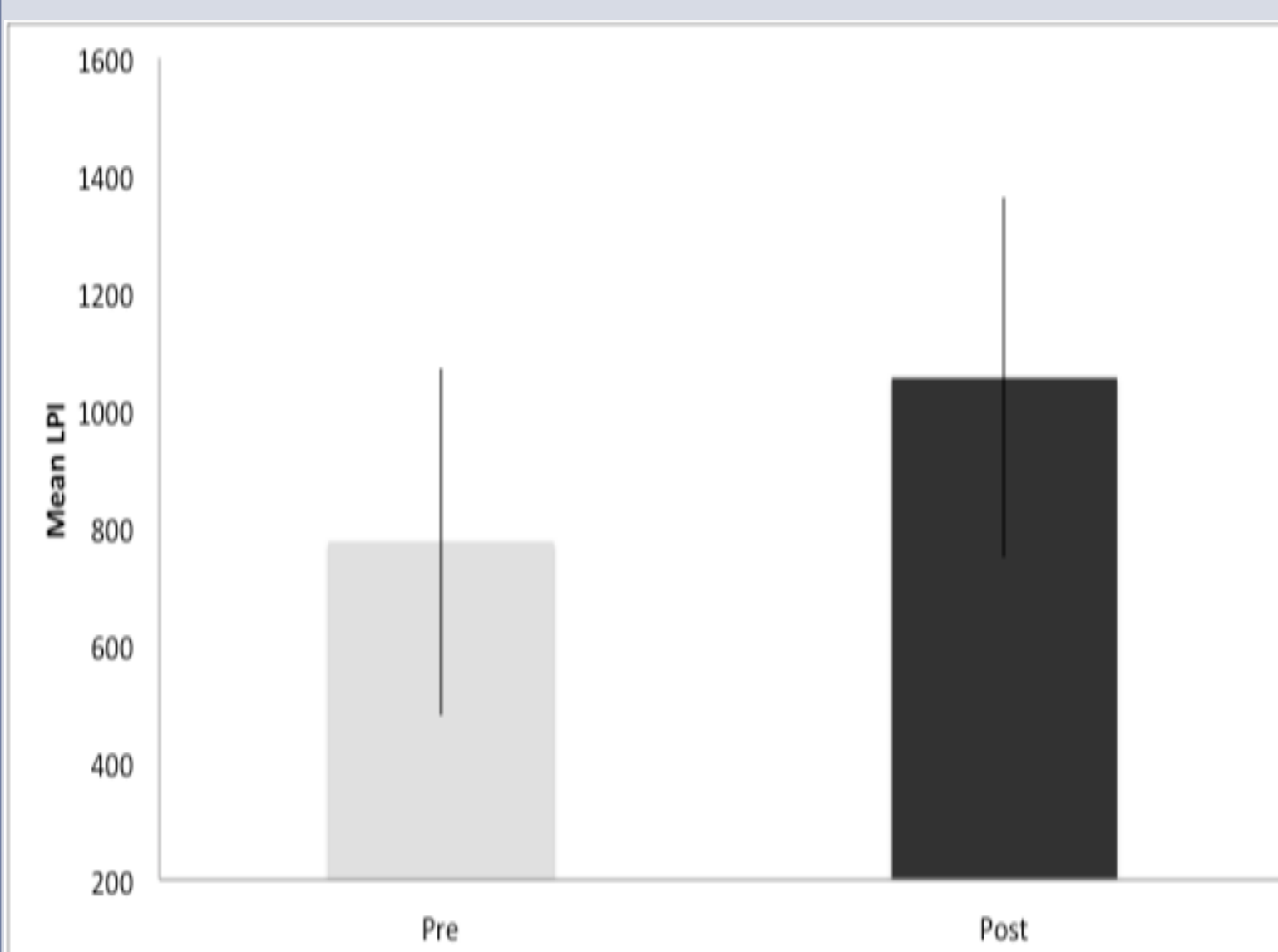


## RESULTS

The number of the active group is (N=37 or 61.42% men) and (N=14or 23% female), while the mean age was  $24.6 \pm 7.8$ years .The control group was 15 men or 24.9%, and the mean age was  $25.4 \pm 8.3$  years. There was significant difference in Lumosity performance index (LPI) at the first day and at the end of the training specially in the active group and there is improvement in their performance. LPI was a sum of memory, flexibility, speed, problem solving, and attention. statistically significant difference was found after the training in terms of attention switching task (AST) latency (P=0.000), AST (congruent) (P=0.000), AST (incongruent) condition (P=0.000), and motor speed (P=0.000). There was no significant difference for all (AST) performance in the control group after training. There was no significant difference in pattern recognition memory (PRM) percent correct response and motor screening task (MOT) mean error in both group .There was a negative correlation between MOT and ApoE. There was a positive correlation between pattern recognition memory (PRM) and ApoE



Change in mean attention switching task correct latency before and after the training.



Change in lumosity performance index (LPI) before and after the training.

## DISCUSSION and CONCLUSIONS

The most important findings of this study were that playing the brain training application significantly can improve flexibility, memory, attention, speed and problem solving in young adults. The executive functions, working memory and processing speed, which showed a significant transfer effect by the brain training game in this study, also involve the prefrontal cortex. These findings suggest that both training application and CANTAB tasks can share the same brain region which is the prefrontal cortex

In sum, results from this work suggests that BTA may help to decline aging in adults. In spite of the deficiencies; this is the first study trying to evaluate BTA in subjects in KSA.

## REFERENCES

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