



# Impact of Creatine Supplementation on Cognitive Performance and Mental Health in Geriatric Adults



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## ABSTRACT / INTRODUCTION

- Creatine is a naturally-produced, fundamental nutrient in human energy metabolism, formed in the liver, pancreas, and kidneys and is commonly utilized as an ergogenic aid.
- Creatine phosphate assists in the resynthesis of ATP by acting as a readily available high-energy phosphate donor and is naturally produced in neurons within the brain. This biomolecule has been shown to be key in the production of ATP in high energy consuming parts of the body like the brain.
- Many neurodegenerative diseases, like Huntington's disease, Alzheimer's, and more broadly, dementia, as well as major depressive disorders, can often be characterized by insufficient levels of phosphocreatine and creatine in specific areas of the brain.
- From this idea, exploration into the effects of an oral supplementation of Creatine to an aged population (a group vulnerable to neurodegenerative diseases) was investigated through the study.

## PURPOSE

- The primary purpose of this study is to determine the impact of oral creatine monohydrate (CM) supplementation on neuropsychological performance in geriatric populations, using the RBANS assessment as our primary outcome measure.
- The secondary purpose is to analyze how CM supplementation affects mental health and depressive symptoms in older adults, using the BDI, BAI, and SF-36 as our secondary outcome measures.

## METHODS

- Before participating, interested individuals completed a pre-screening visit, which consisted of a consent form and blood sampling. Blood was centrifuged and assessed using a Piccolo Renal Function Panel test to assess for any kidney irregularities.
- Twelve older adults (M = 5, W = 7; Mean  $\pm$  SE: 66  $\pm$  1 years) qualified to participate in this.
- Subjects were randomly allocated to either the creatine monohydrate supplementation (CM) or placebo (PL) group.
- Both pre- and post-supplementation, participants completed **The Repeatable Battery for the Assessment of Neuropsychological Status (RBANS)**, a comprehensive evaluation of 5 cognitive domains: **Attention, Language, Visuospatial/Constructional (Visuo/Con), Immediate and Delayed Memory**.
- To assess cognitive well-being, a subset of participants also completed three questionnaires pre- and post-. These questionnaires included the **Beck's Depression Inventory (BDI)**, **Beck's Anxiety Inventory (BAI)**, and the **36-Item Short Form Survey (SF-36)**.

## METHODS (CONT.)

- Delta change in scores for all cognitive domains (Post-score – Pre-score) were calculated, and independent *t*-tests ran to assess significance. Significance was accepted as  $p < 0.05$ .
- Questionnaire results were reported as a percentage of participants that showed improvements.

## RESULTS

- There was a statistically significant difference in mean delta change in scores for Immediate Memory, with the CM group significantly improving more than the PL group (CM = 15.33  $\pm$  2.42, PL = -2.67  $\pm$  3.81,  $t(10) = 3.99$ ,  $p = 0.003$ ).
- Similar improvements were noted for Language (CM = 9.67  $\pm$  1.73, PL = -3.33  $\pm$  2.75,  $t(10) = 4.001$ ,  $p = 0.003$ ) and Total Score (CM = 12  $\pm$  3.4, PL = -0.67  $\pm$  3.48,  $t(10) = 2.61$ ,  $p = 0.026$ ).

## RESULTS (CONT.)

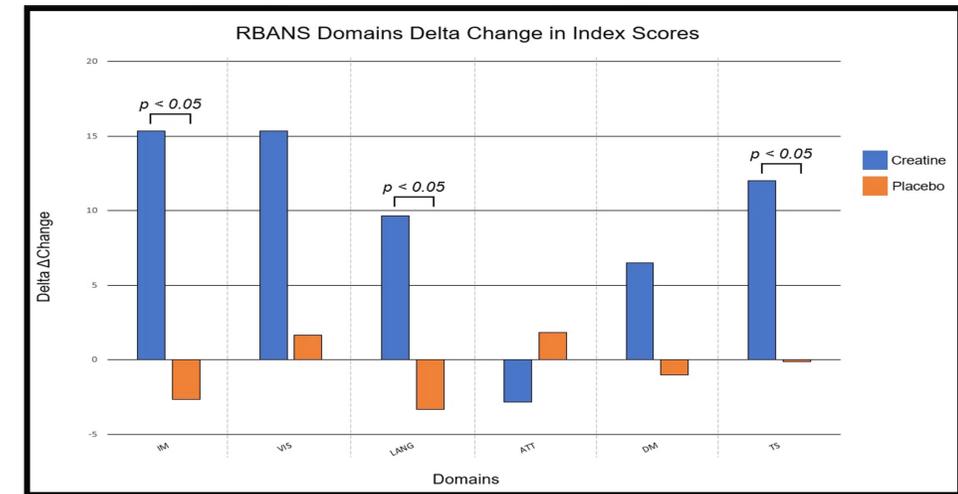


Figure 3: Delta change in scores for all RBANS domains. Significance  $p < 0.05$ .

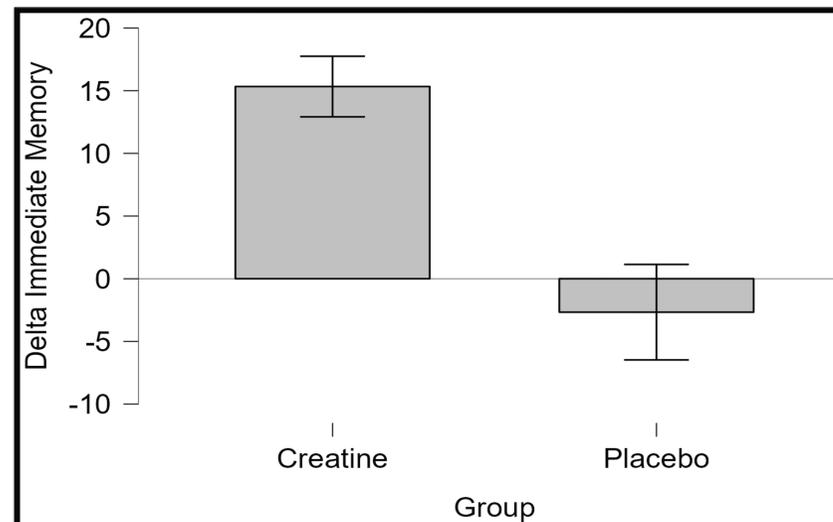


Figure 1: Delta Change in RBAN scores for Immediate memory in creatine and placebo groups (CM = 15.33  $\pm$  2.42, PL = -2.67  $\pm$  3.81,  $t(10) = 3.99$ ,  $p = 0.003$ ).



Figure 2: Delta Change in RBAN scores for Language in creatine and placebo groups (CM = 9.67  $\pm$  1.73, PL = -3.33  $\pm$  2.75,  $t(10) = 4.001$ ,  $p = 0.003$ ).

- No sig. differences were found for Attention, Delayed Memory, or Visuo/Con. Categories.
- 4 participants completed the additional supplemental questionnaires.
- 100% of participants improved in BDI scores regardless of supplement group.
- 50% of the CM group improved, and 50% of the PL group improved in BAI scores
- 100% of both the CM and PL group showed improvements or consistency in the emotional well-being subcategory and in overall health scores for the SF-36.
- Due to the small sample size, questionnaire scores cannot be tested for significance.

## DISCUSSION / FUTURE DIRECTIONS

- There was a statistically significant change in 2 domains, and total score, of the RBANS after 4 weeks of CM supplementation.
- This suggests that daily CM may indeed be capable of enhancing cognitive performance in older adults, especially neurological processes such as short-term memory and language.
- However, due to the small sample size, further research is still warranted to determine whether these observed improvements in scores are attributed to creatine alone, or other potential confounding variables such as quality of sleep, mood, or daily activity.
- There was no significant difference between groups for the mental health questionnaires, so we are unable to conclude if CM supplementation attributed to these changes alone.
- Further research with a larger and more representative sample is needed to determine the scope of these brain health benefits.

## REFERENCES

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