# Does Depression Predict Executive Function Performance In A Military Sample?

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## INTRODUCTION

Since military operations began in the Middle East in 2001, veterans have been surviving with wounds considered "invisible" due the difficulty in their detection. Perhaps the most prevalent injury in this war has been traumatic brain injury (TBI) with the Department of Defense (DoD) estimating nearly 300,000 new cases of TBI since 2001. These injuries have led to a host of neuropsychological concerns including deficits in executive functions (EFs). While there is no singularly agreed upon definition of what an EF is, they are often thought of as an umbrella term which describes numerous variables such as: decision-making, goal-oriented behavior, and adapting to novel stimuli/situations. One of the most consistent complications in recovery of EF performance following a TBI has been the presence of depressive symptoms[1,2].

## OBJECTIVE

The present study utilizes neuropsychological and psychological measures to asses how scores on two measures of depression predict performance on four measures of EF. The present study will use data from 368 Marines and sailors. It is hypothesized that scores on the measures of depression will strongly predict performance on EF measures.

## METHODS

The present study makes use of a large electronic database which contains neuropsychological data from over 1,000 Marines and sailors. Only 368 scores from this large database were used as these individuals completed all measures of depression and EF.

Measures of depression come from the depression subscales of the following tests:

- Minnesota Multiphasic Personality Inventory 2 (MMPI-2)
- Trauma Symptoms Inventory (TSI)

Measures of executive function include:

- Controlled Oral Word Association Test (COWAT)
- Hayling & Brixton Tests
- Stroop
- Trail Making Test (Trails A & B)

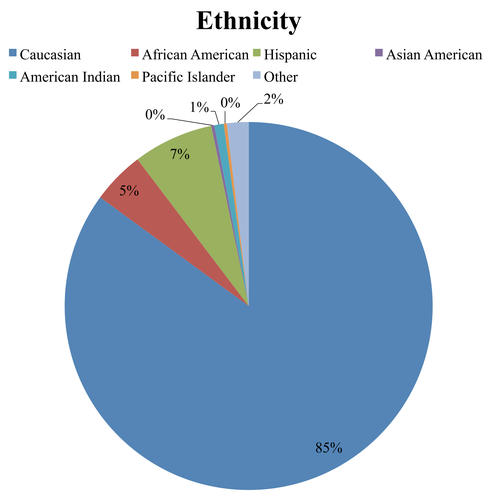
Demographic information collected included:

- Age
- Education
- Ethnicity
- Gender
- Handedness

Data was compiled via a private practice associated with Camp Lejeune, North Carolina. All individuals participated through the Tricare health care program and were referred by various military neurologists or other medical officers. The UNCW Office of Research reviewed and provided IRB approval.

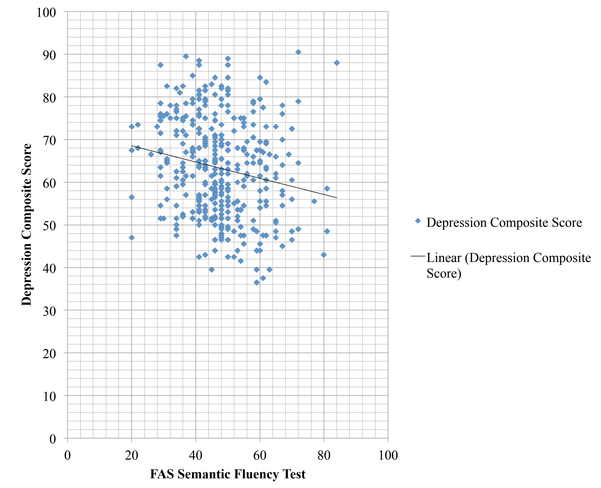
## RESULTS

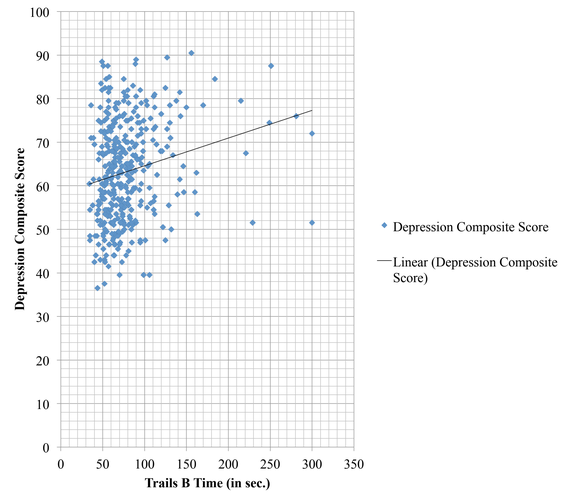
### Demographic Results (N=368)

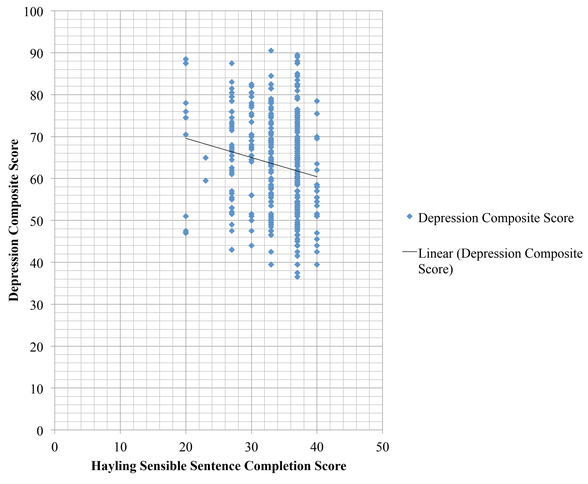


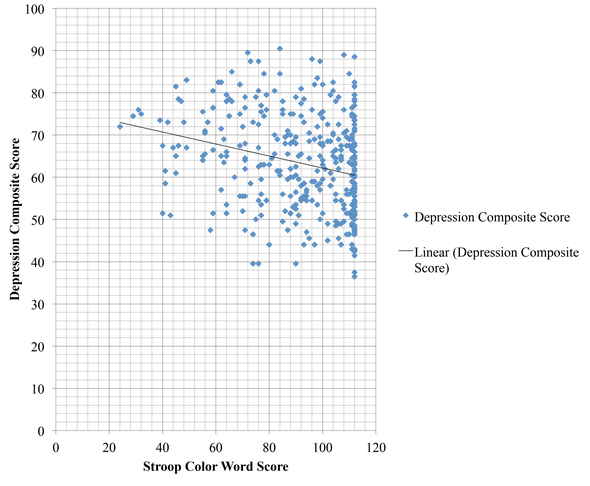

| Age | |
|---|---|
| Mean | 25.8 Years |
| Standard Deviation | 5.9 Years |
| **Education** | |
| Mean | 12.5 Years |
| Standard Deviation | 1.1 Years |
| **Gender** | |
| Male | 367 |
| Female | 1 |
| **Handedness** | |
| Right-Handed | 327 |
| Left-Handed | 33 |
| Ambidextrous | 8 |

### Results from Multiple Regressions




## SUMMARY

Multiple regression analyses utilizing a composite depression score derived from the two depression scales was compared against the four measures of EF. There were a number of significant findings that the analyses produced:

- FAS Semantic Fluency: $R^2$=.035, $F_{(1,366)}$=13.205, $p<.01$
- Trail A: $R^2$=.070, $F_{(1,366)}$=27.413, $p<.01$
- Trail B: $R^2$=.042, $F_{(1,366)}$ = 6.165, $p<.01$
- Hayling Sensible Sentence Completion: $R^2$=.033, $F_{(1,366)}$=12.572, $p<.01$
- Stroop Color: $R^2$=.013, $F_{(1,366)}$=4.633, $p<.03$
- Stroop Color-Word: $R^2$=.065, $F_{(1,366)}$=25.242, $p<.01$

These results suggest depression plays a minor (but significant) role in predicting EF performance of combat veterans with TBI. Long-term EF recovery of military personnel with TBI and depression needs clinical consideration and further research.

## LIMITATIONS

- Retrospective statistical analysis (lack of experimental control).
- Wide variety in the operationalization of EFs complicates capture of true EF peformance[3].
- No pre-deployment information regarding depression or EF performance.
- The inclusion/exclusion criteria were rigid with nearly 700 individuals being ruled out.

## FUTURE DIRECTIONS

Future directions of interest for this project include a study with pre- and post-measures of depression and EF to ensure that pre-existing affect and cognition do not impact findings from this study. Additionally, future directions will incorporate more measures of depression (e.g., Beck Depression Inventory 2) as well as measures of EF (e.g., Wisconsin Card Sorting Task) to better measure both constructs.

## REFERENCES

[3] Jurado, M.B. & Rosselli, M. (2007). The elusive nature of executive functions: A review of our current understanding. *Neuropsychology Review, 17 (3),* 213-233.

[1] Mooney, G., Speed, J., & Sheppard, S. (2005). Factors related to recovery after mild traumatic brain injury. *Brain Injury, (19) 12,* 975-987

[2] Rapoport, M.J., McCullagh, S., Shammi, P., & Feinstein, A. (2005). Cognitive impairment associated with major depression following mild and moderate traumatic brain injury. *The Journal of Neuropsychiatry and Clinical Neurosciences, 17,* 61-65.

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