How Does the Free Cog compare to the Addenbrooke's Cognitive Examination (ACE III) in Traumatic Brain Injury (TBI)?

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Introduction

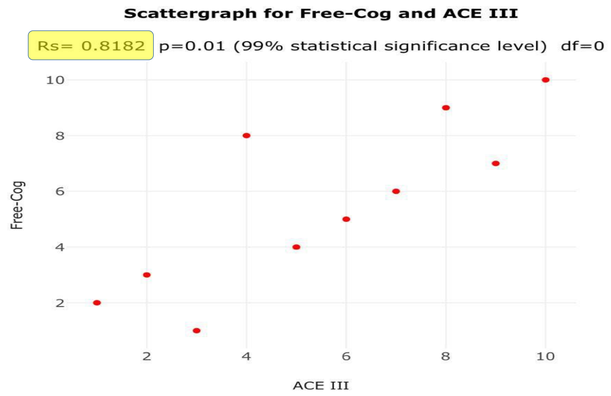
- **Cognitive dysfunction** is the most frequent sequalae post TBI (1) with a prevalence of 25-70% (2),
- and has been implicated in poorer patient outcomes such as greater difficulties in employment, maintaining relationships, pursuing leisure activities and quality of life (3),
- with impairments in attention, concentration, memory, language, executive functions and reduced speed of information processing (4).
- Brief screening instruments may not identify frontal lobe disorders with impairments in executive and social function.
- Here we looked at the **Free-Cog**, a novel, hybrid, cognitive screening instrument that **assess both cognitive and executive function in a single instrument** (5) and comparing it to a known standard, the **ACE III**.

Methods

A cohort of 10 males with moderate to severe TBI admitted in a neuropsychiatry unit between 2021 and 2022 were assessed with both an ACE III and the Free Cog

Results

Patients varied in age (20-71), TBI site and of differing chronicity. Z scores were calculated using published normative data. **Spearman's rho showed positive correlation** between the two data sets (**Correlation Coefficient 0.81818**, p(2-tailed) = 0.00381). Therefore, there was a **statistically significant** agreement between the subjective total Free Cog scores and the ACE III.



Scattergraph for Free-Cog and ACE III showing Spearman's rho correlation of 0.8182.

Free Cog v1.0

Cognitive Function			
Domain	**Question/Instruction**	**Score**	**Scoring guide**
General Knowledge	Can you tell me anything that's in the news recently?	/1	This is a general opening question to try to put people at ease, also accept recent events in sport or soap opera, if they state they don't follow the news. **Score 1 for any key fact of current knowledge but none for a general answer**
Orientation (time)	What day of the week is it today; what month, year?	/3	Only allow accurate responses **Score 1 point for each correct answer**
Orientation (place)	Where are we?	/3	Only allow accurate responses If in clinic/hospital score 1 for ward/ floor; 1 for hospital name; 1 for town If in residence Score 1 for name/number of house; 1 for street name; 1 for town
Memory (registration)	Repeat 5 words (watch, car, scarf, pen, house)	0	**No score, record responses, allow up to 3 attempts.**
Calculation	Take 6 away from 70 and keep subtracting until I say stop	/3	64, 58, 52, 46, 40, then stop **Score 3 = 5 or 4 correct; Score 2 = 3 or 2 correct Score 1 = 1 correct; Score 0 = 0 correct**
Attention	Spell "plate" backwards	/2	Check first they can spell "plate" then ask to spell it backwards **Score 2 = 5 or 4 letters in correct order Score 1 = 3 or 2 letters in correct order Score 0 = 1 or 0 letters in the correct order**
Memory (recall)	Repeat 5 words (watch, car, scarf, pen, house)	/5	Record responses **Score 1 point for each correct answer**
Visuospatial	In this circle draw a clock face with numbers and with hands set to ten past eleven	/3	Draw a circle for the patient **Score 1 point for each correct part: All numbers present = 1 point All numbers placed correctly = 1 point Hands placed correctly = 1 point**
Language	Name ear and fingernail	/2	Point to ear then fingernail **Score 1 point for each correct answer**
Fluency Task	Name as many different animals as you can in 1 minute	/1	Time one minute and record the responses **Do not count different breeds of the same animal (eg corgi, spaniel, Cockapoo, Alsatian etc). Score 1 = if 10 or more correct responses Score 0 = if <10 responses**
Repeat a Sentence	Repeat this sentence "Don't beat about the bush"	/1	**Score 1 for repeated fully correctly**
Write a Sentence	Write a sentence	/1	**Sentence needs to be understandable – ignore minor grammatical and spelling errors; Score 1 if fully correct**

Executive Function			
Domain	**Question**	**Score**	**Scoring guide** These questions are to test the person's ability to plan and describe sequences. Scoring is based on clinical judgement, non-leading clarifying questions may be asked if answers are tangential/ circumstantial
Social	You have bought a birthday card and want to send it by post – tell me how you would do it?	/1	**Score 1 = complete enough for the card to arrive Score 0 = incomplete answer (i.e. card would not arrive)**
Travel	If you were going to take a bus (or train) what would you need?	/1	**Score 1 = if answer indicates need for a ticket or bus pass Score 0 = if they fail to mention ticket or bus pass**
Home	Could you tell me how you would make a cup of tea or coffee for yourself?	/1	**Score 1 = if answer leads to a drinkable cup of tea/coffee Score 0 = if answer does not lead to a drinkable cup of tea/coffee**
Emergency	If you discovered a fire at home, what would you do?	/1	**Score 1 = if answer indicates the person would be appropriate and safe in their response; Score 0 = if they do not**
Care	Could you tell me the steps you took in order to get dressed as you are today?	/1	**Score 1 = plausible story, consistent with the clothes they are wearing Score 0 = incomplete and seems inconsistent with the clothing they are wearing**
	Total	/30	

Addenbrooke's Cognitive Examination (ACE III)

- Attention
- Memory
- Language
- Visuospatial
- Fluency

Discussion

Benefits of using Free-Cog:

- Covers cognitive and executive functions
- Reliable, quick and easy to administer during busy outpatient clinic, ward rounds
- Questions are patient centre
- Free to use

Limitation of this study

- Small sample size

Conclusion

- These findings indicate that the Free Cog may be a **useful brief screening** in **TBI patients** and is consistent with the Free-Cog index study which showed high correlation and similar diagnostic accuracy in old age memory clinics where it was compared with Mini Mental Screening Examination, Montreal Cognitive Assessment and the ACE-III (6).
- These preliminary findings indicate further assessment of the Free Cog is warranted with examination of outcomes in different domains and in a wider range of TBI severity.

References

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