The Relationship between Cognitive Complaints, PTSD symptoms and Neuropsychological Test Performance in Danish Veterans with mTBI

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Introduction

The relationship between subjective cognitive complaints, post traumatic stress disorder (PTSD), and neuropsychological test performance in combat related mild traumatic brain injury (mTBI) is complex and not well understood (Vasterling & Dikmen, 2012).

The present study is the first investigation of Danish veterans with mTBI. It was hypothesized that cognitive complaints would correlate positively with PTSD symptoms and negatively with neuropsychological test performance.

Participants and Methods

One female and 15 male veterans (mean age 26.4 years (SD=4.0), mean time since mTBI 13.5 months (SD=5.0), and mean education 11.9 years (SD=2.1)) with a history of mTBI incurred during service in the International Security Assistance Force in Afghanistan were identified by the Danish Armed Forces Health Services and referred to neuropsychological evaluation at Hammel Neurorehabilitation and Research Centre by the Danish Veteran Centre.

Veterans were evaluated with a comprehensive standardized battery of neuropsychological tests, estimation of intelligence (Danish Adult Reading Test (DART)), and questionnaires assessing cognitive complaints, PTSD symptoms, perceived stress and emotional symptoms.

Neuropsychological Tests

- Danish Adult Reading Test (DART)
- Trail Making Test A & B (TMA, TMB)
- Wechsler Adult Intelligence Scale, third edition, subtest Coding and Digit Span
- Rey Auditory Verbal Learning Test (RAVLT)
- Word Fluency, Animals and words beginning with letters F, N and S
- Rey Complex Figure Test (RCFT)
- Stroop Color and Word test (SCWT)
- Tower of London (TOL)
- Wisconsin Card Sorting Test (WCST)

Questionnaires

- Cognitive Failures Questionnaire (CFQ) (Broadbent et al.,1982)
- PTSD Check List (PCL) (Weathers et al., 1993)
- Symptom Checklist 90 Revised, subscales anxiety, depression and negative affect (SCL-ANX, SCL-DEP, SCL-8) (Derogatis, 1994, Christensen et al., 2010)
- Perceived Stress Scale (PSS) (Cohen et al., 1983)

Results

There were no significant correlations between Cognitive Complaints (CFQ) or PTSD symptoms (PCL) and estimated intelligence (DART), age, time since mTBI, or years of education.

Table 1 Demographic and Clinical Characteristics and the Correlation to Cognitive Complaints (CFQ) and PTSD symptoms (PCL)

	Mean	SD	*rs* CFQ	*p*	*rs* PCL	*p*
Age, years	26.44	4.07	.05	.85	.36	.16
Education, years	11.94	2.08	-.12	.67	-.14	.61
Est. intelligence, DART	22.44	9.59	-.35	.19	-.33	.22
Months Since Injury	13.49	5.01	.17	.52	.31	.24

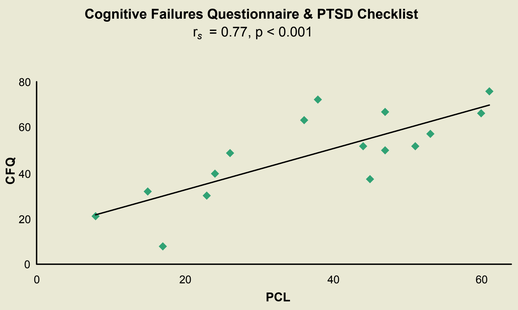
rs = Spearman´s rho

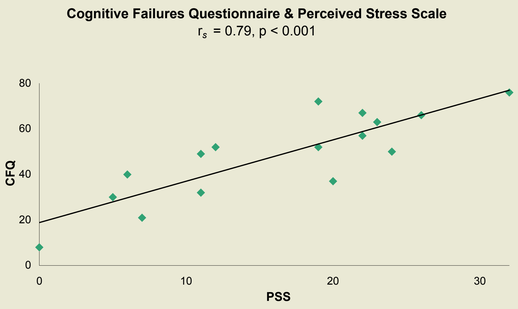
Veterans, as seen in table 2, had relatively high PCL- and CFQ-scores. In addition, results showed a strong and highly significant positive correlation between CFQ and PCL. Similar highly significant positive correlations were seen between CFQ and PCL on one side and perceived stress load (PSS) and emotional symptoms (SCL) on the other.

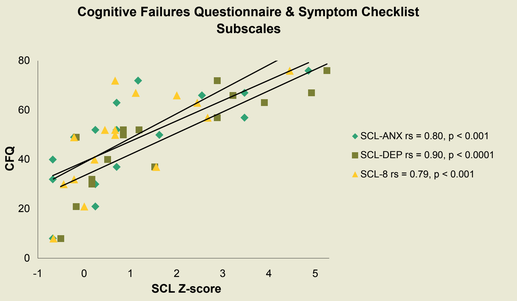
Table 2 Correlations between Cognitive Complaints (CFQ) and PTSD symptoms (PCL), and Perceived Stress (PSS) and Emotional Symptoms (SCL)

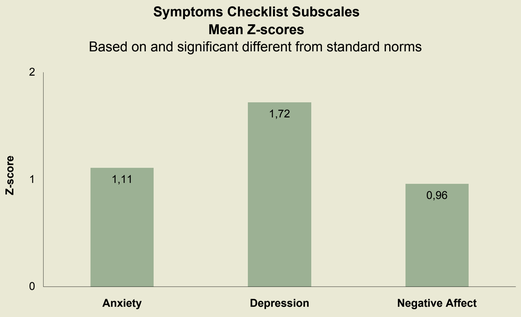
	Mean	SD	*rs* CFQ	*rs* PCL
Cognitive complaints (CFQ)	48.25	19.12		.77**
PTSD (PCL)	37.19	16.50	.77**	
Perceived Stress (PSS)	16.19	8.94	.79**	.83***
Negative Affect (SCL-8)	7.31	6.16	.79**	.80**
Anxiety (SCL-ANX)	3.88	3.61	.80**	.82***
Depression (SCL-DEP)	6.56	5.53	.90***	.79**

rs = Spearman's rho, ** $p<.001$, *** $p<.0001$









Veterans had relatively high scores (and significantly higher than normative data ($p<.001$)) on SCL scales measuring emotional symptoms such as anxiety, depression and general negative affect. Depressive symptoms had the highest magnitude.

There were no significant correlations between cognitive complaints (CFQ) and 18 neuropsychological test-variables when adjusting for multiple testing.

Table 3 Neuropsychological Test-scores and the Correlations to Cognitive Complaints (CFQ) and PTSD symptoms (PCL)

	Mean	SD	*rs* CFQ	*p*	*rs* PCL	*p*
Processing Speed						
TMA	29.13	8.20	.42	.11	.42	.10
TMB	73.38	20.46	.40	.13	.30	.26
Coding scaled score	8.69	2.44	-.43	.09	-.62	* .01
Working Memory						
Digit Span scaled score	8.88	2.13	-.05	.86	.19	.66
RAVL 1. trail	6.50	1.55	-.01	.96	-.07	.78
Word Fluency						
Animals	24.88	7.69	-.23	.38	-.26	.32
F-N-S	34.06	12.05	-.31	.25	-.55	* .03
Visual Construction						
RCFT Copy	33.13	1.75	-.10	.71	.08	.77
Visual memory						
RCFT 3 min.	22.41	3.89	-.25	.36	-.22	.42
RCFT 30 min.	22.25	3.65	-.28	.29	-.19	.49
Verbal memory						
RAVLT learning	48.38	7.99	-.17	.52	-.55	* .03
RAVLT recollection	10.00	3.27	-.08	.78	-.28	.29
Response Inhibition						
SCWT interference score	1.88	5.15	-.41	.11	-.30	.26
Planning						
TOL total correct	5.50	2.53	-.57	* .02	-.24	.36
TOL move score	23.06	15.68	.40	.12	-.13	.63
Executive Function						
WCST categories	5.94	0.25	-.36	.17	.03	.91
WCST perseverative errors	9.38	4.75	.21	.42	.16	.55
WCST total trials	90.00	16.15	.38	.15	.12	.67

SD = standard deviation, *rs* = Spearman's rho, * $p<.05$

Conclusions

Results suggest that cognitive complaints in veterans with a history of mTBI primarily are associated with PTSD symptoms, perceived stress and emotional symptoms and not cognitive dysfunction as measured with neuropsychological tests.

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Photos: Stig Schmidt Knudsen, Army Operational Command Denmark.