

Recovered Head Injury: Cognitive Status vs. Stress Resilience*

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Although it is widely held that many head injury victims recover completely and return to a normal life, little research has been done to examine this belief. We compared a group of Air Force recruits reporting a history of prior head injury to their non-injured peers in regard to cognitive performance, medical service use, and resilience to military stressors. "Stress resilience" was defined as the ability to complete an intense six week military training course.

METHOD

2,237 Air Force recruits participated in a study examining the effects of gender on adaptability to military stressors. All recruits met the rigorous physical and intellectual standards for enlistment in the Armed Forces. Screening procedures included physical examination, a physician's review of medical history, and aptitude testing with the *Armed Services Vocational Aptitude Battery* (ASVAB). Because women's stress responses were the focus of this study, the majority of our sample was female (1,419 women = 64.43%; 818 men = 36.57%). On average, subjects were 20.24 years old ($SD = 3.14$) and had completed 12.63 years of education ($SD = 1.29$). Most were right-handed ($n = 1965, 87.8\%$).

Based on medical history review, 90 recruits (4.02%) were identified as having suffered head injuries (HI) prior to joining the military. Data was not available regarding severity or length of time since injury, but applicants are ineligible to enlist in the Air Force for five years following a severe HI, two years following a moderate HI, and one month following a mild HI. All HI subjects were considered to have fully recovered from their injuries, meeting all physical and intellectual requirements for enlistment. Despite overrepresentation in the total sample, women were underrepresented in this group (44.4% HI vs. 64.2% non-HI; $\chi^2 = 14.58, p < .00013$). The HI group averaged 20.27 years old ($SD = 2.32$) and had completed 12.70 years of education ($SD = 0.99$); 92.2% were right-handed. The HI and non-HI groups did not differ in age, education, or handedness.

Recruits were administered a computerized neuropsychological screening battery (*MicroCog*; Powell et al., 1993) and a sociobiographical inventory (*History Opinion Inventory-Revised*, HOI-R; Fiedler, 1992) during their first week of basic military training (BMT). *MicroCog* was adapted for use with soundcards and headphones, and was administered to groups of 30 subjects at a time; results were scored using age-corrected General Population norms. The HOI-R was group-administered in a separate setting. Data collected from individual record reviews included the AFQT subscale of the ASVAB (a measure of general intellectual ability), information regarding past medical history, number of visits to outpatient medical clinics during BMT, number of days hospitalized during BMT, and whether each recruit graduated from BMT or was discharged from the military without completing training.

RESULTS

Head-injured subjects did not differ from non-HI recruits on a global aptitude measure (AFQT; HI = 68.70, $SD = 16.26$; non-HI = 66.38, $SD = 15.49$), but there was a trend for them to score in the more

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pathological direction on a sociobiographical inventory (HOI-R; $F = 2.80, p < .09$). The HI group actually scored higher than the non-HI group on all nine MicroCog Indices, two of which reached significance (see Table). Neither the AFQT nor *MicroCog* differentiated subjects who completed training from those who failed to graduate. As a group, HI subjects did not visit outpatient medical services more often than other recruits (HI = 1.00, $SD = 2.54$; non-HI = 1.09, $SD = 2.25$), nor were they hospitalized more frequently ($t = -1.04, p < .30$). When they were hospitalized, however, they tended to spend significantly more days in the hospital than non-HI trainees ($F = 7.09, p < .008$). They were also more likely to fail BMT ($\chi^2 = 4.07, p < .04$), and to be discharged from the military for mental health reasons ($\chi^2 = 6.33, p < .012$). A total of 12.2% of HI subjects failed BMT, relative to 6.7% of the non-HI group. Four of the 90 HI subjects, or 4.8%, were discharged for a mental health condition, compared to only 1.4% of non-HI subjects.

MICROCOG SCORES

INDEX	Head Injured		Non-Injured		p <	
	Mean	SD	Mean	SD	F	t
Attention	100.60	14.69	100.50	15.54	ns	ns
Reasoning	102.48	11.51	100.93	13.68	ns	ns
Memory	107.42	10.61	106.64	13.71	.01	ns
Spatial Processing	102.01	7.72	98.89	10.79	.015	.000
Reaction Time	103.52	15.57	99.97	18.04	ns	.066*
Information Processing Speed	105.32	8.84	103.44	13.18	.053*	.055*
Information Processing Accuracy	95.86	12.18	94.94	14.57	ns	ns
General Cognitive Functioning	100.72	10.42	99.09	13.87	ns	ns
General Cognitive Proficiency	100.51	9.85	98.51	13.38	ns	ns

* Trend toward significance

CONCLUSIONS

In summary, it appears that an old HI may have a long-term impact on functional status. We found that Air Force recruits with a history of head injury failed military training and were discharged at a significantly higher rate than those without head injuries. They were more likely to be discharged for mental health reasons and, when hospitalized, remained in the hospital longer than their non-HI peers. Cognitive factors were unrelated to these outcomes and, in fact, HI subjects tended to score slightly higher on MicroCog than those without HI. Our head-injured subjects were young, very healthy, and apparently fully recovered. They passed rigorous military entrance standards and scored well on neuropsychological tests, yet we found them less able to adapt to a stressful environment than their non-HI peers. It is clear that noncognitive characteristics exert powerful influences on posttraumatic functioning. It may be that brain injury makes one less emotionally resilient to stress. Or, it may be that HI per se is not the critical event. A third factor (such as impulsivity, antisocial tendencies, or childhood physical abuse) could both increase the likelihood of HI and impair stress resilience. Finally, it may be that our HI subjects were very high functioning premorbidly, and that their Average MicroCog scores actually represent a significant cognitive decline. Other issues to be addressed in the future include the ability of "recovered" HI subjects to function in less stressful environments, and how aging affects stress resilience over time.

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