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## Research report

## Affective temperament and executive functions in emergency medicine professionals

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## ABSTRACT

**Background:** Recent studies indicate that choice of profession is related to differences in affective temperament, which is probably due to various predispositions needed to efficiently perform particular professions. The aim of the present study was to assess affective temperament and executive functions in a sample of emergency medicine professionals.

**Methods:** 75 emergency medicine professionals were enrolled in the study. Affective temperament was assessed by means of TEMPS-A. Executive functions were assessed by means of Trail Making Test and Stroop Color Word Interference Test.

**Results:** Subjects showed significantly higher rates of hyperthymic, compared to depressive, cyclothymic, irritable and anxious temperaments. The principal component analysis revealed that hyperthymic temperament contributes to a different factor, than the remaining ones. Higher rates of depressive, cyclothymic, irritable and anxious temperaments were related to poorer performance in Trail Making Test, whereas hyperthymic temperament had the opposite effect.

**Limitations:** Due to the size of the sample, results of the present study may have lacked power to show all the relationships between tested variables.

**Conclusions:** Hyperthymic temperament promotes efficient performance of complex tasks under time pressure. Depressive, cyclothymic, irritable and anxious temperaments have the opposite effect. This makes hyperthymic temperament a desirable trait in emergency medicine professionals, performing complex medical tasks under extreme conditions.

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## 1. Introduction

Recent conceptualization of affective temperaments indicates that affective temperamental traits are continuously distributed in the general population, with bipolar disorders being their extreme manifestations (Akiskal and Akiskal, 2005a). In their mild, sub-affective form, they play a significant role in emotional communication, survival, and significantly contribute to professional functioning (Akiskal and Akiskal, 2005b). Depressive temperament may promote devotion to work in men, cyclothymic temperament may contribute to creativity, whereas hyperthymic temperament – to leadership, exploration and risk-taking. Recent studies revealed that subjects performing various professions, differ in terms of their profiles of affective temperament (Nowakowska et al., 2005;

Figueira et al., 2010; Vellante et al., 2011). Those engaged in stressful professions, requiring making fast decisions in novel and highly diverse situations, show high rates of hyperthymic temperament (Akiskal et al., 2005). For example, in a study by Maremmani et al. (2010), higher rates of hyperthymic temperament were related to a greater probability of success during application to become a cadet in Italian air force. Furthermore, it was shown that hyperthymic subjects show higher levels of emotional stability and resistance to stress, which enable appropriate responding to anxiety-arousing situations (Maremmani et al., 2011).

Emergency medicine is a demanding profession, especially because of several possibly burdening job-related factors, i.e. the necessity to perform efficiently while facing a direct threat to life of others, often during consecutive night shifts. Extreme levels of stress as well as fatigue may have a negative effect on physicians' mood, concentration and consequently, on patient safety (Machi et al., 2012). Thus, it can be hypothesized that hyperthymic temperament plays a positive role in emergency medicine professionals, promoting higher levels of adaptation to job-related stress

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and efficient level of cognitive functioning under high levels of stress and fatigue.

The present study had two major goals. The first one was to assess the profile of affective temperament in a sample of emergency medicine professionals. Temperament was assessed by means of Temperament Evaluation of Pisa, Paris and San Diego-autoquestionnaire version (TEMPS-A). The temperamental profile was elaborated by assessment of differences between scores on particular scales, which was followed by evaluation of relationships between temperaments by means of the principal component analysis (PCA). The second goal was to assess the relationships between affective temperament and neurocognitive performance in the aforementioned sample. To this end, two brief tests, measuring psychomotor skills, as well as set-shifting and conflict monitoring, were applied.

## 2. Subjects

75 emergency medicine professionals (paramedics and physicians), aged 21–56 (mean age  $30.82 \pm 9.90$  years) were enrolled in the study. The group consisted of 32 male subjects, aged 21–48 (mean age  $30.68 \pm 9.37$ ) and 43 female subjects, aged 21–56 (mean age  $30.93 \pm 10.38$ ). 74 subjects received higher education, whereas 21 subjects received post-secondary education in emergency medicine. All subjects are staff members at emergency medicine departments of the kujavian-pomeranian province of Poland. None of the enrolled subjects had a history of major psychiatric disorder, which was verified by means of the MINI International Neuropsychiatric Interview, Polish version 5.0.0 (Matysiak, Przychoda 1998). All subjects gave their written consent to participate in the study after the nature of procedures were fully explained to them.

## 3. Methods

### 3.1. TEMPS-A

Affective temperament was assessed by means of the Temperament Evaluation of Pisa, Paris and San Diego-autoquestionnaire version (TEMPS-A). TEMPS-A is a 110-item yes-or-no self-report autoquestionnaire, designed to assess affective temperament in psychiatric and healthy subjects. It consists of five sub-scales: depressive, cyclothymic, irritable, hyperthymic and anxious (Akiskal et al., 2005). In the present study, we used the Polish version of TEMPS-A, validated in the sample of 521 Polish undergraduate students (Borkowska et al., 2010).

### 3.2. TMT

Trail Making Test is part of the Halstead-Reitan Neuropsychological Test Battery, elaborated for the assessment of brain impairment. Part A of TMT test measures psychomotor speed whereas part B

assesses the visuospatial working memory as well as the set-shifting ability. In the first part, a subject is asked to connect points with numbers 1–25 in an ascending order, as quickly as possible. In the second part, a subject is asked to match points with numbers 1–13 and letters A–L in alternating, ascending order. Time (in seconds) required for completion of each part was analyzed in this study (Reitan and Wolfson, 1985).

### 3.3. SCWT

Stroop Color Word Interference Test measures cognitive flexibility, cognitive inhibition, selective attention and information processing speed. In the first part of the test, a subject is asked to read color names, printed in black. In the second part, the task of the subject is to name the colors in which the words are printed, the color of the ink being different from the colors designated by the words. In the present study, we analyzed time required for completion of each part of the test (Stroop, 1935).

### 3.4. Statistical analysis

Statistical analyses were performed with Statistica 10.0 program. Normality of distribution of analyzed variables was assessed with Shapiro-Wilk test. Between-group differences were assessed with Mann-Whitney *U* test. Between-variable comparisons were performed by means of Friedman ANOVA, post-hoc analyses being carried out with Wilcoxon test. Correlations between variables were assessed by means of Spearman's rho coefficient. Exploratory factor analysis was performed using Principal Component Analysis (PCA).

## 4. Results

The results of TEMPS-A as well as both neuropsychological measures, TMT and Stroop tests were presented in Tables 1 and 2, respectively. Male subjects showed significantly higher rates of hyperthymic temperament ( $U=489$ ;  $p < 0.04$ ) and lower rates of anxious temperament ( $U=480$ ;  $p < 0.03$ ), compared to female subjects. Both groups did not differ in terms of performance in either of neuropsychological tests.

An analysis of differences between scores, obtained on different TEMPS-A scales, as performed by means of Friedman's ANOVA, revealed significant between-scale differences ( $\chi^2(4)=131.37$ ,  $p < 0.01$ ). Post-hoc analyses demonstrated, that the rates of hyperthymic temperament were higher, compared to all other temperaments ( $p$ 's  $< 0.01$ ) and were followed by depressive, cyclothymic, irritable and anxious temperaments, respectively. No differences were observed between rates of irritable and anxious temperaments.

Principal component analysis was performed with five original variables (temperament scales) are presented in Table 3 and Fig. 1. Two first factors, Factor 1 (50,16%) and Factor 2 (18,76%), accounted cumulatively for 68,92% of the total variance on PCA. Factor 1 was

**Table 1**  
Results of TEMPS-A in the sample of emergency medicine professionals.

	Total ( $n=75$ )		Males ( $n=32$ )		Females ( $n=43$ )		$p^a$
	Mean $\pm$ SD	Median (25–75%)	Mean $\pm$ SD	Median (25–75%)	Mean $\pm$ SD	Median (25–75%)	
Depressive	$0.32 \pm 0.13$	0.33 (0.23 ÷ 0.42)	$0.31 \pm 0.14$	0.30 (0.19 ÷ 0.38)	$0.34 \pm 0.12$	0.33 (0.23 ÷ 0.42)	0.183
Cyclothymic	$0.27 \pm 0.16$	0.28 (0.14 ÷ 0.38)	$0.24 \pm 0.16$	0.23 (0.09 ÷ 0.35)	$0.29 \pm 0.16$	0.28 (0.14 ÷ 0.38)	0.109
Hyperthymic	$0.63 \pm 0.21$	0.66 (0.47 ÷ 0.76)	$0.69 \pm 0.25$	0.69 (0.54 ÷ 0.80)	$0.58 \pm 0.17$	0.61 (0.42 ÷ 0.71)	0.032
Irritable	$0.22 \pm 0.16$	0.20 (0.10 ÷ 0.30)	$0.21 \pm 0.17$	0.20 (0.10 ÷ 0.30)	$0.21 \pm 0.15$	0.20 (0.10 ÷ 0.30)	0.666
Anxious	$0.19 \pm 0.15$	0.19 (0.07 ÷ 0.26)	$0.14 \pm 0.12$	0.11 (0.03 ÷ 0.21)	$0.23 \pm 0.16$	0.20 (0.11 ÷ 0.34)	0.025

<sup>a</sup> difference between males and females. Mann-Whitney test.

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