



Sex Differences in Cardiovascular and Subjective Stress Reactions: Prospective Evidence in a Realistic Military Setting

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- ❖ This study characterized sex differences in cardiovascular and subjective stress reactions among military survival trainees.
- ❖ Females showed greater residual elevation in systolic blood pressure (SBP) during recovery and reported greater psychological impact of mock captivity than males.
- ❖ This may elucidate sex differences in posttraumatic stress development (PTSD).

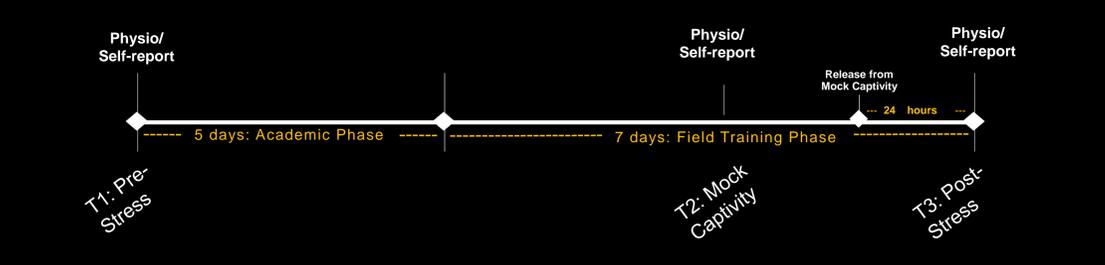
BACKGROUND & PURPOSE

- ◆ Heightened physiological arousal in response to acute stress exposure is both a prospective marker and core characteristic of PTSD.^{1,2}
- ◆ Growing evidence suggests males and females exhibit different patterns of acute stress response, which may explain sex differences in PTSD development.^{3,4} However, the available research is largely from controlled, laboratory studies.
- ◆ Military survival school provides an ideal setting to examine sex differences in acute stress reactions under standardized and highly realistic conditions.
- ◆ The purpose of this study was to evaluate sex differences in cardiovascular and subjective stress reactions in military survival school trainees.

METHODS

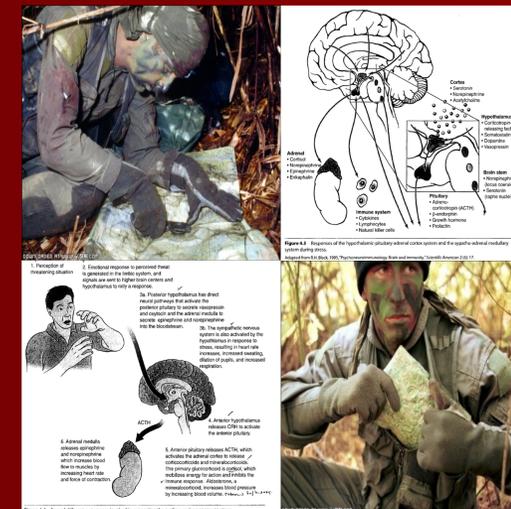
- ◆ **Participants.** 185 (77.8% male) healthy, active-duty military personnel attending military survival school (mean ± SD age = 25.2 ± 4.4 years).
- ◆ **Measures.** Physiological and self-report data were collected at three time points: **T1**) first day of the academic phase of survival training, **T2**) directly after a stressful mock-captivity event, **T3**) approximately 24 hours after release from mock captivity (see **Figure 1** for timeline).
 - ◆ **Physiological measures (T1, T2, T3):** heart rate (HR), SBP, diastolic blood pressure (DBP), tympanic temperature, arterial peripheral oxygen saturation (SpO₂)
 - ◆ **Self-report measures (T1, T2, T3, unless otherwise noted):** psychological impact⁵, dissociative states⁶, perceived stress (T1), locus of control (T1), prior trauma (T1), dispositional resilience (T1), personal and service characteristics (T1)
- ◆ **Analysis.** Descriptive statistics, repeated measures Analysis of Covariance (ANCOVA); Bonferroni corrections were implemented for all comparisons at 0.5/3 = 0.017.

Figure 1. Study Timeline



RESULTS

- ◆ No sex differences were observed for dissociative states or HR reactivity, recovery, or residual elevation ($p > 0.017$).
- ◆ Females exhibited significantly lower DBP ($F(1,162) = 8.2, p < 0.017, \eta_p^2 = 0.05$), although no sex differences were observed for reactivity, recovery, or residual elevation ($p > 0.017$).
- ◆ Females had lower SBP than males at all three time points ($F(1.7,260.4) = 4.2, p < 0.05, \eta_p^2 = 0.03$), but showed greater residual elevation in SBP (relative T1-T3Δ; $F(1,159) = 12.1, p < 0.017, \eta_p^2 = 0.07$).
- ◆ Females reported greater psychological impact of mock captivity than males ($F(1,178) = 5.2, p < 0.05, \eta_p^2 = 0.04$).
- ◆ No sex differences were observed for dissociative states or HR reactivity, recovery, or residual elevation ($p > 0.017$).
- ◆ Exploratory causal steps modeling suggested stress-induced HR may partially mediate sex differences in psychological impact of acute stress.



CONCLUSIONS

- ◆ This study demonstrated sex-specific cardiovascular stress reactions in military personnel, along with greater psychological impact of stress exposure in females.
- ◆ Results of this study may help to elucidate sex differences in physiological response to trauma and development of posttraumatic stress.
- ◆ Future studies continuing this line of research would benefit from collecting additional cardiovascular metrics, including cardiac output, stroke volume, peripheral resistance, and pre-ejection period.

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