

Psychophysiological response of military pilots in different combat flight maneuvers in a flight simulator

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Authors

Santos Villafaina, Dr. Juan Pedro Fuentes-García, Narcis Gusi, José F. Tornero-Aguilera, Vicente J. Clemente-Suárez

Abstract

Objective: To analyze the psychophysiological response during takeoff, landing, air-air attack and air-ground attack maneuvers. Methods: A total of 11 expert pilots (age=33.36 (5.37)) from the Spanish Air Force participated in this cross-sectional study. Participants had to complete in a flight simulator the following missions: 1) takeoff; 2) Air-air attack; 3) Air-Ground attack, and 4) Landing. The electroencephalographic activity (EEG) and heart rate variability (HRV) were collected during all these maneuvers. Results: Significant higher values of theta (during takeoff, air-air attack and air-ground attack) EEG power spectrum were obtained when compared to baseline. Significant difference in the P3 scalp location was observed between landing and takeoff maneuvers in the beta EEG power spectrum. Furthermore, significant lower values of HRV were obtained during takeoff, landing, air-air attack and air-ground attack when compared to baseline values. Also, landing showed a higher sympathetic response when compared to takeoff maneuver. Conclusion: Takeoff, landing, air-air attack or air-ground attack maneuvers performed in a flight simulator produced significant changes in the electroencephalographic activity and autonomic modulation of professional pilots. Beta EEG power spectrum modifications suggest that landing maneuvers induced more attentional resources than takeoff. In the same line, a reduced HRV during landing was obtained when compared to takeoff. These results should be considered to training purposes.

Keywords

HRV, EEG, Army, Simulator, Flight, Combat