

# Psychophysiological response in night and instrument helicopter flights

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## Abstract

Instrument and night flights are sources of mishaps: they produce stressful contexts to aircrews in which operability can be affected. This study aimed to analyse the effect of night and instrument flights in cortical arousal, autonomic modulation, muscle strength, and stress perception. 23 people were analysed (8 helicopter pilots, 4 helicopter mechanics – Spanish Air Forces – and 11 controls) before and after instrument and night flight exposition. Lactate and perceived exertion rose after flights. Anxiety was higher in instrument than in night flights. Pilots had a higher sense of anxiety before a flight compared to mechanics, although mechanics experienced a higher raise of heart rate during flight, with lower heart rate variability. Breath capacity was affected in pilots. Cortical arousal was more affected in unexperienced than in experienced aircrew during flights. These data suggest differences in their previous training. Practitioner summary: Night and instrument helicopter flights produced a different psychophysiological response of aircrew. These results could help to design specific training for aircrew that usually face instrument and night manoeuvres. Specific training based on high-intensity interval training integrated with reverse periodisation could improve their preparation. Abbreviations: BMI: body mass index; BOS: blood oxygen saturation; BT: body temperature; CA: cognitive anxiety; CFFT: critical flicker fusion threshold; ES: effect size; FEV<sub>1</sub>: forced expiratory volume in 1 second; FVC: forced vital capacity; HF: high frequency; HR: heart rate; HRV: heart rate variability; HIS: isometric handgrip strength; LF: low frequency; NVG: night vision goggles; PEF: peak expiratory flow; pNN50: proportion of differences between R-R intervals higher than 50 ms; RMSSD: square root of the mean of the sum of the squared differences between adjacent normal R-R intervals; RPE: rated of perceived exertion; SA: somatic anxiety; SC: self confidence; STAI: state trait anxiety inventory

## Keywords:

Pilot; psychophysiology; aircrew; stress; arousal