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Author: Mr. Jean Pauly
Université de Lorraine, France, jean.pauly@univ-lorraine.fr

Dr. Cecile Langlet
France, cecile.langlet@univ-lorraine.fr
Dr. Jean-Philippe Hainaut
France, hainaut@univ-metz.fr
Dr. Benoît Bolmont
France, bolmont@univ-metz.fr

DETECTION AND MONITORING OF AFFECTIVE STATES DURING A 4-MONTH CONFINEMENT IN A SPACE-LIKE ENVIRONMENT

Abstract

Introduction: Long-duration space missions are a source of multiple stress that can disturb the affective states of astronauts (isolation, communication delays, workload...). However, studies in space or in space analogous environments struggles to find a consensus on the affective response to these stressors. Today we are unable to say if the human's response to space conditions is mostly positive, negative, or neutral. Also, we are not certain of the presence of a temporal dynamic like the third-quarter phenomenon (Palinkas Suedfeld, 2021). Therefore, more research is required to better understand the human psycho-physiological mechanisms during a long-term space-like missions. Our objective is to assess the time-course variations of multiple psychometric and physiological parameters that are likely to account for affective changes in a 4-month confinement simulating a lunar mission. We hypothesize that the isolation could influence these parameters. Methods: Six subjects (3 males, 3 females) were submitted to the protocol before and during (1/month) the 4-month confinement. Once a month, the participants responded to various psychometric tests measuring their affective states (SAM valence/arousal, PANAS, VAS thoughts / anxiety). Cardiac parameters were recorded at rest for 2 minutes (HR, HRV). Capillary cortisol was also collected at each test session. The data from each session during the mission were compared to those obtained before. Because of the small number of people studied, the statistics used were descriptive (mean, standard error) and the analysis was purely qualitative. Results: Our data do not allow us to observe that psychometric or cardiac parameters were modified according to the period of confinement. We observed increasing rates of hair cortisol for the first and second samplings during the mission before a return to baseline values during the third. Discussion: We found no significant change in the cardiac or subjective measures over the 120-day experiment. We infer that there was no positive or negative effect related to the isolation. Therefore, there is no obvious time effect corresponding to a third-quarter phenomenon. We hypothesize that the hair cortisol increasing observed at the beginning of the mission may be attributed to a preparation and adaptation phase of the crewmembers. The unfamiliar physical, social, and psychological environment may have required some acclimatization efforts from the crew, which chronically increased the activity of their hypothalamic pituitary adrenal axis. However, this challenge may not have been cognitively appraised as negative or positive by the participants. This might explain the difference between the cortisol data and the subjective data. It would be relevant to study whether the observed results are found during longer confinements. We suppose that affective impacts of space-like confinements should be greater when the duration is longer (Pagel Choukèr, 2016). This will improve our understanding of the adaptation capabilities of astronauts, which will be exposed to long space flights (Moon, Mars).