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ADDRESSING KEY PSYCHOLOGICAL AND PHYSIOLOGICAL FACTORS IN PREPARATION FOR LONG DURATION MANNED MISSIONS - SUGGESTED ADAPTATION OF CURRENT ASTRONAUT TRAINING

Abstract

Long-duration human space flight missions (longer than 6 months) create new challenges in space exploration. Maintaining crew well-being and performance is critical for the success of these missions. In addition to physiological effects (e.g. due to microgravity or radiation), experiments have demonstrated that in this extreme environment, long-term spaceflight can have adverse psychological and sociological effects on the crew. The Space Exploration Working Group of the 2nd and 3rd "European - Space Generation Workshops" (E-SGW) organized by the Space Generation Advisory Council (SGAC) in Paris,

France in March 2017 and in Bucharest, Romania in March 2018 set out the following topics that will be addressed in this paper: 1) Identify physiological and psychosocial risks for long-duration manned missions; 2) Propose mitigation measures against these detrimental health effects and impact they could have; 3) Consider if the astronaut selection process and training could be adapted to the needs of future missions. Physiological risks are dominated by the effects of radiation and microgravity causing a myriad of potential short and long term health issues for astronauts. Medical challenges need to be addressed not only with technical countermeasures, but also considering crucial factors such as team composition and training. Potential psychological disorders include a wide range of mental health problems (for example chronic stress, sleep disorders, anxiety, psychosis, psychosomatic illness, mood disorders) that are not only detrimental to the astronaut, but also reduce productivity. Interpersonal challenges that could develop in such conditions include a tendency to avoid social contact, as well as tension and conflicts arising within the team, which increase with the duration of the mission and distance from Earth, as the crew becomes more isolated. The breadth of the identified psychological problems needs the implementation of countermeasures to minimize the effects of this stress-inducing environment. Suggested evidence-based and applied psychological approaches in contextual behavioural science could successfully reduce the stress imposed and increase psychological well-being, team cohesion and performance of the crew. A range of potential changes to current selection and training techniques for long-term missions is discussed focusing on selection criteria, to ensure a complementary interpersonal mix within teams, and training to support both the physical and psychological demands and endurance required for long-term space travel. The presented topic will be examined interdisciplinarily, and will aim to identify a practical and pragmatic approach to enable human spaceflight, balancing risk acceptance versus risk mitigation.