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EXPLORING HUMAN ADAPTATION AND PERFORMANCE DYNAMICS IN DEEP SPACE ANALOGUES: INSIGHTS FROM LUNARES MISSION SIMULATION

Abstract

Future deep space exploration missions pose unique challenges on individual and team level affecting performance and behavior, necessitating thorough preparation and understanding of potential issues. Some of the issues have a history of research, while other critical topics remain untouched. We aimed to address several typical challenges along with innovative research questions in the NIKE01 mission at the LunAres station in Poland.

The first aspect examines the influence of demographic and personality factors on adaptability during deep space analog missions. Utilizing standard questionnaires (such as the Big Five inventory and questionnaires used in HERA and on the ISS) and cognitive data (Psychomotor Vigilance Task, we describe the course of individual well-being and performance during mission in relation to individual factors. This study part enhances the potential for future meta-analyses, contributing significantly to the field by employing established measures, ensuring data reliability and validity.

The second investigation focused on the theory of mind in crew and mission control. Individuals consider their actions in relation to their own prediction of other individuals' behavior and mental state. Anecdotal evidence and previous research suggest the presence of an "us-vs-them" effect and undesirable actions stemming from poor judgments of each other's emotional states due to communication limitations. Inspired by Madison Diamond's work, the study explores the expression of theory of mind between crew and mission control. By examining day-to-day perceptions of emotional states, the research aims to bridge discrepancies and improve communication protocols, ultimately enhancing mission effectiveness and crew well-being.

Additionally, the study delves into changes in environmental perception during deep space analogues, highlighting the impact of prolonged isolation on individual perceptual experiences. The data showed that analog astronauts preferred natural and urban scenery the least before the mission and the most during it. Variation in pro-environmentalism was small. Findings offer insights into psychological dynamics in confined environments, informing the development of isolation countermeasures and enhancing indoor environments for improved quality of life.

Lastly, the research pioneers the exploration of sociosexuality's impact on mood and team dynamics during deep space missions. By addressing this overlooked aspect, the study uncovers novel insights into interpersonal dynamics within confined groups, crucial for ensuring crew cohesion and well-being.

All aspects will be presented separately. Overall, this interdisciplinary study advances our understanding of psychological dynamics in deep space analogues, offering valuable insights for future missions and contributing to the broader understanding of human behavior in isolated and confined environments.