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Editorial

Human Behavior in Space Exploration Missions

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Fifty years of human space exploration have allowed space psychology as an applied area of science to take major steps forward. Initially, space psychology was related to setting selection criteria, which involved choosing and training the right staff for space missions. In the early years of space exploration, this selection process mainly consisted of completing a number of questionnaires, and these were sufficient for short missions involving a couple of astronauts. Now, the principles of selecting in and selecting out are based on a long psychological monitoring process, involving training, control, the acquisition of necessary professional skills, and sophisticated performance tests. Moreover, space psychologists have shifted their focus from selecting healthy individuals who can manage the stresses of space to identifying and preparing partners compatible with the demands of extended space missions, which can span over a year or more [1–4].

Remarkable progress has also been achieved in understanding how psychological health, motivation, mood, and work capacity evolve under the stressful conditions of space flight [5]. At present, psychologists recognize that humans can successfully cope with space-related stress and are able to execute intricate mission protocols, even after prolonged periods in orbit. Concurrently, certain adverse changes have been observed, such as indications of depression, irritability, sleep disturbances, and performance errors [6]. The existence of phenomena such as the "third quarter phenomenon" and "space asthenia" during extended missions continues to be debated, necessitating further investigation in this domain [7].

The present stage of human space exploration is characterized by an increase in mission duration, with missions lasting up to one year or longer. Additionally, large international teams of astronauts, hailing from diverse backgrounds and spanning a wide range of professions and religions, now live and work together on the International Space Station. With regard to the future, plans have been outlined for establishing human space stations on the Moon and Mars. These developments have inevitably shifted the focus of space psychology research [8].

In particular, intra- and intergroup interactions have become one of the primary targets of research by space agencies. The reason for this can be derived from the data acquired from space simulations, which indicate substantial increases in the probability of leadership loss, negative group dynamics with conflicts and tension, scapegoating, territorial behavior, and subgrouping during extended autonomous interplanetary missions. Thus, issues related to choosing the right leader and maintaining crew cohesion under conditions where external supervision is lacking should influence current approaches to crew selection and team building [8–10]. Additionally, new factors such as personal and team values, including religious principles, should be considered for proper team composition [11].

Apart from these, problems related to crew autonomy in future missions have increased scientific interest in the analysis of regularities in crew communication, both inside the crew and with mission controllers [1]. Scientists seek to understand how the lack of outside control and recommendations can influence the execution of performance tasks. Among other, crew communication analysis can provide researchers with samples of data regarding astronaut behavior and performance, which are not influenced by external factors such as socially desirable reactions and career perspectives [1,12,13].

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Additionally, new digital technologies are significantly expanding the capabilities of research in space psychology. These technologies, such as virtual reality in particular, are widely used in space simulations for the modeling of space flight conditions and professional activities [7,8]. Virtual technologies, i.e., voice assistants, are also used for the elaboration of new space tools, both in helping astronauts execute performance tasks and as a means for individual psychological support under autonomous conditions. Alongside these tasks, experiments are being conducted in order to detect the potential positive and negative effects of such approaches and tools. Simultaneously, scientists in the U.S., Russia, China, and the U.A.E. are conducting intensive studies on the "opposite" approach to psychological support on other planets, which is based on creating biospheres that can not only feed the crew but also provide astronauts with places for psychological rehabilitation [4,7].

Thus, the main objective of these seven papers in space psychology is to provide a brief understanding of the current state of the art, as well as demonstrate scientific perspectives concerning this area. We also hope this knowledge can make human missions to the Moon and Mars more feasible and ensure their success.

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