

SPACE LIFE SCIENCES SYMPOSIUM (A1)
Behaviour, Performance and Psychosocial Issues in Space (1)

Author: Prof. Nick Kanas

University of California, San Francisco (UCSF), United States, nick.kanas@ucsf.edu

Mr. Matthew Harris

University of California and Veterans Affairs Medical Center, United States, mharris2@alliant.edu

Prof. Thomas Neylan

University of California and Veterans Affairs Medical Center, United States, thomas.neylan@ucsf.edu

Prof. Jennifer Boyd

University of California and Veterans Affairs Medical Center, United States, jennifer.boyd@ucsf.edu

Prof. Daniel S. Weiss

University of California and Veterans Affairs Medical Center, United States, daniel.weiss@ucsf.edu

Ms. Colleen Cook

University of California and Veterans Affairs Medical Center, United States, colleenlcook@gmail.com

Ms. Stephanie Saylor

University of California and Veterans Affairs Medical Center, United States, stephanie.saylor@va.gov

HIGH VERSUS LOW CREWMEMBER AUTONOMY DURING A 105-DAY MARS SIMULATION
MISSION

Abstract

Crewmembers participating in long-duration space missions beyond the Earth-Moon environment will have more autonomy than in previous on-orbit missions or missions to the Moon. In order to study the impact of high versus low crew autonomy on crewmembers and mission control personnel, we studied 6 men who were isolated for 105 days in a Mars mission simulator at the Institute for Biomedical Problems in Moscow, along with 18 outside individuals who monitored their activities in a simulated mission control. During the first 10 weeks of the mission, the crew interacted with mission control under a low autonomy condition, where the latter developed the work schedule and communicated with the former in real time. During the last 5 weeks, a high autonomy condition was instituted, where crewmembers planned and revised their work schedule and where a 40-minute Mars-like communication delay occurred with the outside monitors. Both crew and mission control subjects completed weekly measures of mood, group interpersonal climate, and work freedom and performance. The results suggested that high work autonomy was well-received by the crew, mission goals were accomplished, and there were no adverse effects. During the high autonomy period, crewmember mood and self direction were reported as being better, but mission control personnel reported more anxiety and work role confusion. Despite scoring lower in work pressure overall, the four Russian crewmembers reported a greater rise in work pressure from low to high autonomy than the two Europeans. In contrast, the European crewmembers reported a greater rise in negative dysphoric mood in going from low to high autonomy, whereas the Russians' emotional state remained the same or slightly improved. Work freedom was rated slightly higher during high autonomy, but work performance was about the same overall, although Russian scores increased and European scores decreased on all four performance measures. It is time to study the effects of high autonomy with larger subject samples during on-orbit space missions (e.g., to the International Space Station) in order to prepare for future deep space exploratory missions, where high autonomy will be the norm.