

Human Performance in Extreme Environments

Palinkas and Sandal Papers

Presented by

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Psychosocial Issues in Long-term Space Flight, by L. Palinkas

- Behavior in ICE is fascinating to many people
 - Evidenced by popularity in 'Survivor' and 'Eco Challenge' shows
- Excerpt from 'Bold Endeavors' by J. Stuster that describes worst-case scenario for ICE missions
- Palinkas states that psychosocial issues are likely to have significant impact on the outcomes of long-duration space missions



Paper Organization

- 3 Different Domains of Behavior
 - Individual
 - Interpersonal
 - Organizational



Individual Domain Issues

Stress and Coping

- Elements of long-duration flight
 - Little privacy & personal space
 - Social monotony
 - Homesickness
 - Real environmental physical hazards
- How much stress?
 - Depression, insomnia, anger, anxiety, fatigue, and decrements in cognitive performance
 - 4 year Antarctic mission showed 5.2% met DSM-IV disorder criteria



Individual Domain Issues

Screening and Selection

- Traditionally 'select-out' based
- Longer missions may require a 'select-in' approach
 - PCI test
 - “Right Stuff” (goal oriented, warm, strive for excellence, and strong work ethic)
 - “Wrong Stuff” (competitive, impatient, verbal aggressiveness)
 - “No Stuff” (dependent, subservient, unassertive)
 - <http://www.advisorteam.com/>



Individual Domain Issues

Screening and Selection

- Test limitations
 - Baseline measures are often weak predictors of behavior in ICE
 - Accuracy of tests not completely proven



Interpersonal Domain Issues

Tension, Conflict, & Cohesion

- Prolonged time in ICE leads to increased social tension.
 - Depends on a number of factors including: leadership, group size, social, cultural, and personality attributes of crew members
 - Lebedev estimated that 30% of his time in space involved crew conflict.
 - Developed psychological countermeasures has had little effect on preventing crew conflict
 - Antarctic program indicates screening has had little impact on the problem
- Some ICE groups exhibit high levels of cohesion. (2/3 studies in McDonnell space cabin simulators found no significant levels of conflict)

Interpersonal Domain Issues

Social Dynamics of Small Groups

- Three Stages
 1. Open interaction between crew members
 2. Formation of subgroups based on common characteristics
 3. Entire group coalesces around a social core
 - This core may emerge at the expense of those who refuse to adhere to group norms leading to individual isolation from the group



Interpersonal Domain Issues

Sources of Conflict during Space Flight

- Many and Varied
 - Gender (implicit & overt sexual stereotyping)
 - Occupation (pilot/engineer vs. 'guest')
 - Culture (evidenced during MIR missions)
 - Astronauts share a “microculture”
 - Personality (socially adept introverts vs socially inept extroverts)



Interpersonal Domain Issues

Leadership

- Line of communication is clear for short-term flights, however, informal leadership may arise on longer missions
- Key Leadership Qualities
 - Task oriented leadership initially
 - Supportive leadership in latter phases
 - Both decisive and shared decisions
 - Flexible, non-interfering, & showing pride



Interpersonal Domain Issues

Ground-Crew Interaction

- Russian & American space missions have witnessed overt hostilities between astronauts and ground-control.
- “Us versus Them” mentality may have adaptive properties by uniting the astronaut crew and providing an outlet for aggression



Organizational Domain Issues

- Each involved space agency is likely to possess different values & practices
 - In ground-crew interactions Russian personnel have been reported to be more confrontational
 - Contact between ground and crew is more prolonged for NASA
 - NASA emphasizes over-training, whereas RSA has more of an “on-the-job” training protocol
 - Russian practice of docking cosmonaut’s pay



Organizational Domain Issues

Time Dependence

- ICE behavior correlates linearly with time
 - “Third Quarter Phenomenon”
 - Could lead to appropriate countermeasures such as scheduling of tasks



Psychosocial Issues in Space: Future Challenges by G. Sandal

- Analog Environments
 - Since little direct space flight data exists researchers have turned to analog environments
 - These environments include: space simulators, Antarctic expeditions, submarines



Analog Environments

- Care must be taken when extrapolating from these environments to space missions
 - People cognizant they are being studied may show themselves in the best light possible
 - Not ethical to create life-threatening dangers and so polar models may be of the most help
 - Reactions to monotony and boredom due to forced confinement may be best observed in space simulators
 - Submarine crews are often too large to be applicable
 - Common set of measures is often absent



Countermeasures

- Cultural training
 - Ensure all crew members are compatible pre-flight
 - May be accomplished via role-playing, group discussion and exercises, and education
- Crew-ground interactions
 - “Bull Sessions”
- “Select-in” personality screening



Countermeasures

- Prediction of when problems are most likely to occur
 - Lighting schedules, celebrations, or distracting tasks has worked to some degree for the Russian program
- Monitor crews in-flight
 - Analysis of speech (intonations, speed, themes discussed, and duration of talks)



Countermeasures

- Pre-flight training
 - Especially important for interplanetary missions
 - A need for mental health self-diagnosis and resolving conflict by one's self
 - Manzey suggests training should consist of
 1. Support of a team building process
 2. “Anticipatory problem-solving” skills



Results from ESA Simulator

- Tension developed between multinational crew
 - Lead to closing the door between two chambers and one subject leaving the experiment (kissing misinterpretation?)
- 26-day crew resulted in isolation of one member and limited communication between fellow cabin mates
- 60-day crew remained cohesive throughout isolation though to be due to Manzey's training schema prior to the study



Discussion and Conclusion

Open to any ideas you would like to discuss.

