

Mental Health in Space

Problem: Astronauts on long –duration space missions will have increasing potential for feelings of isolation, trouble sleeping, and mental health issues caused by environmental and physiological changes.


Start with the Habitat

From HRP documentation:

Environmental psychology research, spaceflight analog research and anecdotal spaceflight evidence show that risks posed by environmental stressors can be mitigated by modifying the vehicle environment (e.g., introduction of novel stimuli, greenhouses, virtual reality, etc.). Thus, these habitat/vehicle environments also offer protection from the hazards of spaceflight and can serve to mitigate the negative psychological and behavioral effects of environmental stressors (e.g., isolation, confinement, reduced sensory stimulation) likely to be experienced during long-duration spaceflight. HRP funded research has sought to identify and validate habitat environmental specifications, countermeasures, and operational regimens for using countermeasures to prevent and mitigate health and performance decrements due to sleep, circadian, and neurobehavioral disruption, for flight, surface, and ground crews, during all phases of spaceflight operations.

Goals of this project

All students will research (with documentation) about mental health issues in isolated sensory deprived environments. (Think North Pole, South Pole research, HERA, etc). It is suggested that students research the DSM-5 document for sleep disorders, anxiety and depression.



Students will all capture the following:

A habitat overall design that will encourage positive mental health and have countermeasures to eliminate loneliness, isolation, sensory deprivation, circadian rhythm and sleep issues.

Choose one countermeasure that you will be technologically focused on and modify or add to an existing solution to create a unique aspect to the habitat.

Prototype from these Goals



Your scale of the habitat you design will be small (look up architecture small models and interior architecture small models). Your Habitat model can be a rendering or a small-scale physical model. You should include a document with the flow diagram that explains your habitat as well.



Use this website to understand and design an interior design bubble flow diagram



[Understanding Architecture Bubble Diagrams: A Comprehensive Guide - Arch Articulate](#)



For the technology concept that you are focusing on, this is where a **physical prototype** should be present.

Aspects to Consider



Habitat should include mental health countermeasures for sleep, circadian cycles, loneliness and isolation and sensory deprivation.



Use of technology encouraged including Virtual Reality, AI, and sensory.



Imagine walking into the habitat after a long day on the moon or martian surface and what the habitat will do to help your mental health for connection (mentally and sensory).



Designing the Habitat should be aesthetically pleasing (think interior design from a mental health standpoint) but keep the idea minimalist and potentially multi-functional aspects.

Sleep issues

- ❑ Astronauts see 16 sunsets and 16 sunrises
 - ❑ Circadian Rhythm is off
- ❑ Primary lighting on Station is Blue light with certain wavelength
 - ❑ Affects the hormone Melatonin
- ❑ Radiation hits to optic nerve and the crewmember sees flashes of light
- ❑ Sleep deprivation can cause issues with alertness, motor speed, and anxiety, as well as a host of other issues



Isolation Issues

- ❖ Crew members often feel isolated from the rest of world
 - ❖ They miss nature (sounds, colors, smells, touch)
 - ❖ They miss family – long duration missions may make contact more difficult
 - ❖ They miss social aspects from home



Technology Assistance?



- Many technology items we have today could assist with mental health
 - VR technology
 - Cognitive training
 - Motion sensing wearables
 - Smart wearables
 - Biometric devices

