



CLDP MedOps Workshop

Behavioral health and Performance

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Overview



- ❖ The mission of Behavioral Health and Performance is the *prevention and/or mitigation* of behavioral health and performance problems resulting from exposure to spaceflight hazards by:
 - Developing and implementing countermeasures for astronauts and families
 - Providing input to mission-guiding documents, vehicle design, policies, procedures and standards

- ❖ *Isolation and confinement* is the spaceflight hazard posing the greatest risk to behavioral health and performance in long duration missions
 - *Distance from earth, microgravity, and space radiation*, also contribute to risks of behavioral health and performance problems, especially cognitive and performance problems



BHP In-Flight Worst-Case Scenarios



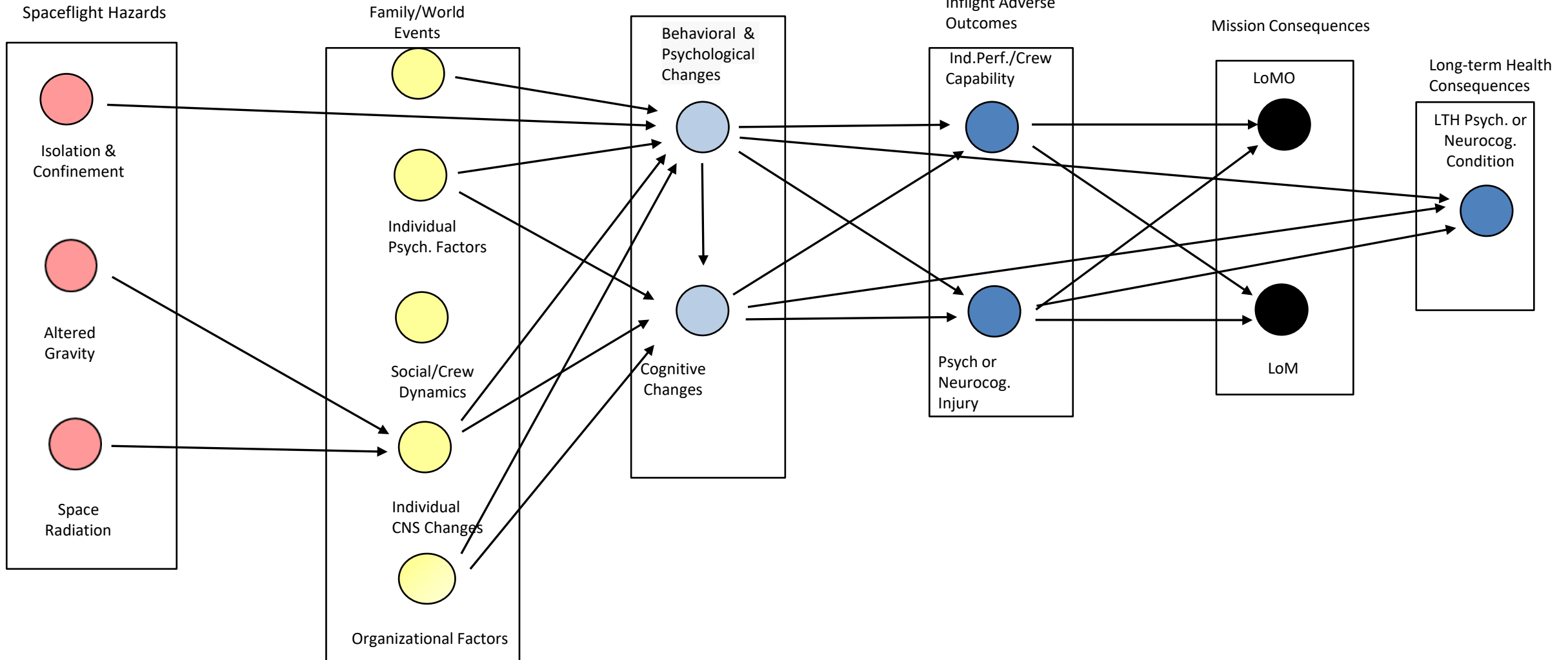
- ❖ What we worry about:
 - Death of family member on earth (especially that of a child)
 - Illness or injury on orbit leading to behavioral instability
 - Mishap during space operations due to human error caused by extreme fatigue or insufficient sleep
 - Development of depression, anxiety, or other significant behavioral health symptoms on orbit
 - Home life stability
 - Significant crew-crew interpersonal conflict
 - Significant crew-ground conflict that turns into an overt “us against them” scenario
 - Making media headlines
- ❖ Some can arise from a gradual gathering of lesser conditions/situations
- ❖ Countermeasures are directed at preventing these problems and others

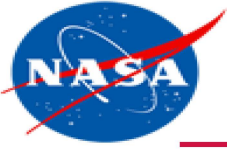


Pathways from Spaceflight Hazards to Mission and Behavioral Health Consequences: Importance of Individual Mediating and Moderating Factors



Mediating/Moderating Factors





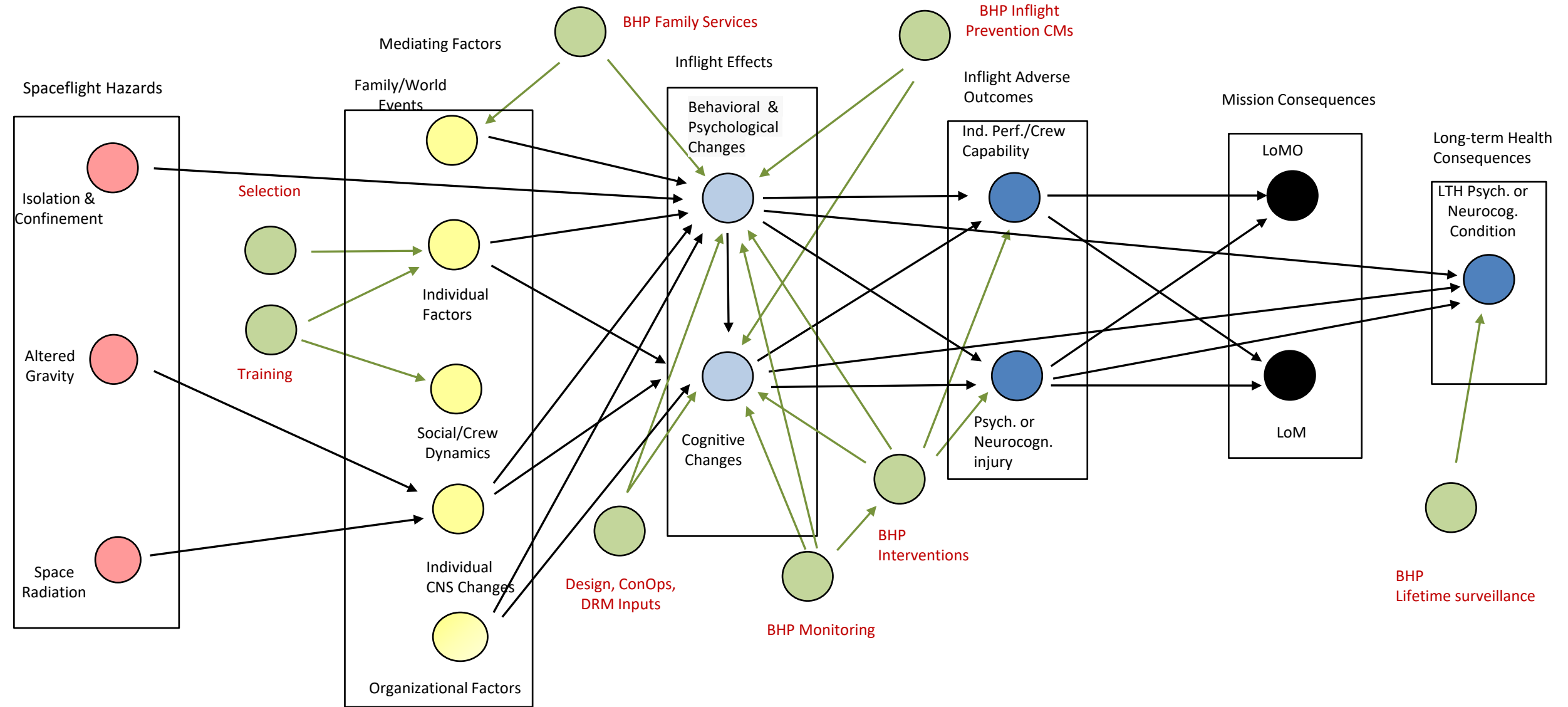
BHP Countermeasures



- ❖ BHP mitigates known behavioral health risks during missions through delivery of countermeasures informed by science (e.g., analog and spaceflight research) and practice (e.g., previous US and international spaceflight experience)
 - tailored to the needs of individual crewmembers for optimal effectiveness
- ❖ BHP engages in continuous refinement of countermeasures using both quantitative (e.g., astronaut selection) and qualitative/narrative methods (e.g., post-flight debriefs with each crewmember)



BHP Countermeasures to Mitigate the Consequences of Spaceflight Hazards





BHP Countermeasures



- ❖ Four major efforts to mitigate the risks of hazards in spaceflight
 - Input into Vehicle and ConOps Design
 - Early preventives
 - Astronaut Selection
 - Screen out applicants who do not meet behavioral health standards
 - Identify the most adaptable, resilient candidates with specific capabilities tailored to exploration mission needs
 - Post-Selection Training
 - Train capabilities and skills to deal with the unusual environment of spaceflight
 - In-flight Operational Support
 - Monitor behavioral health of crewmember, team, and family
 - Provide info, advise crewmembers on orbit, “intervene” as clinically indicated
 - Consult with mission medical, flight directors, and program managers
 - Import sustaining conditions; “normalize” the environment
 - Re-patriation/re-integration



Astronaut Selection



- ❖ Selection is the most important countermeasure for mitigating risks to behavioral health and performance
- ❖ Comprises two complementary processes
 - Psychiatric Qualification
 - According to current NASA medical standards
 - Recommendation to Aerospace Medical Board
 - Psychological Suitability for Space Missions
 - Accommodate multiple, varied DRMs
 - Minimum suitability requirements in NASA medical standards and MOPG
 - Advisory information to Astronaut Selection Board (ASB)



Psychiatric Qualification



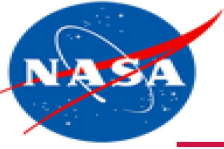
- ❖ Determined by comprehensive and structured psychiatric interview
- ❖ Includes completion of psychodiagnostic testing
 - Results inform areas of follow-up in psychiatric evaluation



Psychological Suitability for Spaceflight Operations



- ❖ Overall assessment of the degree to which applicants possess sufficient levels of critical psychological attributes (competencies) to complete training and perform effectively under operational conditions (spaceflight)
 - Assumes that not all psychiatrically healthy individuals have the necessary competencies to perform effectively in spaceflight and that some possess certain attributes that are maladaptive but not sufficient for a psychiatric disorder
 - Identifies those who may be psychiatrically healthy yet psychologically “unsuited” because they present unacceptable levels of risk to crew cohesion, flight safety, or mission execution
- ❖ Failure to assess suitability can result in individuals being psychiatrically certified to fly but who pose a **significant threat to crew cohesion, flight safety, or mission execution** because of insufficient levels of specific psychological competencies



BHP Training



- ❖ Training and preparation serves as another important countermeasure for ensuring the psychological health and performance readiness of individuals and whole crews, and immediate family
- ❖ Training specifically targets the important non-technical skills needed for living and working with others in a confined setting for both short and extended durations (i.e., expeditionary skills)
 - Secondarily targets family preparation and expectations
- ❖ BHP relevant training provided at two critical junctures
 - Astronaut candidate period
 - Pre-flight training period



BHP Mission Support



❖ *Behavioral Health and Performance Monitoring* of crewmembers

- Pre-flight Readiness interviews (three during the preflight period)
- Pre-flight and in-flight fatigue management services
- In-flight Private Psychological Conferences (PPCs; every 2 weeks on orbit)
- In-flight Cognitive assessment (WinSCAT once per 30d on orbit)
- Post-flight interviews and re-adaptation support (three during the post-flight period)

❖ *Fatigue management*

- Sleep/rest is the top item to protect
- Must ensure reserve/readiness for next big 'push' or crisis
- Ground testing of sleep medications and provision of sleep shift schedules

❖ *In-flight Operational Psychology Support Services* for crews and families

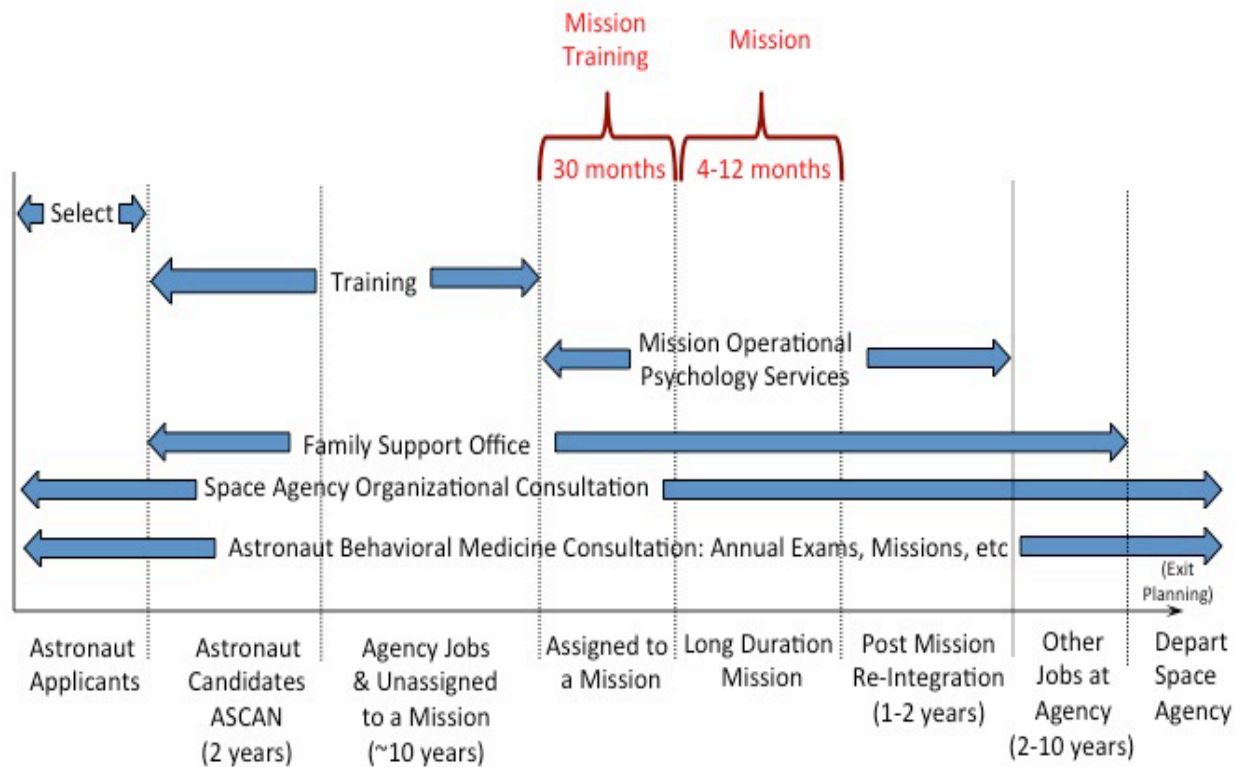
- Objective is to mitigate the psychological and social consequences of isolation and confinement in spaceflight by importing sustaining conditions to “normalize” the environment and keep crews connected to families and events on earth
- All products are optional, private, personalized and provided via individualized, concierge-like service
 - News, family contacts, movies, music, special events, care packages etc.



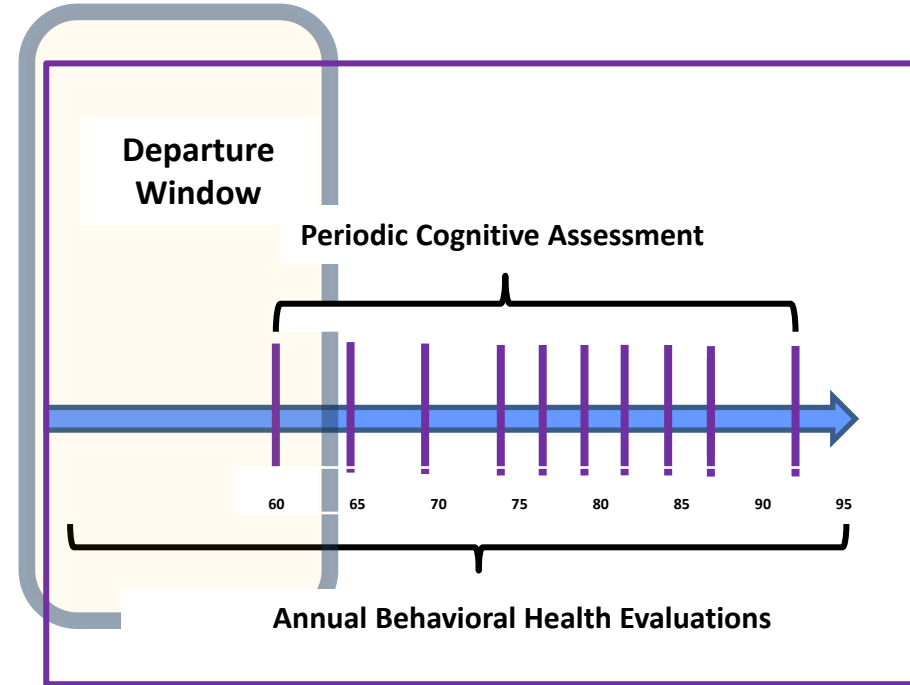
Time Line of BHP Services



Integrated Behavioral Health Services for US Astronauts



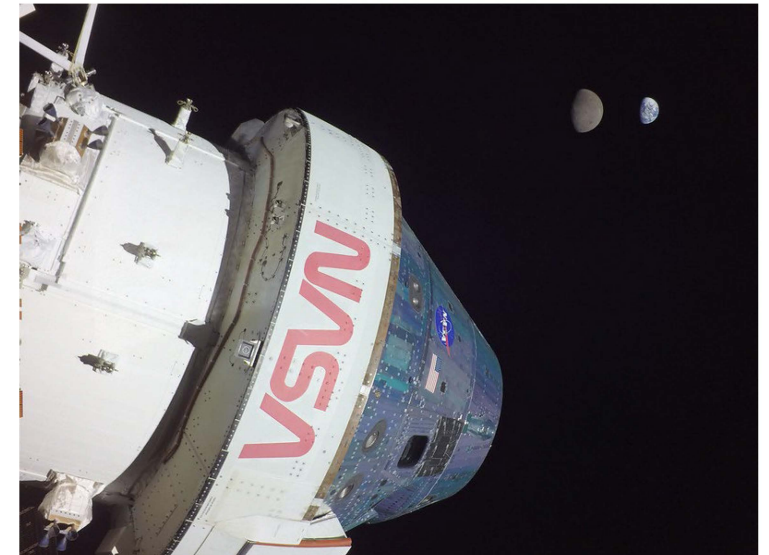
Longitudinal Career of Astronaut



Former Astronaut Behavioral Health Services (TREAT)



Overview of Astronaut Selection





Evolution of a Comprehensive Assessment Process



- ❖ Early selection efforts in the Shuttle era primarily focused on absence of disqualifying psychiatric conditions - “Qualified or Not Qualified”
- ❖ Awareness of variation among those deemed “Qualified” led to the beginnings of a more differentiated suitability rating
 - 4-point scale (NQ, Q-, Q, Q+)
- ❖ Competency-based suitability evaluations for LDM in astronaut applicants since 1998 in anticipation of International Space Station (ISS) missions
 - The structured interview for suitability was introduced in 1989. It called out what we today recognize as specific “competencies” in 1994. Use of former fliers to generate the specific competencies for short- and long-duration flights was first done in 1998.
- ❖ Evaluation of suitability using a competency-based multi-method approach began in 2013



What We Assess



- ❖ Non-technical “soft” skills -- attributes (competencies) identified via systematic job/mission analyses with experienced long-duration mission astronauts





Key Psychological Competencies of Astronauts



- ❖ Multiple astronaut job analyses have identified several key competencies that emerge for astronauts across multiple mission types
 - *Problem-solving*
 - *Teamwork*
 - *Leadership/Followership*
 - *Self-Regulation*
 - *Resilience*
 - *Adaptability*

- ❖ A good resource for an internationally approved document is the ISS Competency Model (NASA/TM-2008-214775, International Space Station Competency Model, Vols 1&2)



Competency-driven Multi-method Assessments



- ❖ The standard practice in selection programs for high-risk operational jobs includes multiple and systematic procedures beyond self-report.
 - NASA has incorporated formal behavioral simulations in astronaut selection since 2013

- ❖ Behavioral simulations and multiple methods decrease the probability of unsuitable applicants being selected
 - Of 15 NASA finalist applicants deemed low in suitability over two selection cycles, 9 (60%) were not detected by preliminary structured interviews (low in focus on self-regulation)
 - Ratings from behavioral exercises are increasing in importance in our determinations of overall suitability
 - Accounted for nearly 50% of the variance in the overall rating beyond the suitability interview in our latest selection round

- ❖ NASA has increased its reliance on suitability evaluations in selection decisions for ISS missions



What and How NASA Assesses: Multiform Procedures

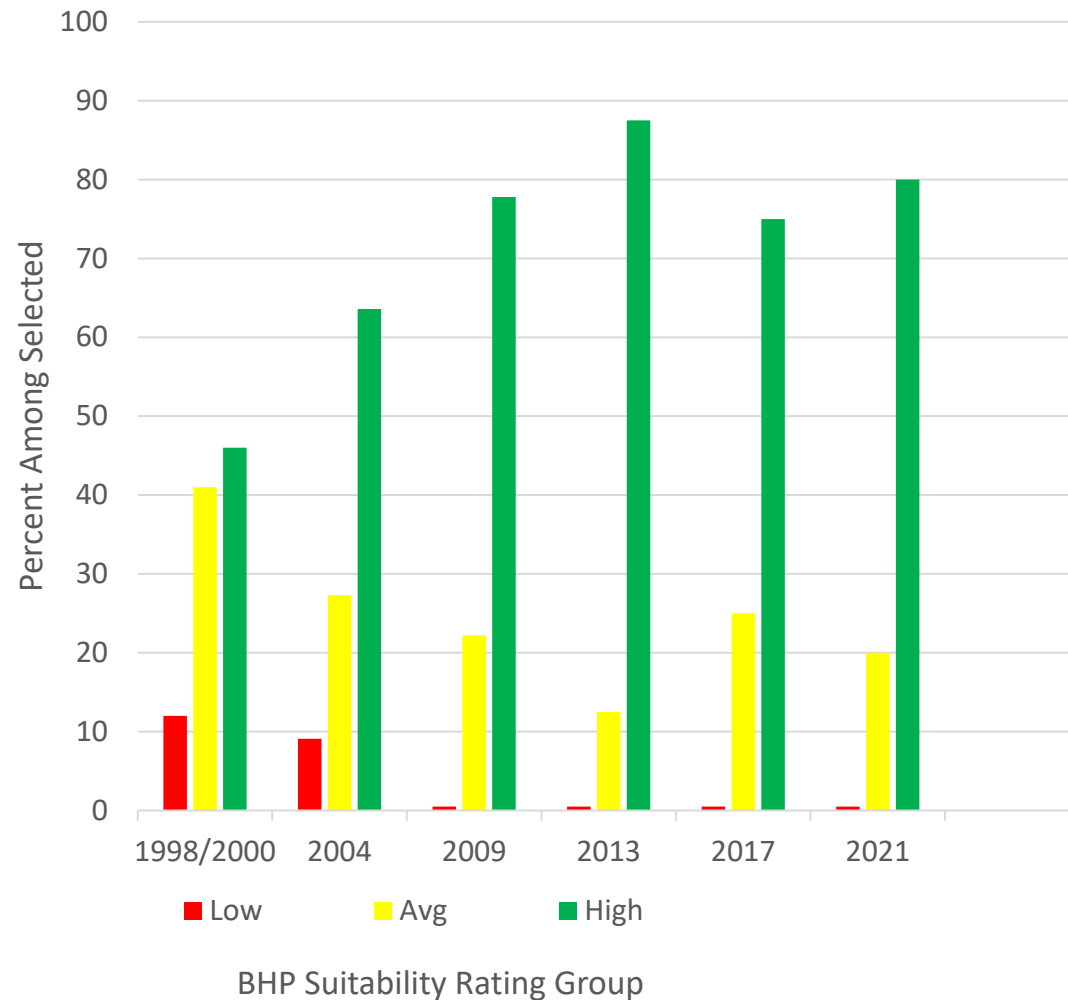


Assessment Component	BHP Competencies*	Sub-competencies	Testing	Clinical Interview	Suitability Interview	Team Sim	Leaderless Team Sim	Individual Sim	Team Peers	Communal Peers
Psychiatric Medical Standards			+	+						
Suitability for Spaceflight	Self-regulation	Emotional stability	+	+	+			+		
		Positivity	+	+	+			+		
		Self-awareness		+	+	+	+	+	+	
	Resilience	Stress Tolerance	+	+	+			+		
		Recovery	+	+	+			+		
	Teamwork	Team Orientation	+		+	+	+		+	
		Communication			+	+	+		+	
	Small Group Living	Consideration of Others	+		+					+
		Orderliness	+		+					+
	Operational Problem-solving	Judgment	+		+	+	+	+		
		Adaptability	+		+		+	+		
	Leader/Followership		+		+	+		+		

*Assessment competencies are mapped to the ISS competency model--NASA/TM-2008-214775, International Space Station Competency Model, Vols 1&2



BHP Suitability Ratings Among Selected Astronaut Applicants (N=91)



- Ratings of Suitability for Long Duration Missions (LDM) have been given since 1998
 - Ratings are given after an extensive interview (1998-2009) and simulations (after 2009)
 - Suitability rating ranges from 1 (low) to 5 (High)
- Selected applicants comprise three groups in terms of suitability for LDM
 - *Low*- suitability ratings of 1 or 2
 - *Average*- suitability rating of 3
 - *High* – suitability ratings greater than 3
- There is a preference for applicants who are rated higher in suitability for LDM
 - No applicants were selected since 2004 who were rated *low* in suitability for LDM
 - The percentage of applicants selected who are rated *high* in suitability for LDM equals or exceeds 75% over the last 4 cycles



BHP Operational Support for ISS Missions





BHP Mission Support



❖ *Contingency Launch Support*

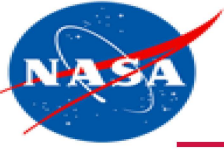
- BHP provider present at launch to support immediate family

❖ *Behavioral Health and Performance Monitoring of crewmembers*

- Pre-flight Readiness interviews (three during the preflight period)
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❖ *In-flight Operational Psychology Support Services for crews and families*

- Objective is to mitigate the psychological and social consequences of isolation and confinement in spaceflight by importing sustaining conditions to “normalize” the environment and keep crews connected to families and events on earth
- All products are optional, private, personalized and provided via individualized, concierge-like service
 - News, family contacts, movies, music, special events, care packages etc.



BHP Preflight Assessments (L-365/180/30)



❖ Principal pre-flight evaluation topics:

- Training issues including perception of mission readiness
- Training workload and fatigue levels
- Family or personal relationship issues
- Crew-crew training interactions, familiarity and concerns
- NASA management issues or concerns
- Mood and anxiety
- Mission goals, desires, challenges and risks
- Post mission rehabilitation or family concerns

- *Important Note: all active astronauts are also seen annually in the FMC for a BHP eval throughout their careers*



In-Flight Private Psychological Conference (PPCs)



- ❖ The Russians developed the PPC as a standard psychological countermeasure beginning with Salyut 6 and continued to use them on Salyut 7 and Mir
- ❖ NASA began using PPC's during Shuttle-Mir in 1995
- ❖ Performed every two weeks during ISS expeditions (all crew members)
 - Private video conference between the ISS astronaut and the NASA psychiatrist or psychologist
 - Typically lasts 15-20 minutes depending on subject matter discussed and mission phase
 - Contents are non-recorded private and confidential medical events



Private Psychological Conferences



❖ The following topics reflect the main clinical/operational concerns:

- Sleep (duration and quality) and sleep shift issues
- Workload and pace of work
- Individual and crew morale
- Crew relationships and cohesion
- Crew-ground relationships
- Mood
- Cognition
- Family and personal relationships
- Environment and habitability issues, including food
- Operational psychology issues or requests
- Preparation for important tasks, such as EVA's



Neurocognitive Assessment with WinSCAT

(Space Flight Cognitive Assessment Tool for Windows)



- ❖ The Spaceflight Cognitive Assessment Tool for Windows (WinSCAT) has been used onboard the ISS since Expedition 1
 - Designed to be a brief screening assessment of cognitive functions
 - Five subtests from the Automated Neuropsychological Assessment Metrics (ANAM)
 - Completed every 30d by astronauts while onboard the ISS
 - Provides immediate, objective clinical feedback to the astronaut and medical personnel post-event

Activity	Duration	Preflight	In Flight	Postflight
Training	60 minutes	L-120 days		
Neurocognitive Assessment Baseline (MAT)	60 minutes	L-100 days		
	45 minutes	L-90 days		
	30 minutes	L-60, L-30, L-7 days		
Routine Monitoring	30 minutes		Every 30 days	
Postflight	30 minutes			R+14*, R+30 days * If clinically indicated



ISS Post-flight Assessment



❖ Occurs at Return (R) + 3d ; R+14d; R+30-45d

❖ Principal post-flight evaluation topics:

- Mission in retrospect—level of personal satisfaction
- Greatest challenges, frustrations, joys during the mission
- Retrospect review of fatigue level prior to critical events such as EVA's
- Family reintegration issues
- Post-flight mood, anxiety and cognition
- What are short and long-term career plans?
- What BHP services need improvement or change? (Lessons learned inform our training for future crews)



Sample Events Occurring During Long Duration Missions over past 46 years (Russian & US)



- death of family members and friends
- depressed mood
- crew friction
- excessive sleep shifting
- hot or noisy cabins
- mixed/same gender crews
- dark and crowded station
- work underload/overload
- anger with ground team
- periods of low motivation
- mild anxiety
- delayed return to Earth
- onboard fire (Mir)
- depressurization
- over scheduling and insufficient timeline control
- physical reactions to stress
- Frustration, self -doubt
- conflict with ground control
- language difficulties
- isolation
- Family crisis
- cultural misunderstandings
- persistent system and comm failures
- Major earth events (hurricanes, war, terrorism)
- aged and frail parents, near death
- but for the most part--excitement, contentment, exhilaration, fulfillment...



What has not been reported as occurring during space flight...



- ❖ Physical confrontation/aggression
- ❖ Major depression
- ❖ Mania
- ❖ Delusions
- ❖ Delirium (anoxia, head injury, illness)
- ❖ Panic attacks
- ❖ Use of psychiatric medication (e.g., antipsychotics or antidepressants)
- ❖ Substance withdrawal
- ❖ Any other major psychiatric disorders (panic disorder, obsessive compulsive disorder, etc.)



In-flight BHP Psychological Support Services



- ❖ Suite of individualized countermeasures for isolation and confinement emphasizing connection with people and events on Earth
 - IP phones on ISS

 - Private Family Conferences (weekly)
 - Two-way audio and visual using VSee & Doxy.me

 - Crew Care Packages (on launch and re-supply vehicles)
 - About 18 kgs per crewmember comprising items and ideas provided by family friends and co-workers

 - Private Special Conferences (one per month)
 - Private two-way audio and visual conference with extended family, friends, or co-workers

 - Crew Discretionary Events (two per mission)
 - Private video contacts with a person of interest such as celebrities, professional athletes, authors, comedians, etc., for the purpose of building morale

 - Crew recreation (morale, welfare, relief)
 - Music, movies, sports, news, TV, musical instruments, holiday celebrations, etc.



Private Family Conferences (PFC)



- ❖ Video Private Family Conferences (PFC's) are scheduled on a weekly basis
- ❖ At will, crew-initiated video conferences are also available and popular
- ❖ Laptop or tablet with video camera in use since ISS 28



Equipment in the home



Astronaut Clay Anderson
conducting a PFC onboard ISS



Internet Phone (IP Phone)



- ❖ The IP Phone runs on a software program that is dependent on KU-Band satellite coverage
- ❖ There are currently 12 units on ISS
- ❖ Can be used as non-scheduled communication
- ❖ Using the IP Phone ISS crewmembers can dial any number in the world but cannot receive calls



Expedition 4 Flight Engineer, Carl Waltz, using the IP Phone.



Crew Care Package (CCP)



- ❖ Items and ideas provided by family friends and co-workers
- ❖ About 18 kgs per crewmember per 6m mission
- ❖ Delivered via cargo and launch vehicles



Astronaut Jeff Williams, Expedition 13, opening a CCP on-orbit.



Private Special Conference (PSC)



- ❖ Private conference with extended family, friends, or co-workers
- ❖ One per month



Expedition 5 – Peggy Whitson talks with friends in the NASA offices in Star City, Russia

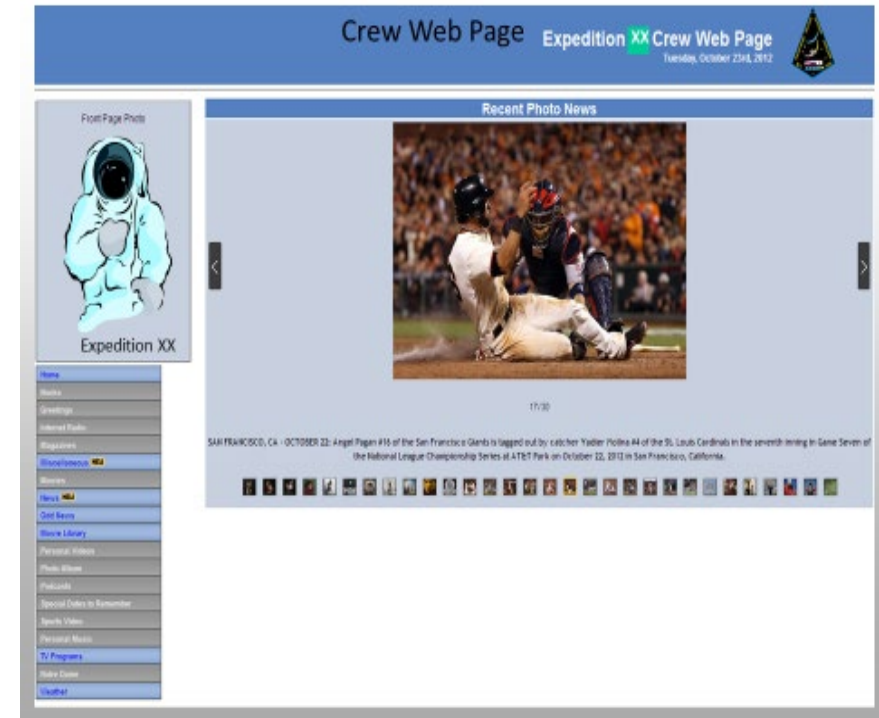


Crew Web Page

News and Information for Crew



- ❖ ISS Crew Personal Webpage (individualized for each crew member) designed to keep the crewmember “connected”
- Onboard gateway for up-to-date news and personal media files such as:
 - News selections (audio or video)
 - TV Shows
 - Sports and entertainment events
 - Movies
 - Music
 - Family and friends video greetings
 - Photographs
 - Magazine/Web articles
 - Books
- ❖ Daily items not affecting personal allocation
 - Houston Chronicle
 - USA Today
 - NBC Nightly News
 - NBC Meet the Press
 - National Public Radio (NPR) podcasts
 - All Things Considered
 - Morning Edition
 - Car Talk
 - Wait, Wait Don't Tell Me
 - Engines of Our Ingenuity

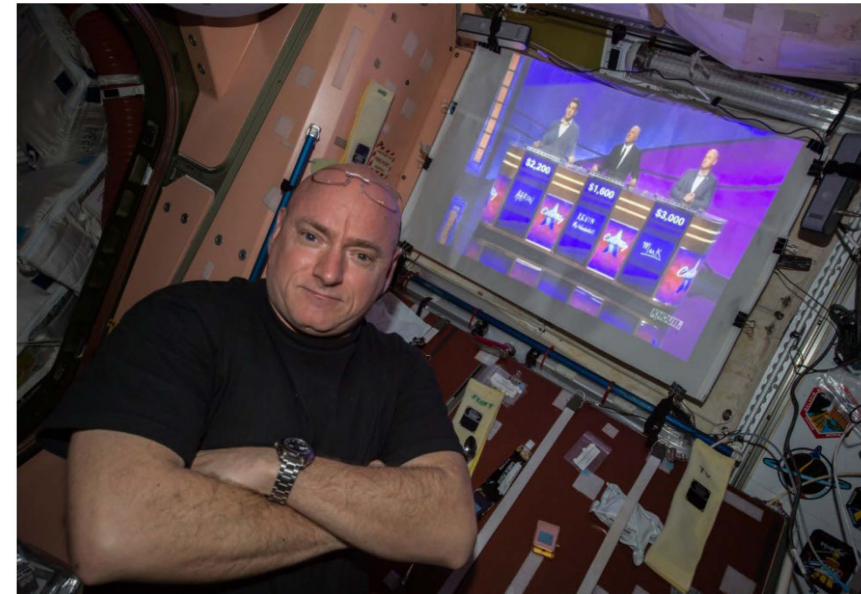
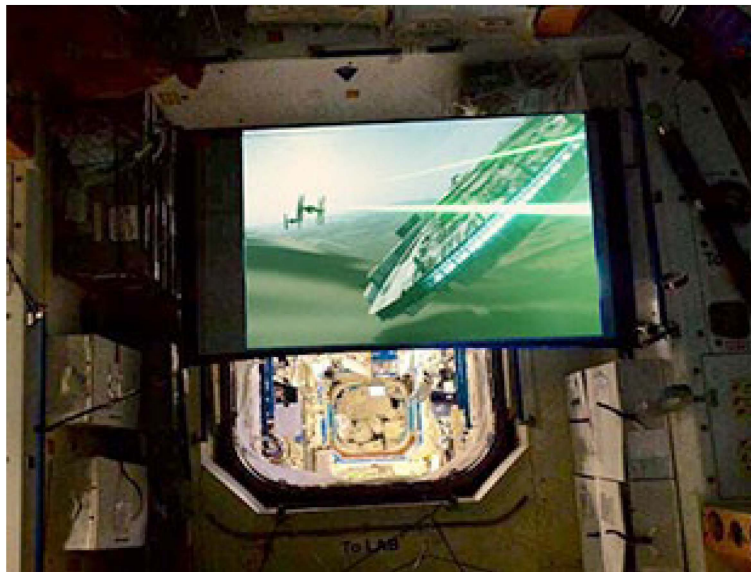


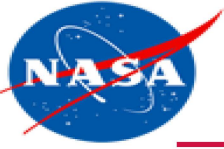


Entertainment in Space



- Movie and TV library (over 850 titles)
- Electronic Keyboard – Yamaha PSR-282 (61 keys)
- 2 Guitars
- Projector and big Screen (62') for movie nights or sporting events
- Weekend viewing of Dish Network can be coordinated through BHP





Application of our lessons learned from ISS: Requirements for Private Astronaut missions to the ISS



- ❖ Current BH requirements for Private Astronauts on NASA platforms
 - Personnel reliability assurance
 - Integrity of its station, and safety and productivity of its personnel
- ❖ For the same reasons, NASA also will likely apply these when it considers sending its astronauts to CLDP platforms
- ❖ The current PA approach reflects Lessons Learned from NASA flight and analogs since 1984



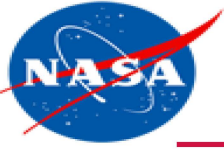
Private Astronaut



- ❖ ISS Crew Member who is not a USG Astronaut or an ISS International Partner Astronaut

- ❖ Diverse group with differing motivations
 - Wealthy adventurers
 - Non - ISS International Partner (IP) Government Space Agency Astronauts (e.g., Saudi Arabia)
 - IP “Project” Astronaut (ESA)
 - Former NASA or IP Career Astronaut (currently “Escort Astronaut”)

- ❖ Classified as either active or non-active crewmember
 - **Active-** performs either hazardous tasks or tasks that include use of high criticality hardware on the NASA Vehicle (such as piloting/docking, EVAs, and robotics).
 - **Non-Active** – does **not** perform hazardous tasks or tasks that include use of high criticality hardware on the NASA vehicle. Such crew may perform research activities



BH Selection, Training, and Support Requirements (from the PACE Annex)



- ❖ All Private Astronauts shall be medically and **behaviorally screened** to fly to ISS
- ❖ Provider shall be responsible for medical and **behavioral health training** of their crew as recommended by NASA
- ❖ The Provider shall provide a doctoral-level, licensed Behavioral Health Clinician (psychologist or psychiatrist) with operational experience and experience in isolated and confined environments to aid in **behavioral and cognitive health monitoring and intervention** of the PAM crew



PAM BH Screening Requirements



- ❖ All Private Astronauts shall be behaviorally screened to fly to ISS
 - “...*the psychological/psychiatric exams that any one of our astronauts would do...*”

- ❖ We detail the expectations and standards for screening in SSP 51096 PAM Medical Operations Plan Guide (MOPG)
 - Psychiatric Evaluation
 - Psychodiagnostic Testing
 - Suitability Assessment

- ❖ We also define the qualifications required for examiners and evaluators in the MOPG



PA Suitability Screening Requirements



- ❖ The Provider is expected to conduct a multi-method assessment of behavioral suitability
- ❖ Address the spaceflight psychological competencies for selection
 - ISS Human Behavior and Performance Competency Model, *NASA/TM-2008-214775, International Space Station Competency Model, Vol 2, Appendix A*
 - Currently revising this to better apply to PA missions
- ❖ At a minimum, must include a structured interview, psychological testing, two team behavioral exercises
 - Other methods (e.g., peer ratings, individual behavioral exercises) may be added as desired
- ❖ Must use multiple qualified and trained behavioral assessors, systematic behavioral observation, standardized ratings, and systematic integration of data across raters.



PA BH Screening Requirements



- ❖ All PA must undergo a psychiatric evaluation by qualified psychiatrist
 - Board of Psychiatry and Neurology or the American Board of Osteopathic Neurology and Psychiatry
 - Experience in aerospace psychiatry (such as a FAA Human Intervention Motivation Study (HIMS) psychiatrist)
- ❖ All PA must undergo psychodiagnostic assessment by a qualified clinical psychologist
 - Doctor of Philosophy (Ph.D.), Doctor of Psychology (Psy.D.) and licensed by the state to practice independently
 - Experience in aerospace or operational psychology
- ❖ Use of cognitive ability, psychopathology, and personality measures
 - We specify the minimum expected in the MOPG
- ❖ Certification according to Behavioral Health standards outlined in SSP 50667, Volume A



PA Suitability Criteria



- ❖ We specify the *minimum level of suitability* each PA must meet:
 - Free of personality traits that interfere with the forming and maintenance of social connections (teams, crews)
 - Free of behaviors and traits that suggest poor impulse control, emotional instability, lack of judgment, difficulty with authority, or disregard for social norms and rules
 - Ability to effectively cope with and adapt to stressful conditions including dangerous or rapidly changing operational situations
 - Ability to appreciate the impact of one's emotions or behaviors on others
 - Ability to live cooperatively with others in austere and confined conditions

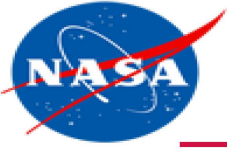


PA BH Training



- ❖ The MOPG outlines the minimum expected BH training provided to PAs
- ❖ NASA is not involved in the delivery of the training
- ❖ Training has been delivered by current and former NASA employees/contractors
- ❖ NOLS, HERA

Training	Hours
BHP Consultation	1.5
Psychological Factors	1.5
Multicultural Overview (OV)	1.5
Expeditionary Skills	2
Self-Management	1
Conflict Management	1
Visiting ISS	1



PA BH Mission Support



- ❖ The PAM Provider is responsible for BH care for their crew during pre-flight training and testing, in-flight, and post-flight operations
- ❖ Must provide a doctoral-level, licensed BH Clinician (clinical psychologist or psychiatrist) with operational experience and experience in isolated and confined environments
- ❖ We have an internal PA BH operations guide outlining monitoring and support requirements
 - Based upon a well-developed suite of BH monitoring and support services that we use for ISS LDM
 - Tailored for the length of the PAM



PA BH Mission Support



❖ BH Monitoring

- Pre-flight Readiness interviews
- In-flight Private Psychological Conferences (PPCs)
- In-flight Cognitive assessment (Recommended for LDM)
- Post-flight interviews and re-adaptation support

❖ In flight Operational Psychology Support Services

- Import sustaining conditions to “normalize” the environment and keep crews connected while isolated in space
 - Movies, music, family contacts, special events, care packages etc.
- For PAM < 30 days, at a minimum
 - Training on the use of the IP phone
 - Weekly two-way audio/video Private Family Conference (PFC)



Considerations for CLDP



- ❖ For missions involving a visit to the ISS follow the Private Astronaut documentation (PACE and MOPG) requirements for BH as outlined in the presentation for selection, training, and behavioral health support
- ❖ Consider implementing all the practices as described for selection, training, and operational support for space station operations, but especially for LDM
 - Based upon 20+ years of ISS support
 - Grew out of NASA and Russian experience in various other stations (Mir) as well as research involving polar stations and other analogs
 - Standard for US and its IPs
 - Reduce management headaches, political problems, company embarrassment, customer complaints, errors resulting in loss of vehicle or loss of crew
 - Build a reputation as a reliable, go-to, top tier space provider
 - Attract better personnel and customers
 - Develop personnel increasingly capable of longer and more complex missions
 - The human system must be maintained, like other key onboard systems



Strategic Building over Time



- ❖ Three tiers used here to describe building an effective capability over time
 - Don't need to begin with a fully-developed capability - - Build in Steps
 - Strategic building produces maximum effectiveness for each step
 - Top Step is a continuous, fully capable operational program

- ❖ Risk mitigation is the motivation to move up the tiers

- ❖ At some point, sharing resources may make sense to reduce costs

- ❖ Build differently for SFP/non-active versus active astronauts

- ❖ Full-up 3-tier behavioral programs are used in ISS partner agencies



Initial Planning



- ❖ Determine likely mission durations for your target missions
 - Short duration - - 30d or less
 - Long duration - - up to ??
 - 3-4 months is ideal 'long duration' orbital stay
 - 6mos more demanding
 - 7-12 mos
 - Real-time comm?
 - Current BHP countermeasures rely on real-time comm
- ❖ Determine task complexity, criticality of hardware to be used
 - Non-Active, relatively 'passive' personnel, not using critical hardware
 - Active astronauts, fully cleared to use important hardware and perform critical operations
- ❖ Shape your screening/selection, training, inflight monitoring and support accordingly



Tier 1 – All durations 14d or less



	Non-Active Crew	Active Crew
Screening & Selection	Psychiatric & psychodiagnostic screening per PACE/MOPG Suitability Interview	Prior agency-screened astronaut PACE/MOPG psychiatric, psychodiagnostic, and suitability evals Annual psychiatric/psychological eval
Training & Prep	Set expectations (Visitor behavior, What to Expect, and 1 Family Familiarization).	Set expectations (Role) Subset of the trainings in MOPG
Inflt Monitoring	PPC midway	PPC midway. Sounding board as desired (IP phone).
Inflt Support	Supportive work-rest schedule Crew-initiated family conferences as desired News, personal music	Supportive work-rest schedule Crew-initiated family conferences as desired. News, personal music



Tier 2– Durations 14-30d



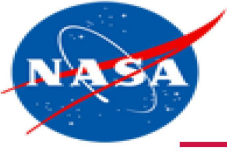
	Non-Active crew	Active Crew
Screening & Selection	Psychiatric & psychodiagnostic screening per PACE/MOPG Recommend PACE/MOPG suitability eval Interview (self-report) alone is insufficient to substantially mitigate risk	Prior agency-screened astronaut PACE/MOPG psychiatric, psychodiagnostic, and suitability evals Annual psychiatric/psychological eval
Training & Prep	Set expectations (Visitor behavior, What to Expect, and 1 FamFam, Self-mgt, Psyc Factors Whole-crew team building experience.	Set expectations (Role, Conflict mgt, Psyc Factors, Self mgt Whole-crew team integration experience)
Inflt Monitoring	PPC midway	PPC midway. Sounding board as desired (IP phone).
Inflt Support	Supportive work-rest schedule. Crew-initiated family conferences as desired. News, personal music, videos. Onboard leisure resources.	Supportive work-rest schedule. Crew-initiated family conferences as desired. News, personal music, videos. Onboard leisure resources.



Tier 3– Durations >30d



	Non-Active Crew	Active Crew
Screening & Selection	PACE/MOPG psychiatric, psychodiagnostic, and suitability evals	Prior agency-screened astronaut PACE/MOPG screening. Annual psychiatric/psychological eval.
Training & Prep	All MOPG required training Whole-crew team integration experience	All MOPG required training Whole-crew team integration experience
Inflt Monitoring	PPC every 2 weeks	PPC every 2 weeks
Inflt Support	Supportive work-rest schedule. Crew-initiated family conferences as desired. News, personal music, videos. Onboard leisure resources.	Supportive work-rest schedule. Crew-initiated family conferences as desired. News, personal music, videos. Onboard leisure resources.



Back-Up Slides





ASCAN BHP Training



- ❖ Expeditionary Skills Training developed by BHP in conjunction with the Astronaut Office
 - Non-technical skills for long-duration spaceflight
 - Self-Care, Team Care, Teamwork and Group Living, Communication, and Leadership/Followership
 - Classroom and operational training to train and practice expeditionary skills and debrief method

- ❖ Didactic Training targeting important competencies for long-duration spaceflight
 - Cross Cultural Skills Training
 - Provides insight into the influence of culture on thought, behavior, and communications
 - Provides practical information and strategies to build effective cross-cultural work relationships
 - Stress Management
 - Focus on models of resilience and strategies and techniques for enhancing resilience and managing stress
 - Conflict Management
 - Short and long-term conflict mitigation strategies

- ❖ BHP training during the ASCAN years provides the foundation for later BHP training once assigned to a mission



Pre-Flight BHP Training and Preparation



❖ Psychological Factors in Spaceflight (Psych Fac I and II)

- Individual training with each crewmember
- Basic principles such as adaptation to the environment, prevention versus repair, active pacing, maintaining reserves, and balanced connectivity with earth emphasizing mitigation strategies and passing on lessons learned

❖ Topics

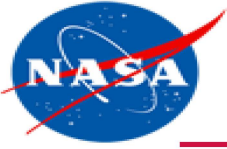
- Process of adapting to the psychological and environmental demands of long duration spaceflight and
- Environmental, interpersonal, and programmatic factors that can adversely impact health and performance in extended confinement.
- Manifestations of adaptive difficulties within the individual, crewmates, and in the interactions among crew and with ground personnel.
- Available self-care strategies, resources, and countermeasures available for enhancing adaptation and well-being



Risks from Insufficient Selection Process



Area	Criterion	Suitability Indicators	Negative Flags in Past Astronaut Applicant Finalists	Potential Adverse Outcomes for 10d
Teamwork	Function as a team member or crewmate in an operational setting	Free of behaviors and personality traits that interfere with forming and maintaining social connections or functioning cooperatively with others as a teammate or crewmember. This may include personality traits or characteristics such as self-centeredness (egocentrism), lack of concern for others, arrogance, entitlement, lack of empathy, and social avoidance or withdrawal	<ul style="list-style-type: none">*Loner, disengaged from team, doesn't read social cues, very introverted, becomes exhausted being around people. Anxious, very quiet.*Has to be the leader in every situation, excessively competitive with others, 'forces his way to the top' overstepping leader, can become hostile and impatient when frustrated. Won't ask for assistance.*Extremely high opinion of himself versus others, narcissism/egocentrism.*Rigid about task completions and quickly irritated with others when interrupted.*Lost professional demeanor with teammates and looked really annoyed.*Uninterested in engaging in a constructive team culture onboard.	<ul style="list-style-type: none">*Knowingly breaks rules, such as going into airlock or opening cupola shutters.*Doesn't own up to mistakes, creates extra work for NASA crew.*NASA crew falls behind timeline, loses science, becomes irritated.*Direct conflict between NASA crewmembers and visitor onboard.*NASA crew eventually refuses to assist visitor any further.*Onboard crewmembers splinter into factions.



Risks from Insufficient Selection Process



Area	Criterion	Suitability Indicators	Negative Flags in Past Astronaut Applicant Finalists	Potential Adverse Outcomes for 10d
Self-regulation	Regulate and manage emotions, behaviors, and impulses	Free of behaviors and traits that suggest poor impulse control, emotional instability, lack of judgment, difficulty with authority, or disregard for social norms and rules	<ul style="list-style-type: none">*Disdain for rules. Refused to comply with instructions from Ground.*Offensive or inappropriate humor or sarcasm; flippant.*Uncomfortable and has difficulty in novel situations, often feels 'out of his element'.*Timid, non-assertive, passive, indirect, very self-critical and is easily thrown off by a task that's not going well.	<ul style="list-style-type: none">*Breaks equipment.*Changes settings on key equipment; doesn't return equipment to prior settings when done.*Inappropriate actions or remarks made in public downlinks (e.g., political, personal)*Embarrassing post-flight behavior or comments*Won't try to do minor things for self before asking for help from crew.
Self-regulation (awareness)	Apprehend the impact of one's actions or emotions on others	Free of deficiencies in self-knowledge and emotional awareness, or in the ability to understand or manage own emotions that disrupts personal relationships or team or crew cohesion and effectiveness	<ul style="list-style-type: none">*No understanding of how his actions affect others. "Oblivious".*Talks constantly, unable to contain himself and self-regulate his emotions when with others.	<ul style="list-style-type: none">*Direct conflict between onboard crew members.*Creates extra work for NASA crew.



Risks from Insufficient Selection Process



Area	Criterion	Suitability Indicators	Negative Flags in Past Astronaut Applicant Finalists	Potential Adverse Outcomes for 10d
Resilience	Tolerate high levels of stress	Free of behaviors or personality traits that interfere with coping with and adapting to stressful conditions including dangerous or rapidly changing operational situations. This may include low self-efficacy, inadequately developed stress-coping resources, inability to recover quickly from stressors, or high stress reactivity.	<ul style="list-style-type: none">*Physically shakes and can be de-railed when under stress or time pressure.*Fails to heed and follow instructions during a high-stakes task (defib).*Shows hostility when under pressure; tends to turn critical.*When stressed, becomes overly-focused on detail to the point of slowing everything down, over-analyzing, gets bogged down, painfully slow.*Not used to doing things for himself.*Never been in an emergency situation.	<ul style="list-style-type: none">*Will freeze under pressure or won't perform in an emergency.*NASA crew will need to rescue visitor in an emergency.*Direct conflict between onboard crew members.
Small Group Living	Live cooperatively with others in austere and confined conditions	Tolerant of others' differences, and aware and respectful of others' personal needs and boundaries in those living conditions	<ul style="list-style-type: none">*Doesn't look after his teammates. Poor recognition of others' needs.*Not orderly, can't keep his materials organized in the work area.	<ul style="list-style-type: none">*Leaves gear and personal items out/unstowed. Not cleaning up tools after himself.*Direct conflict between onboard crew members.



BHP PA Suitability Criteria from MOPG



PAM Suitability Criterion	Suitability Indicators
Function as a team member or crewmate in an operational setting	Free of behaviors and personality traits that interfere with the forming and maintenance of social connections or functioning cooperatively with others as a teammate or crewmember. This may include personality traits or characteristics such as self-centeredness (egocentrism), lack of concern for others, arrogance, entitlement, lack of empathy, insensitivity, and social avoidance or withdrawal
Regulate and manage emotions, behaviors, and impulses	Free of behaviors and traits that suggest poor impulse control, emotional instability, lack of judgment, difficulty with authority, or disregard for social norms and rules
Tolerate high levels of stress	Free of behaviors or personality traits that interfere with coping with and adapting to stressful conditions including dangerous or rapidly changing operational situations. This may include low self-efficacy, inadequately developed stress-coping resources, inability to recover quickly from stressors, or high stress reactivity.
Apprehend the impact of one's emotions or behaviors on others	Free of deficiencies in self-knowledge and emotional awareness, or in the ability to understand or manage own emotions that disrupts personal relationships or team or crew cohesion and effectiveness
Live cooperatively with others in austere and confined conditions	Tolerant of others' differences, and aware and respectful of others' personal needs and boundaries in those living conditions



PA BH Training



BHP Consultation	This consultation will focus on orienting the student to BHP training and familiarizing BHP instructor with student's background to better tailor training plan.
Psychological Factors	Psychological issues involved in long-duration space flight are explained and discussed with crewmembers. The manifestation of various factors are discussed, as well as the procedures used to manage any contingencies.
Pre-Launch Practical Planning	Logistical coordination for family and crew with launch and landings.
Multicultural Overview	Training provides insight into how culture influences thought, behavior, and communication among Russians, Japanese, Germans, French, Italians and Americans. It begins by reviewing key features and characteristics of these cultures and explores how they impact cross-cultural interactions. The course will provide practical information and strategies that participants can use to reduce the incidence of cross-cultural misunderstandings and to build effective cross-cultural work relationships. Discussion and application will focus on cross-cultural situations in which astronauts are likely to find themselves.
Expeditionary Skills	This lesson provides an overview on expectations and skills development required by CB for astronauts.
Self Management	This lesson introduces the criticality of stress management for success as an astronaut. Positive and negative impacts of stress are reviewed. Ways to detect and manage stress are described. Participants leave with resources and ideas to help them build their capability for managing personal and professional stress. Additionally, resilience and performance enhancement will be discussed.
Conflict Management	This lesson introduces the criticality of conflict management for success as an astronaut. Sources and causes of conflict on the Astronaut job and long duration missions are reviewed. Ways to manage conflict are described. Participants leave with resources and ideas to help them successfully manage personal and professional conflict.