13* 1.3.7	EV 2022		EV 11/19/2022	
Fiscal Year:		Task Last Updated:	FY 11/18/2023	
PI Name:	Bell, Suzanne Ph.D.			
Project Title:	A US-Russian Collaborative Proposal for Data Interpersonal Relations, and Team Effectivene	a Collection in HERA: The ess in Space Crews	e Relationship between Composition,	
Division Name:	Human Research			
Program/Discipline:				
Program/Discipline Element/Subdiscipline:	HUMAN RESEARCHBehavior and perform	nance		
Joint Agency Name:	r	FechPort:	No	
Human Research Program Elements:	(1) HFBP:Human Factors & Behavioral Perfo	ormance (IRP Rev H)		
Human Research Program Risks:	(1) Team :Risk of Performance and Behaviora Communication, and Psychosocial Adaptation	l Health Decrements Due within a Team	to Inadequate Cooperation, Coordination,	
Space Biology Element:	None			
Space Biology Cross-Element Discipline:	None			
Space Biology Special Category:	None			
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Zip Code:	77058	Congressional District:	36	
Comments:				
Project Type:	Ground	Solicitation / Funding Source:	2015-16 HERO NNJ15ZSA001N-ILSRA. Appendix F: International Life Sciences Research Announcement	
Start Date:	08/12/2016	End Date:	06/30/2022	
No. of Post Docs:		No. of PhD Degrees:	8	
No. of PhD Candidates:	2	No. of Master' Degrees:	9	
No. of Master's Candidates:	0	No. of Bachelor's Degrees:	10	
No. of Bachelor's Candidates:	0	Monitoring Center:	NASA JSC	
Contact Monitor:	Whitmire, Alexandra	Contact Phone:		
Contact Email:	alexandra.m.whitmire@nasa.gov			
Flight Program:				
Flight Assignment:	NOTE: End date changed to 6/30/2022 per NSSC information; PI now at JSC and extension is for subcontract completion and final reporting (Ed., 10/20/21) NOTE: End date changed to 9/30/2021 per HFBP element; PI now at JSC and extension is for subcontract completion and final reporting (Ed., 6/15/21)			
	NOTE: End date changed to 5/11/2021 per NSSC information (Ed., 8/28/20)			
	NOTE: End date changed to 8/11/2020 per NSSC information (Ed., 7/31/19)			
	NOTE: Element change to Human Factors & Behavioral Performance; previously Behavioral Health & Performance (Ed., 1/17/17)			
Key Personnel Changes/Previous PI:				

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Grant/Contract No.:	NNX16AQ48G	
Performance Goal No.:		
Performance Goal Text:		
Task Description:	The environments anticipated during Long-Distance Space Exploration Missions (LDSEM) will require crews diverse in national background, professional background, and gender to face a number of stressors such as living and working in isolated and confined environments (ICE) for an extended period of time, separation from family and friends, loss of or significant delay when in communication with the ground, and limited privacy. The unique challenges of LDSEM will require team members to rely on one another for social support and to keep conflict manageable. The long-term duration of the mission coupled with extreme living and working conditions means interpersonal compatibility among the crew members, and between the crew and mission control, will be essential to the success of any LDSEM. How crew composition and interpersonal relations affect crew functioning and effectiveness has been and continues to be of interest to both NASA and the Institute of Biomedical Problems (IBMP), whose research informs operations for Roscosmos. Over time, research related to interpersonal compatibility from these agencies has evolved with different emphases. NASA-sponsored team composition research heavily relies on trait and network theories. It seeks to identify traits and combinations of traits that can be used to compose, train, and manage highly effective crews (Team Gap 8). IBMP-sponsored research mostly has moved away from trait-based approaches toward an idiographic (in-depth, heavily descriptive) approach to researching crew interpersonal relations. Our research is a US-Russia collaborative research effort with two primary aims: (1) develop and empirically test a cutting-edge process model of interpersonal relationship formation in ICE, which integrates US and Russian approaches to examining interpersonal compatibility in ICE; and (2) examine the validity of the Personal Self-Perception and Attitudes (PSPA), which is an approach utilized by the Russians to assess interpersonal compatibility and relations in ICE. To addres	
Rationale for HRP Directed Research		
Research Impact/Earth Benefits:	Results will contribute to a greater understanding of the life cycle of teams operating in isolated and confined environments (ICE), and the effective composition and management of future space crews. Particularly notable is the integration of Russian and US approaches to researching interpersonal compatibility. Our model makes significant contributions to team composition and interpersonal compatibility research by elaborating and testing the foundations of various states, which are individual, relational, and team events. This advancement is critical for understanding how personal attributes shape the subjective attitudes towards the self and towards others, and how relationships develop over time, which can affect the affect, motivation, cognition, and performance of the team. The specific propositions and research questions developed and tested in HERA are specific to ICE; thus, beyond space crews, the most direct application of the research findings will be to Earth teams that operate in ICE such as expedition and science teams in the Arctic and Antarctic. The general framework and analytic strategies we are developing to research interpersonal relationship formation, however, can be applied to Earth teams more generally.	
	Task is complete with final report submitted. November 2023 Update (Ed., 11/22/23):	
	AIM 1	
	We created and validated five team interaction batteries which can be used to assess team functioning and performance. These batteries allowed us to examine communication patterns and how they relate to performance. We developed a codebook for assessing team interaction, as well as transcribed and coded behavioral interaction data.	
	We found that generally crew members keep the same rank-order in how much they speak over time, suggesting individual differences shape speaking behavior. Dramatic changes in rank order may reflect poor relationships or poor adaptation (i.e., alienation or withdrawal). In addition, high performing teams engaged in more conversation and expressed more disagreements providing initial support for a constructive controversy hypothesis where disagreements and light conflict can be beneficial for eliciting unique information and better decision making. Aspects of communication behavior were also related to team cohesion. For example, rejections during both task and relational events related to less team cohesion. These results might suggest that crews need to be able to find the balance of how to effectively disagree with others without rejecting them to achieve both high performance and cohesion.	
	To further explore the relationship between team composition, states, and behaviors, we developed a collaborative, integrated model that incorporates two distinct perspectives of interpersonal relationship formation in isolated and confined environments (ICE). We pioneered a novel co-evolution of states and events modeling, and demonstrated the model with a subset of the data.	
	AIM 2	
Task Progress:	The Personal Self-Perception and Attitudes (PSPA) is an interview and self-report method that can be used to understand the psychological similarity between aspects of a group of people. Although the method can be used to describe and qualitatively examine team dynamics, it can also yield quantitative metrics. The approach is indirect (i.e., it does not ask individuals directly about dynamics or compatibility as a survey question would) and likely more resistant to impression	

	management. Our second aim was to validate the PSPA. A series of analyses were conducted at the individual, relational, and team levels to examine the validity of three metrics drawn from the PSPA: self-criticality, psychological closeness to another crew member, and team integration.
	Self-criticality, defined as the discrepancy between an individual's perception of his/her/their current and ideal selves, is conceptually similar to neuroticism and unrelated to impression management. Within a dyad, a crewmember was more likely to be reported as a hindrance if they scored higher on self-criticality. Neuroticism did not predict hindrance in this sample. We also demonstrated the construct and criterion-related validity of psychological closeness as measured by the PSPA. At the team level, configurations of psychological closeness were able to predict decrements in team performance better than measures of team cohesion often used in NASA-funded research. Given the ability of the PSPA metrics to predict important outcomes in space analog environments, the comparable data to simulations such as Mars 105, Mars 500, SIRIUS-19, and cosmonauts in the International Space Station (ISS), NASA should consider including the PSPA in its analog exploration measures and/or examine its operational use in astronauts.
	Two other notable contributions made with Aim 2 research were: (1) the coding of Multi-Mission Space Exploration Vehicle (MMSEV) and Extravehicular Activities (EVA), or MMSEV-EVA, data to create an objective, operationally relevant team performance measure; and (2) our documentation of a decrement in objective, operationally relevant team performance for teams with poor cohesion/integration in an isolated and confined environment.
Bibliography Type:	Description: (Last Updated: 01/20/2025)
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Articles in Peer-reviewed Journals	Marcinkowski MA, Bell ST, Roma PG. "The nature of conflict for teams in isolated, confined, and extreme environments." Acta Astronaut. 2021 April 2021;181:81-91. http://www.sciencedirect.com/science/article/pii/S0094576521000047, Apr-2021
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