

Fiscal Year:	FY 2017	Task Last Updated:	FY 05/25/2017
PI Name:	Contractor, Noshir Ph.D.		
Project Title:	CREWS: Crew Recommender for Effective Work in Space		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Behavior and performance		
Joint Agency Name:	TechPort:	Yes	
Human Research Program Elements:	(1) HFBP :Human Factors & Behavioral Performance (IRP Rev H)		
Human Research Program Risks:	(1) Team :Risk of Performance and Behavioral Health Decrements Due to Inadequate Cooperation, Coordination, Communication, and Psychosocial Adaptation within a Team		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	60208-0834	Congressional District:	9
Comments:			
Project Type:	GROUND	Solicitation / Funding Source:	2014-15 HERO NNJ14ZSA001N-Crew Health (FLAGSHIP & NSBRI)
Start Date:	07/01/2015	End Date:	05/17/2019
No. of Post Docs:	1	No. of PhD Degrees:	2
No. of PhD Candidates:	6	No. of Master' Degrees:	1
No. of Master's Candidates:	0	No. of Bachelor's Degrees:	0
No. of Bachelor's Candidates:	1	Monitoring Center:	NASA JSC
Contact Monitor:	Williams, Thomas	Contact Phone:	281-483-8773
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Flight Program:			
Flight Assignment:	NOTE: End date changed to 5/17/2019 per D. Arias/HRP (Ed., 3/22/18) NOTE: Element change to Human Factors & Behavioral Performance; previously Behavioral Health & Performance (Ed., 1/17/17)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Bell, Suzanne Ph.D. (DePaul University) DeChurch, Leslie Ph.D. (Georgia Tech Research Corporation)		
Grant/Contract No.:	NNX15AM32G		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Team composition, the configuration of member attributes and their relationships, is a critical enabling feature of fostering effective teamwork and likely to play an important role in the effectiveness of future long-duration space exploration (LDSE). Limited research on team composition in environments analogous to LDSE exists, and currently how team composition can be used to optimize crew functioning and performance is unclear. Our research aims to: (1) identify the effects of team composition on team functioning in LDSE and the critical factors of team composition driving this effect, (2) identify particular patterns of this effect with different team compositions, (3) identify methods for composing teams for LDSE, (4) develop a predictive team composition model for use in composing teams and identify potential issues with already composed teams, and (5) provide recommendations for composing teams for LDSE. To address these critical aims, we propose a 3-year, multi-method research effort, in which we: (1) develop an agent-based model of team composition for LDSE based on empirical data linking key model inputs (e.g., individual difference variables, network relational factors, task characteristics) to team functioning (e.g., social integration, team processes, team cohesion, team conflict) in LDSE-relevant contexts; (2) conduct virtual experiments using characteristics and relationships identified in Phase I to identify the team functioning patterns that arise under different member compositions, and create a predictive model of team composition; and (3) conduct an initial validation of the model developed in Phase 2 in the Human Exploration Research Analog (HERA) and NASA Extreme Environment Mission Operations (NEEMO) analogue environments using specific manipulations of key factors (e.g., compositions; situational characteristics). Research products critical to closing Team Gap 8 will be developed including a predictive model of team composition in LDSE, evidence in support of the model, and a mockup of a proposed interface to assist in the staffing and management of LDSE crew and mission teams.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	While the primary objectives of this project are to be applied to astronaut crews in LDSE contexts, results from this research may also benefit teams on Earth in similar ICE (Isolated, Confined, and Extreme) conditions. Teams such as those sent to winter-overs in Antarctica or submarine crews that spend months underwater would be analogous environments in which the results of this research may prove useful. In a general sense, our findings could have implications for composing optimal teams that are not in ICE conditions, such as work teams at an organization, teams of students working on a project, and squadrons of military personnel, to give but a few examples.
Task Progress:	Team composition, the configuration of member attributes and their relationships, is a critical enabling feature of fostering effective teamwork and likely to play an important role in the effectiveness of future long-duration space exploration (LDSE). Limited research on team composition in environments analogous to LDSE exists, and currently how team composition can be used to optimize crew functioning and performance is unclear. In year 2 of a 3 year programmatic effort, we have made significant progress on our three research aims: (1) develop an agent-based model of team composition for LDSE based on empirical data linking key model inputs (e.g., individual difference variables, network relational factors, task characteristics) to team functioning (e.g., social integration, team processes, team cohesion, team conflict) in LDSE-relevant contexts; (2) conduct virtual experiments using characteristics and relationships identified in Phase I to identify the team functioning patterns that arise under different member compositions, and create a predictive model of team composition; and (3) conduct an initial validation of the model developed in Phase 2 in the Human Exploration Research Analog (HERA) and NASA Extreme Environment Mission Operations (NEEMO) using specific manipulations of key factors (e.g., compositions; situational characteristics). Research Aim #1: Our first research aim is to develop an agent-based model of team composition for LDSE based on empirical data linking key model inputs (e.g., individual difference variables, network relational factors, task characteristics) to team functioning (e.g., social integration, team processes, team cohesion, team conflict) in LDSE-relevant contexts. This year we developed a first functional version of the model based on theories of team composition, team functioning, and social networks. Research Aim #2: Our second research aim is to conduct virtual experiments using characteristics and relationships identified in Phase I to identify the team functioning patterns that arise under different member compositions, and create a predictive model of team composition. This year we began testing the model for its fit with the positive-affect, negative-affect, information-sharing, and coordination networks. Research Aim #3: Our third research aim is to conduct an initial validation of the model developed in Phase 2 in the Human Exploration Research Analog (HERA) and NASA Extreme Environment Mission Operations (NEEMO). To support this aim, we have been collecting data on trait constructs, sociometric constructs, and team dynamics measures, with many of these constructs and measures being collected over time. For the HERA mission, there were three main data collection phases: before simulation, during simulation, and at the end of simulation.
Bibliography Type:	Description: (Last Updated: 03/29/2024)
Abstracts for Journals and Proceedings	Schecter A, Sun Y, DeChurch LA, Contractor NS. "The semantic networks that underpin group interaction." 2016 Interdisciplinary Network for Group Research Annual Meeting, Helsinki, Finland, July 14-16, 2016. 2016 Interdisciplinary Network for Group Research Annual Meeting, Helsinki, Finland, July 14-16, 2016. , Jul-2016
Abstracts for Journals and Proceedings	Ng J, Antone B, Gibson Z, Bell S, DeChurch LA, Contractor N. "Crew recommender for effective work in space: CREWS." Presented at 32nd Annual Meeting of the Society for Industrial and Organizational Psychology Conference, Orlando, FL, April 27-29, 2017. 32nd Annual Meeting of the Society for Industrial and Organizational Psychology Conference, Orlando, FL, April 27-29, 2017. , Apr-2017
Abstracts for Journals and Proceedings	DeChurch LA, Larson L, Gómez-Zarà D, Jones BR, Contractor N, Johnson J. "Leadership Emergence in Space Multiteam Systems." Team, Training, and Performance Metrics. Presented at 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. , Jan-2017

Abstracts for Journals and Proceedings	Contractor NS, Gibson Z, Antone W, Ng J, DeChurch LA, Bell ST. "Composing effective space crews: Predicting crew camaraderie (CREWS)." Presented at 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. , Jan-2017
Abstracts for Journals and Proceedings	Contractor NS, Gokhman IA, Larson LE, Bell ST, DeChurch LA. "Leadership networks in space crews." Presented at 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. , Jan-2017
Abstracts for Journals and Proceedings	Contractor NS, Antone W, Gibson Z, Ng J, DeChurch LA, Bell ST. "Building extreme teams: Simulating team composition effects in isolated and confined environments." Presented at 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. Poster presented at the NASA Human Research Program Investigators' Workshop, Galveston, TX. , Jan-2017
Abstracts for Journals and Proceedings	Antone W, Contractor NS, Bell ST, DeChurch LA. "Faulty analysis: Analyzing the validity of different faultline measurement algorithms for long-duration space exploration." Presented at 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. , Jan-2017
Abstracts for Journals and Proceedings	Weiss JA, Outland NB, Bell ST, DeChurch LA, Contractor NS. "Interpersonal compatibility in HERA 2016." Presented at 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. , Jan-2017
Abstracts for Journals and Proceedings	Outland NB, Bell ST, Contractor NS, DeChurch LA, Weiss JA. "Determinants of team viability over time: An ERGM analysis." Presented at 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. 2017 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 23-26, 2017. , Jan-2017
Abstracts for Journals and Proceedings	Brown SG, Vazquez M, Bell ST. "Virtual teams "in the wild" considering individual and contextual influences." Team Composition and Performance at Different Levels of Virtuality: A Meta-analysis. In N. Savage (Chair). Symposium presented at the 32nd Annual Meeting of the Society for Industrial and Organizational Psychology Conference, Orlando, FL, April 27-29, 2017. 32nd Annual Meeting of the Society for Industrial and Organizational Psychology Conference, Orlando, FL, April 27-29, 2017. , Apr-2017
Abstracts for Journals and Proceedings	Bell ST. "More than Just Average: Novel Approaches to Measurement in Teams." Panel discussion at the 32nd Annual Meeting of the Society for Industrial and Organizational Psychology Conference, Orlando, FL, April 27-29, 2017. 32nd Annual Meeting of the Society for Industrial and Organizational Psychology Conference, Orlando, FL, April 27-29, 2017. , Apr-2017
Abstracts for Journals and Proceedings	Vessey WB, Bell ST. "Industrial and Organizational Psychologists and Space Related Research." Community of interest at the 32nd Annual Meeting of the Society for Industrial and Organizational Psychology Conference, Orlando, FL, April 27-29, 2017. 32nd Annual Meeting of the Society for Industrial and Organizational Psychology Conference, Orlando, FL, April 27-29, 2017. , Apr-2017
Awards	Bell S. (Suzanne Bell) "Scientist of the Month, Association for Women in Science, Chicago, May 2016.." May-2016
Awards	Bell S. (Suzanne Bell) "Named as one of 2016's Top 10 Chicago Women in Science by Make it Better Magazine, January 2017." Jan-2017
Significant Media Coverage	Bell ST. "Teamwork in and out of this world. Keynote address at the 103rd undergraduate commencement for Olivet Nazarene University. Bourbonnais, IL, May 2017." Olivet Nazarene University website, May 2017. (https://portal.stretchinternet.com/olivetadmin/portal.htm?eventId=274749&streamType=video ; minute 11). With additional press coverage in the Chicago Tribune, the Patch, The Daily Journal etc. , May-2017