Fiscal Year:	FY 2022	Task Last Updated:	FY 08/04/2021	
PI Name:	Alfano, Candice Ph.D.			
Project Title:	Characterization of Psychologica Confined, Extreme (ICE) Enviro	al Risk, Overlap with Physical Healt nments	h, and Associated Performance in Isolated,	
Division Name:	Human Research			
Program/Discipline:				
Program/Discipline Element/Subdiscipline:	HUMAN RESEARCHBehavio	or and performance		
Joint Agency Name:		TechPort:	No	
Human Research Program Elements:	(1) HFBP:Human Factors & Ber	navioral Performance (IRP Rev H)		
Human Research Program Risks:	(1) BMed :Risk of Adverse Cogn	itive or Behavioral Conditions and	Psychiatric Disorders	
Space Biology Element:	None			
Space Biology Cross-Element Discipline:	None			
Space Biology Special Category:	None			
PI Email:	caalfano@uh.edu	Fax:	FY	
PI Organization Type:	UNIVERSITY	Phone:	713-743-8611	
Organization Name:	University of Houston			
PI Address 1:	Psychology Department			
PI Address 2:	126 Heyne Bldg			
PI Web Page:				
City:	Houston	State:	TX	
Zip Code:	77204-5022	Congressional District:	18	
Comments:				
Project Type:	Ground	Solicitation / Funding Source:	2013-14 HERO NNJ13ZSA002N-BMED Behavioral Health & Performance	
Start Date:	11/13/2014	End Date:	09/30/2022	
No. of Post Docs:	0	No. of PhD Degrees:	2	
No. of PhD Candidates:	1	No. of Master' Degrees:	0	
No. of Master's Candidates:	0	No. of Bachelor's Degrees:	0	
No. of Bachelor's Candidates:	0	Monitoring Center:	NASA JSC	
Contact Monitor:	Whitmire, Alexandra	Contact Phone:		
Contact Email:	alexandra.m.whitmire@nasa.gov	<u>′</u>		
Flight Program:				
Flight Assignment:	NOTE: End date changed to 9/30 NOTE: End date changed to 9/30	0/2022 per NSSC information (Ed., 0/2021 per NSSC information (Ed.,	8/24/21) 4/22/2020)	
	NOTE: End date changed to 3/31/2020 per NSSC information (Ed., 1/29/2020)			
	NOTE: End date changed to 12/31/2019 per NSSC information (Ed., 7/17/19)			
	NOTE: End date changed to 5/31/2019 per NSSC information (Ed., 2/12/19)			
	NOTE: End date changed to 1/31/2019 per NSSC information (Ed., 12/28/18)			
	NOTE: End date changed to 11/12/2018 per NSSC information (Ed., 12/13/17)			
	NOTE: Element change to Human Factors & Behavioral Performance; previously Behavioral Health & Performance (Ed., 1/17/17)			
Key Personnel Changes/Previous PI:	July 2021 report: Dr. Matthew G 2020; Dr. Mitzi Laughlin is no lo	allagher was added as a Co-Investig onger CoI on the project.	ator-statistician during the NCE starting in April	

	Complex, Christophen Dh.D. (University of Dittelevent)
COI Name (Institution):	Simpson, Richard Ph.D. (University of Houston) Gallagher, Matthew Ph.D. (University of Houston)
Grant/Contract No.:	NNX15AC13G
Performance Goal No.:	
Performance Goal Text:	
Task Description:	Anecdotal and empirical findings collected in space and other extreme environments continue to highlight the potential for psychological symptoms and conditions to degrade crew performance, increase conflict, and jeopardize mission success. Indeed, 'negative reactions' during periods of isolation, confinement, demanding work schedules, stimulus reduction, separation from loved ones, sleep deprivation, and a host of other stressors are more appropriately viewed as normative rather than pathogenic. Selection methods and countermeasures serve to mitigate some degree of psychological risk, but long-duration space flight will substantially extend exposure to these and other stressors. Previous research documenting psychological symptoms experienced during space flight and in other isolated and confined environments (ICE) provides evidence of a wide range of psychological and behavioral reactions. Unfortunately however, these collective data ultimately serve to raise more questions than answers. Differences in collection methods, types of symptoms/reactions assessed, psychological constructs examined, and timing and duration of measurements limit conclusions that can be drawn from this research. As a result, understanding of the discrete symptoms and conditions most likely to occur during space flight and thus, ability to quantify the magnitude, probability, or consequences of such risk remains inadequate. The current project proposes to address these notable gaps in knowledge via three specific Aims. First, we will conduct extensive scientific literature reviews and interviews with subject matter experts in order to synthesize existing knowledge of the psychological and behavioral symptoms experienced in space and other extreme environments (Aim 1). Our review will directly inform the development of a comprehensive checklist of symptoms to be monitored among 6 separate cohorts (i.e., 2 Antarctic and 4 Human Exploration Research Analog (HERA) cohorts)) as part of a longitudinal investigation (Aim 2). Symptoms will be
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	Anecdotal and empirical findings collected in space and other extreme environments continue to highlight the potential for psychological symptoms and conditions to degrade crew performance, increase conflict, and jeopardize mission success. Indeed, 'negative reactions' during periods of isolation, confinement, demanding work schedules, stimulus reduction, separation from loved ones, sleep deprivation, and a host of other stressors are more appropriately viewed as normative rather than pathogenic. Selection methods and countermeasures serve to mitigate some degree of psychological risk, but long-duration space flight will substantially extend exposure to these and other stressors. Previous research documenting psychological symptoms experienced during space flight and in other isolated and confined environments (ICE) provides evidence of a wide range of psychological and behavioral reactions. Unfortunately however, these collective data ultimately serve to raise more questions than answers. Differences in collection methods, types of symptoms/reactions assessed, psychological constructs examined, and timing and duration of measurements limit conclusions that can be drawn from this research. As a result, understanding of the discrete symptoms and conditions most likely to occur during space flight and thus, ability to quantify the magnitude, probability, or consequences of such risk remains inadequate. Thus, there is a need to: (1) identify the psychological/behavioral symptoms structs (2) provide accurate and acceptable risk. This project specifically addresses several knowledge gaps related to Risks of Adverse Behavioral Conditions and Psychiatric Disorders [Ed. note: August 2021–Gaps have changed since this grant was awarded in FY2015; see Human Research Roadmap https://j including: Gap 1 (Need to identify and quantify the key threats to and promoters of mission -based performance during exploration class missions) and Gap 3 (Need to identify and validate masures to monistore behavioral health and performance

Task Progress:	During the past year, we published several papers from our Antarctic study, including primary mental health outcomes. Among the three Mental Health Checklist (MHCL) subscales, both positive adaptation and poor self-regulation scores changed significantly across the 9-month mission. For positive adaptation, a continuous linear decrease was observed from baseline to the end of the mission. Thus, even as crew members were preparing to return home, positive adaptation scores did not evidence a 'bounce back' effect. Deterioration in the range of items that make up this MHCL subscale (e.g., proud, inspired, enthused/spirited, interested/facinated, perfectionistic) might be viewed as progressive feelings of detachment or indifference over time. For MHCL poor-regulation scores, the greatest increases were observed during the first half of the mission. Scores decreased somewhat in later months, though not back to baseline levels. Interestingly, higher poor self-regulation scores were observed early in the mission at McMurdo compared to the South Pole station. Considering the larsher, more extreme conditions at the South Pole, and the absence of station-based differences in demographic, military, or prior polar experience, poorer self-regulation scores at McMurdo may reflect the absence of pre-deployment psychological screening at this station. By comparison, monthly MHCL anxious apprehension scores did not change significantly over time. Thus, whereas declines in both positive emotion and self-regulatory abilities may be more universal experiences in this ICE setting, changes in anxiety might be shaped more so by individual (e.g., physical symptoms), situational, and/or interactional effects than by broader environmental stressors. We did observe persistently higher MHCL anxious apprehension acres at McMurdo station where weather elements are less extreme but the population in theyre. A potentially important direction for future work is to examine changes in the severity of physical symptoms across at the constal statio
Bibliography Type:	Description: (Last Updated: 12/23/2022)
Abstracts for Journals and Proceedings	Cifre AB, Kim J, So CJ, Gonzalez R, Abeln V, Alfano CA. "Global Sleep Quality as a Predictor of Mental Health During HERA Missions." Poster presented at the 2021 NASA Human Research Program Investigators' Workshop, Virtual, February 1-4, 2021. Abstracts. 2021 NASA Human Research Program Investigators' Workshop, Virtual, February 1-4, 2021. , Feb-2021
Abstracts for Journals and Proceedings	Kim J, Cifre AB, So CJ, Gonzalez R, Bower J, Connaboy C, Simpson R, Alfano CA. "Markers of Distress Among Medical and Behavioral Health Evacuees from Antarctica." Poster presented at the 2021 NASA Human Research Program Investigators' Workshop, Virtual, February 1-4, 2021. Abstracts. 2021 NASA Human Research Program Investigators' Workshop, Virtual, February 1-4, 2021.
Abstracts for Journals and Proceedings	Alfano C, Mi Q, Ahamed NU, Bower JL, Connaboy C, Simpson RJ. "Sleep Regularity and Mental Health during Extended Antarctic." Paper presented at the 2021 NASA Human Research Program Investigators' Workshop, Virtual, February 1-4, 2021.
Articles in Peer-reviewed Journals	Alfano CA, Bower JL, Connaboy C, Agha NH, Baker FL, Smith KA, So CJ, Simpson RJ. "Mental health, physical symptoms and biomarkers of stress during prolonged exposure to Antarctica's extreme environment." Acta Astronautica. 2021 Apr;181:405-13. <u>https://doi.org/10.1016/j.actaastro.2021.01.051</u> , Apr-2021
Articles in Peer-reviewed Journals	Connaboy C, Sinnott AM, LaGoy A, Krajewski KT, Johnson CA, Pepping G-J, Simpson RJ, Bower JL, Alfano CA. "Cognitive performance during prolonged periods in isolated, confined, and extreme environments." Acta Astronautica. 2020 Dec;177:545-51. <u>https://doi.org/10.1016/j.actaastro.2020.08.018</u> , Dec-2020
Articles in Peer-reviewed Journals	LaGoy A, Sinnott AM, Ambarian M, Pepping G-J, Simpson RJ, Agha NH, Bower JL, Alfano CA, Connaboy C. "Differences in affordance-based behaviors within an isolated and confined environment are related to sleep, emotional health and physiological parameters." Acta Astronautica. 2020 Nov;176:238-46. <u>https://doi.org/10.1016/j.actaastro.2020.06.034</u> , Nov-2020