Fiscal Year:	FY 2016	**Task Last Updated:**	FY 10/19/2016
PI Name:	Strangman, Gary E Ph.D.		
Project Title:	Quantifying and Predicting Operationally-Relevant Performance in a Long-Duration Spaceflight Analog		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Behavior and performance		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **HFBP**:Human Factors & Behavioral Performance (IRP Rev H)		
Human Research Program Risks:	(1) **BMed**:Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders (2) **Sleep**:Risk of Performance Decrements and Adverse Health Outcomes Resulting from Sleep Loss, Circadian Desynchronization, and Work Overload		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	strang@nmr.mgh.harvard.edu	**Fax:**	FY
PI Organization Type:	NON-PROFIT	**Phone:**	617-724-0662
Organization Name:	Massachusetts General Hospital		
PI Address 1:	Department of Psychiatry		
PI Address 2:	149 13th Street, Suite 2651		
PI Web Page:			
City:	Charlestown	**State:**	MA
Zip Code:	02129-2020	**Congressional District:**	7
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2015-16 HERO NNJ15ZSA001N-ILSRA. Appendix F: International Life Sciences Research Announcement
Start Date:	08/01/2016	**End Date:**	07/31/2019
No. of Post Docs:		**No. of PhD Degrees:**	
No. of PhD Candidates:		**No. of Master' Degrees:**	
No. of Master's Candidates:		**No. of Bachelor's Degrees:**	
No. of Bachelor's Candidates:		**Monitoring Center:**	NASA JSC
Contact Monitor:	Williams, Thomas	**Contact Phone:**	281-483-8773
Contact Email:	thomas.j.will1@nasa.gov		
Flight Program:			
Flight Assignment:	NOTE: Element change to Human Factors & Behavioral Performance; previously Behavioral Health & Performance (Ed., 1/18/17)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Zhang, Quan Ph.D. (Massachusetts General Hospital)		
Grant/Contract No.:	NNX16AO30G		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Exploration spaceflight missions will expose crewmembers to many risks that could affect their performance and mission success. Minimizing such risks will require identifying and validating objective indicators of behavioral health and performance (BMed2 Gap), understanding the contribution of sleep loss on individual behavioral health (Sleep2 Gap), and identifying countermeasures that can reduce these risks (BMed1, BMed6, and Sleep9 Gaps). Currently the Robotic On-Board Trainer (ROBoT) is used operationally by astronauts both on the ground and on the International Space Station (ISS) to practice Canada Arm activities. Our group is helping adapt ROBoT for research use and for quantitative performance assessment. In addition, our group is developing and testing NINscan-SE: a multi-use system for measuring brain and physiological function. Both ROBoT and NINscan-SE are being characterized and validated in our laboratory over the next several months, and will undergo analog feasibility testing during the Human Exploration Research Analog (HERA) 2016 campaign. We propose to deploy both in this project to: Aim 1: Characterize operational task performance changes during 45-day HERA missions, including the roles of time-in-mission, workload, sleep debt, and operational emergencies. Aim 2: Characterize brain and systemic physiology changes during 45-day HERA missions, including the roles of time-in-mission, workload, sleep debt, and operational emergencies. Aim 3: Identify physiological or behavioral variables that predict operational performance. Aim 4: Quantify the influence of behavioral health countermeasures on both operational performance and (neuro)physiological measures. To achieve these aims, we will recruit up to 32 crewmembers from eight 45-day missions in the HERA facility during Campaigns 4 and 5, plus 32 control subjects. HERA and control participants will all perform ROBoT tasks plus undergo physiological monitoring 2x/week, on matching schedules, thus enabling us to differentiate changes in operational performance due to practice over time from any changes due to HERA sequestration. In addition, two “unexpected operational emergency” events will be introduced in the first and last weeks of each HERA mission. These will consist of an acute need to capture a wayward satellite traveling near the limits of Canada Arm capabilities. We will also work with the Behavioral Health and Performance (BHP) Element and other HERA investigators to coordinate ROBoT and physiological data collection before, during, and after one or more countermeasure (CM) deployments during the HERA missions. CM(s) may include a lighting intervention, a Virtual Space Station-based behavioral intervention, diet, exercise or some other intervention. The experimental design will depend on the nature of the CM. We will test hypotheses that the CM(s) generate detectable changes in ROBoT performance and rest/task (neuro)physiology recordings. We will also compare ROBoT performance to the standardized Behavioral Core Measures (BCM), if available. The knowledge-deliverables of this project will describe: (i) changes in operationally-relevant (ROBoT) performance during the HERA mission in a well-controlled analog study of substantial size; (ii) changes in cerebral and systemic physiology associated with HERA mission parameters as well as operational performance, (iii) identification of potential predictors of future ROBoT performance, and (iv) the influence of the investigated countermeasure(s) on operational performance and physiology.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2016.
Bibliography Type:	Description: (Last Updated: 03/29/2024)