

Fiscal Year:	FY 2019	Task Last Updated: FY 02/04/2019	
PI Name:	Basner, Mathias M.D., Ph.D.		
Project Title:	Advanced Algorithms for the Prediction of Adverse Cognitive and Behavioral Conditions in Space		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	TRISH--TRISH		
Joint Agency Name:		TechPort:	Yes
Human Research Program Elements:	None		
Human Research Program Risks:	None		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	19104-4209	Congressional District:	2
Comments:			
Project Type:	GROUND	Solicitation / Funding Source:	2018 TRA BRASH1801: Translational Research Institute for Space Health (TRISH) Biomedical Research Advances for Space Health
Start Date:	01/01/2019	End Date:	12/31/2020
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:	TRISH
Contact Monitor:		Contact Phone:	
Contact Email:			
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Dinges, David Ph.D. (University of Pennsylvania) Romoser, Amelia Ph.D. (Wyle Laboratories, Inc./NASA Johnson Space Center) Shou, Haochang Ph.D. (University of Pennsylvania) Stahn, Alexander Ph.D. (University of Pennsylvania) Williams, Edward Ph.D. (NASA Johnson Space Center)		
Grant/Contract No.:	NNX16AO69A-T0403		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	<p>This proposal addresses the Human Research Program (HRP) Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders and several other critical HRP risks and gaps. This study utilizes Reaction Self-Test (RST) data collected by the Principal Investigator (PI) and his team in n=24 astronauts on 6-month International Space Station missions, arguably the largest cognitive dataset ever collected in spaceflight. RST consists of a survey module and a 3-minute version of the Psychomotor Vigilance Test (PVT). Our main objective is to additionally obtain data on key environmental stressors (i.e., carbon dioxide levels, temperature, noise, and radiation) and combine them with RST data and other operational data collected by the PI and his team (Specific Aim 1). All data will be integrated in one carefully annotated database, which will be delivered to NASA at the end of the project and could be later amended and mined by other researchers (Deliverable 1). We will then develop an individualized dynamic prediction model that informs future PVT performance based on environmental data, survey data, prior PVT administrations, and person-specific characteristics using state-of-the-art machine learning techniques such as functional concurrent regressions and neural networks for time series forecasting (Specific Aim 2). We will perform model selection and identify those variables that have the highest predictive value for PVT performance (Deliverable 2) and could preferentially be collected on future spaceflight missions to inform relevant changes in cognition and behavioral health. At the end of the study, we will deliver an algorithm to NASA that, for the first time, can predict adverse cognitive conditions in astronauts early and with an unprecedented precision (Deliverable 3). The predictive algorithms can be translated to several settings on Earth where high performing individuals have to sustain high levels of cognitive performance while facing several environmental or other challenges (e.g., US Navy personnel on submarines).</p>
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2019.
Bibliography Type:	Description: (Last Updated: 04/05/2024)