Fiscal Year:	FY 2022	**Task Last Updated:**	FY 08/24/2022
PI Name:	Chaspari, Theodora Ph.D.		
Project Title:	Artificial Intelligence for Tracking Micro-Behaviors in Longitudinal Data and Predicting Their Effect on Well-Being and Team Performance		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:			
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:	77843-0001	**Congressional District:**	17
Comments:			
Project Type:		**Solicitation / Funding Source:**	2020 HERO 80JSC020N0001-FLAGSHIP, OMNIBUS1 Human Research Program: Crew Health Appendix A; Omnibus1-Appendix B
Start Date:	03/09/2022	**End Date:**	08/31/2023
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No. of Master's Candidates:		**No. of Bachelor's Degrees:**	
No. of Bachelor's Candidates:		**Monitoring Center:**	NASA JSC
Contact Monitor:	Whitmire, Alexandra	**Contact Phone:**	
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Flight Program:			
Flight Assignment:	NOTE: End date changed to 08/31/2023 per A. Beitman/JSC (Ed., 2/22/23) NOTE: End date changed to 03/08/2024 per NSSC information (Ed., 2/15/23)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Bell, Suzanne Ph.D. (NASA Johnson Space Center) Roma, Pete Ph.D. (NASA Johnson Space Center) Loerch, Linda M.S. (NASA Johnson Space Center)		
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Performance Goal Text:			

Task Description:	Future long-distance space exploration will have a number of challenges that increase the risk of inadequate cooperation, coordination, collaboration, and psychosocial adaptation, and can lead to behavioral health and performance decrements. In NASA-sponsored analogs, the primary methodology for capturing team interaction data is self-report surveys. While this method may provide some insights, it has significant limitations and biases. We hypothesize that micro-behaviors detected by artificial intelligence (AI) can provide unique insights into emotional reactivity and operationally-relevant team performance, beyond self-report team functioning measures commonly used in NASA-funded research. Micro-behaviors are small, often unconscious gestures, words, and tone of voice which can influence how included (or not included) the people around us feel. The most common type of micro-behaviors are micro-aggressions, which refer to subtle negative exchanges that may take a concealed form, including communications that negate one's thoughts or feelings, offensive jokes/comments, underestimation of the other's ability, or even rudeness and insensitivity. On the other hand, micro-affirmations reflect inclusion and caring and include behaviors such as active listening, recognizing others' achievements, and using friendly expressions and tone of voice. While micro-aggressions can have detrimental impact to well-being and team performance, micro-affirmations can counter-act micro-aggressions' harmful effects. Our research has three primary aims: (1) Leverage advanced multimodal data analytics to detecting micro-behaviors in longitudinal team interactions; (2) Identify emotional reactivity to micro-behaviors; and (3) Incorporate knowledge on micro-behaviors to predict operationally relevant team performance. We will leverage natural language processing analytics and build conversational markers of micro-aggressions that can "read between the lines" by knowledge automatically mined from word embeddings. We will further design linguistic measures of dialogue (in)coherence and (im)polite language, as well as vocal indices representative of empathy and sarcasm. We will further employ machine learning algorithms to learn complex multimodal patterns of micro-behaviors. The proposed AI algorithms will be evaluated on longitudinal data previously collected over 45-day missions from the NASA Human Exploration Research Analog (HERA). This will allow us to identify common targets, micro-aggressors, allies, and bystanders of micro-behaviors with potentially higher sensitivity compared to self-report measures of relational and team functioning. We will quantify individuals' emotional reactivity to micro-behaviors through electrocardiogram (ECG) measures, which will help us tease out the micro-behaviors that matter most (even in an unconscious manner). Measures related to micro-behaviors will be used in combination with existing self-report measures of relational and team functioning to predict operational team performance. We hypothesize that incorporating this additional information will augment the accurate estimation of team outcomes. Our research will make significant contributions toward reducing the Team Risk, particularly gaps 102 and 106. Identified key micro-behaviors that affect well-being and team performance can be used as unobtrusive measures with which to monitor team functioning. Insights from this 1-year project can inform targeted personalized pre-mission and in-mission intervention strategies (e.g., micro-video training) that suggest concrete action items to crew-members and gradually adapt recommendations for a specific person and/or team.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2022.
Bibliography Type:	Description: (Last Updated: 03/07/2024)