



Summary Results from the Assessment of Psychology in Extreme Environments (APEX) Standardized Suite

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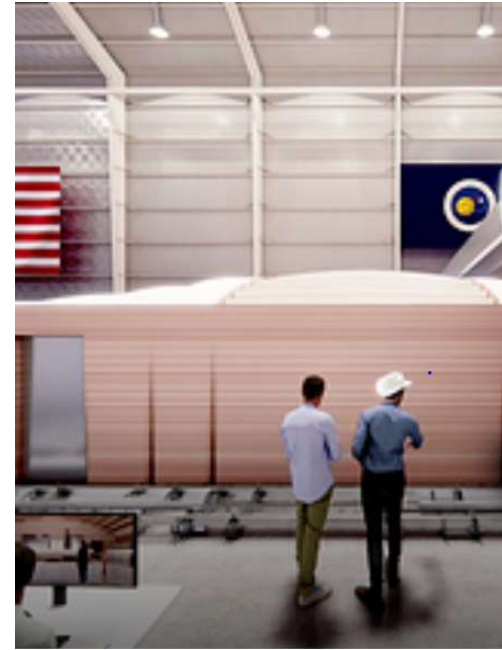
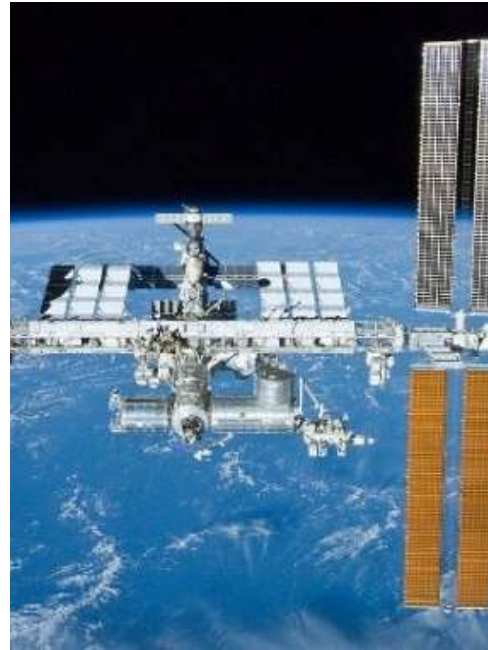
Behavioral Health and Performance Laboratory

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2026 Human Research Program
Investigators' Workshop



Research in Space and Space Analog Environments

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The
Assessment
of Psychology
in Extreme
Environments
(APEX) Suite

Blue = Subset
of measures
administered
on the ISS

APEX Suite

<i>Physiology/Biomarkers</i>
Sleep
Heart Rate
<i>Individual Behavioral Health</i>
Personality Assessment
Social Desirability
Depression
Mood and Affect
Neurobehavioral Function
<i>Objective Performance</i>
Cognition
ROBoT
<i>Team & Social Dynamics</i>
Team Performance: MCC Ratings
Team Performance: Crew Ratings
Team Cohesion
Team Processes
Psychological Safety
Social Support
Group Living

Setting and Participant Characteristics

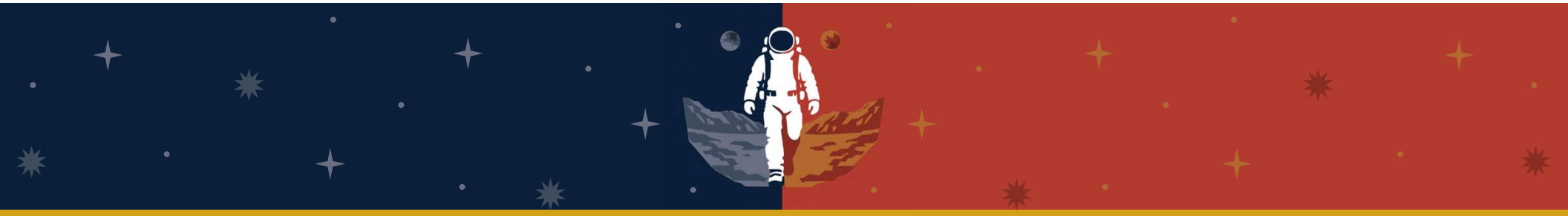


Analog Characteristics							Participant Characteristics				
Analog Study	Days in mission	Habitat Size	Habitat Location	Indiv. <i>n</i>	Team <i>n</i>	Team Size	Age <i>M</i> (SD)	Sex	Education (% advanced degrees)	Military Exp. <i>n</i>	ICE Exp. <i>n</i>
HERA C4	45	148.6m ³	Houston, TX	20	5	4	39.26 (8.40)	7F 13M	75%	5	0
HERA C5	45	133.1m ³	Houston, TX	16	4	4	36.96 (5.68)	4F 12M	100%	6	2
HERA C6	45	133.1m ³	Houston, TX	16	4	4	37.47 (6.38)	8F 8M	100%	2	6
HERA C7	45	133.1m ³	Houston, TX	16	4	4	37.26 (5.53)	8F 8M	100%	4	6
SIRIUS19	120	550m ³	Moscow, RU	6	1	6	34.34 (6.26)	3F 3M	100%	2	4
SIRIUS21	240	550m ³	Moscow, RU	6	1	6	33.63 (5.17)	3F 3M	100%	3	4
ISS	150-350	388m ³	LEO	41	21	2 to 7	48.91 (8.35)	16F 25M	100%	NA	NA
Total	--	--	--	121	40	Mode = 4	M = 38.19	49F 72M	95%	NA	NA

Published Results from the APEX Database

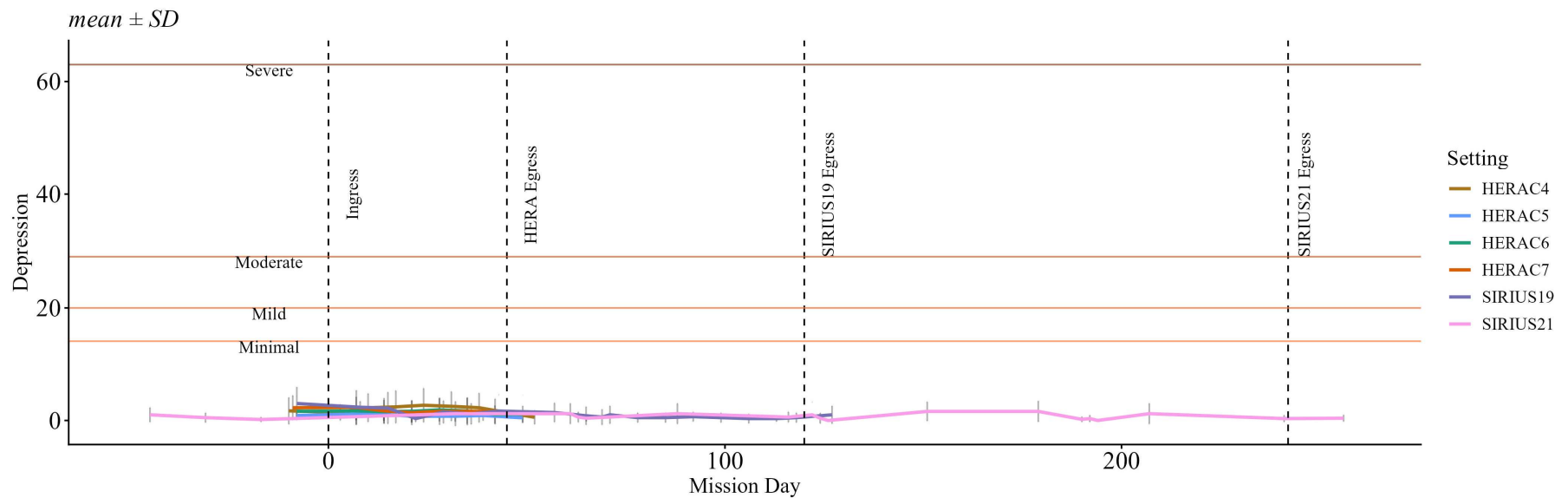
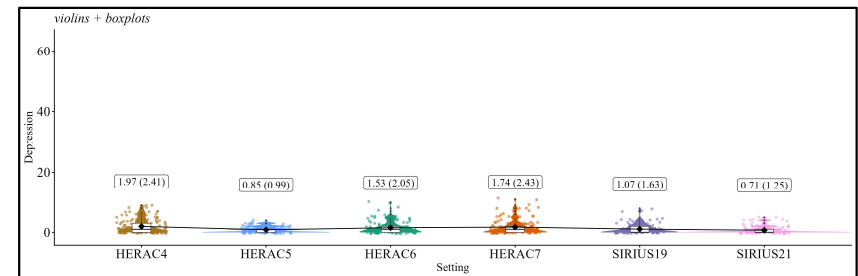
- Data from 25 astronauts aboard the ISS for 6-month missions indicated that **cognitive performance is generally stable over time** with some differences observed across mission phases for specific subtests
 - Dev, S. I., Khader, A. M., Begerowski, S. R., Anderson, S. R., Clément, G., & Bell, S. T. (2024). Cognitive performance in ISS astronauts on 6-month low earth orbit missions. *Frontiers in Physiology*, 15, 1451269.
- Data from 64 crewmembers in isolation showed a **decline in perceived social support across external sources**. Perceived social support from crew was negatively related to evening stress levels.
 - Bell, S. T., Anderson, S. R., Roma, P. G., Landon, L. B., & Dev, S. I. (2025). Social support from different sources and its relationship with stress in spaceflight analog environments. *Frontiers in Psychology*, 15, 1350630.
- Provided reliability and validity evidence for a newly group living skills measure that can be used to capture crew dynamics and also interpersonal dynamics.
 - Landon, L. B., Miller, J. C., Bell, S. T., & Roma, P. G. (2024). When people start getting real: The Group Living Skills Survey for extreme work environments. *Frontiers in Psychology*, 15, 1348119.



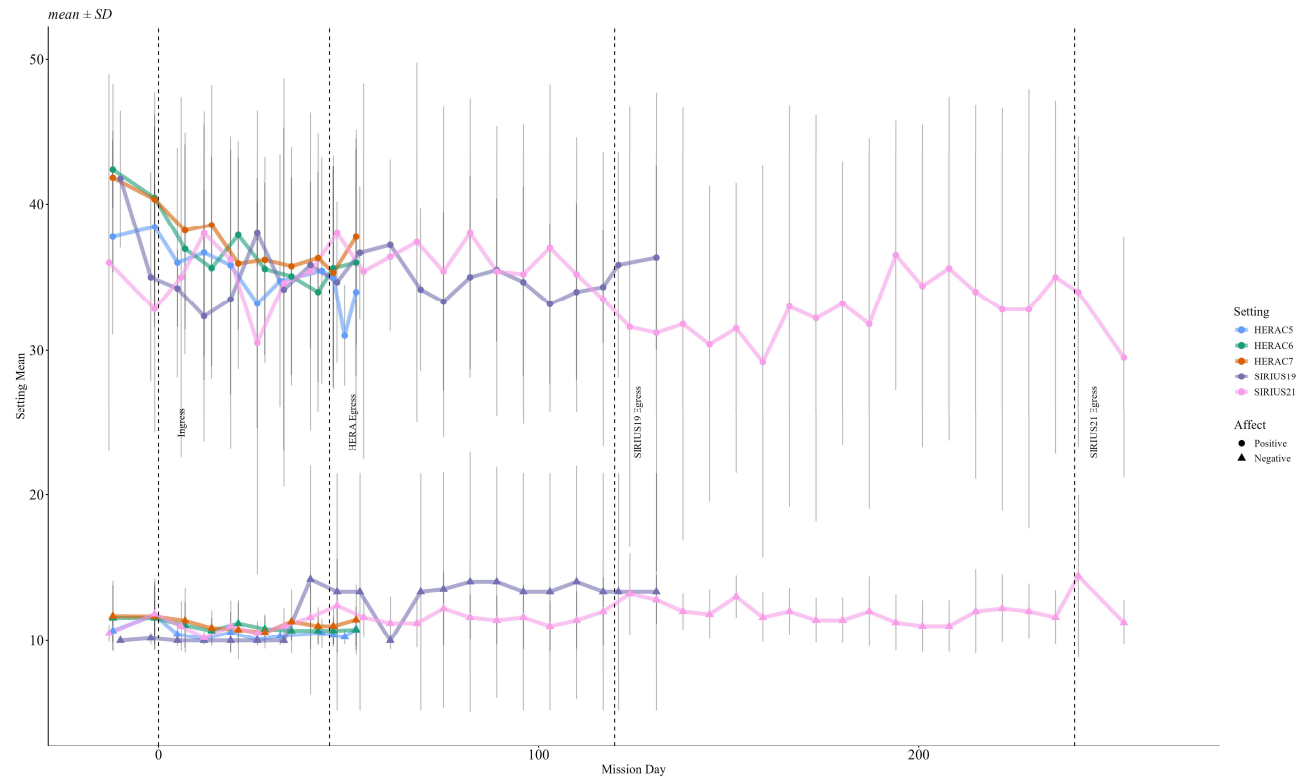


5 Results You Should Know from the APEX Database

1. No Reported Cases of Clinical Depression

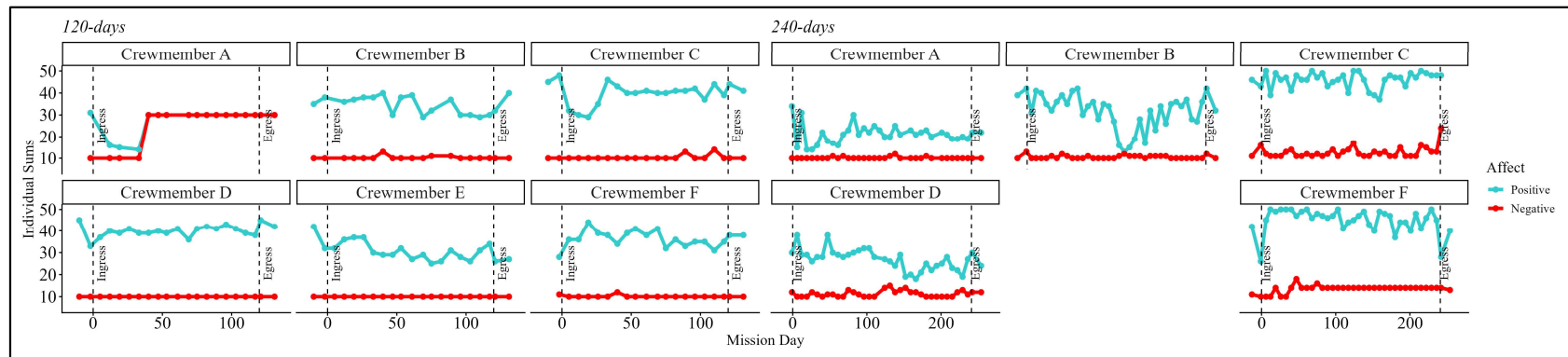


2. Positive Affect Declines Over Time in Isolation





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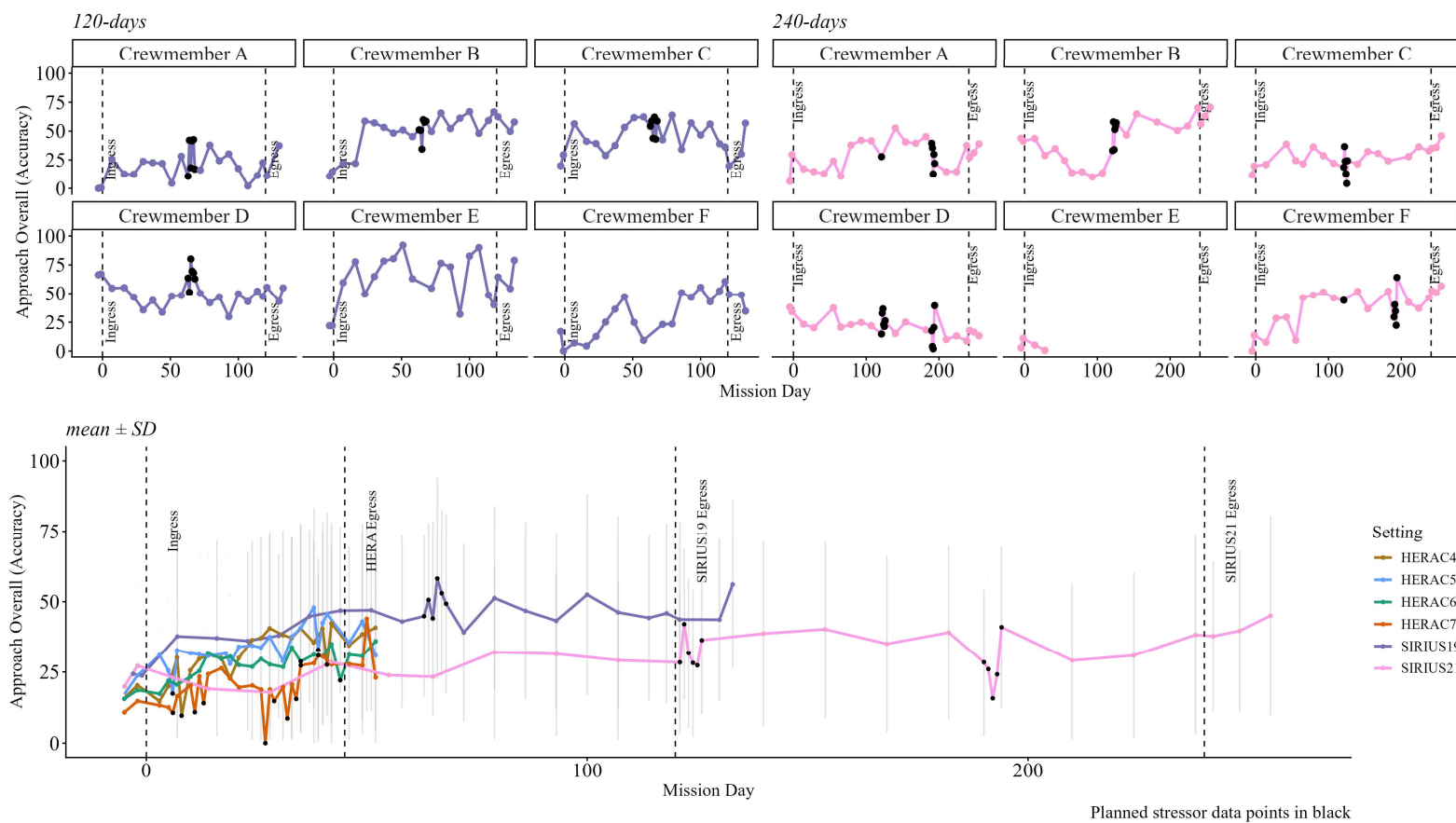


3. Positive Affect is Related to Operationally Relevant Performance



3.

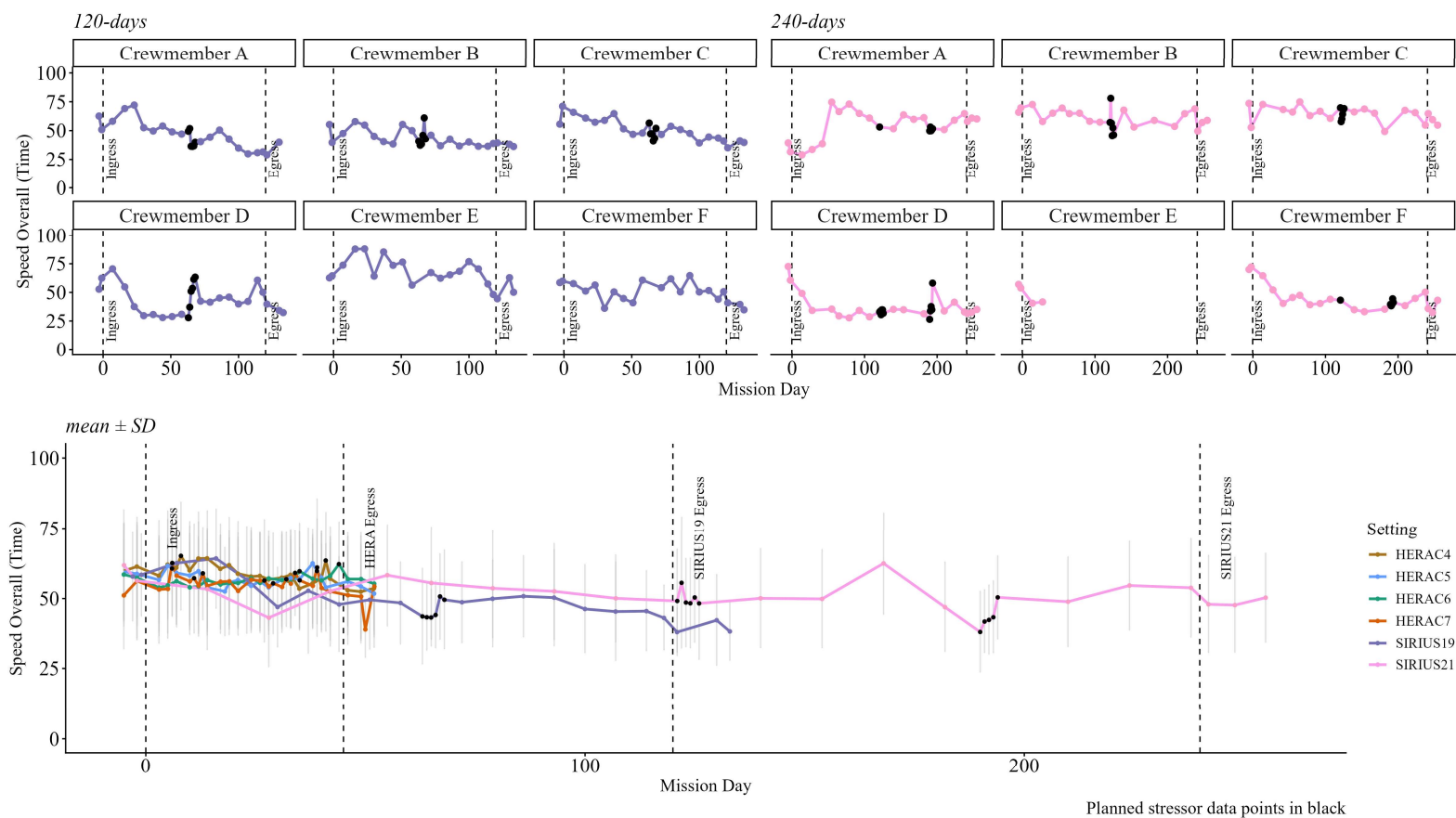
ROBoT-r — Accuracy





3.

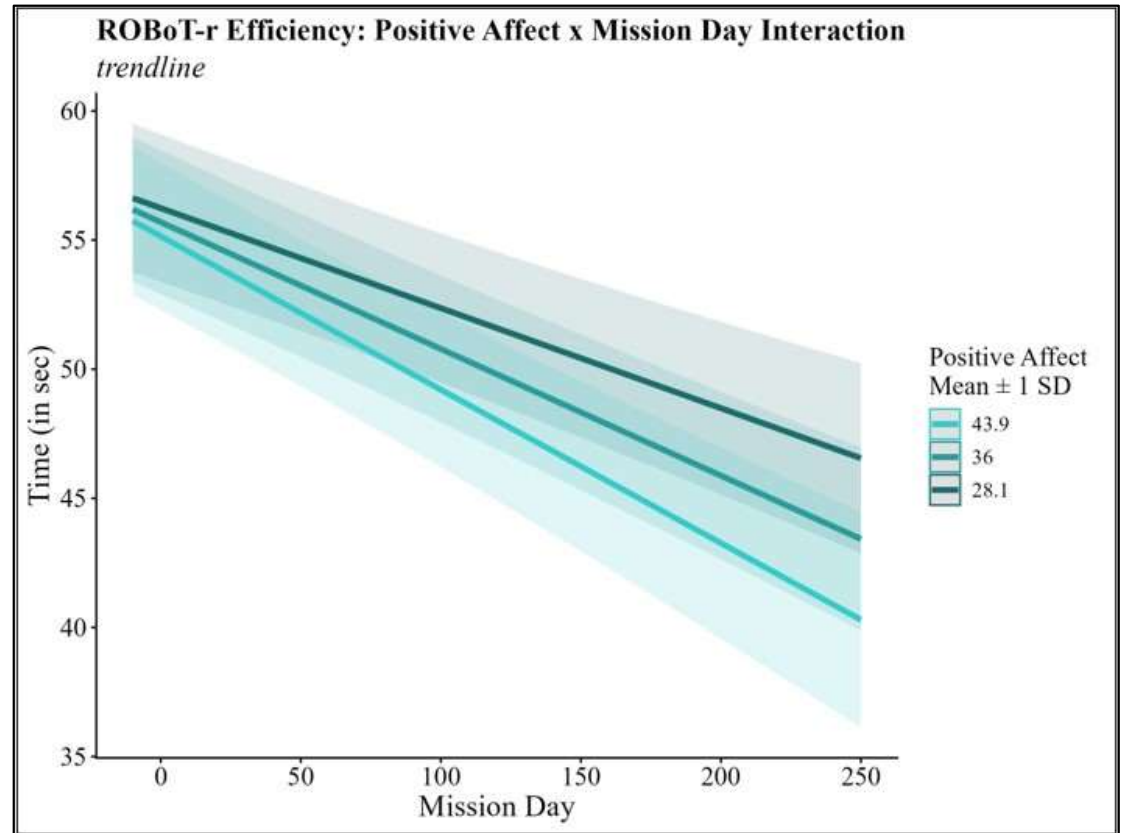
ROBoT-r — Efficiency (Speed)



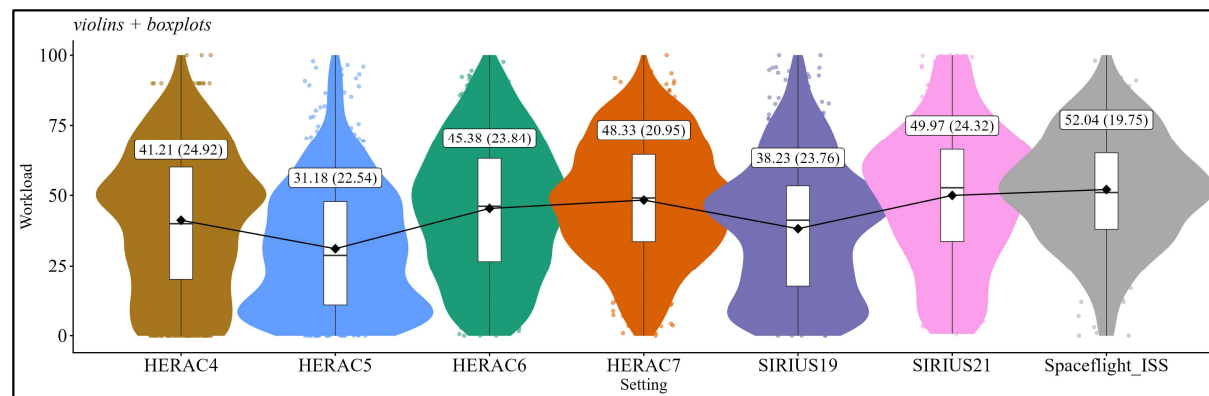
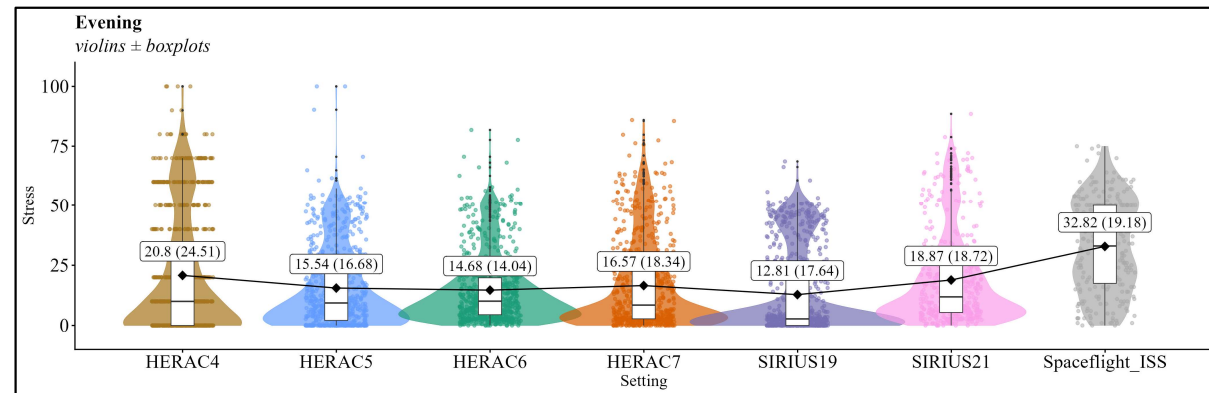


3. Positive Affect is Related to Operationally Relevant Performance

ROBoT_Efficiency_Time					
Predictors	Estimates	std. Error	CI	Statistic	p
(Intercept)	54.0555	1.4099	51.2917 – 56.8192	38.3392	<0.001
C MDay	-0.0491	0.0052	-0.0593 – -0.0388	-9.3822	<0.001
C Positive	-0.1127	0.0360	-0.1833 – -0.0421	-3.1286	0.002
C MDay × C Positive	-0.0013	0.0005	-0.0023 – -0.0003	-2.6666	0.008
Random Effects					
σ^2	197.60				
τ_{00} ID	111.95				
ICC	0.36				
N ID	60				
Observations	9517				
Marginal R ² / Conditional R ²	0.013 / 0.370				



4. Stress is Related to Workload, but There are Other Factors in Play





4. Stress is Related to Workload, but There are Other Factors in Play

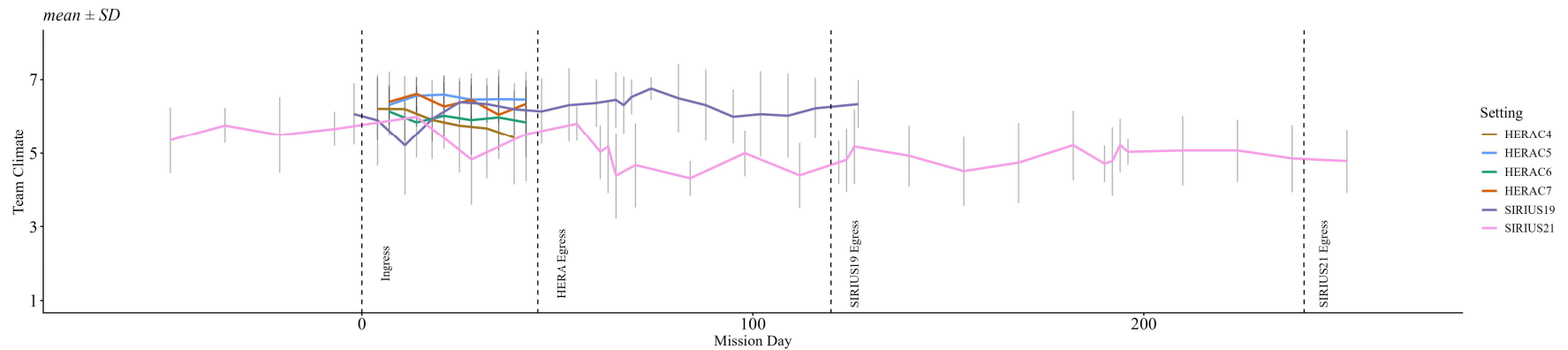
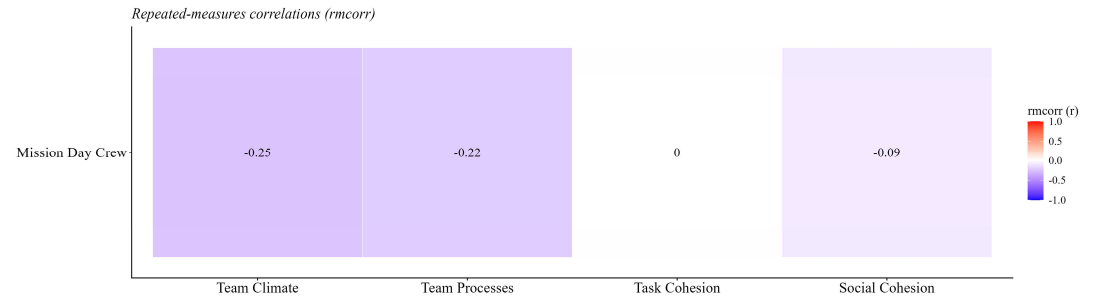


<i>Predictors</i>	<i>Estimates std. Error</i>		C_PM_Stress		
			<i>CI</i>	<i>Statistic</i>	<i>p</i>
(Intercept)	-3.0150	3.4149	-9.7101 – 3.6801	-0.8829	0.377
C Workload	0.0404	0.0056	0.0295 – 0.0513	7.2769	<0.001
C MDay	-0.0009	0.0034	-0.0076 – 0.0057	-0.2804	0.779
Setting [HERAC5]	0.6442	5.1200	-9.3937 – 10.6822	0.1258	0.900
Setting [HERAC6]	-1.8939	5.1198	-11.9315 – 8.1436	-0.3699	0.711
Setting [HERAC7]	-1.1539	5.1203	-11.1923 – 8.8846	-0.2254	0.822
Setting [SIRIUS19]	-2.6218	7.0980	-16.5376 – 11.2940	-0.3694	0.712
Setting [SIRIUS21]	4.1310	7.1132	-9.8146 – 18.0766	0.5808	0.561
Setting [Spaceflight_ISS]	15.2882	4.2866	6.8843 – 23.6922	3.5665	<0.001
Random Effects					
σ^2	45.59				
τ_{00} ID:ID_Crew	220.37				
τ_{00} ID_Crew	0.00				
N ID	116				
N ID_Crew	32				
Observations	4257				
Marginal R ² / Conditional R ²	0.295 / NA				



5.

Team Functioning Tends to Decline Over Time but this Varies by Construct, Team, and Relationships





5.

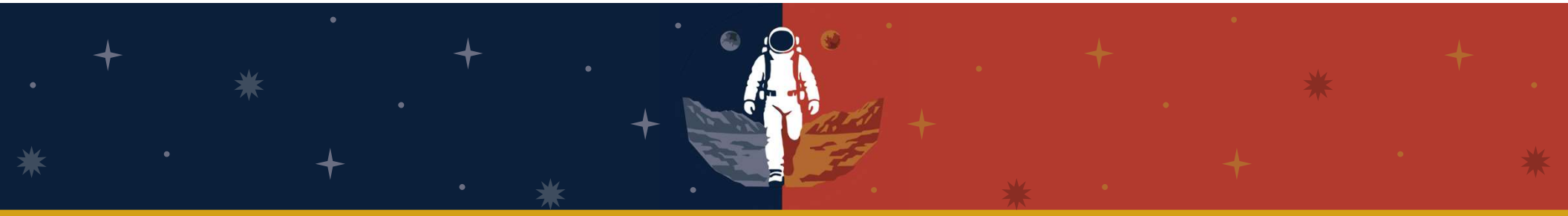
Team Functioning Tends to Decline Over Time but this Varies by Construct, Team, and Relationships



Aspect

- AnotherMission
- Considerate
- Humor
- KSA
- TidyPers
- TidyWork





What's Next?

Former HFBP-EM Suite

Team Performance Crew and MCC
Daily, 4 Likert items

Team functioning

Variable admin., includes psych safety, team processes, group living, cohesion items, 31 items

Beck Depression Inventory (BDI-2)
Weekly, 21 items

Profile of Mood States (POMS) and
NeuroVAS
Daily, 40+ items

Updated APEX Suite

Team Performance BARS Crew and MCC
Daily, 2 items

Team functioning

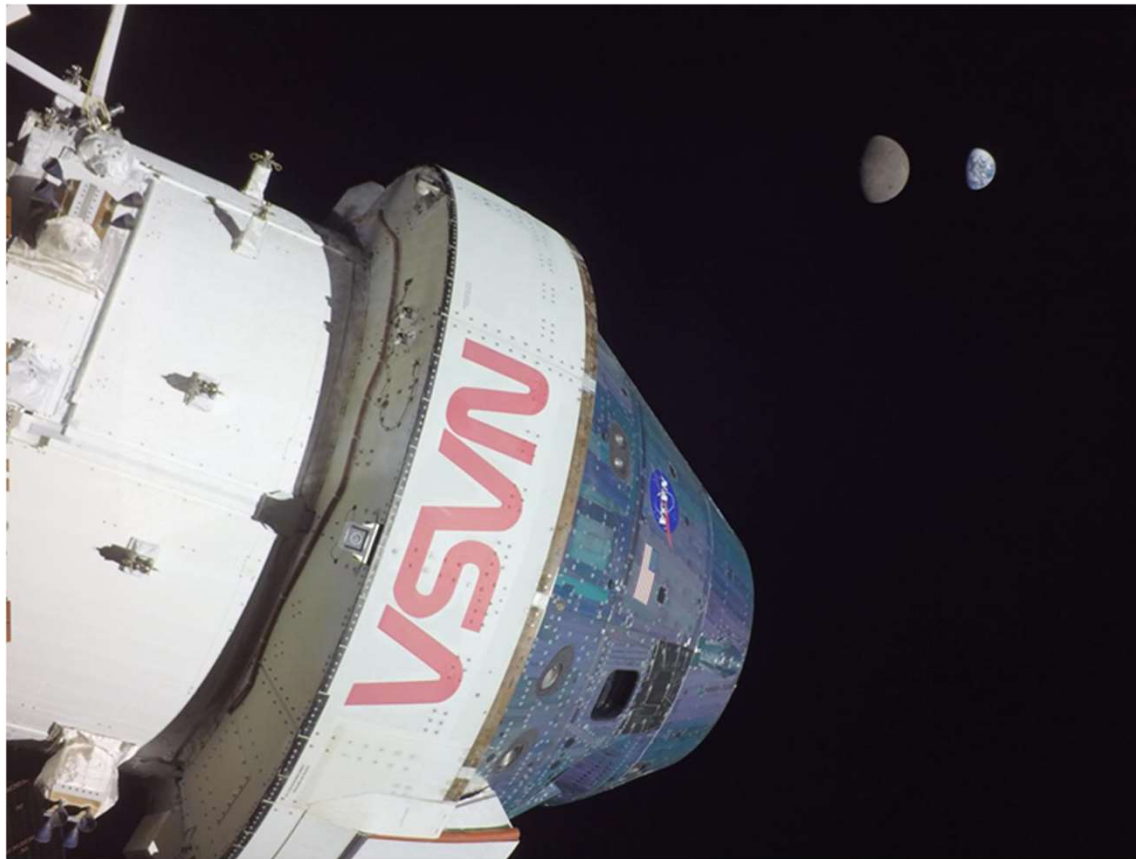
Weekly, <18 items
+2 new constructs: shared mental models, status conflict

BDI-2 or Center of Epidemiological Studies
Depression (CES-D)
Weekly, 20 items

Spaceflight Bhealth, improved coverage
Daily, 31 items

Team Risk

Behavioral Health
Risk



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Thank you!

BHP Lab

Standard Measures Team

HRP and HFBP

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