

Astronauts' mental health risks tested in the Antarctic

April 20 2021, by Laurie Fickman



NASA astronaut Karen Nyberg watches Earth from the Cupola Observational Module of the International Space Station. Credit: NASA

Astronauts who spend extended time in space face stressors such as isolation, confinement, lack of privacy, altered light-dark cycles, monotony and separation from family. Interestingly, so do people who work at international research stations in Antarctica, where the extreme environment is characterized by numerous stressors that mirror those present during long-duration space exploration.

To better understand the psychological hurdles faced by astronauts, University of Houston professor of psychology Candice Alfano and her team developed the Mental Health Checklist (MHCL), a self-reporting instrument for detecting mental health changes in isolated, confined, extreme (ICE) environments. The team used the MHCL to study [psychological changes](#) at two Antarctic stations. The findings are published in *Acta Astronautica*.

"We observed significant changes in psychological functioning, but patterns of change for specific aspects of mental health differed. The most marked alterations were observed for positive emotions such that we saw continuous declines from the start to the end of the mission, without evidence of a 'bounce-back effect' as participants were preparing to return home," reports Alfano. "Previous research both in space and in polar environments has focused almost exclusively on [negative emotional states](#) including anxiety and depressive symptoms. But positive emotions such as satisfaction, enthusiasm and awe are essential features for thriving in high-pressure settings."

Negative emotions also increased across the study, but changes were more variable and predicted by physical complaints. Collectively, these results might suggest that while changes in [negative emotions](#) are shaped by an interaction of individual, interpersonal and situational factors, declines in positive emotions are a more universal experience in ICE environments. "Interventions and counter measures aimed at enhancing positive emotions may, therefore, be critical in reducing psychological

risk in extreme settings," said Alfano.

At coastal and inland Antarctic stations, Alfano and her team tracked mental health symptoms across a nine-month period, including the harshest winter months, using the MHCL. A monthly assessment battery also examined changes in physical complaints, biomarkers of stress such as cortisol, and the use of different emotion regulation strategies for increasing or decreasing certain emotions.

Study results also revealed that participants tended to use fewer effective strategies for regulating (i.e., increasing) their positive emotions as their time at the stations increased.

"Both the use of savoring—purposely noticing, appreciating, and/or intensifying positive experiences and emotions—and reappraisal—changing the way one thinks about a situation—decreased during later mission months compared to baseline. These changes likely help explain observed declines in [positive emotions](#) over time," said Alfano.

More information: Candice A. Alfano et al. Mental health, physical symptoms and biomarkers of stress during prolonged exposure to Antarctica's extreme environment, *Acta Astronautica* (2021). [DOI: 10.1016/j.actaastro.2021.01.051](https://doi.org/10.1016/j.actaastro.2021.01.051)

Provided by University of Houston

Citation: Astronauts' mental health risks tested in the Antarctic (2021, April 20) retrieved 2 May 2024 from <https://phys.org/news/2021-04-astronauts-mental-health-antarctic.html>

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