

Psychosocial stress during new environment  
adaptation: assessing the aspects of acculturation and  
confinement environment

( 新規環境への適応過程での心理社会的ストレス研究  
—異文化適応と閉鎖環境適応のアセスメント — )

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# **Psychosocial stress during new environment adaptation: assessing the aspects of acculturation and confinement environment**

## **Abstract**

*Background and Purpose* - Psychosocial stress is a significant factor affecting our wellbeing, performance, and mental health. Readily detecting, evaluating, and dealing with stress might prevent the deterioration of one's productivity and overall health, therefore, high-stress groups require additional attention. Adapting to new conditions might present a serious stressor, and thus, the study at hand aims to assess psychosocial stress under two different stress-inducing conditions: intercultural contact and acculturation, and confinement environment.

### *Study I*

*Methods* - International students are reported to experience increased amount of stress due to their acculturation process. A longitudinal study was conducted in a cohort of first-year international university students ( $n=42$ ), who completed two different validated scales measuring perceived mental and acculturation stress, and one scale for stress-coping resources and adaptability (sense of coherence) at three timepoints within a year. The students completed the first survey 1 month after the beginning of their studies, with follow-ups at 6 and 12 months. From the initial cohort, 21 students answered both at 1 and 6 months, while 11 answered all three timepoints.

*Results* - While significant differences over time in the mean scores were not observed probably because of the small number of participants, stress levels showed a decreasing (at 6 months) and then increasing tendency during this one-year study. Importantly, however, the reported acculturation stress showed statistically significant negative correlations with the students' sense of coherence, and significant positive correlations with their perceived mental distress both at the 6-month and at the 12-month follow-ups (measured by Pearson and Spearman correlations), verifying acculturation as a valid stressor. As international students' acculturation and mental stress is a matter still under-reported, more empirical data are deemed necessary, and furthermore, application of novel stress-related index measurements, like cognitive function, might bring forward new perspectives.

### *Study II*

*Methods* - Confinement stress experienced in situations where humans are confined in the same restricted environment for prolonged periods of time, can present a high-stress situation. Such conditions are always encountered by astronauts on missions. To study the psychosocial stress experienced in confinement, the conditions experienced by astronauts were simulated using the "confinement environment adaptation facilities" of the Japan Aerospace Exploration Agency (JAXA). Participants ( $n=15$ , adult males, divided

into 2 groups) were confined for 14 days, and their stress levels were monitored by functional near-infrared spectroscopy (fNIRS) during a cognitive verbal fluency test (VFT); the participants' sense of coherence during confinement was also assessed. Additional exercise intervention was applied during confinement to half of the participants (n=8, 15-minute exercise by aero bike every day). To further evaluate the effect of exercise during confinement, we conducted an additional single ABA design experiment with exercise intervals during a 15-day confinement period (n=8, 5 days exercise prohibition - 5 days mandatory exercise - 5 days exercise prohibition).

*Results* - The fNIRS measurements (integrated values) presented a general decrease over time ( $p<0.01$ , mixed model), detecting decreased brain activity due to confinement stress. Though the confinement period was short, participants' sense of coherence had an upward trend. The fNIRS measurements showed that exercise had a positive effect towards maintaining good frontal brain function under confinement stress. In the ABA exercise interval experiment, after exercise, the fNIRS integrated values that usually showed a continuous decreasing trend seemed to increase after confinement, recovering to their pre-confinement levels (before-during confinement:  $p<0.01$ , paired comparison/ before-after confinement: N.S., paired comparison). Although further research is needed, exercise might contribute to the recovery of brain function after confinement stress.

*Discussion* - Understanding adaptation stress in different concepts is essential, as throughout life, several smaller or bigger changes force us to psychologically adapt. From cultural interactions, to moving into new environments, it is important to provide empirical knowledge on the adaptation processes and develop assessment methods for readily detecting, evaluating, and ameliorating psychological stress. Studying acculturation, with focus on international students, presents an insight on cultural adaptation and the effects this process can have on mental health; international students showed high stress levels related to their acculturation, urging for assistance needed during their studies abroad. While self-reported measures provide invaluable insights, objective evaluation, such as cognitive function assessment, might present an efficient and reliable tool towards ensuring our performance, mental health, and wellbeing. The psychological strain of the confinement process was evident in fNIRS measurements taken within a month of confinement, with brain activation gradually diminishing over time. An effective countermeasure of stress in confinement conditions can be exercise, which seems to assist towards maintaining stable brain activity. To better prepare individuals for facing and dealing with adaptation stress, invoked from moving countries and immigration to ISS missions and space-stays, understanding human adaptation and its effects on mental health under a variety of stress-inducing conditions is necessary.