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審査研究科	人間総合科学研究科		
学位論文題目	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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論文の内容の要旨 Abstract of thesis

In this doctoral dissertation, ANDREA Christina Sylvia describes psychosocial stress under two different stress-inducing conditions: intercultural contact and acculturation, and confinement environment. The summary is as follows:

Purpose - Psychosocial stress is a significant factor affecting wellbeing, performance, and mental health in humans. 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. In this doctoral dissertation, the author assesses psychosocial stress under two different stress-inducing conditions: intercultural contact and acculturation, and confinement environment.

Methods—The author conducted a longitudinal study 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. 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. 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 author also assessed the participants’ sense of coherence during confinement. 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, the author 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 - While the author did not observe significant differences over time in the mean scores, 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. However, the author confirmed that 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. 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, the author confirmed that participants’ sense of coherence had an upward trend. By using the fNIRS measurements, the author 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.

Discussion—The author discusses these observations as follows. 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 participants’ 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.

審査の結果の要旨 Abstract of assessment result

(批評 General Comments)

The acculturation study, though not very exhaustive, touches upon a core mental health issue during cultural

adaptation, focusing on international students' acculturative stress and psychological distress during a one-year period. Although small sample size is a limitation in the study, longitudinal studies on acculturation are scarce and difficult to pursue, and international student data in Japan are also limited; thus, this study is importantly striving to fill a crucial knowledge-gap, while urging for further research. The confinement study examined adaptation stress utilizing prefrontal cortex activity as a novel stress index. Overall, this study provides important and novel information on different psychological adaptation processes, although it recognizes the necessity for further research on the matters.

(最終試験の結果 Assessment)

The final examination committee conducted a meeting as a final examination on December 23, 2019. The applicant provided an overview of dissertation, addressed questions and comments raised during Q&A session. All of the committee members reached a final decision that the applicant has passed the final examination.

(結論 Conclusion)

The final examination committee approved that the applicant is qualified to be awarded Doctor of Philosophy in Medical Sciences.