R&D Item

3. Maemuki (Forward-looking) ELSI and social applications

Progress until FY2025

1. Outline of the project

This R&D item addresses the ELSI (Ethical, Legal, and Social Issues) and social application of Maemuki, or a constructive forward-oriented mindset, within Moonshot Goal 9. The project aims to examine the characteristics of Maemuki and its psychological, bodily, neural, and social bases across diverse life stages and conditions, including development, aging, disease, and behavioral addiction-related challenges. In FY2025, we organized the concept of Maemuki through interdisciplinary research integrating philosophy, psychology, neuroscience, and body-information science. In particular, we examined Maemuki as a multidimensional and dynamic concept that is not simply optimism, but is formed in relation to adversity. We also conducted integrated analyses of psychological traits, behavioral characteristics, bodily responses, and brain-related measures in diverse populations, including older adults, cancer survivors, children and adolescents, and individuals facing behavioral addiction-related challenges. In addition, we contributed to the revision of the ELSI guidelines and checklist, thereby strengthening the ethical foundation for the future social implementation of Maemuki-related support technologies.

2. Outcome so far

● **Significance and Ethics of Maemuki**

The research group led by Dr. Shigeru Taguchi at Hokkaido University examined the concept of Maemuki through Japanese corpus analysis and philosophical inquiry. Their work suggests that Maemuki is closely related to adversity and should be understood not merely as positivity, but as a constructive mindset formed through engagement with difficulties and uncertainty. The group also contributed to the revision of the ELSI guidelines and checklist for Moonshot Goal 9.

● **Psychological Adaptation and Maemuki in Cancer Survivors**

The research group led by Dr. Maiko Fujimori at the National Cancer Center conducted a large-scale online survey of cancer survivors. The results suggest that Maemuki attitudes in cancer survivors may be understood in terms of two aspects: coexistence with adversity and growth orientation under adversity. These aspects were associated with resilience, acceptance of illness, depressive symptoms, and life satisfaction. The group also examined bodily and behavioral information and found that certain movement-related characteristics may be associated with traits related to psychological adaptation.

● **Well-Being and Maemuki in Developmental Populations**

The research group led by Dr. Tetsuya Matsuda at Tamagawa University conducted a large-scale survey of approximately 3,000 participants ranging from elementary school students to university students. The study included measures related to Maemuki, lifestyle, physical fitness, movement characteristics, and bodily information. Integrated analyses suggested that well-being-related indicators may share common structures across age groups, while lifestyle factors may vary with age. Neuroimaging analyses also suggested that brain maturation may be associated with the development of social decision-making.

● **Maladaptive Aspects of Maemuki in Behavioral Addiction-Related Challenges**

The research group led by Dr. Hidehiko Takahashi at the Institute of Science Tokyo examined maladaptive aspects of Maemuki in behavioral addiction-related challenges through integrated analyses of psychological measures, brain-related data, and objective behavioral information. In studies on problematic smartphone use, the group analyzed relationships among cognitive characteristics, brain-related measures, and usage patterns, identifying candidate indicators related to behavioral addiction. In studies on Internet gaming disorder, physiological responses and facial expression changes were examined as potential objective indicators that may complement self-report measures.

Measurement and automated analysis of gait

3. Future plans

Future studies will further investigate the psychological, bodily, and neural bases of Maemuki across developmental stages, aging, disease, and behavioral addiction-related challenges using longitudinal and multimodal approaches. In particular, developmental longitudinal studies will examine relationships among Maemuki, lifestyle, sociality, and brain maturation. We will also continue integrated analyses of neuroimaging, behavioral, and bodily information to deepen our understanding of the neural and behavioral bases of Maemuki and related social behaviors. In addition, noninvasive bodily and behavioral sensing approaches will be further examined as objective measures of Maemuki-related states. In the area of behavioral addiction-related challenges, we will continue to examine neural and physiological indicators associated with maladaptive aspects of Maemuki and explore how these findings can contribute to better understanding of these conditions and the development of appropriate support approaches.