

Correspondence

Cite this article: Toyoshima H, Yamamoto N, Komiya S (2024). Gut feelings: associations of emotions and emotion regulation with the gut microbiome in women. *Psychological Medicine* 54, 3197–3198. <https://doi.org/10.1017/S0033291724000874>

Received: 19 January 2024
Revised: 24 February 2024
Accepted: 8 March 2024
First published online: 15 April 2024

Corresponding author:

Hisao Toyoshima;
Email: toyoshima.hisao@gmail.com

Letter to the editor: Gut feelings: associations of emotions and emotion regulation with the gut microbiome in women

Hisao Toyoshima¹ , Norio Yamamoto^{2,3} and Shinnosuke Komiya^{2,4}

¹Pharmacy Management Institute, Graduate School of Business, Japan University of Economics, 25-17, Sakuragaoka-chou, Shibuya-ku, Tokyo 150-0031, Japan; ²Scientific Research Works Peer Support Group (SRWS-PSG), Osaka, Japan; ³Department of Epidemiology, Graduate School of Medicine, Dentistry and Pharmaceutical Sciences, Okayama University, 2-5-1 Shikata-cho, Okayama 700-8558, Japan and ⁴Department of Obstetrics and Gynecology, Kansai Medical University Graduate School of Medicine, Shinmachi 2-5-1, Hirakata-shi, Osaka 573-1010, Japan

We read with interest the paper by Shanlin Ke, Jun Chen, Immaculata De Vivo et al., titled ‘Gut feelings: Associations of emotions and emotion regulation with the gut microbiome in women’ (*Psychological Medicine*, 53, 7151–7160, 2023). In this study, DNA was extracted from the gut microbiota, metagenomic sequencing was performed from a sub-study (MBS: Mind-Body Study) within the Nurses’ Health Study II (NHS II) cohort, and the associations between positive and negative emotions and cognitive reappraisal and suppression were analyzed. This study showed that, among older women, higher suppression was correlated with lower Evenness and Simpson’s diversity. However, this study had some limitations and challenges. Here are some examples.

1. **Sampling Timing:** Stool sampling was conducted approximately 3 and 6 months after the questionnaire was administered. However, questionnaires and stool sampling should be performed simultaneously to evaluate the association between emotional state and the gut microbiota. Previous studies have reported that a test period of 20–30 days is common (Romijn & Rucklidge, 2015). Fecal samples reflect intestinal and systemic conditions at the time of collection and are snapshots that are not indicative of long-term intestinal and systemic conditions. The intestinal microbiota has been reported to change in diversity within one day, depending on the dietary content (Lawrence et al., 2014). Stress also affects intestinal microbiota (Molina-Torres et al., 2019). In this study, there was a temporal gap between the questionnaire and stool sampling, leading to uncertainties in the accurate evaluation of the association between emotional state and the gut microbiota.
2. **Emotional Evaluation Scale:** Originally, the CES-D-10 was used to evaluate the past week (Blodgett et al., 2021), the K6 to evaluate the past month (Umucu et al., 2022), and the ERQ to evaluate general emotions (no time period) (Gross & John, 2003). However, in this study, scores with different time axes were used simultaneously as evaluation scales, and caution is required to accurately evaluate the emotional state and its duration. Furthermore, although the CES-D-10 score is a method established for the past week, it is described as the past month in the literature, ‘During the past month... “I was happy,” “I felt hopeful about the future.”’ This may have been a typographical error in the manuscript. When using an emotional evaluation scale, it is desirable to align periods and use them in a standardized manner.

Considering these points, we suggest that the authors make the following additions to points 1–3:

For point 1, I suggest incorporating content or references that substantiate the claim that the correlation between emotional state and gut microbiota remains unchanged for three to six months in healthy women. Alternatively, a statement could be added at the beginning of the Results section of the Abstract, such as ‘The relationship between emotional state and gut microbiota after three months is...’

For points 2 and 3, we recommend verifying and rectifying them if they are incorrect. If they are accurate and the CES-D-10 revised score is used, I suggest including this detail in the literature.

We believe that these responses improved the quality and validity of this study. Thank you for considering our manuscript.

Acknowledgements. We would like to thank Editage (www.editage.jp) for the English language editing.

Authors’ contributions. H. T. wrote the draft, and N. Y. and S. K. revised and approved the final version. The authors have read and approved the final manuscript.

Funding statement. This study received no funding.

Competing interests. None.

References

- Blodgett, J. M., Lachance, C. C., Stubbs, B., Co, M., Wu, Y. T., Prina, M., ... Cosco, T. D., (2021). A systematic review of the latent structure of the Center for Epidemiologic Studies Depression Scale (CES-D) amongst adolescents. *BMC Psychiatry*, 21, 197. <https://doi.org/10.1186/s12888-021-03206-1>
- Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85(2), 348–362. <https://doi.org/10.1037/0022-3197.85.2.348>
- Lawrence, A. D., Corinne, F. M., Carmody, R. N., Gootenberg, D. B., Button, J. E., Wolfe, B. E., ... Turnbaugh, P. J., (2014). Diet rapidly and reproducibly alters the human gut microbiome. *Nature*, 505, 559–563. <https://doi.org/10.1038/nature12820>
- Molina-Torres, G., Rodriguez-Arrastia, M., Roman, P., Sanchez-Labraca, N., & Cardona, D., (2019). Stress and the gut microbiota-brain axis. *Behavioural Pharmacology*, 30, 187–200. <https://doi.org/10.1097/FBP.0000000000000478>
- Romijn, A. R., & Rucklidge, J. J. (2015). Systematic review of evidence to support the theory of psychobiotics. *Nutrition Reviews*, 73(10), 675–693. <https://doi.org/10.1093/nutrit/nuv025>
- Umucu, E., Fortuna, K., Jung, H., Bialunska, A., Lee, B., Mangadu, T., ... Brooks, J., (2022). A national study to assess validity and psychometrics of the Short Kessler Psychological Distress Scale (K6). *Rehabilitation Counseling Bulletin*, 65(2), 140–149. <https://doi.org/10.1177/00343552211043261rcb.sagepub.com>