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**Prof. Nicholas Jakubovics**

**Editor-in-Chief**

***Journal of Dental Research***

Prof. Ana Paula Colombo and Prof. Bei Wu,

Guest editors – Special issue: Aging and Oral Health

*Journal of Dental Research*

Dear Profs. Jakubovics, Colombo, and Bei Wu:

I would like to submit the manuscript entitled “Impact of teeth on social participation: modified treatment policy approach” by Upul Cooray, Georgios Tsakos, Anja Heilmann, Richard G Watt, Kenji Takeuchi, Katsunori Kondo, Ken Osaka, & Jun Aida for publication in the *Journal of Dental Research special issue “Aging and Oral Health: Biological and Socio-behavioral Perspectives”.*

In aging societies, social participation is an important determinant of health and well-being among older adults. Thus, WHO recognizes social participation as a key element for an age-friendly world because it reduces social isolation, which is an established risk factor for unfavorable aging-related health outcomes such as dementia. Nonetheless, interventions can improve social participation among older adults. However, it is unclear whether improving oral health (e.g., preventing tooth loss) can improve social participation. In this study, we used a recently developed Longitudinal Modified Treatment Policies (LMTP) method to investigate the causal effect of retaining more teeth on social participation among older adults in Japan. LMTP can overcome some of the limitations of conventional counterfactual causal inference frameworks, such as gross violation of positivity assumption.

By using LMTP to define causal effects and doubly-robust targeted minimum loss-based estimation to calculate corresponding statistical parameters, we were able to obtain unbiased estimates of social participation related to several emulated tooth loss prevention scenarios and tooth loss scenarios over six-years. Social participation gradually improved when tooth loss prevention scenarios were emulated and decreased when tooth loss scenarios were emulated indicating a robust causal relationship.

To the best of our knowledge, this study is the first to adapt a modern causal inference methodology to investigate this relationship while accounting for time varying nature of the variables over six years. Hence, this study provides robust evidence that among Japanese older adults, retaining a higher number of teeth positively affects social participation, whereas having a relatively lower number of teeth negatively affects their social participation. Furthermore, we made all software codes used in our analyses publicly available to maintain the transparency and reproducibility of results (https://github.com/upulcooray/social-participation).

We confirm that this manuscript has not been published elsewhere and is not under consideration by any other journal. Authors have no conflicts of interest to declare. All the authors have approved the final version of the manuscript.

We would be obliged if the manuscript could be reviewed and considered for publication in the Journal of Dental Research.

Sincerely,

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