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Title: Exploration of the Contributing Factors to the Walking and Biking Travel Frequency using Multi-Level Joint Models with Endogeneity

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Abstract: There are significant advantages of active transportation that have forced recent scholars to concentrate on the enhancement of walking and biking trips. The current research will contribute to the existing literature as it will determine the influential factors to the walking and biking travel frequency based on data collected from the NHTS California add-on survey. The current project will feature some highlights. First, bivariate models will be used to account for the common unobserved heterogeneity shared by the same individuals or houses for the number of walking and biking trips. Second, endogeneity will be unambiguously be considered due to the strong interdependency between walking and biking trips. Third, the bivariate normal distribution will be applied to both households and person levels of random effects. Fourth, both variable importance ranking and correlation analyses will be applied in order to determine the features that need to be fed into the models. Fifth, a fast Bayesian inference approach, Integrated Nested Laplace Approximation (INLA) will be used to efficiently estimate the model parameters. Finally, different evaluation metrics will be used to gain a wider understanding of model performance. It is expected that the results will show that the models developed with endogeneity performed better than those without endogeneity. Furthermore, there are only four influential variables that can significantly impact walking and biking trips.

Keywords: Civil Engineering, Traffic Engineering, Safety

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