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Travel-based multitasking reframed? A latent class cluster analysis of travel time use styles

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1 Introduction

Multitasking has become ubiquitous due to expanded possibilities of activity engagement enabled by Information and Communication Technologies (ICTs) and as a strategy to deal with time pressures. As discussed in the Social Acceleration Theory (Rosa & Trejo-Mathys, 2013), multitasking is one of the four strategies to complete more activities within a certain timeframe and deal with overlapping demands. In this context, travel time also becomes a space-time locus for activities, including those that release time outside the journey (i.e., activity transferability, as coined by de Sá et al., 2024). This study aims to investigate travel time use styles - distinctive patterns of engaging in activities while travelling. Specific objectives are two-fold:

(1) Investigate travel time use styles from the perspective of activity transferability, travel-based multitasking (i.e., conducting two or more travel-based activities simultaneously), ICT-related information (i.e., Internet usage and electronic devices carried during the journey), and activity participation (among mandatory, maintenance, and discretionary activities).

(2) Identify the profile of travellers and travel context characteristics associated with each travel time use style.

2 Methodology

We applied a latent class cluster analysis (LCCA) to identify patterns in travel time use, utilising a probabilistic clustering method suited for categorical data and based on the assumption of a multinomial distribution. The primary aim of LCCA is to uncover hidden classes that exhibit similar behaviours within each class, while showing distinct differences across groups (Lee et al., 2022). We draw on revealed preference data from a web-based survey conducted between June and September 2023. The survey targeted a representative sample of the population in Greater Melbourne and Greater Geelong (age, gender, and household income). After data processing, the final sample size was 1,673 participants, which exceeds the required minimum of 897 responses. This minimum was calculated based on a 70% incidence of travel time use, as seen in similar multimodal studies (Singleton, 2019; Sun & Wong, 2022), with a 3% margin of error at a 95% confidence level (acceptable margins range between 4% to 8%, per Bartlett et al., 2001). Data processing did not introduce bias, as the final sample distribution remained consistent with the original data. For the LCCA, we focused on participants who used their travel time (N = 1,182) and compared their characteristics with those who did not (N = 491).

3 Main findings

We identified four distinct travel time use styles - *time-passers, ICT-based effective multitaskers, upkeepers, and heavy work investors* – along with an additional exogenous class of *no travel time users*. *Time-passers* (27% of the total sample) primarily engage in passive leisure activities to cope with their dislike of travelling and are mainly travellers aged above 45 (i.e., Generation X and Baby Boomers) using non-passengerised modes (e.g., car driving).

ICT-based effective multitaskers (22%) consist of time-pressured young travellers who engage in multitasking, activity transferability, and participation in multiple activity types. This cluster underscored that the virtual accessibility afforded by ICTs expands the pool of activities one can conduct and overlap, while time pressures exacerbate the need to transfer and overlap various activities. *Upkeepers* (13%) primarily engaged in companion-related activities, suggesting that travel time can be a space-time locus for social activities; this cluster mostly comprised women and those currently not working. *Heavy work investors* (8%) are mainly middle-aged, high-earning, and highly-educated workers who engage in non-transferred mandatory tasks. The exogenously defined class of *no travel time users* (30%) comprise those who did not engage in travel-based activities; they mainly comprise older individuals with lower educational attainment and lower incomes who are currently not working or studying.

4 Discussion and Conclusions

Our findings can serve a dual purpose. From the transport practice standpoint, they can guide vehicle internal space design and minimum ICT provision standards to suit expected travel time use styles. For instance, *ICT-based effective multitaskers* and *heavy work investors* can benefit the most from it, such as improvements to in-travel conditions at rail modes to best accommodate multi-activity participation and work tasks, respectively, including tables, power sockets and Internet connection. Conversely, *time-passers* and *no travel time users* might be less responsive to transport interventions to improve the ability to perform activities while travelling. From the behavioural standpoint, our results also prompt a debate concerning the welfare implications of transforming the nature of travel time use from "offline" to "online" with the associated expectations concerning activity participation requirements and time pressure consequences. For example, if *heavy work investors* were deprived of the opportunity to work while travelling, it would likely affect their travel satisfaction and choices. Since *heavy work investors* may wish to maximise their work time, they could opt for faster travel modes or even prefer other telecommuting options if they cannot work during the journey.

This study has some limitations and suggests the need for further research. We did not collect which activities were performed simultaneously; future research could address it by explicitly asking about which activities were performed simultaneously to better uncover travel-based multitasking. Capturing this type of information may be challenging, likely suggesting the need to utilise passive data collection (e.g., smartphone-based).

5 References

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