**Conclusion**

This paper examines spatio-temporal dynamics in mobility levels over the course of the COVID-19 pandemic by using novel data resources and advanced data mining techniques. Whereas previous studies have focused on temporal trends of mobility, less attention has been given to spatio-temporal developments of mobility. To this end, this paper explores place-specific trends in mobility levels over time. This is because developments in mobility level over time were not persistent; it is a challenging to understand mobility changes by a single facet. Thus, it is vital to focus on the patterning of mobility changes in a spatially uneven manner. In other words, a speed and intensity of reduction in mobility with recovery varied substantially across geographical space.

Key findings of this research are that spatio-temporal patterns in mobility levels were correlated with sociodemographic factors more than accessibility and COVID-19 risk. A shape-based time-series clustering method is deployed to identify an internal heterogeneity in the temporal properties of mobility developments during the first wave of the pandemic. Penalised regression is then used to reveal distinct spatial distributions of temporal trends of mobility that correlate with sociodemographic profiles, accessibility levels, and local COVID-19 risks, yet the magnitude of the correlations varied substantially.

This paper also contributes to the theoretical development of adaptability and resilience in the transport context. To suggest a new way of conceptualisation that adaptability is people’s mobility capabilities to shift their travel behaviours in a pandemic way, and understanding resilience is the ability to recover and bounced back to the pre-pandemic routines. It helps to explain the variations over time in mobility levels that have occurred geographically during the first wave in England. Within this context, we have looked the extent of variability in trajectories of mobility reductions over time through the lens of the combination of adaptability and resilience. Differences over space to accept new normal in a way to emerge or change their everyday mobilities.

Greater adaptability and lower resilience have led to the greater pace of reduction followed by the slowest pace of recovery in mobility levels over the first wave of the pandemic, overrepresentation in London. Also, they are likely to continue the new normal way of life, such as working from home, shift to active modes, food deliveries, online shopping in the endemic phase. It is also possible that a strong spontaneous reduction in mobility according to a higher perceived risk in the early stage of the pandemic in those areas, where the epidemic had been reached London 15 days earlier than the rest of the country (Knock et al. 2021). In contrast, lower adaptability and greater resilience have attributed to the marginal deviations in mobility levels, may be relevant to resist their travel behaviours in pre-pandemic way, such as bus outside London recovered to quickly up to 60% compared with pre-pandemic levels

Place-based mobility - behavioural tendencies in a given setting

but differences in people-based mobility - Looking beyond back-to-normal

Anable et al. (2021)