Causal loop diagram of the complex causal mechanisms between urban environment and mild cognitive impairment and dementia

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BACKGROUND

- The number of people living with dementia and mild cognitive impairment (MCI) has doubled since the 1990s. A supportive urban environment can prevent or delay the progress of cognitive decline.
- There is evidence for the existence of causal mechanisms between the urban environment and cognitive decline, but the interrelations between these mechanisms are unclear.

Aim

We aimed to map the causal mechanisms by which urban environment factors might impact cognitive decline outcomes.

METHODS

- A 2-day workshop with 12 researchers from the Supportive environments for Physical and social Activity, healthy ageing and CognitivE health (SPACE) project was conducted based on the Group Model Building (GMB) methodology.
- The workshop aimed to create a causal-loop diagram (CLD) that identifies established and potential urban environment, lifestyle, health, and physiological factors determining dementia and MCI, and the dynamic interrelationships between these factors.
- The workshop was held online, and a facilitation team guided the activities following appropriately adapted scripts.
- After the workshop, the modelling team reviewed the CLD to ensure that main potential causal pathways and mechanisms were captured.

RESULTS

- The final CLD (Figure 1 & QR code) contains 34 factors and 109 connections, conceptualised as a complex system which mapped mechanisms between the urban environment and cognitive decline.
- All factors were classified in nine main themes: urban design, social environment, travel behaviours, by-products, lifestyle, mental health conditions, disease/physiology, brain physiology, and cognitive decline outcomes.
- Thousands of feedback loops were identified and five were selected to illustrate some dynamics in the system. Figure 2 shows a balancing feedback loop about transport use and stress.

SCAN ME

Figure 1. SPACE Causal Loop Diagram (CLD)

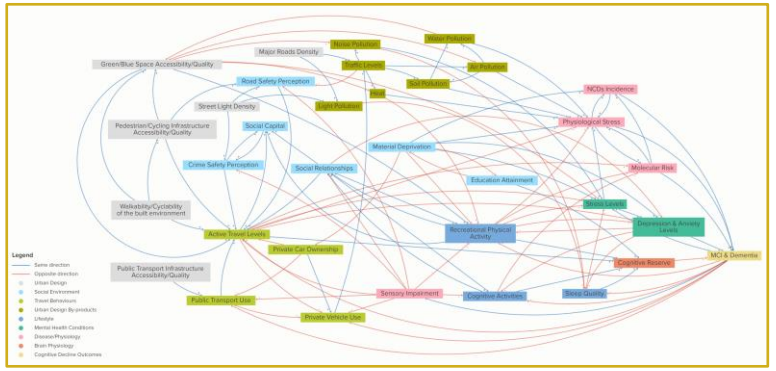
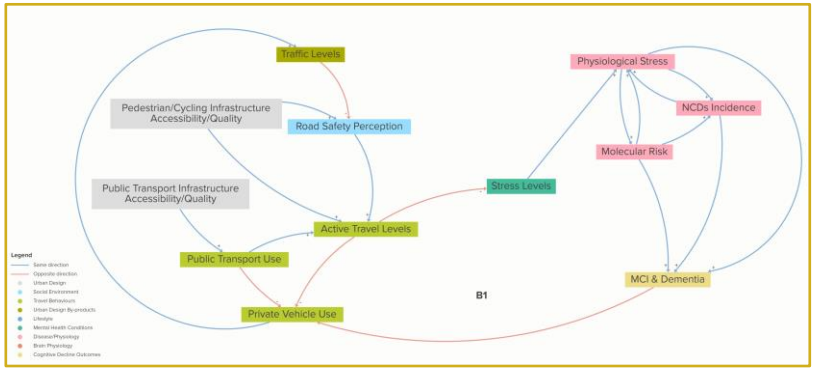


Figure 2. Causal Loop Diagram (CLD) balancing feedback loop 1 - transport use & stress



CONCLUSIONS

- The CLD detailed the plausible causal pathways between the urban environment and cognitive decline.
- Our findings suggested that GMB can engage experts and help them view problems through the lens of complex systems.

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