A Systematic Review of Cognitive Mechanisms of Travel Mode Choices

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Background

Why do we need to reduce car use?

- Pollution
  - Respiratory and cardiovascular diseases
  - 1.2 million deaths globally (OECD, 2014)

- Physical inactivity
  - Overweight and obesity
  - Contributes to GBP 4.08 billion (DfT, 2012)
Background

- How do we reduce car use?

- Ajzen (1988)
- Personal Norm
- Lifestyle Desires
- Perceived Risk
- Environmental Beliefs
- Values
- Perceived Desires
- Subjective Norm
- Perceived Necessity
- Attitudes
- Prosocial Motives
- Subjective Norm
- Perceived Behavioural Control
- Habits
- Awareness of consequences
- Ecological Norm
- Intentions
- Environmental Beliefs
- Personal Norm
- Perceived Necessity
- Values
- Perceived Desires
The Review

- Research Question

What cognitive mechanisms have been measured as predictors of adults’ driving and travel mode choice (TMC)?

- Aims

- Which modifiable cognitive mechanisms have been used to explain TMC and how frequently have these been related to TMC?
- Which theories are these derived from?
- Does strength of relationships between mechanisms and driving or TMC differ across different study characteristics?
Methods - Search Strategy

- 64 search terms entered for title, abstract and keyword search

- Systematic search of 10 databases
  - [Web of Knowledge](#) (Web of Science™ Core Collection)
  - [TRB](#) (Transport Research Information Services - TRIS)
  - [EBSCO](#) (Business Source Complete, Environment Complete, PsychINFO, Psychology and Behavioural Science Collection)
  - [ProQuest](#) (ASSIA, ABI/Inform Complete, ProQuest Sociology, Sociological Abstracts)

- English language, peer-reviewed published journal article, no limit on publication date, psychology literature
Methods - Inclusion Criteria

- **Population**
  - General adult population, various socio-economic groups
  - Excluded: Households, disabled, non-drivers & elderly only

- **Journey Type**
  - General purpose, commuting, shopping, leisure trips
  - Excluded: School runs, holiday travel

- **Behavioural Outcome**
  - Frequency or intensity of (i) driving or (ii) use of an alternative transport mode in relation to car use

- **Mechanisms & Measures**
  - Provide at least one measured cognitive mechanism
  - Quantitative measure of relationship between cognitive mechanism and transport mode behaviour in relation to car use
Results - Search

N=4,156
• 805 duplicates removed

N=3,351
• 3,005 excluded after Title & Abstract Screening

N=388
• 348 excluded after Full Text Screening

N=42
• Identified through ancestry search

N=40
Results - Study Characteristics

- **Design**
  - Cross sectional \((N = 29)\)
  - RCT \((N = 6)\)
  - Prospective \((N = 5)\)

- **Context**
  - Urban \((N = 21)\)
  - Mixed \((N = 8)\)
  - Rural \((N = 2)\)
Results - Study Characteristics

- **Journey Type**
  - Commuting ($N = 17$)
  - General purpose ($N = 13$)
  - Leisure trips ($N = 5$)

- **Country**
  - Europe ($N = 34$)
  - Australia ($N = 3$)
  - USA ($N = 3$)

- No consistent TMC definition
Results - Mechanisms

- 274 associations with TMC were tested

<table>
<thead>
<tr>
<th>Cognitive Mechanism</th>
<th>N of measures and % of 274 reported associations</th>
<th>N and % of 40 studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>80 (29.2%)</td>
<td>20 (50%)</td>
</tr>
<tr>
<td>Beliefs</td>
<td>22 (8.03%)</td>
<td>4 (10%)</td>
</tr>
<tr>
<td>PBC</td>
<td>21 (7.65%)</td>
<td>16 (40%)</td>
</tr>
<tr>
<td>Social Norms</td>
<td>20 (7.3%)</td>
<td>15 (37.5%)</td>
</tr>
<tr>
<td>Lifestyle</td>
<td>20 (7.3%)</td>
<td>3 (7.5%)</td>
</tr>
<tr>
<td>Habit</td>
<td>16 (5.84%)</td>
<td>12 (30%)</td>
</tr>
<tr>
<td>Intention</td>
<td>13 (4.73%)</td>
<td>12 (30%)</td>
</tr>
</tbody>
</table>
Results - Mechanisms

Attitudes

- Convenient
- Reliable
- Secure
- Comfortable
- Pleasant
- Subjective Importance
- Positive/negative evaluation of cars, public transport etc.
- Travel in general
- Stress
- Commute Benefit
- Environment
- Hazard perception
- Car autonomy
- Proposal to reduce car use
Results - Theory

- 26 studies applied 5 Social-Psychological Models (10 extended model or combined theories)
  - Theory of Planned Behaviour (TPB) \((N = 20)\) (Ajzen, 1991)
  - Norm Activation Model (NAM) \((N = 4)\) (Schwartz, 1977)
  - Ipsative Theory \((N = 2)\) (Frey, 1989)
  - Role Theory \((N = 1)\) (Stryker, 1987)
  - Material Possessions \((N = 1)\) (Dittmar, 1992)
Conclusion

- Plethora of driving-specific mechanisms to understand behaviour?
  - Generalisability?
  - More use of theory?
- Diversity vs. Consistency
Acknowledgements

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References


