Evaluating Partially Joint Travel of Household Members in the Activity-Based Model Design

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presented by
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Background

- Baltimore region
- Modeling domain
- BMC Activity-Based Model Development
  - Travel demand management
  - Land use
  - Transit
  - Roadway

Source: BMC.
Household Travel Surveys

  - Approximately 15,000 households
  - Approximately 31,000 persons
  - Approximately 160,000 activities

Tour data development

- Trip files are reprocessed to develop tour profiles
- Tour-level variables
Definitions

- Fully joint tour – All important aspects of tour-making are shared by two or more household members, including origin, destination, mode, departure and arrival times, and purpose.

- Partially joint tour – At least some aspects of the tour are not shared by the household members traveling together.

- Independent tour – One person in a household makes a complete tour by oneself.
## BMC Tour Data Overview

<table>
<thead>
<tr>
<th></th>
<th>Tour Number</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Independent tour</td>
<td>22,700</td>
<td>58%</td>
</tr>
<tr>
<td>Fully joint tour</td>
<td>7,400</td>
<td>19%</td>
</tr>
<tr>
<td>Partially joint tour</td>
<td>8,800</td>
<td>22%</td>
</tr>
<tr>
<td>School escorting or escorted tour</td>
<td>3,400</td>
<td>39%</td>
</tr>
<tr>
<td>Total home-based tour</td>
<td>39,500</td>
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Joint Travel and Tour Purpose

- **Tour types**
  - School tours, 53 percent
  - Work tours, 17 percent
  - Non-mandatory tours, 22 percent
Joint Travel and Household Size

- Household sizes
  - The share of partially joint tours increases significantly with the household sizes, from 14 percent to 32 percent.
  - 62% of tours for a household with 4 or more persons is joint travel either fully or partially.

[Diagram showing the percentage of fully joint, partially joint, and independent tours for households of different sizes.]
Joint Travel and Household Vehicle Availability

- Household vehicles
  - Households with 2 vehicles have the highest share of partially joint tours (nearly 26 percent), more than double households without any vehicle (9 percent)
Joint Travel and Person Type (continued)
Joint Travel Time of Partially Joint Travel Travel

- About 71 percent of partially joint tours have joint travel time less than 30 minutes.
- 5 percent of partially joint tours have joint travel time longer than 1.5 hours.
Travel Period of Partially Joint Travel

- About 40 percent of partially joint tours start in AM peak period only.
- About 30 percent of partially joint tours start in PM peak period only.
- In combination, 80 percent of partially joint tours have joint travel in peak periods.

![Bar chart showing joint travel departure times]
Summary of Partially Joint Travel Characteristics

- Shares of partially joint tour vary by tour purpose, household size, person type, and household vehicle availability
  - 53% of school tours
  - Almost one third of tours for a household with four or more persons
  - As children/students grow from school age children to adult students, the share of partially joint tours declines by half

- 80% of partially joint tours have joint travel in peak period. 71% of partially joint tours have joint travel time less than 30 minutes.
Model Design

- **School escorting**
  - Traveling with another household member on a mandatory tour
  - Pure escorting by a household member not doing any mandatory activity
  - School escorting accounts for most partially joint school tours as well as many partially joint work tours

- **Fully joint tours for nonmandatory activities**
  - Some fully joint tours will be included in school escorting
Conclusion

- Partially joint travel plays an important role in travel activities in the Baltimore/Washington region.

- BMC ABM explicitly models joint travel via school escorting and fully joint tours for non-mandatory activities.
  - Mandatory travel (work and school) shares more than half of partially joint tours (55 percent).
  - School escorting is the dominant type for school tours.

- Modeled implicitly:
  - Fully joint tours made for mandatory purposes and partially joint tours unrelated to school.
  - Joint travel between individuals in different households.