Dangerous Drop-Off of Student Passengers, Pedestrian Behaviours and the Built Environment Around Schools

CARSP Conference 2016, Halifax NS

Linda Rothman, York University, Hospital for Sick Children
Andrew Howard, Hospital for Sick Children
Ron Buliung, University of Toronto Mississauga
Sarah A. Richmond, York University, Hospital for Sick Children
Colin Macarthur, Hospital for Sick Children
Alison Macpherson, York University
INTRODUCTION

• Dangerous student passenger drop-off behaviours have not been well described

• Some observational data re: speeding, stop-sign violations near schools

• Some parent-perceived dangerous driving using surveys
INTRODUCTION

• Cross-sectional study (2011)
  • dangerous drop-offs, greater social disadvantage and higher speed roads associated with higher child pedestrian-motor vehicle collisions (PMVCs) near schools

• Case control study (2015)
  • more dangerous drop-off and pedestrian behaviours, walking exposure
OBJECTIVES

1. To identify correlates of child pedestrian-motor vehicle collisions (PMVCs) related to dangerous passenger drop-off and pedestrian behaviour around elementary schools in the City of Toronto, Canada

2. To identify built environment correlates of dangerous passenger drop-off and pedestrian behaviour around elementary schools
METHODS

- Observational data collection, Spring 2015
  - Regular kindergarten-grade 6 (n = 100)
    - Dangerous drop-off/pedestrian behaviour
    - Walking exposure

- Police-reported PMVCs, ages 4-12, 2000-2013
  - 200m of a school, school travel times

- Outcomes
  1. Cases (≥1 collision), controls (0 collisions)
  2. Dangerous behaviours: driver, pedestrian
METHODS: Covariates

- **Built environment (BE)**
  - Downtown urban vs. inner suburb
  - School crossing guards
  - Designated car drop-off areas (Kiss ‘n ride)
  - Major and minor arterial roads (200m)
  - Intersections (200m)
  - Walking trails (200m)

- **Social disadvantage**
  - Learning Opportunities Index (LOI), scale 0-1

- **Walking to school (proportions)**

- **Logistic regression**
Case and Control Schools in the City of Toronto

- 53 collisions during school travel times
### Descriptive Comparison of Case and Control Schools

<table>
<thead>
<tr>
<th>Built Environment</th>
<th>N (%)</th>
<th>Mean (S.D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case</strong></td>
<td><strong>Control</strong></td>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>Urban School (n = 25)</td>
<td>11 (30.6%)</td>
<td>14 (21.9%)</td>
</tr>
<tr>
<td>Designated drop-off areas</td>
<td>23 (63.9%)</td>
<td>35 (54.7%)</td>
</tr>
<tr>
<td>School crossing guard</td>
<td>19 (52.8%)</td>
<td>22 (34.4%)</td>
</tr>
<tr>
<td>Congestion</td>
<td>25 (69.4%)</td>
<td>42 (65.6%)</td>
</tr>
<tr>
<td>Major/minor arterial (m)</td>
<td>221.5 (106.0)</td>
<td>96.4 (177.0)</td>
</tr>
<tr>
<td>Intersection (＃)</td>
<td>8.19 (6.17)</td>
<td>6.48 (5.38)</td>
</tr>
<tr>
<td>Walking trail (m)</td>
<td>0.73 (0.47)</td>
<td>0.86 (0.35)</td>
</tr>
<tr>
<td>LOI (scale 0 – 1)</td>
<td>0.59 (0.27)</td>
<td>0.45 (0.31)</td>
</tr>
<tr>
<td>% Walking to school</td>
<td>71.0%</td>
<td>62.6%</td>
</tr>
<tr>
<td></td>
<td>(15.3%)</td>
<td>(17.1%)</td>
</tr>
</tbody>
</table>
Child PMVCs -2000-2013

Frequency of Age

- 4 years: 2 cases (4%)
- 5 years: 1 case (2%)
- 6 years: 5 cases (9%)
- 7 years: 8 cases (15%)
- 8 years: 8 cases (15%)
- 9 years: 13 cases (25%)
- 10 years: 5 cases (8%)
- 11 years: 9 cases (17%)
- 12 years: 3 cases (6%)

Frequency of Severity

- Minimal: 20 cases (38%)
- Minor (ED): 32 cases (61%)
- Major (Admitted): 1 case (8%)
Dangerous Driving Behaviours (n = 100)

- Dropping children opposite side of road: 79%
- Drivers parking blocking vision: 72%
- U-Turns: 67%
- Backing up dangerously: 64%
- Double parking: 46%
- Drivers not obeying traffic controls: 28%
- Parking blocking crossing controls: 19%
- Texting while driving: 15%
- Talking on phone while driving: 15%

>1 dangerous driving behaviour, 98% of schools
Dangerous Pedestrian Behaviours (n = 100)

- Crossing unsafely at uncontrolled midblock: 85% children, 82% adults
- Crossing unsafely between parked cars: 61% children, 57% adults
- Using cell phones/electronic devices: 4% children, 25% adults
- Not following crossing controls: 14% children, 8% adults
- Not following crossing guards instructions: 2% children, 2% adults

≥1 dangerous pedestrian behaviour, 90% schools
### Odds of at least one collision within 200m

<table>
<thead>
<tr>
<th>Pedestrian Behavior: Children crossing at uncontrolled midblock locations</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adjusted</strong></td>
<td>9.82* (1.10, 87.77)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Correlates</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major and minor arterial roads/100m</td>
<td>1.37* (1.09, 1.73)</td>
</tr>
<tr>
<td>Social disadvantage (LOI)</td>
<td>2.03 (0.34, 11.98)</td>
</tr>
<tr>
<td>% Walking to School</td>
<td>5.72 (0.21, 155.54)</td>
</tr>
</tbody>
</table>

*significant

None of the dangerous driving variables were significant.
# Odds of Dangerous Drop-off Behaviours

<table>
<thead>
<tr>
<th></th>
<th>Double Parking</th>
<th>Parked Blocking Vision</th>
<th>Parked Blocking Controls</th>
<th>Dangerous Reversing</th>
<th>Texting While Driving</th>
<th>Talking on Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic congestion</td>
<td>5.96* (2.14,16.61)</td>
<td>5.11* (1.97,13.31)</td>
<td>-</td>
<td>4.14* (1.67, 10.32)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Inner suburb</td>
<td>2.05 (0.71, 5.95)</td>
<td>-</td>
<td>7.57 (0.96, 60.00)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>% Walking</td>
<td>-</td>
<td>12.7 (0.77, 209.17)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Designated drop-offs</td>
<td>-</td>
<td>-</td>
<td>0.26* (0.09, 0.75)</td>
<td>0.34* (0.14, 0.93)</td>
<td>-</td>
<td>2.92* (1.05, 8.13)</td>
</tr>
<tr>
<td>School crossing guards</td>
<td>-</td>
<td>-</td>
<td>0.32 (0.10, 1.04)</td>
<td>-</td>
<td>0.18* (0.04, 0.85)</td>
<td>-</td>
</tr>
</tbody>
</table>

*significant
## Odds of Dangerous Pedestrian Behaviours

<table>
<thead>
<tr>
<th>Correlates</th>
<th>Adults</th>
<th>Children</th>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Designated drop-off</strong></td>
<td>0.18 *</td>
<td>0.27</td>
<td>0.41*</td>
<td>0.31*</td>
</tr>
<tr>
<td>*(0.04, 0.88)</td>
<td>(0.05, 1.37)</td>
<td>*(0.17, 0.97)</td>
<td>(0.12, 0.75)</td>
<td></td>
</tr>
<tr>
<td><strong>Social disadvantage</strong></td>
<td>5.20</td>
<td>11.56 *</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>*(0.64, 42.15)</td>
<td>*(1.11, 120.7)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>% Walking</strong></td>
<td>2.81</td>
<td>2.43</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>*(0.09, 91.37)</td>
<td>*(0.06, 99.43)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Traffic congestion</strong></td>
<td>-</td>
<td>-</td>
<td>2.99*</td>
<td>2.71*</td>
</tr>
<tr>
<td>*(1.24, 7.22)</td>
<td>*(1.11, 6.63)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

*significant
SUMMARY

1. Correlates of child PMVCs
   • Children crossing at uncontrolled midblocks
     • controlling for higher speed roadways

2. BE correlates of dangerous driving and pedestrian behaviours
   a) Traffic congestion
   b) Designated drop-off
   c) School crossing guards
STRENGTHS AND LIMITATIONS

Strengths

• Multivariate analysis
• Objective measurements of driving behaviours

Limitations

• Small number of collision events
• Assumption that behaviours were consistent over the 12 year collision period
• Dangerous driving behaviours may have been underestimated
• Not all behaviours measured (e.g. failure to stop at stop signs)
CONCLUSIONS

• Dangerous behaviours are pervasive
• May put children at risk for PMVCs
• Changes to the BE (designated drop-off areas, school crossing guards, reductions in traffic congestion) may reduce these behaviours and provide a safer child pedestrian environment
• We need to encourage more walking to school to decrease traffic congestion resulting in a safer child pedestrian environment
MEDIA’S RESPONSE

Driving your kids to school puts other children at risk, new study finds

Parents’ dangerous driving at drop-off areas puts students at risk, study finds

Parents warned of dangers during school pick-up, drop-off times

School drop-offs more dangerous than parents think: study
Last day of observations
Friday, June 19, 2015
ACKNOWLEDGEMENTS

• Toronto District School Board

• Funding
  • Strategic Teams in Applied Injury Research (STAIR)
  • CIHR Chair in Child and Youth Health Services and Policy Research
    (Dr. Alison Macpherson)