TS4.1

BUILT FOR WALKING: SAFE ENVIRONMENTS FOR ACTIVE SCHOOL TRANSPORTATION

June 24, City-School Boards Advisory Committee

Linda Rothman, BScOT, PhD, Post-Doctoral Fellow,
York University, School of Kinesiology and Health Science,
Hospital for Sick Children
Alison Macpherson, PhD, Andrew Howard MD, MSC, FRCSC, Ron Buliung PhD,
Colin Macarthur MBChB, PhD, Sarah Richmond PhD

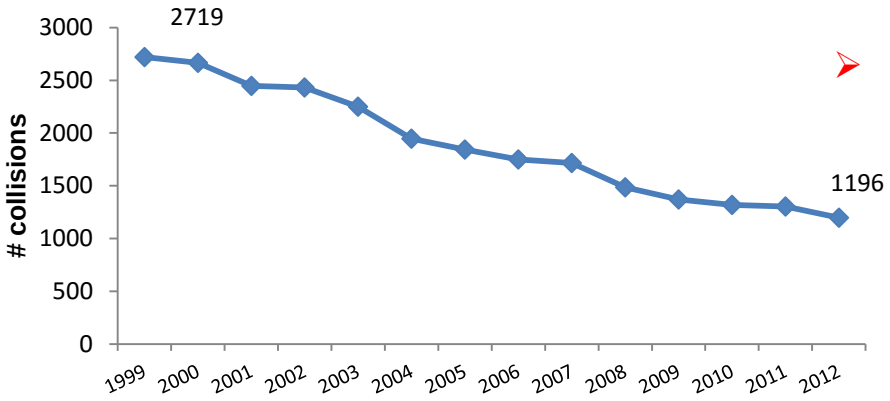
YORK UNIVERSITÉ UNIVERSITY

SickKids

UNIVERSITY OF TORONTO MISSISSAUGA

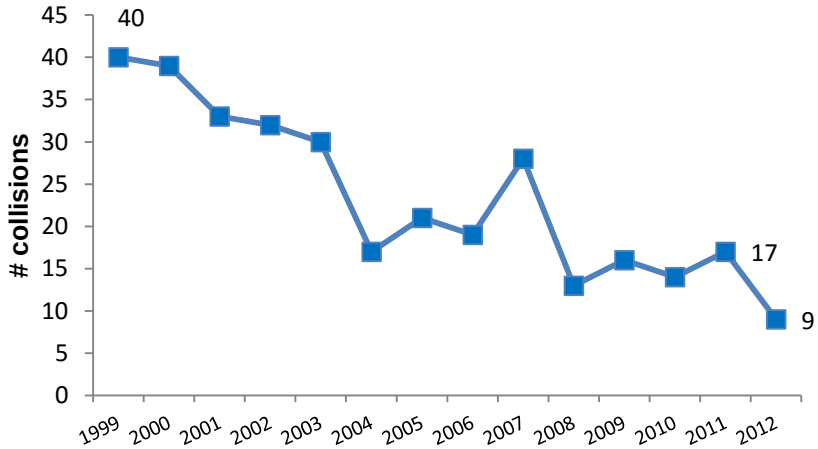
CIHR IRSC
Canadian Institutes of Health Research | Instituts de recherche en santé du Canada

National Pedestrian Collisions Resulting In Any Injury (0-14)[1]



- 44% reduction

National Pedestrian Fatalities (0-14)[1]



- 57% reduction

[1]Transport Canada, Canadian Motor Vehicle Traffic Collision Statistics: 2013

- Are there fewer collisions because children walk less?[1]
    - 1986: 59% 2011: 45%

- Only 38% of Canadian children use any active school transportation (2013)[2]

1. Metrolinx. School Travel in the City of Toronto, 2015.
2. Active Healthy Kids Canada. Is Canada in the running? 2014.

Walking to School

Built Environment Design (BE)

Potential Health Benefits

Potential Risk of Pedestrian-Motor Vehicle Collisions (PMVCs)

BALANCE

OBSERVATIONAL STUDY

- What proportion of children in JK-Grade 6 walk to school in the City of Toronto ?
- How many child PMVCs occur in the areas surrounding elementary schools?
- How does the BE relate to children walking to school and child PMVCs?
- What types of driving and pedestrian behaviours are observed around schools, and how are they related to child PMVCs and the BE?


Preventive Medicine 60 (2014) 10–15

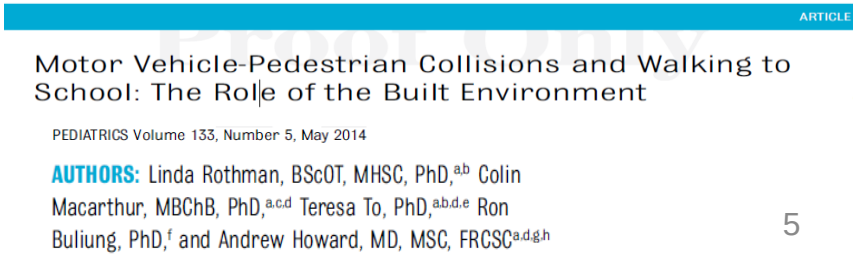
Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Influence of social and built environment features on children walking to school: An observational study☆

Linda Rothman [a,b,*], Teresa To [a], Ron Buliung [c], Colin Macarthur [a], Andrew Howard [a]


ARTICLE

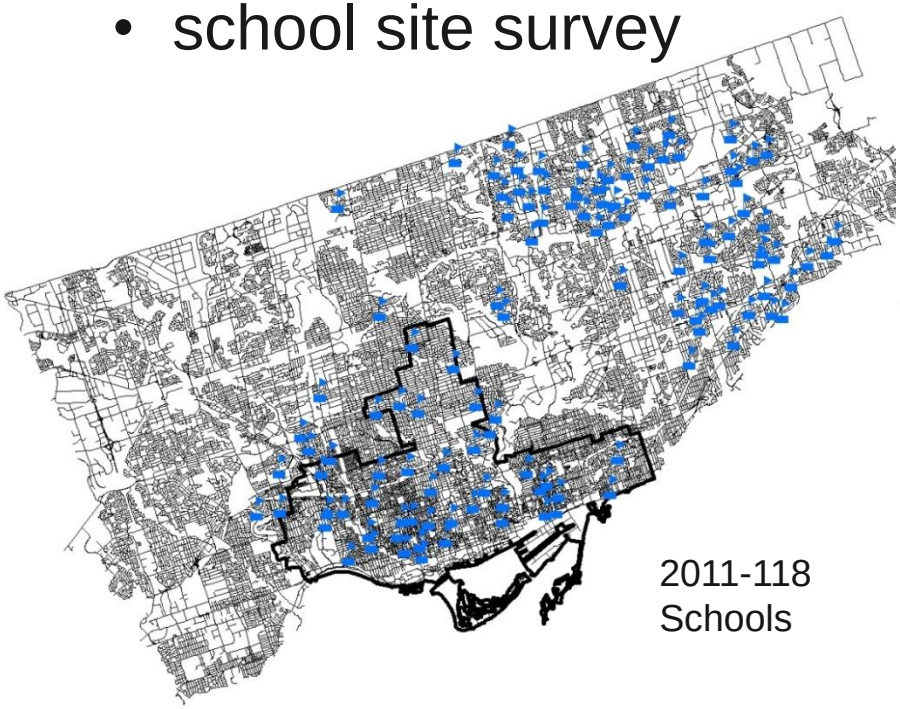
Motor Vehicle-Pedestrian Collisions and Walking to School: The Role of the Built Environment

PEDIATRICS Volume 133, Number 5, May 2014

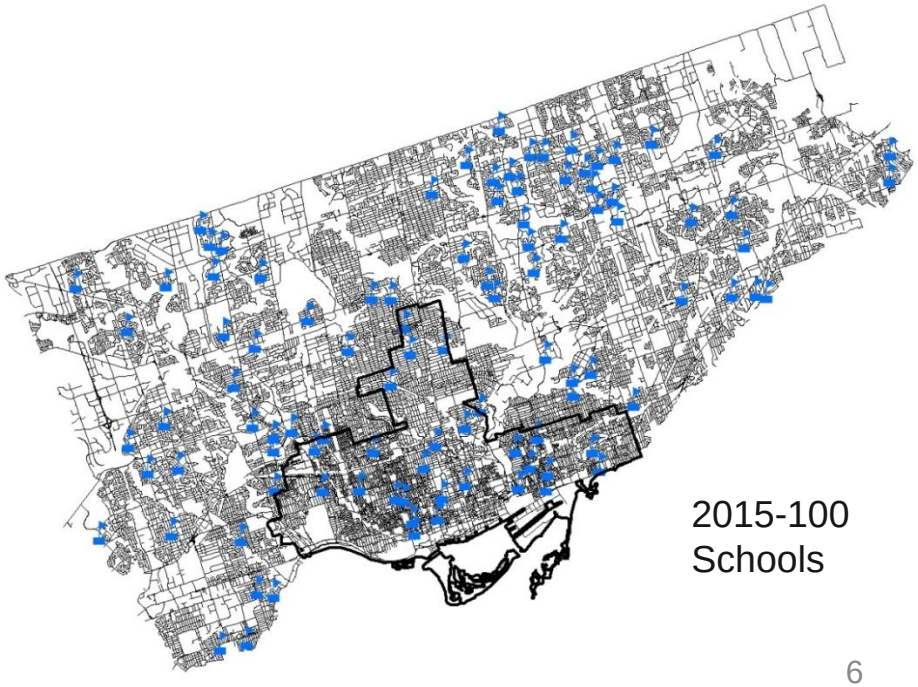
AUTHORS: Linda Rothman, BScOT, MHSC, PhD,[a,b] Colin Macarthur, MBChB, PhD,[a,c,d] Teresa To, PhD,[a,b,d,e] Ron Buliung, PhD,[f] and Andrew Howard, MD, MSC, FRCSC[a,d,g,h]

DIRECT OBSERVATIONS

- 2 data collections, regular program TDSB JK-grade 6 schools
- 2011 (118), 2015 (100)
- Trained observers morning drop off time (May-June)
  - counts of travel mode, excluding school bus (>20,000)
  - dangerous driver behaviour checklist
  - school site survey



2011-118
Schools



2015-100
Schools

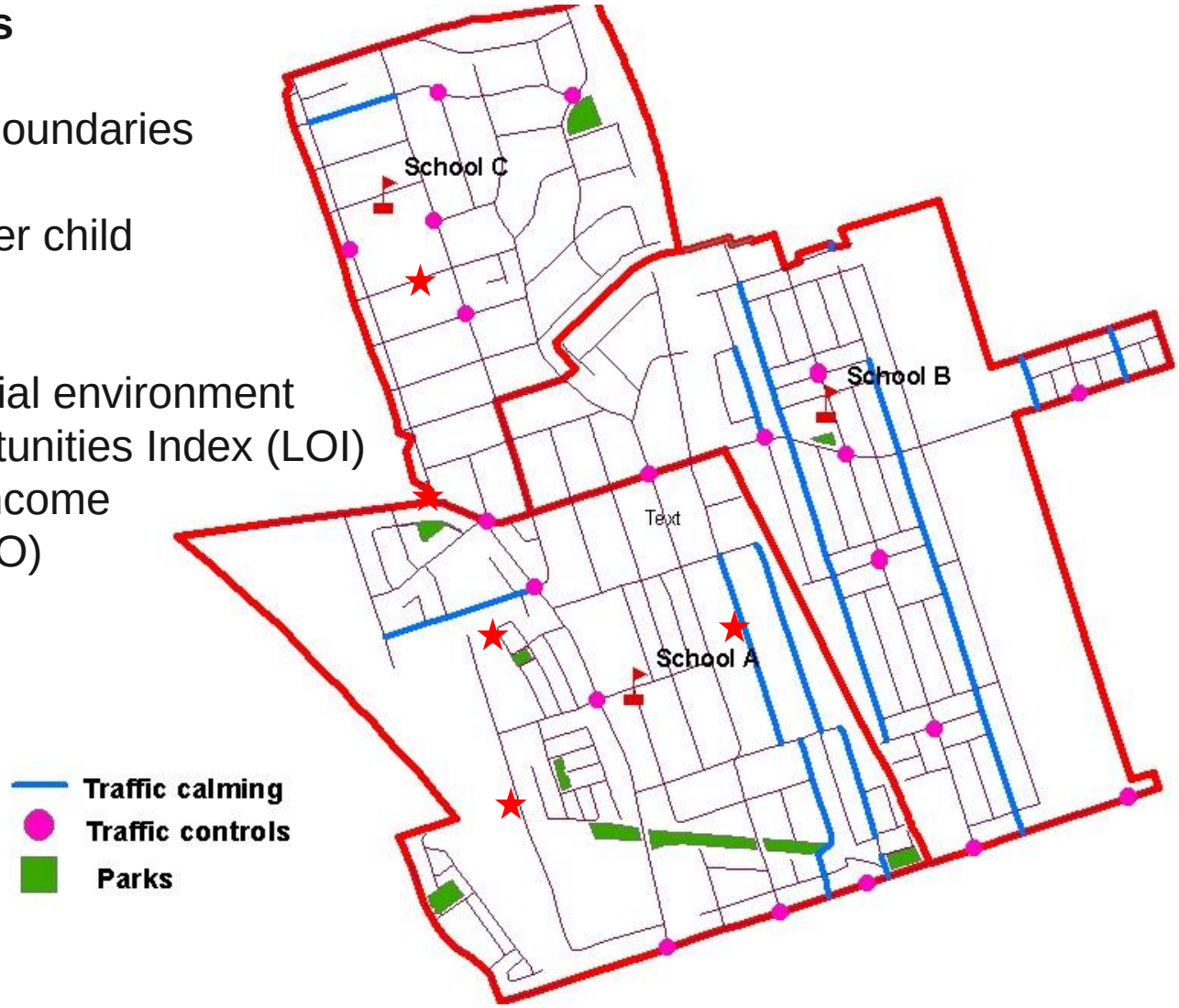
MAPPING

- **Police-reported child PMVCs 2002-2011, 4-12 years**

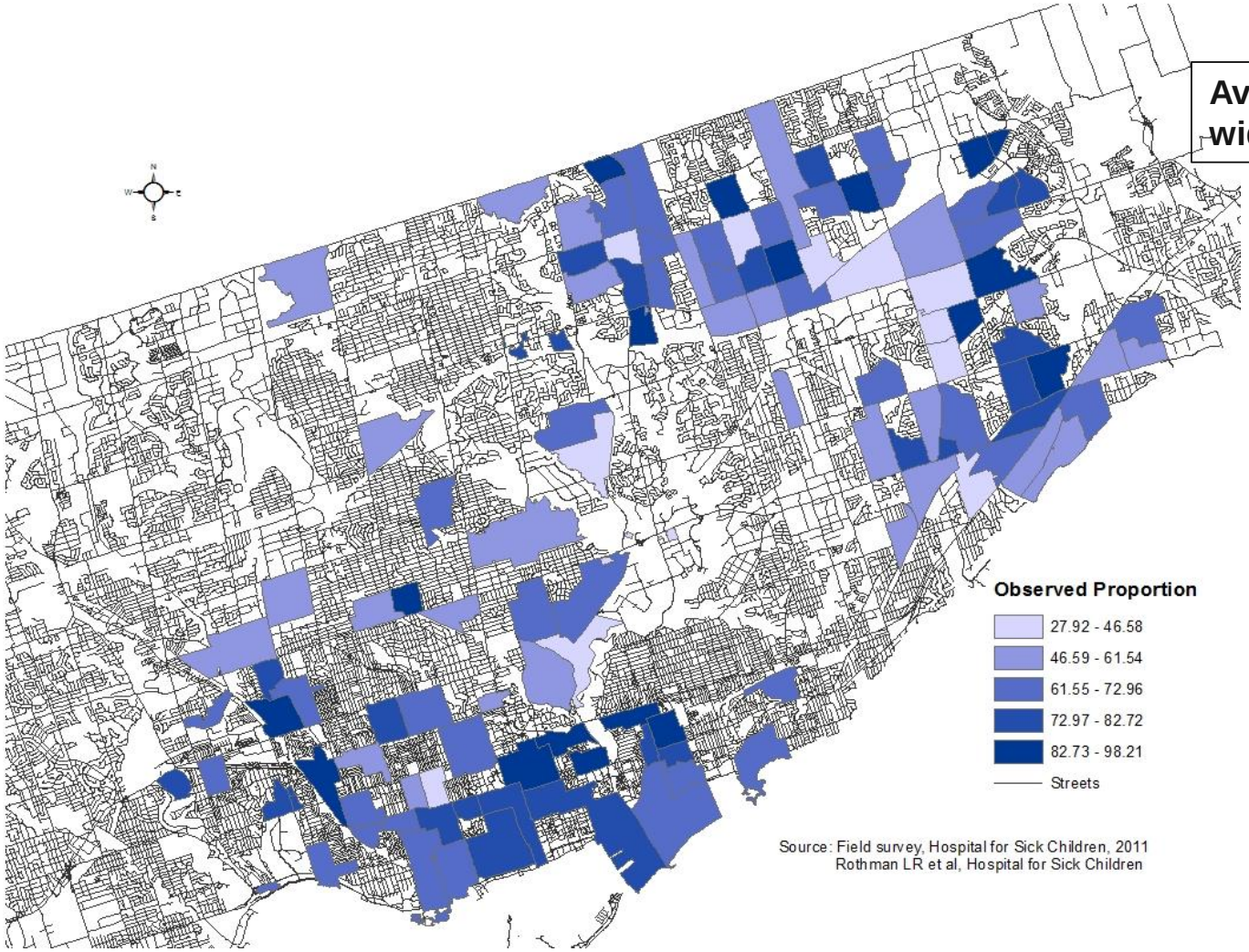
- School attendance boundaries

- Rates of collisions per child population

- Mapped BE and social environment
  - Learning Opportunities Index (LOI)
  - After Tax Low Income Cut-offs (ATLICO)



Proportion of children observed walking to study schools by school boundary (2011)

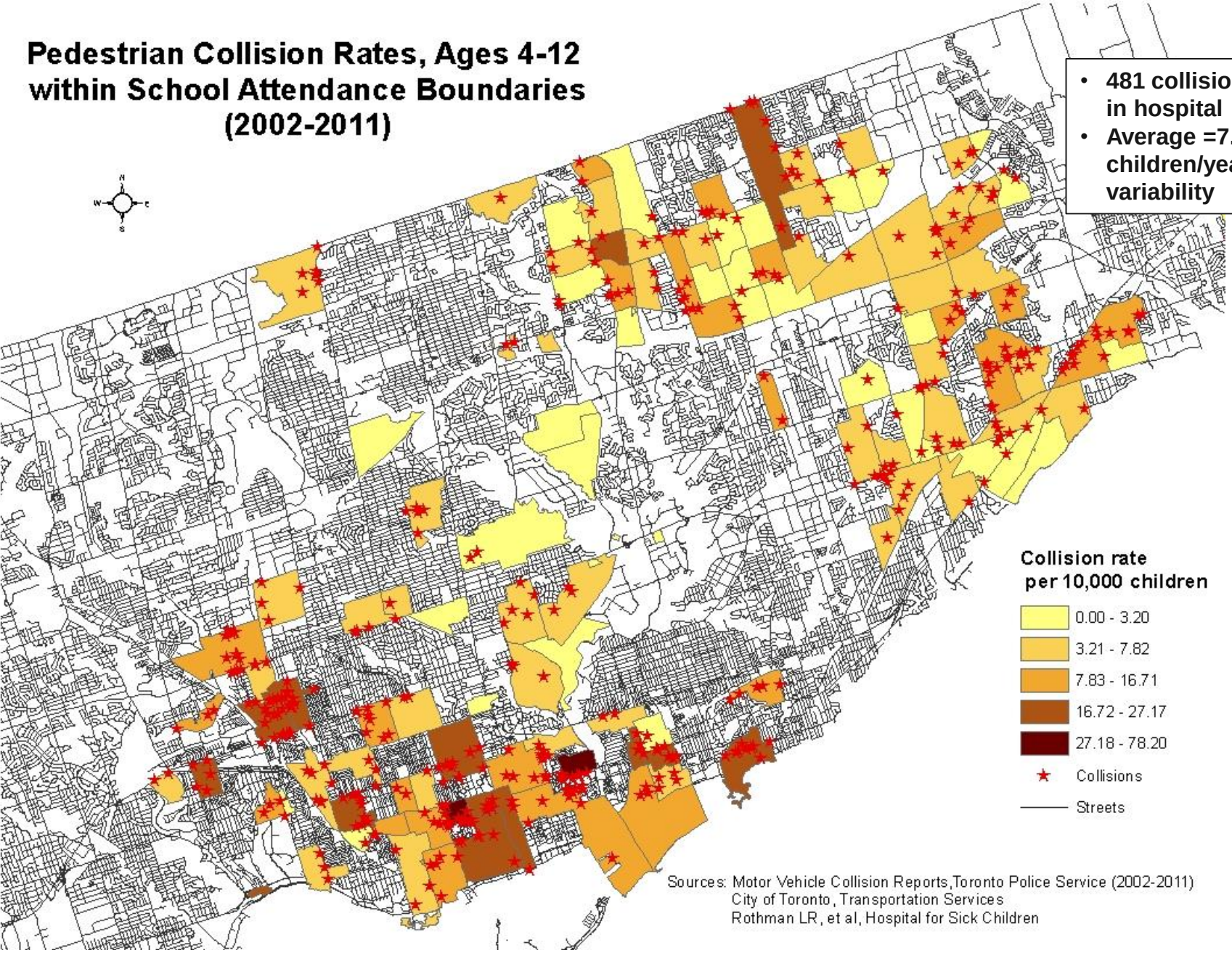


Average walking = 67%, wide variability

What was related to more walking to school?

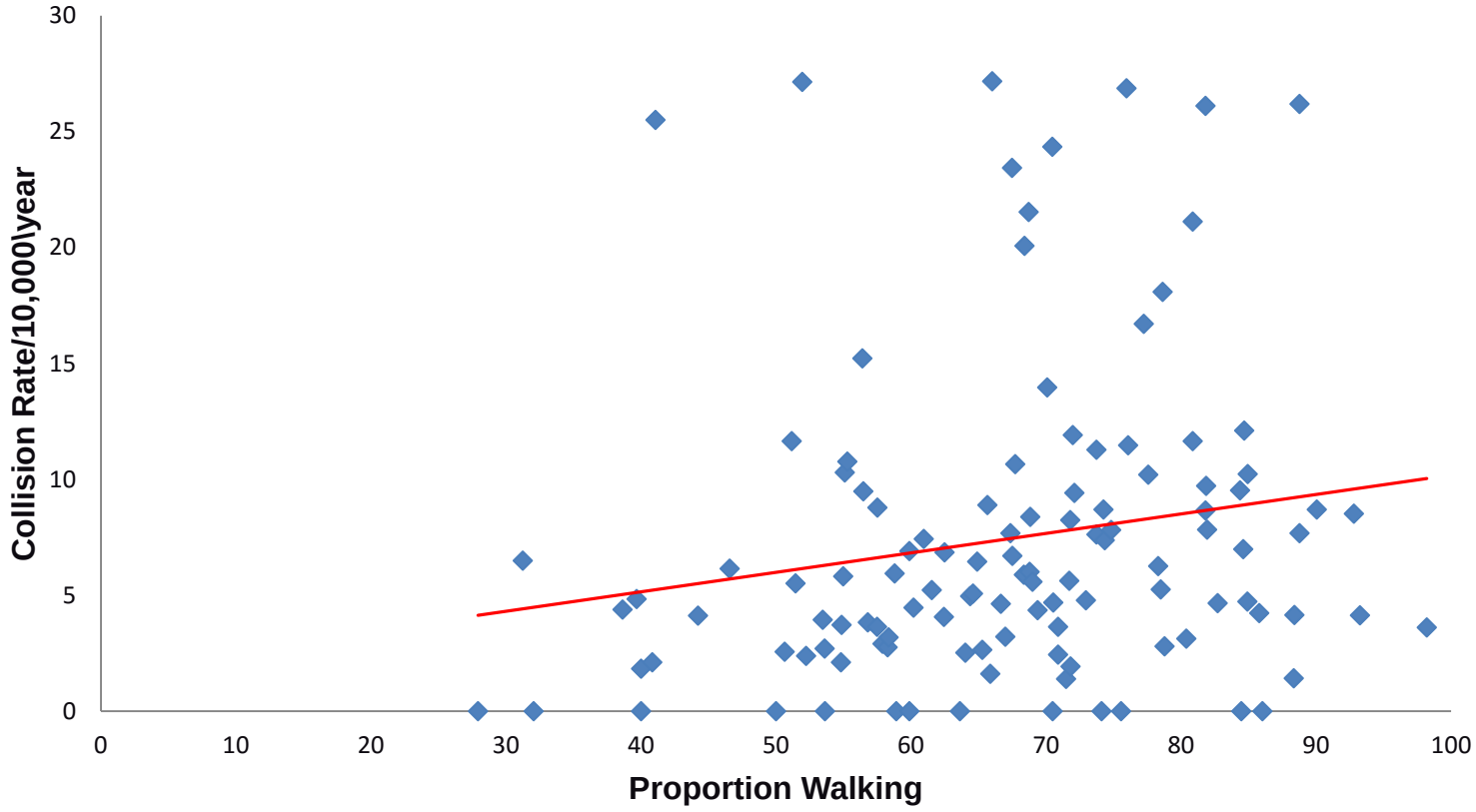
- Population density
- Traffic lights
- Intersections
- Pedestrian crossovers (crossing controls)
- Children who's first language wasn't English
- School crossing guards (14% more walking)
  - Where there were school crossing guards, nothing else was important

Pedestrian Collision Rates, Ages 4-12 within School Attendance Boundaries (2002-2011)



- **481 collisions >1/2 seen in hospital**
- **Average =7.4/10,000 children/year, wide variability**

Collision Rate and Proportion Walking to School



- 13% increase in collision rate with every 10% increase walking
- HOWEVER, once we controlled for the influence of BE features, this relationship disappeared

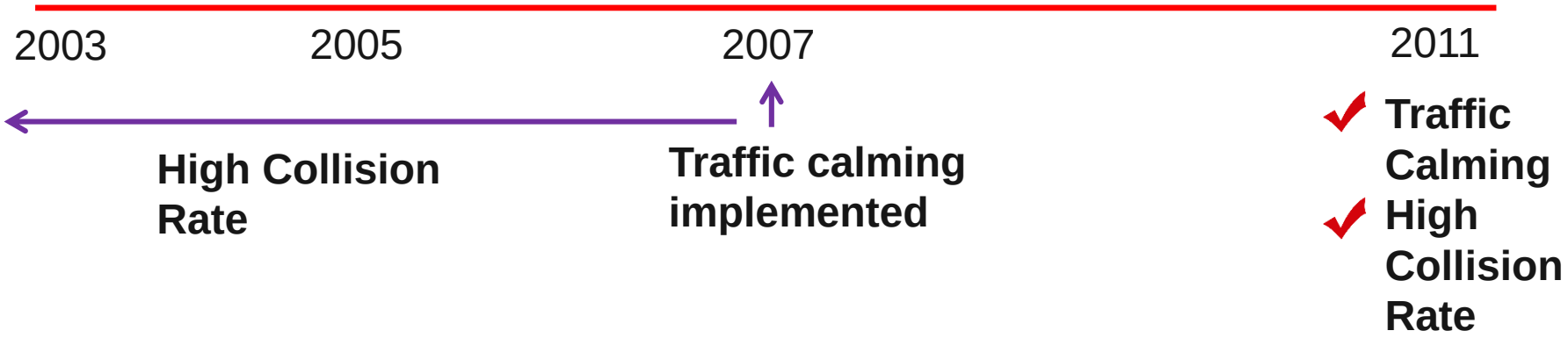
What is related to a safer traffic environment?

- Higher population/residential density
- Less school disadvantage
- Fewer one way streets
- Fewer traffic lights (i.e. road crossings)
- ? Speed humps
- ? School crossing guards

➢ **Walking to school is unrelated to child PMVCs if environment is safe**

PROBLEMS WITH CROSS-SECTIONAL STUDIES

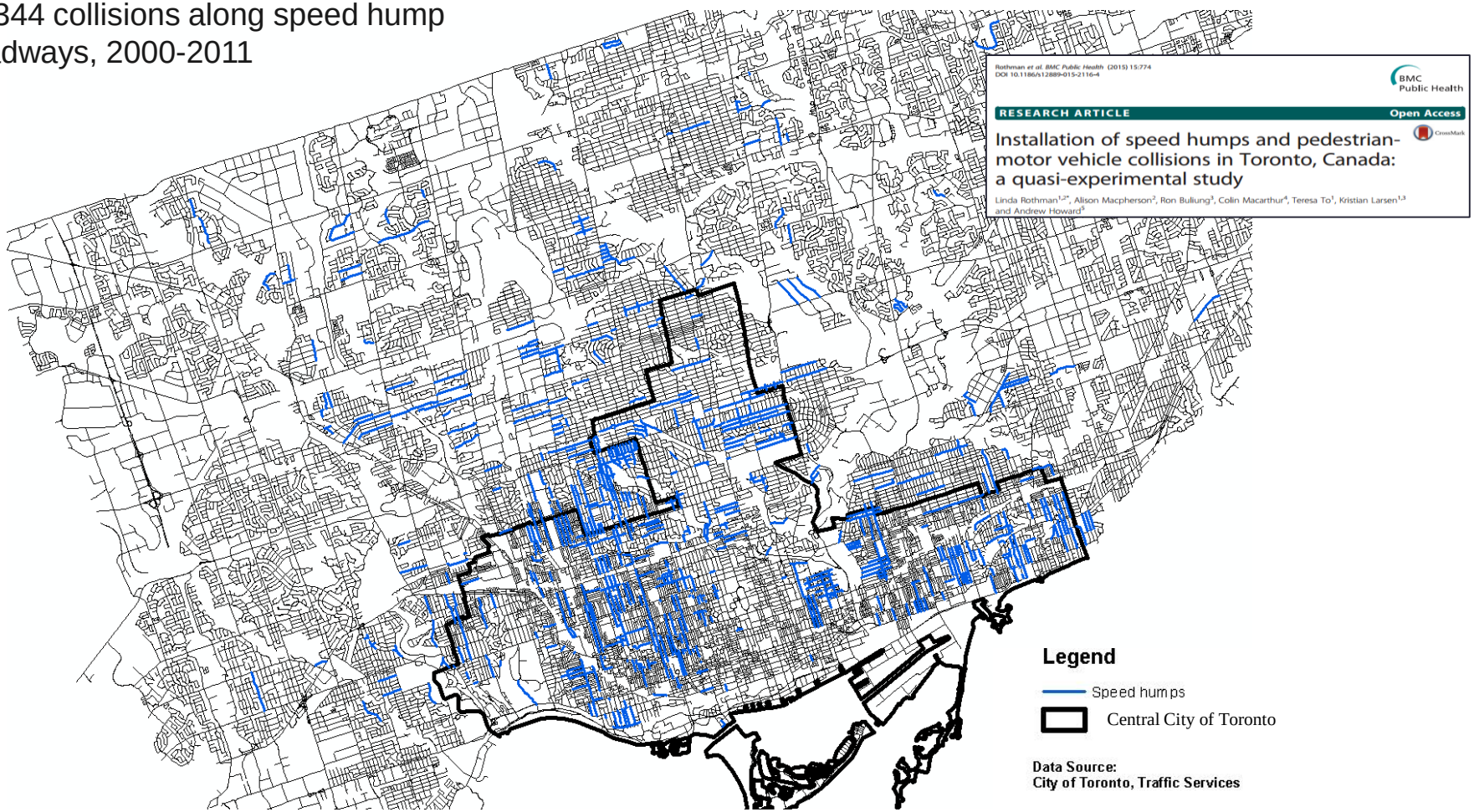
- Associated with higher collision rates ??
  - School crossing guard
  - More traffic calming



- Traffic calming may have not been present when collisions occurred
- Pre-post studies

SPEED HUMPS: PRE-POST STUDY

•1,344 collisions along speed hump roadways, 2000-2011



Rothman et al. BMC Public Health (2015) 15:774
DOI 10.1186/s12889-015-2116-4

BMC Public Health

RESEARCH ARTICLE Open Access

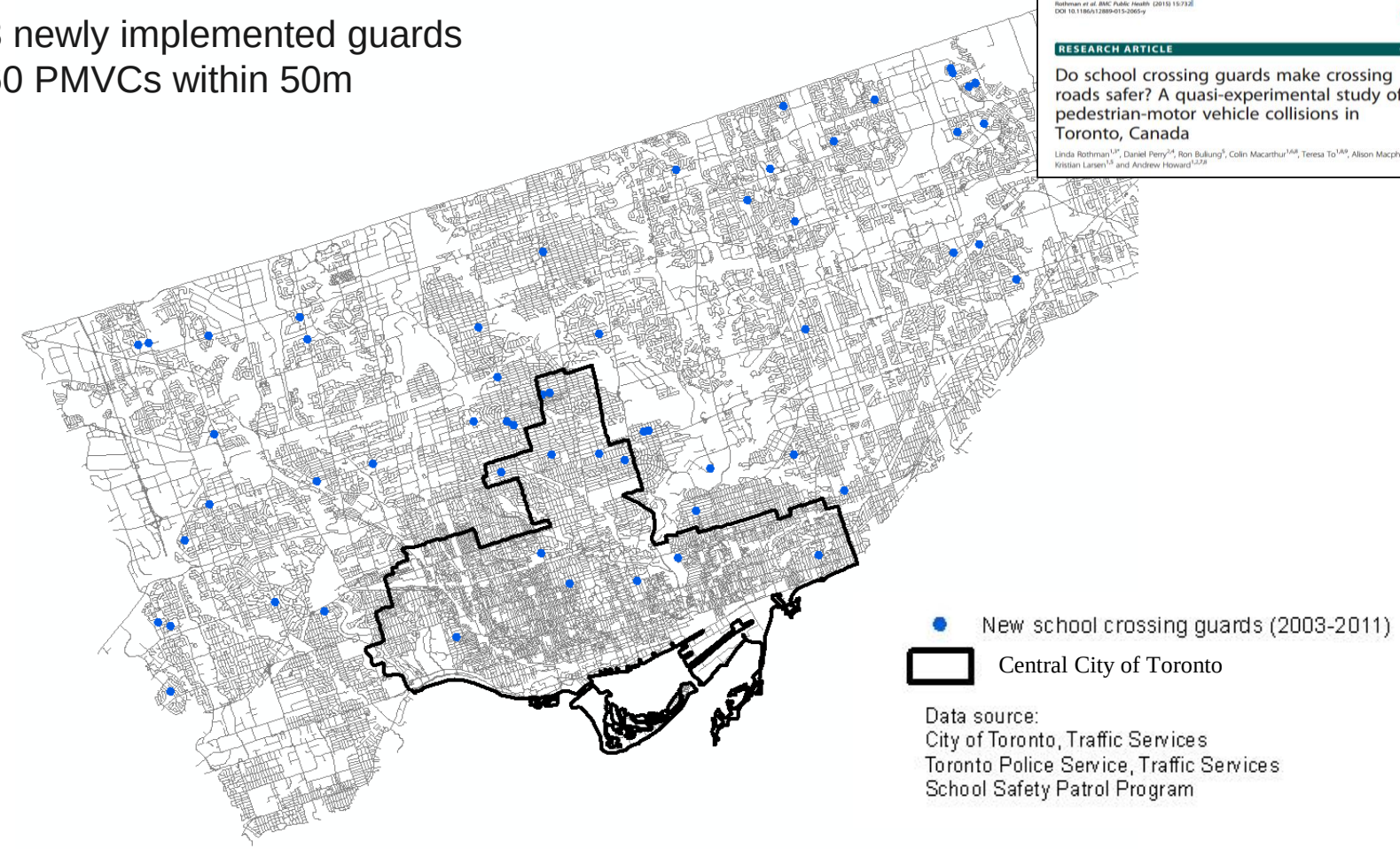
Installation of speed humps and pedestrian-motor vehicle collisions in Toronto, Canada: a quasi-experimental study

Linda Rothman[1,2*], Alison Macpherson[2], Ron Buliung[3], Colin Macarthur[4], Teresa To[1], Kristian Larsen[1,3] and Andrew Howard[5]

- Installation associated with a 22% decrease overall (296 PMVCs prevented)
- 45% decrease in child PMVCs

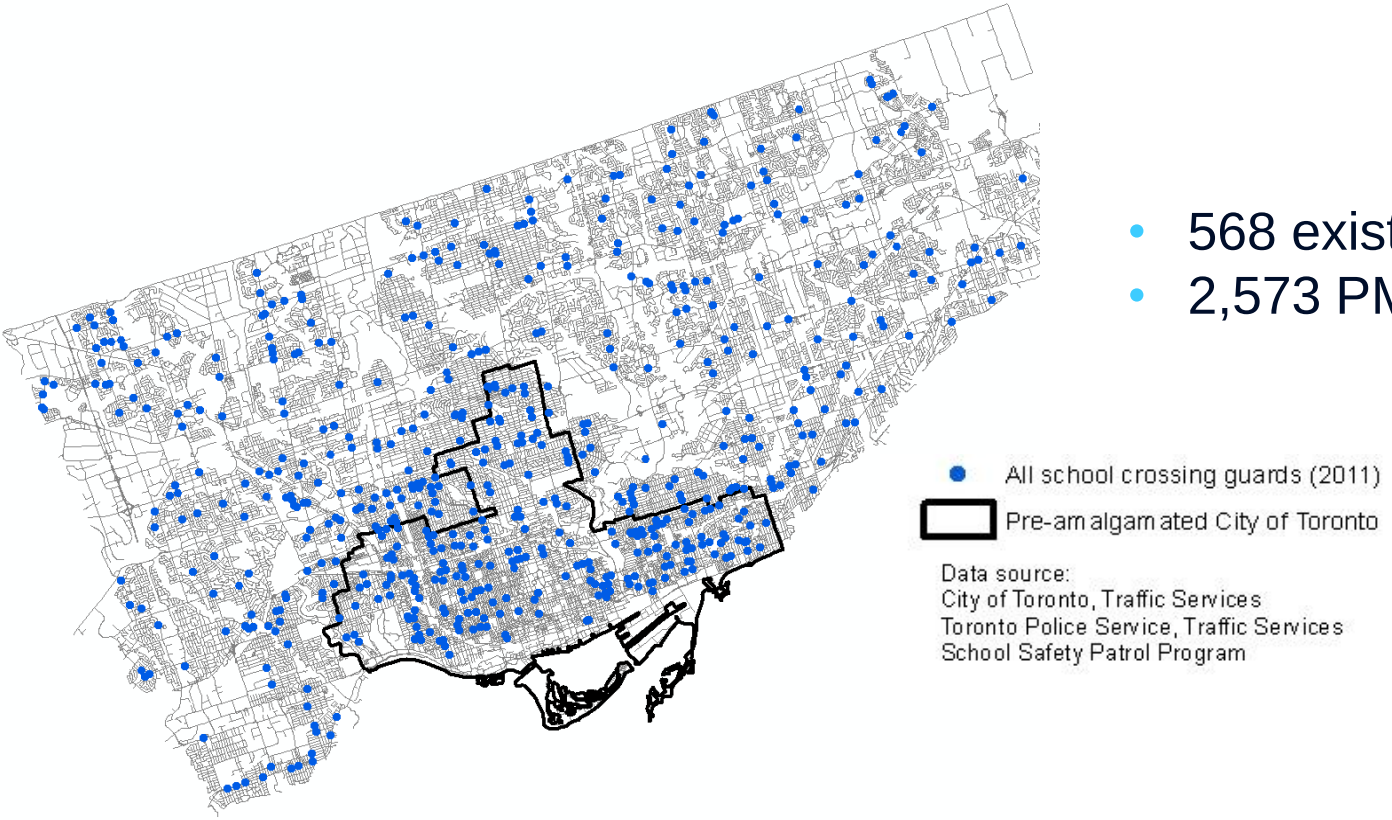
SCHOOL CROSSING GUARDS: PRE-POST STUDY

- 58 newly implemented guards
- 260 PMVCs within 50m



- Collision rates unchanged after implementation
- Simple roadway modification that may be related to more walking without detrimental safety effects

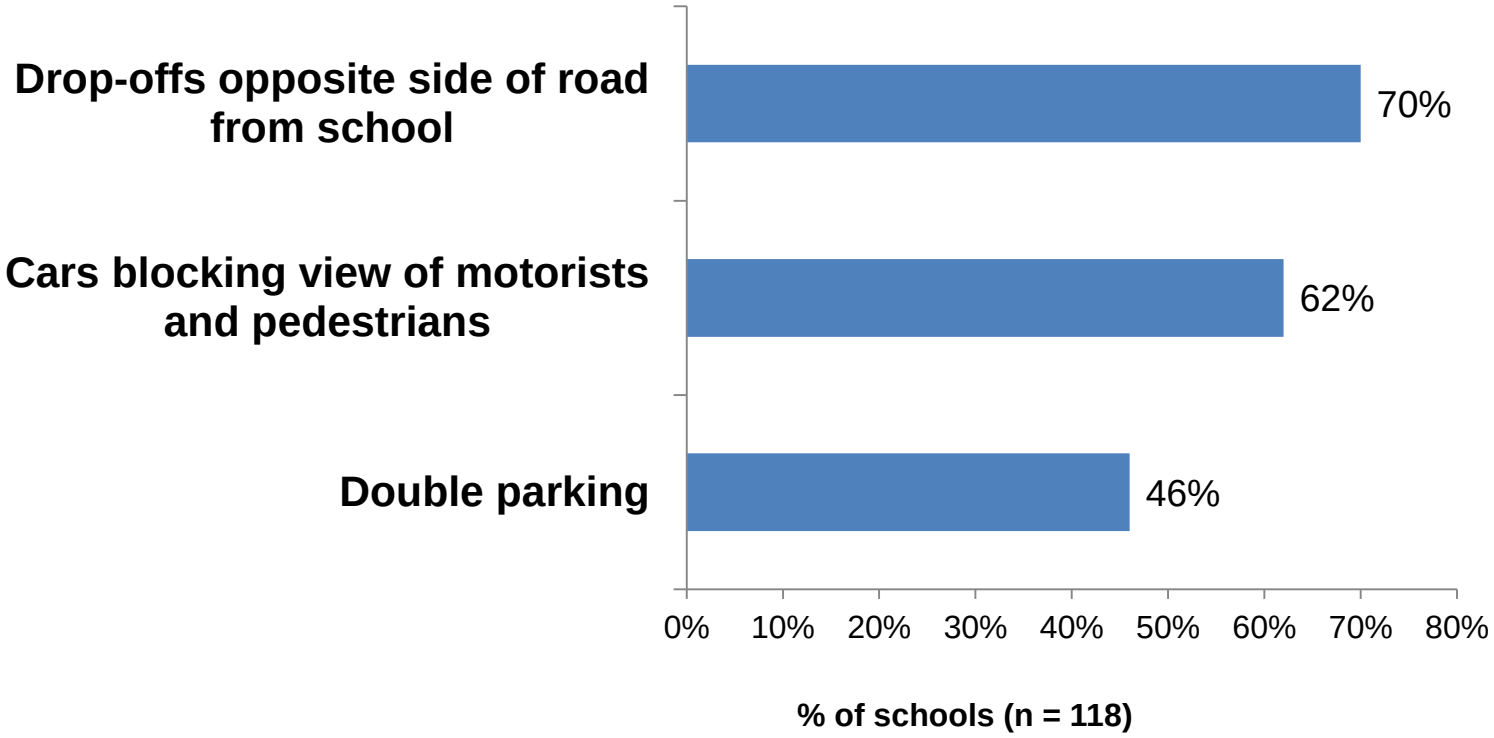
SCHOOL CROSSING GUARDS



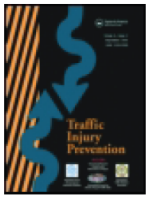
- 568 existing guards city-wide
- 2,573 PMVCs, 2000-2011

- Most child PMVCs occurred outside of school travel times (62%)
- Most school travel time PMVCs occurred in locations without crossing guards (86%)
- More permanent interventions needed to address high burden of child PMVCS happening outside of school travel times and away from guard locations

TOP 3
OBSERVED DANGEROUS DRIVING BEHAVIOURS, (2011)



- Each additional dangerous driving behaviour
  - 45% increase child PMVC rates within 200m of a school during school travel times
  - Higher LOIs and more high speed roadways had higher collision rates



Traffic Injury Prevention

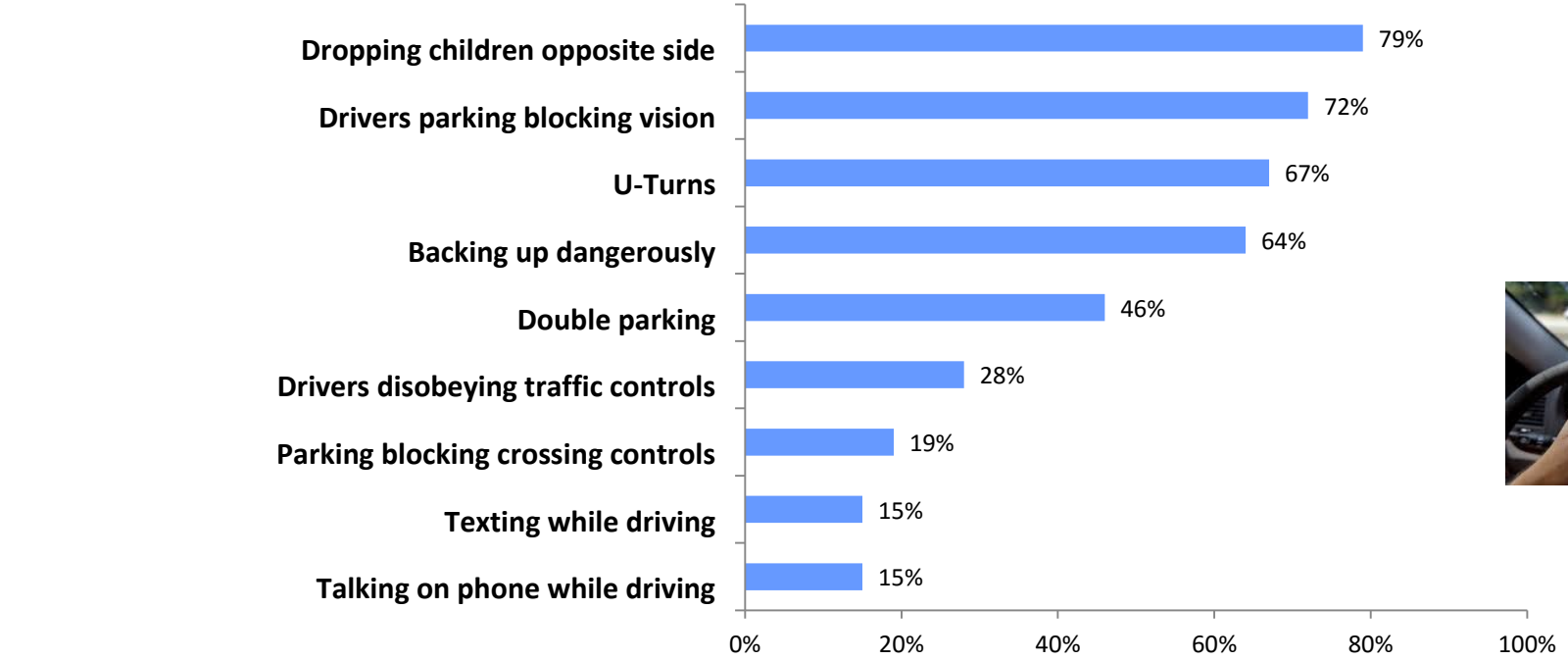
ISSN: 1538-9588 (Print) 1538-957X (Online) Journal homepage: http://www.tandfonline.com/loi/gcpi20

Dangerous student car drop-off behaviours and child pedestrian-motor vehicle collisions: an observational study

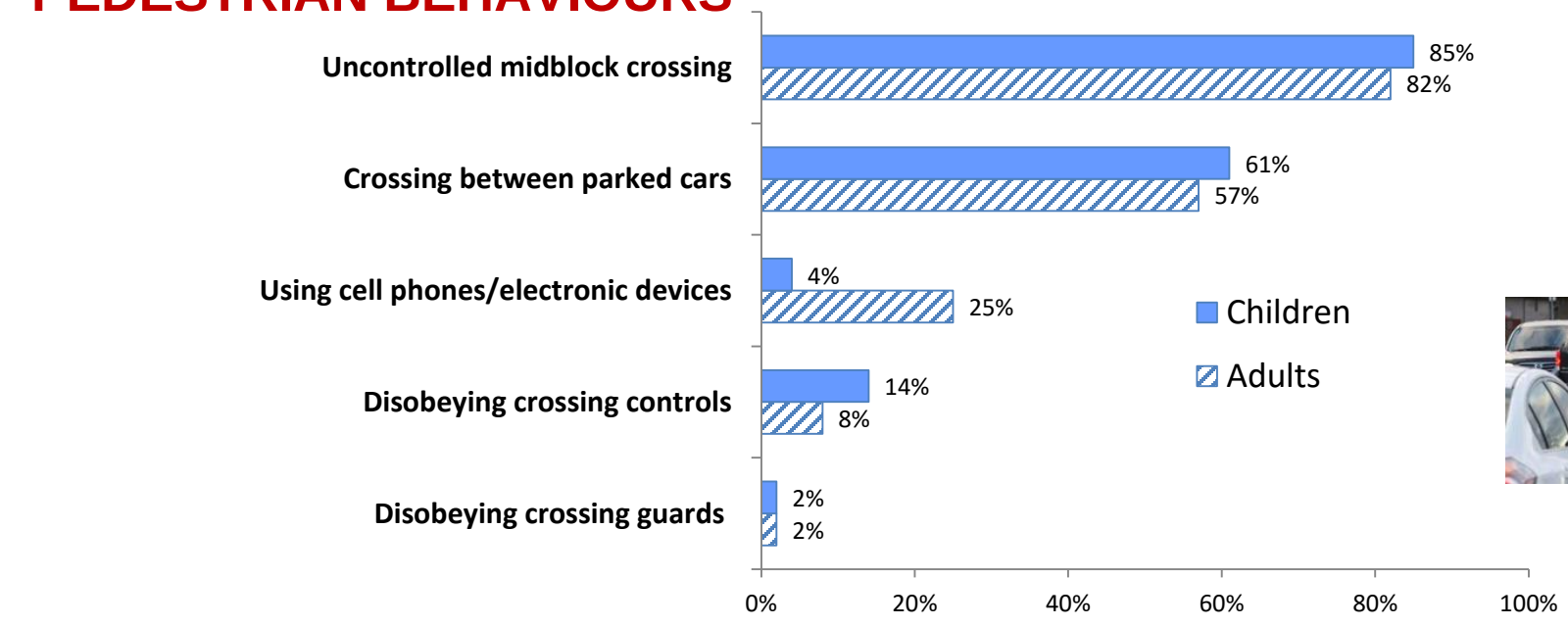
Linda Rothman MHSCPhD , Andrew Howard MSCFRCSC , Ron Buliung PhD, Colin Macarthur MBChBPhD & Alison Macpherson PhD

DRIVING BEHAVIOURS

2015



PEDESTRIAN BEHAVIOURS



HOW IS THE BUILT ENVIRONMENT RELATED TO THESE BEHAVIOURS?

- **Traffic congestion** *related to:*
  - ***Dangerous driving behaviours*** (4)
  - ***Pedestrian behaviours*** (crossing between cars)
- **Designated drop-offs** *protective for:*
  - ***Dangerous driving behaviours*** (parked blocking controls, dangerous reversing)
  - ***Pedestrian behaviours*** (uncontrolled midblock crossings, crossing between cars)
  - *But related to driver texting*
- **School crossing guards** *protective for:*
  - ***Dangerous driving behaviours*** (texting while driving, and potentially parking blocking controls)

SOCIAL DISADVANTAGE

Schools that had higher LOIs and/or high proportion of ATLICO

- Greater proportions of children walking
- Higher collision rates
- Higher density multifamily housing
- Fewer crossing guards
- Higher speed roadways
- Less traffic calming
- More traffic congestion

SCHOOLS' RESPONSE….

Knowledge users

- Parent council
- School staff
- School advisory council
- Crossing guard
- Community liaise officer
- Toronto public health
- Caretaker
- School superintendent
- Caring and safe schools committee
- Toronto Police Services
- School newsletter

Actions taken

- Developed a pedestrian/parking safety committee
- New crosswalk installed
- Used info for establishment of Kiss' N Ride
- Used for proposal to City of Toronto for new crossing guard
- Walking school bus implemented
- Contacted police re: excessive speeding
- Assigned more staff to monitor drop off
- "No stopping, buses only" signs posted along curb
- Started Walking Wednesdays
- New lines painted on driveway
- Purchased bike rack
- Planned 3 walk to school days
- Registered on the Safe Routes to School website
- Changed bus loading, legal parking and drop-off zones
- Investigated changes to speed limit and signage (e.g. curve ahead)
- Invited Manager of Traffic Operations for City of Toronto to do student talk about traffic safety
- Traffic safety incorporated into health class discussions
- Established walking goals for school

MEDIA'S RESPONSE

thestar.com

GTA

News / GTA

Kids' rates of walking to school not linked to crashes: study

The proportion of kids who walk to school is not linked to the number of crashes in a neighbourhood. Instead the "built environment" is responsible, a new study shows.

A child crossing the street at a crosswalk

THINKSTOCK PHOTO

Walking the walk: How cities can make it safe for kids en route to school

ADRIANA BARTON

The Globe and Mail

Published Tuesday, Apr. 08 2014, 3:10 PM EDT

Last updated Tuesday, Apr. 08 2014, 11:57 PM EDT

660News
ALL NEWS RADIO

Ad

Study recommends kids walk to school

News Staff *Apr 7, 2014 06:47:09 AM*

CityNews LOCAL VIDEO NEWS TIPS

School drop-offs more dangerous than parents think: study

BY NEWS STAFF

POSTED JAN 21, 2016 10:31 AM EST

LIFE

Safety of walking to school for children related to features of the environment

April 7, 2014 / *Author: Tara Haelle* / *Reviewed by: Robert Carlson, M.D Beth Bolt, RPh*

Rate This Article

Average Rating ★★★★★ Your Rating ☆☆☆☆☆

(dailyRx News) Walking or riding a bicycle to school is a great way for children to get extra physical activity — but only if it's safe for them to do so.

A recent study looked into whether the risk of getting hit by a car had more to do with the number of children walking or the features of the road environment

CBCnews | Toronto

Home World Canada Politics Business Health Arts & Entertainment Technology & Science Trending Weather Video

Canada Toronto Photo Galleries

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

Dangerous driving a problem at over 100 Toronto-area elementary schools

Stay Connected with CBC News

thestar.com
SCHOOLS

Your Toronto / Schools

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

Study finds increased chance of injury in and around schools in the morning rush as drivers break all the rules.

- Safety **must** be considered with the promotion of walking to school
- Built environment features are more important determinants of pedestrian collisions than are walking rates
- We need to get the built environment right!

Last day of observations
Friday, June 19, 2015

ACKNOWLEDGEMENTS

- City of Toronto, Transportation Services
- Toronto Police Services
- TDSB, Sustainability Office

- **Funding**
  - Hospital for Sick Children
    - *Restracomp Research Training Award*
  - Ontario Neurotrauma Foundation (ONF)
    - *Summer Internship Program in Injury Prevention*
  - CIHR
    - *Doctoral Research Award*
    - *Strategic Teams in Applied Injury Research (STAIR)*
      - *Traffic and Road Injury Prevention Program (Dr Andrew Howard, Dr. Anne Snowdon)*
      - *CIHR Chair in Child and Youth Health Services and Policy Research (Dr. Alison Macpherson)*

- EXTRA SLIDES

Built Environment **Density** **Census**	Child population Total population Males, 4 to 12	Multi-dwelling
Diversity **MPAC, City of Toronto**	Mixed land use (entropy) Commercial land use Industrial Institutional	Residential Vacant land Recreational Park land
Design **City of Toronto, Census** **Field Survey**	Crossing guards Dead end Flashing lights Intersection Road Local road Collector road Major road Minor road School crossing guard Mean speed> 5 km over speed limit Any dangerous crossing Double parking Cars parked blocking	One way streets Old houses (pre 1946) Sidewalks missing (both, one) Traffic calming Traffic lights Trails Urban Route directness (Inter/inter+dead end) Other TDSB and Catholic schools Cars appear to be driving fast Traffic congestion Any dangerous intersection Dropping opposite side School vehicle volume
Social Environment **TDSB, Census**	School LOI (Social disadvantage) School population Children grades 4 - 6 at school Males at school	Below ATLICO by school DA New immigrants at school School age (years) English not first language

CHILD PMVCs, 2002-2011 (10 years)

- 481 collisions within 105 school boundaries*
- No collisions in 13 school boundaries

- No Injury: 24 (5%)
- Minimal Injury: 191 (40%)
- Minor Injury (seen in ED): 236 (49%)
- Major Injury (admitted): 30 (6%)
- Fatality: 1 (<1%)

- 214 (44%) were school travel time collisions

13 schools with no collisions

- Lower LOI
- Lower density of higher speed roads
- Lower density of one way streets

- Traffic congestion *related to:*
  - ***Dangerous driving behaviours*** (double parking, parking blocking vision, parking blocked crossing controls, dangerous reversing)
  - ***Pedestrian behaviours*** (crossing between cars)
- Designated drop-offs *protective for:*
  - ***Dangerous driving behaviours*** (parked blocking controls, dangerous reversing
  - ***Pedestrian behaviours*** (uncontrolled midblock crossings, crossing between cars)
  - *But related to driver texting*
- School crossing guards *protective for:*
  - ***Dangerous driving behaviours*** (texting while driving, and potentially parking blocking controls)

PARENT PERCEPTIONS OF TRAFFIC DANGER

- **Objective 1**

To determine if parent perceptions of traffic danger en route to school and/or at the school site during morning drop-off are related to walking to school

- **Objective 2**

To examine the relationship between features of the built environment and parent-perceived traffic danger

- Parent questionnaire in 20 schools, grades 4-6, that participated in the observational study, 733 surveys returned


Contents lists available at ScienceDirect

Journal of Transport & Health

journal homepage: www.elsevier.com/locate/jth

ELSEVIER

Associations between parents' perception of traffic danger, the built environment and walking to school

Linda Rothman [a,b,*], Ron Buliung [c], Teresa To [a], Colin Macarthur [a], Alison Macpherson [b], Andrew Howard [a]

"How dangerous is the traffic for your child…

1. *Between your home and your child's school? (ROUTE)*
2. *Around the school during drop-off time?" (SITE)*

"How often does your child walk to school (frequent = 4-5 times/weekly)"

- **High route danger perception** was related to:
  - Less frequent walking
  - Dangerous midblock crossing
  - Higher speed roadways
  - But **not** actual collision rates

➢ To influence walking, the **safety of the route** must be considered, however, must also address safety directly around school sites