



Spatial Distribution of Pedestrian-Motor Vehicle Collisions Before and After Pedestrian Countdown Signal Installation in Toronto, Canada

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Linda Rothman, Hospital for Sick Children

Marie-Soleil Cloutier, Institut national de la recherche scientifique (INRS)

Alison Macpherson, York University

Sarah Richmond, York University

Andrew Howard, Hospital for Sick Children

INTRODUCTION

- Pedestrian countdown signals (PCS) have been installed in many cities over the last 15 years
- 95% of Toronto signalised intersections received a PCS between November 2006 and November 2009
- Traditional walk/don't walk signals were changed
 - Initiation of walk-time when the vehicle green light phase begins
 - Then a 9 to 18 second displayed countdown signal
 - Ends as the vehicle light phase changes from green to yellow



INTRODUCTION

- Evidence regarding PCS effectiveness has been inconclusive.
 - Most have examined driver and pedestrian behaviour
 - Small studies of pedestrian-motor vehicle collisions (PMVC)
- 2013 study of 1,965 installations found a 26% increase in PMVC after installation (Richmond et al)
- It is important to consider the spatial distribution of PMVC and the relationship to PCS installation

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Original article

The impact of pedestrian countdown signals on pedestrian-motor vehicle collisions: a reanalysis of data from a quasi-experimental study

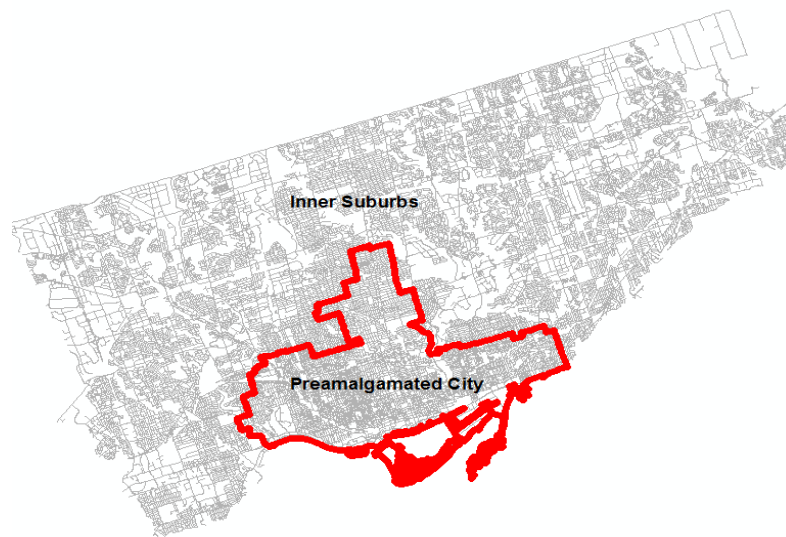
Sarah A Richmond,¹ Andrew R Willan,^{1,2} Linda Rothman,¹ Andi Camden,¹ Ron Buliung,³ Colin Macarthur,^{1,4} Andrew Howard^{1,5,6,7}

OBJECTIVES

- To compare point densities of PMVC pre and post PCS installation for
 - Intersections with PCS
 - Roadways and smaller intersections without PCS
- To determine whether there were differences in spatial point densities of PMVC related to PCS installation
 - Overall
 - By age

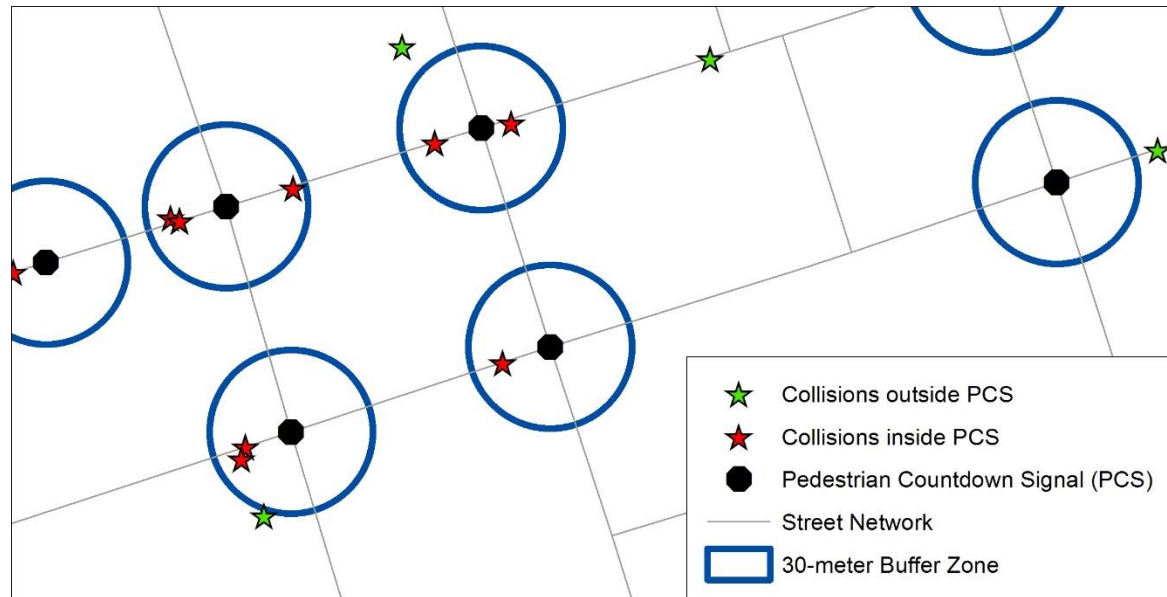
METHODS

- PCS intersections (n = 1864) and police-reported PMVC (2000-2013) were mapped, delineating the downtown pre-amalgamated City of Toronto versus the inner suburbs



METHODS

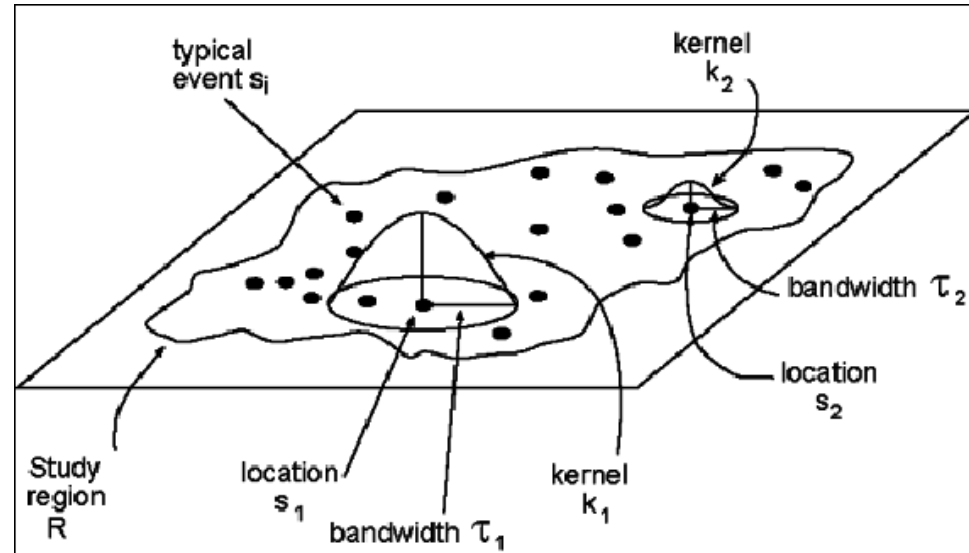
- PCS PMVC
 - within 30 m radius of a PCS intersection



- Non PCS PMVC
 - outside 30 m, including mid-block collisions and collisions at smaller intersections without pedestrian signals

METHODS

- Step 1: Kernel density estimation
 - Interpolate the spatial density of PMVC in a raster (matrix of pixels) by considering distance to points nearby
 - Each collision point is given a weight according to a kernel function
 - The output of this process: a matrix of 30-meter X 30-meter pixels covering the study area

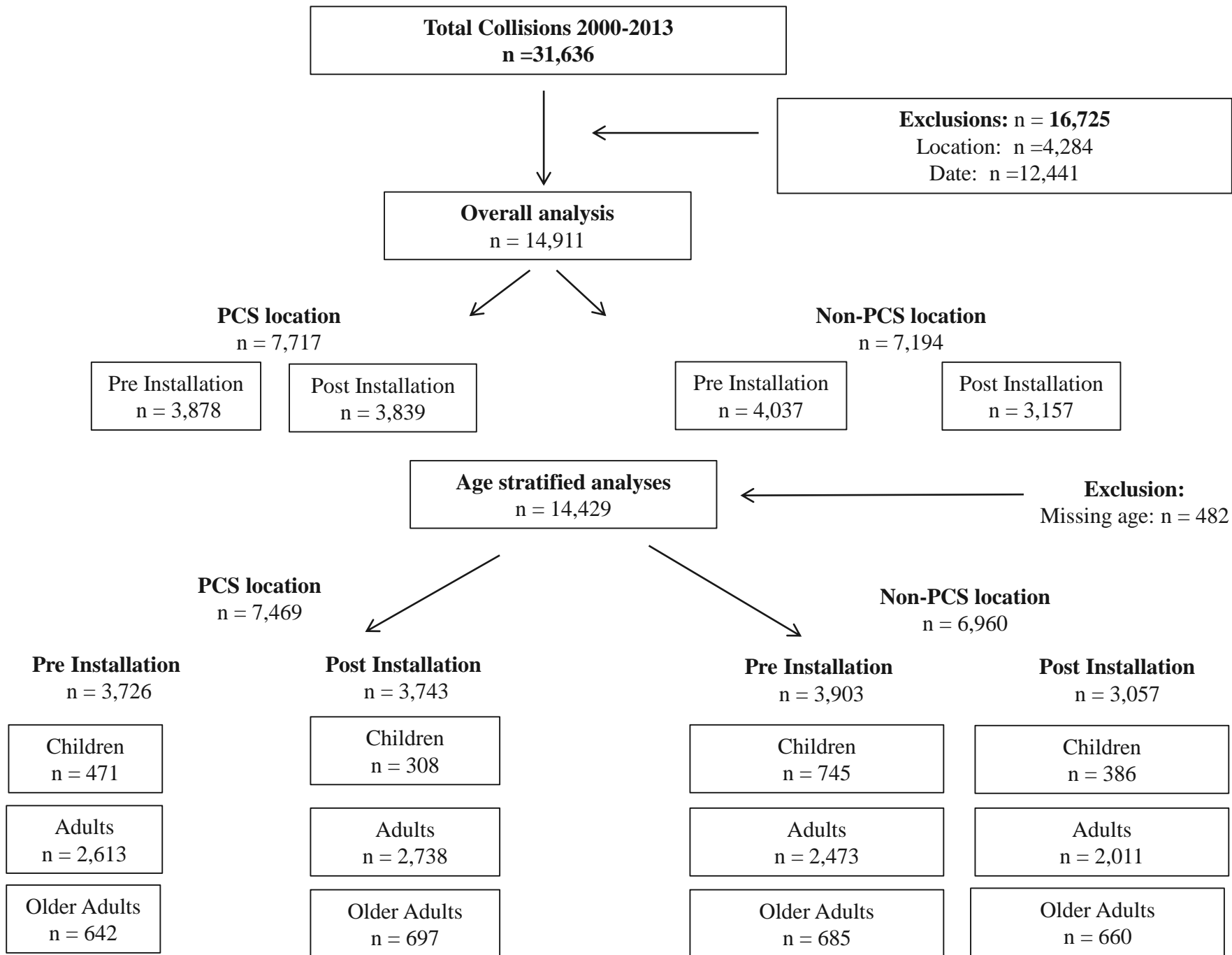


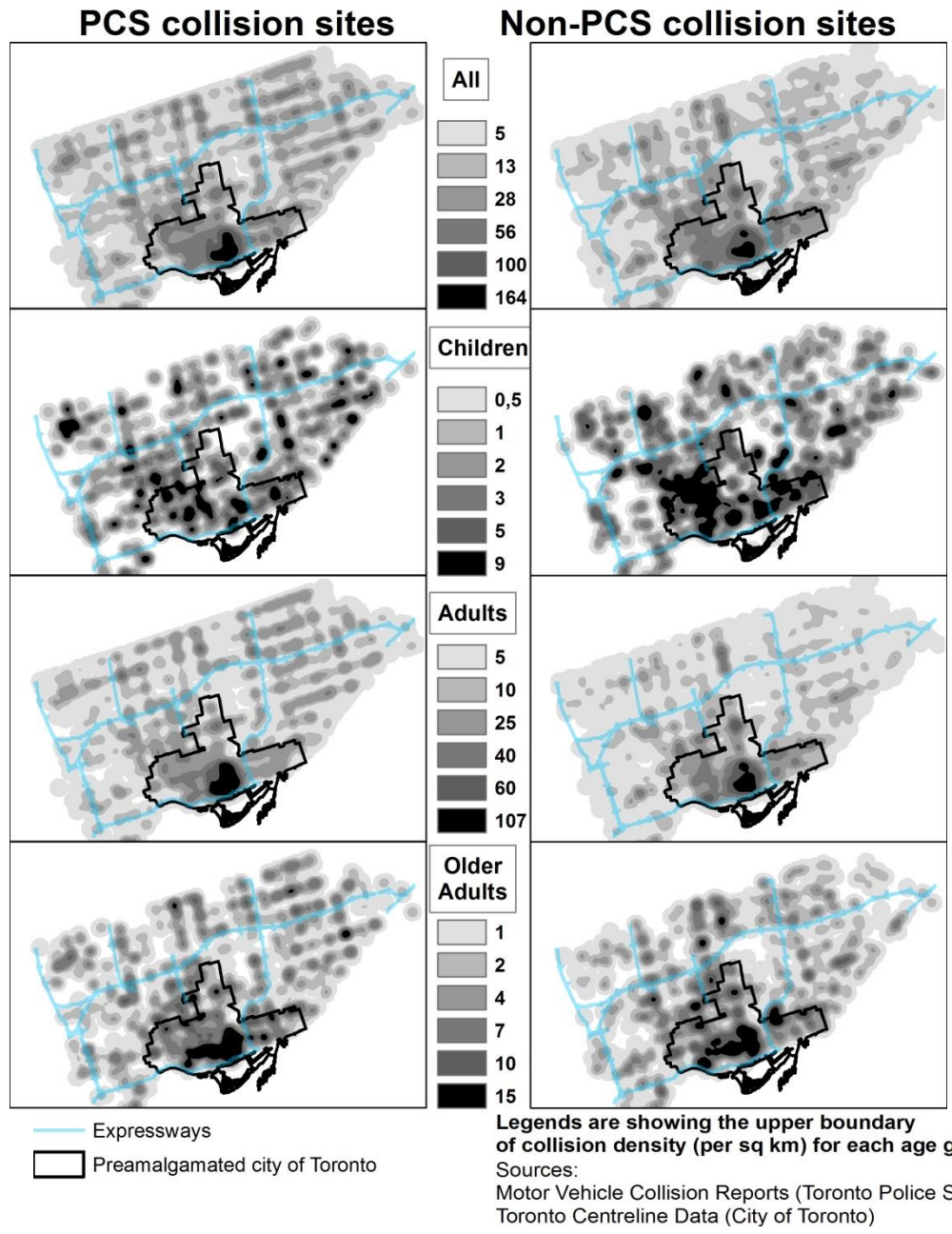
- *Typical event*: collisions
- *Bandwidth*: radius of the window to search for nearby points (here: 1 km)
- *Kernel*: function giving the highest weight to the central point

(Bailey & Gatrell, 1995)

METHODS

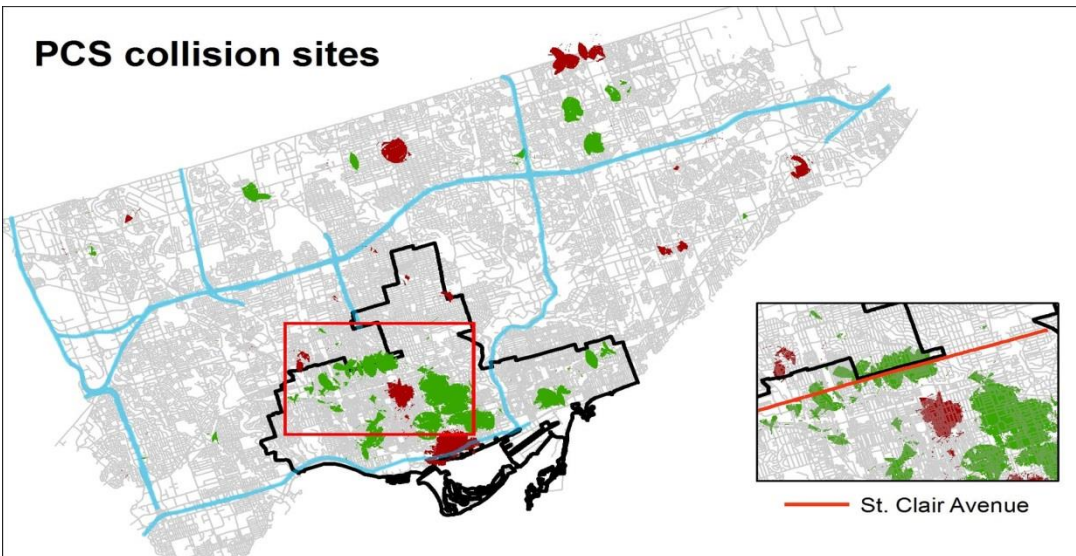
- STEP 2: Simple point pattern density within a raster
 - Examined areas of higher or lower point density, pre to post installation at PCS and non PCS locations overall and by age
- STEP 3: Z-scores within a raster
 - Tested significant changes (increase or decrease) in PMVC. Only significant pixel values +/- 3 standard deviations at a 5% level were mapped



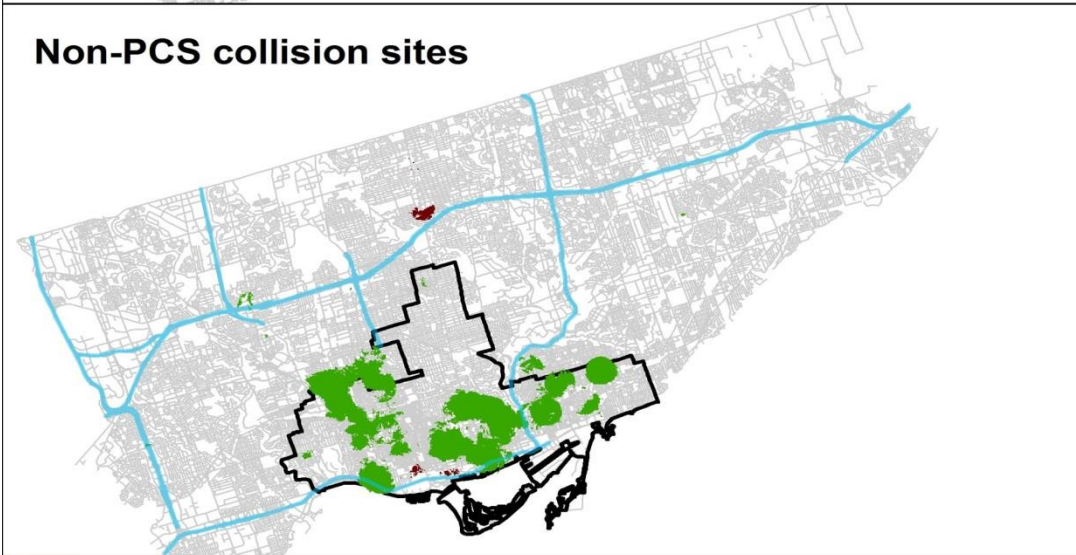


Kernel-density estimates (collision/km²) for collision locations (2002-05, 2009-13)

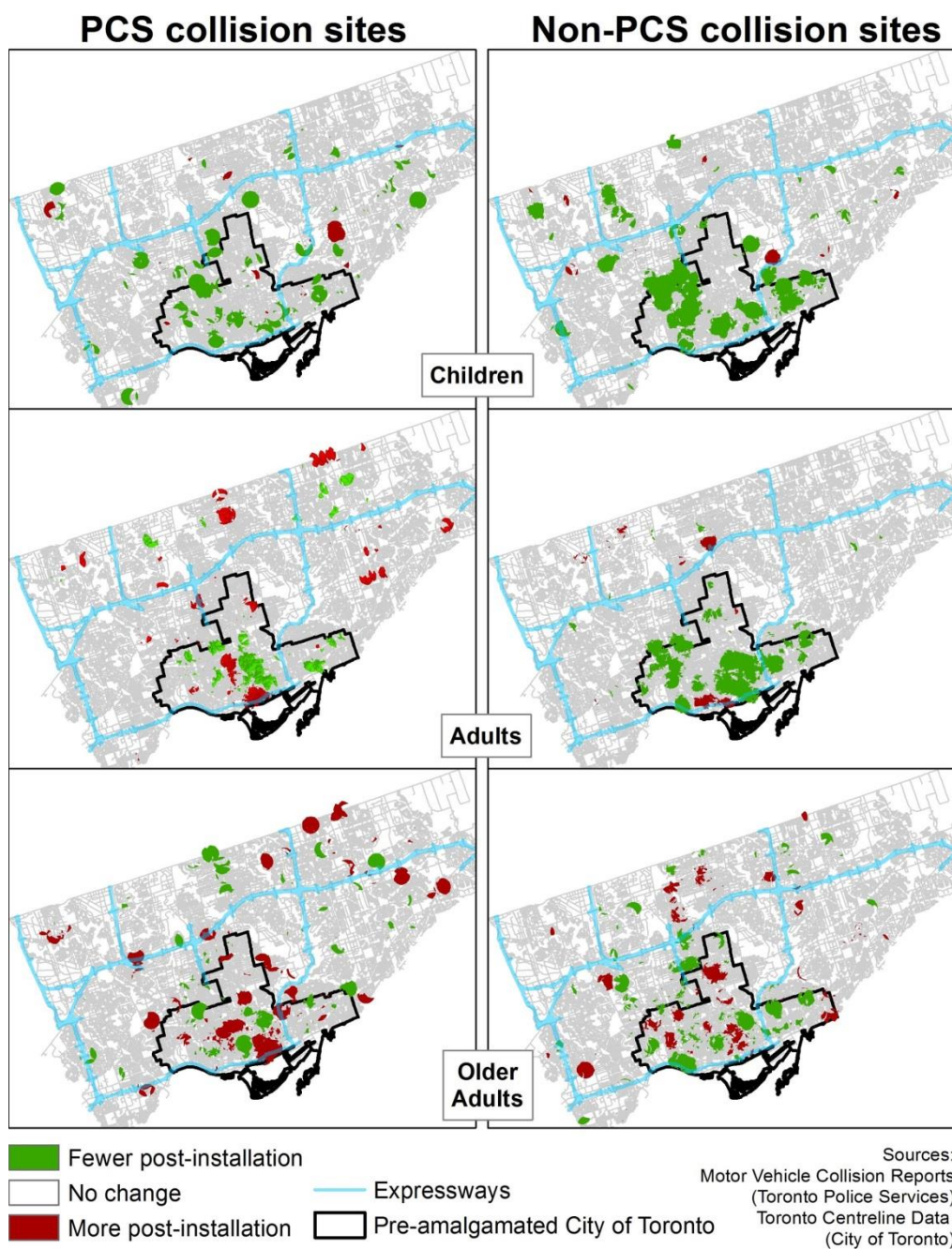
PCS collision sites



Non-PCS collision sites



Sources: Motor Vehicle Collision Reports (Toronto Police Services)
Toronto Centreline Data (City of Toronto)



Significant change in PMVC density before and after PCS installation period by age group

DISCUSSION

- The effect of PCS varied by age and location
- The installation of PCS may result in increased PMVC; non-PCS locations showed more consistent reductions
- Effectiveness varies within a city, therefore, likely to vary across cities



DISCUSSION

- The strongest spatial patterns were in adults, varied effects by age expected
- Effect of co-interventions
- Exposure should be considered; however, good exposure data for pedestrians and cars does not exist



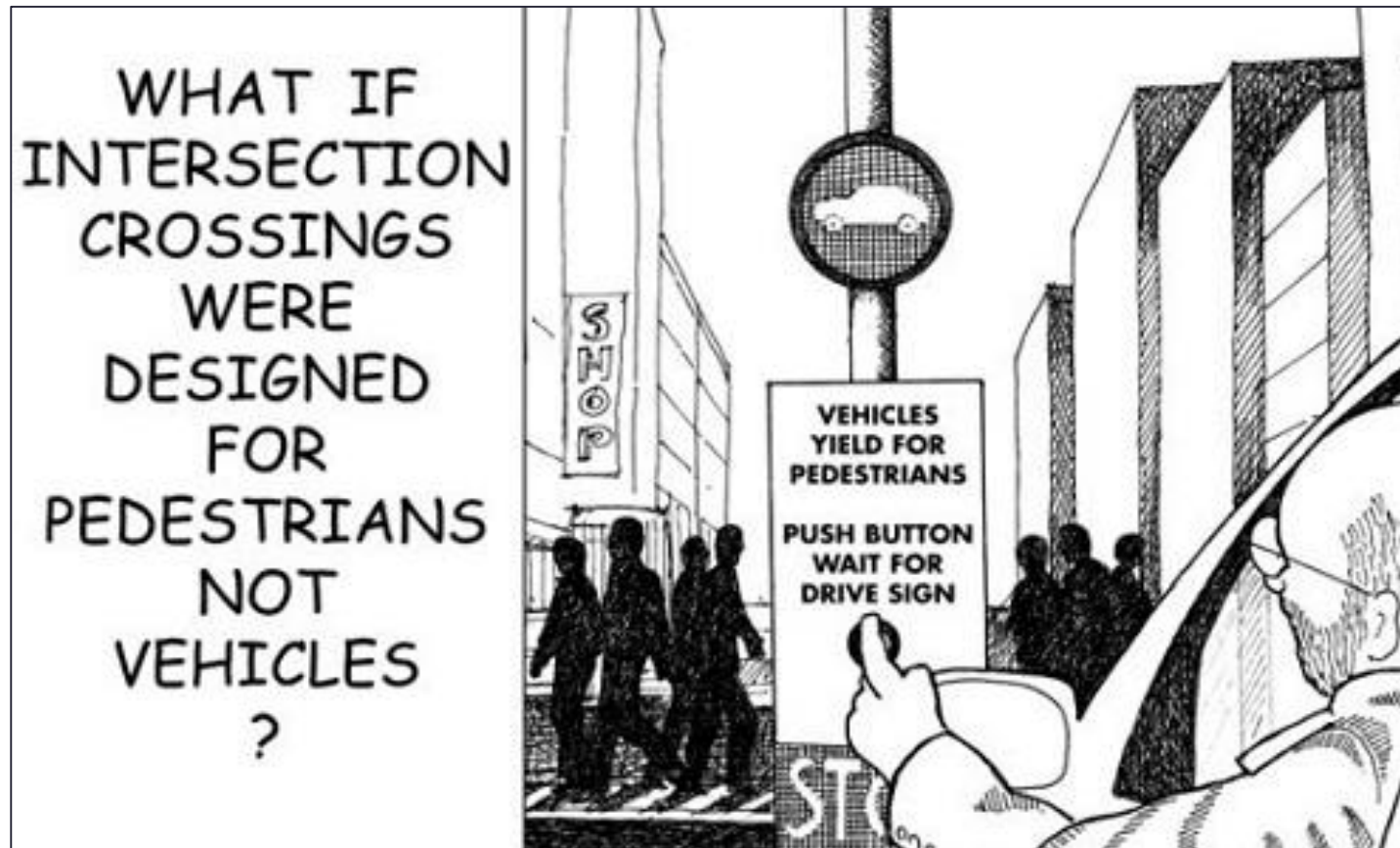
DISCUSSION

- Pedestrians may misuse the information to cross quickly, rather than to cross safely
 - Confusion re: Ontario Highway Traffic Act
- We believe that PCS can improve pedestrian safety
 - Could changes in signal timing, or vehicle turning restrictions, yield desired safety benefits?



- Age and location effects of PCS need to be fully understood to consistently improve pedestrian safety

QUESTIONS?



Source: http://shadeparadenashville.blogspot.ca/2015_08_01_archive.html