

# Bicycling injuries on streetcar (tram) or train tracks: causes & solutions

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## Methods

We compared personal, trip, and route infrastructure characteristics of 87 crashes directly involving streetcar or train tracks to 189 crashes in other circumstances in Toronto, Canada.

We complemented this with engineering information about the rail systems, interviews of personnel at seven bike shops about advice they provide to customers, and width measurements of tires on commonly sold bikes.

## Results

32 % of injured cyclists had crashes that directly involved tracks. The vast majority resulted from the bike tire being caught in the rail flangeway, often when cyclists made unplanned maneuvers to avoid a collision.

Track crashes were more common

- on major city streets with parked cars & no bike infrastructure
- with left turns at intersections
- with hybrid, racing and city bikes
- among less experienced and less frequent bicyclists, and among women.

Commonly sold bikes typically had tire widths narrower than the smallest track flangeways.

There were no track crashes in route sections where streetcars and trains had dedicated rights of way.

## Conclusions

Certain demographics were more likely to have track-involved crashes, suggesting that increased knowledge about how to avoid them might be helpful. However, such advice is long-standing and common in Toronto, yet the injury toll is very high, underscoring the need for other solutions.

Bike tires wider than streetcar or train flangeways might prevent them being caught.

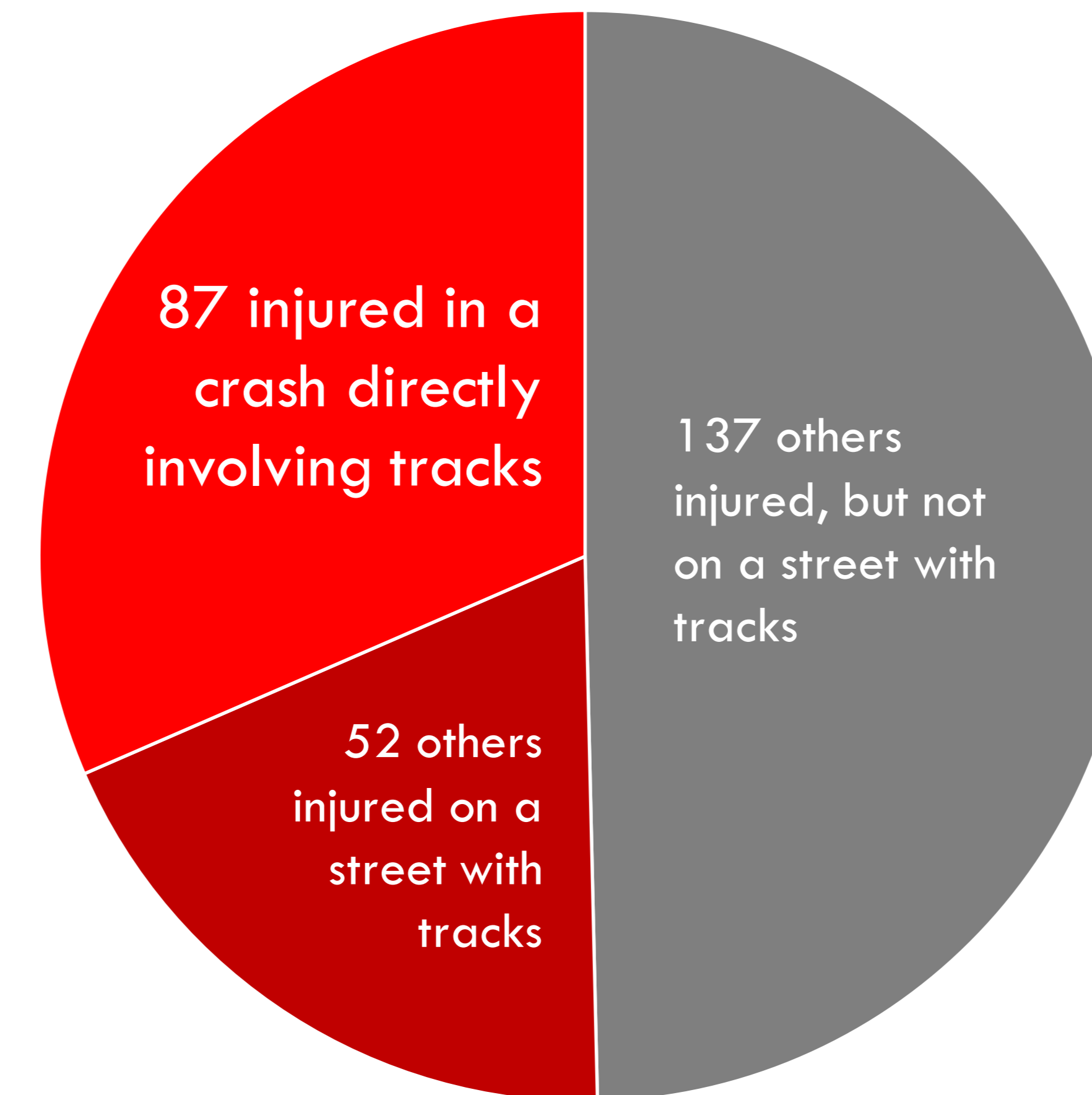
Route infrastructure made a difference to the odds of track-involved injuries. Dedicated rail rights of way, cycle tracks (physically separated bike lanes), and protected intersections that direct two-stage left turns would have prevented most of the observed track-involved injuries. These population-based measures are likely to be more successful, since they don't require individual actions or repeated reinforcement.

## Toronto streetcar system – largest in North America



**3-fold increase in injury risk on streets with tracks** in our Toronto & Vancouver study of bicyclists injured & treated in emergency departments

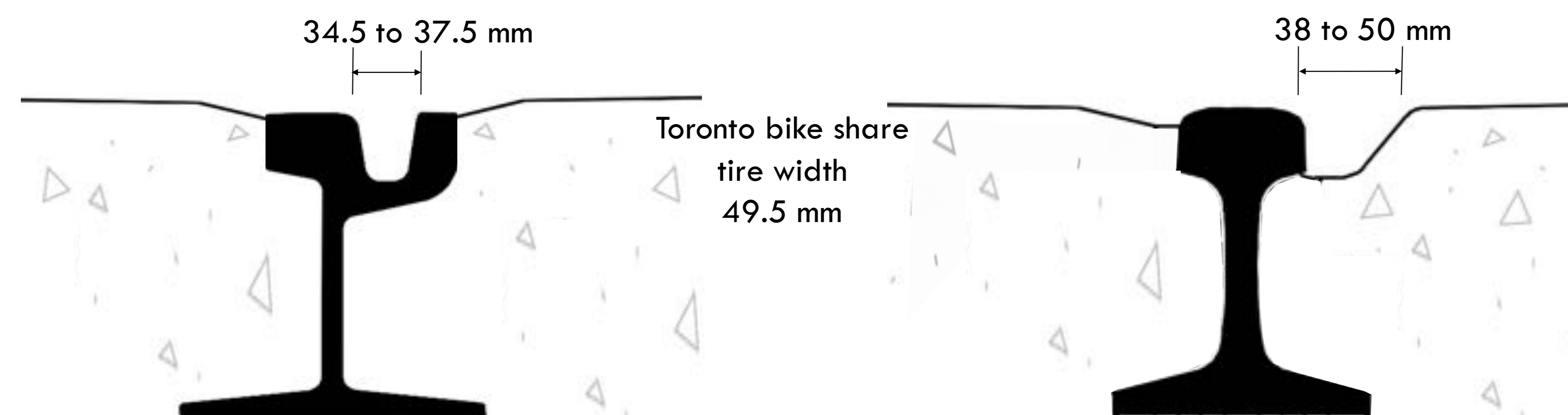
Here, focus on 276 injured in Toronto



**Bike tires caught in rail flangeways – 85 % of track crashes**  
**Bike tires slipped on rails – 15 % of track crashes**

> 50 % of commonly sold bikes had tires narrow enough to be caught in the narrowest flangeways – those in girder rails (used on curves)

Only 8 % of commonly sold bikes had tires likely wide enough not to be caught in widest flangeways – those next to tee rails (used on straight sections)



Profiles of 2 rail types used in Toronto, showing flangeway (gap in road surface beside rails) that holds flanged wheels in position

