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An Investigation of the Built Environment Risk Factors Related to Specific Mechanisms of Injury Between Children and Adolescents

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Slide-Deck Presentation for CARSP 2021



CHild Active-Transportation Safety and the Environment

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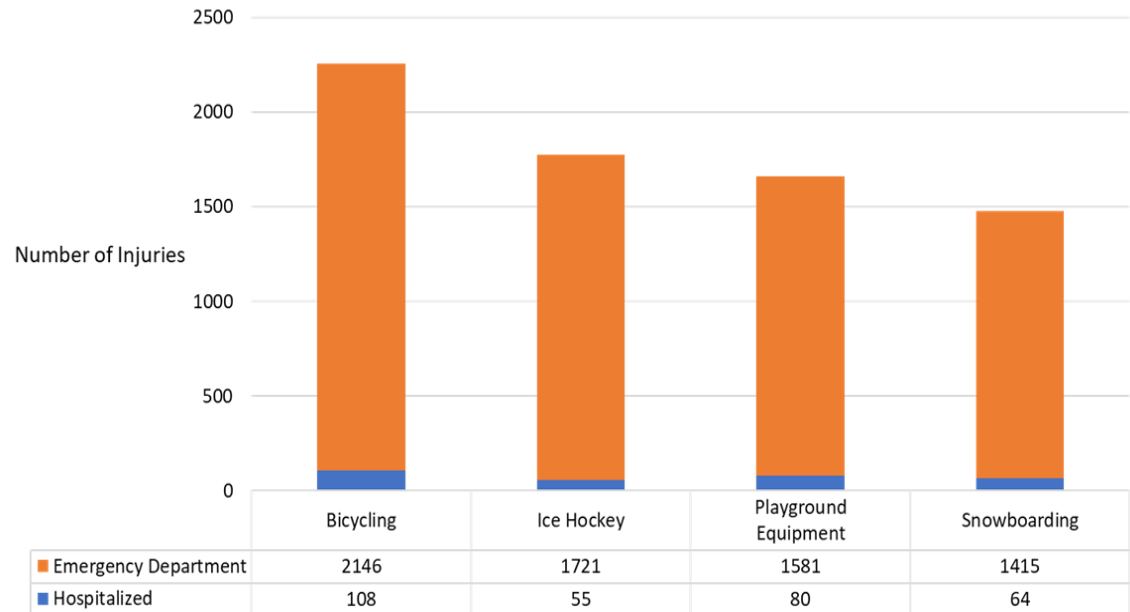
- The Benefits
 - Improves physical and mental health, and physical literacy.
 - Benefits to environment, the economy, and general communities.
- The Problem
 - Ongoing decline in participation in part due to concerns of traffic-related injury and safety.

Barnes et al (2016); Calgary Transportation Plan (2016); Rothman et al (2018)



- Most common cause of sports and recreation injury in children and adolescents in Canada.
- Injury severity increases with Motor Vehicle involvement.

Alberta Children's Hospital Top Sport and Recreation CHIRPP Injuries from 1999-2003



Hagel et al (2015); Injury Data Dashboard, The Canadian Atlas of Child & Youth Injury Prevention (2016); Parachute Unintentional Injury Trends for Canadian Children (2016) ; Kang et al (2013).





Background

Methods

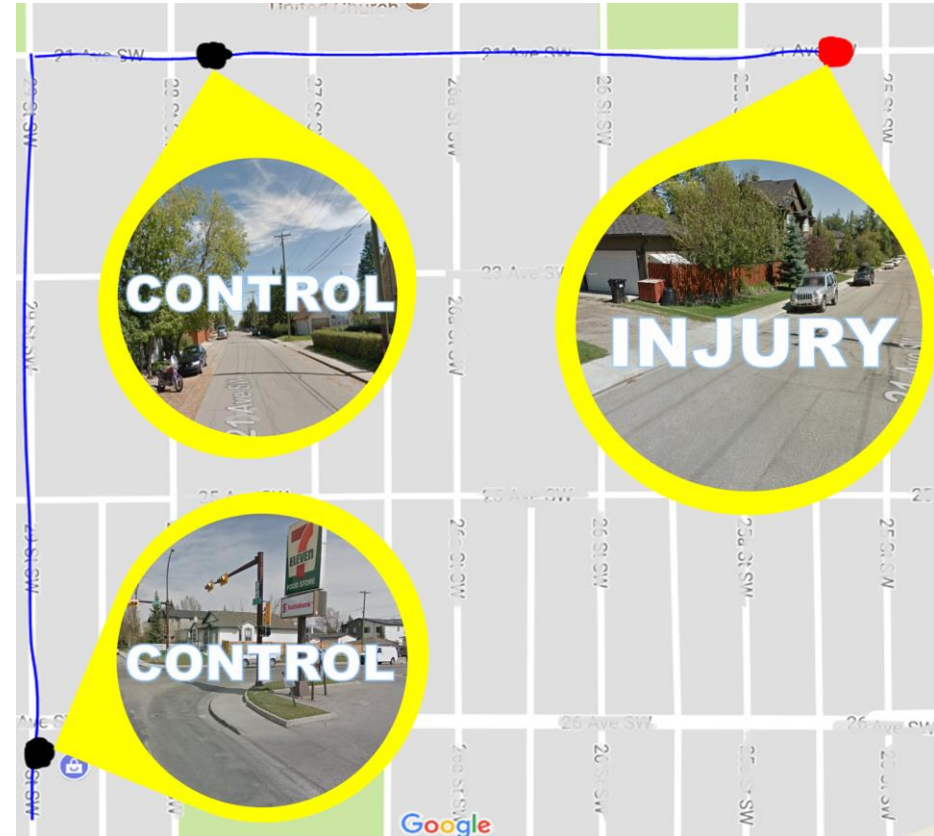
Results

Discussion

To compare the mechanism of injury (falls versus collisions) and built environment injury risk factors between children (5-12 years old) and adolescents (13-17 years old) in three urban centres across Canada.



- Case-Crossover Design
 - Participants act as own control
 - Random/matched control sites
 - Based on case-control design





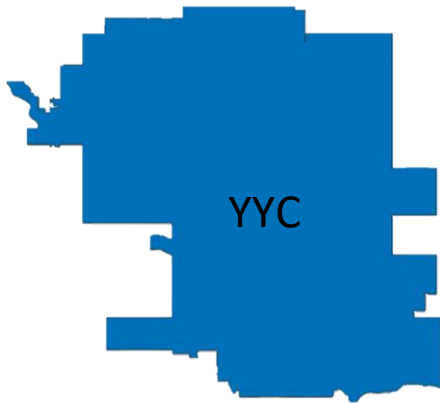

BC Children's Hospital

Alberta
Children's HOSPITAL
RESEARCH INSTITUTE

SickKids
THE HOSPITAL FOR SICK CHILDREN



- School aged children (ages 5-17).
- Present to ED of the Children's Hospital with a bicycling injury.
- Eligibility criteria places emphasis on bicycling for transportation and the BE in major urban centers.



Interviews

- 30-45 Minute Structured Interviews.
- Injury circumstances, cycling route, perceived safety, and personal information related to cycling experience.



Site Audits

- Auditor blinded to the site's injury or control status.
- Assess infrastructure, traffic speed, traffic volume, route type, speed limits, traffic control/calming devices, and visibility.



Vancouver

117
Participants

Calgary

65
Participants

Toronto

103
Participants

Data Collection Ongoing: May 2018-October 2021



Gender

- 69% Male
- 198/285 participants



Age

- Mean = 10.48 y/o
- SD = 3.41
- Range: 5-17y/o



Mechanism of Injury

- Falls: 139/285 (48.77%)
- Collisions: 146/285 (51.23%)

Children



- **Falls: 109/202 (53.96%)**
- **Collisions: 93/202 (46.04%)**
 - Motor Vehicle: 16/93 (17.78%)
 - Other Bicyclist: 14/93 (15.56%)
 - Built Environment: 24/93 (26.67%)
 - Surface Feature: 18/93 (20.00%)
 - Natural Feature: 13/93 (14.44%)

Adolescents



- **Falls: 30/83 (36.14%)**
- **Collisions: 53/83 (63.86%)**
 - Motor Vehicle: 13/53 (26.53%)
 - Other Bicyclist: 2/53 (4.08%)
 - Built Environment: 18/53 (36.73%)
 - Surface Feature: 12/53 (24.49%)
 - Natural Feature: 3/53 (6.12%)

Children

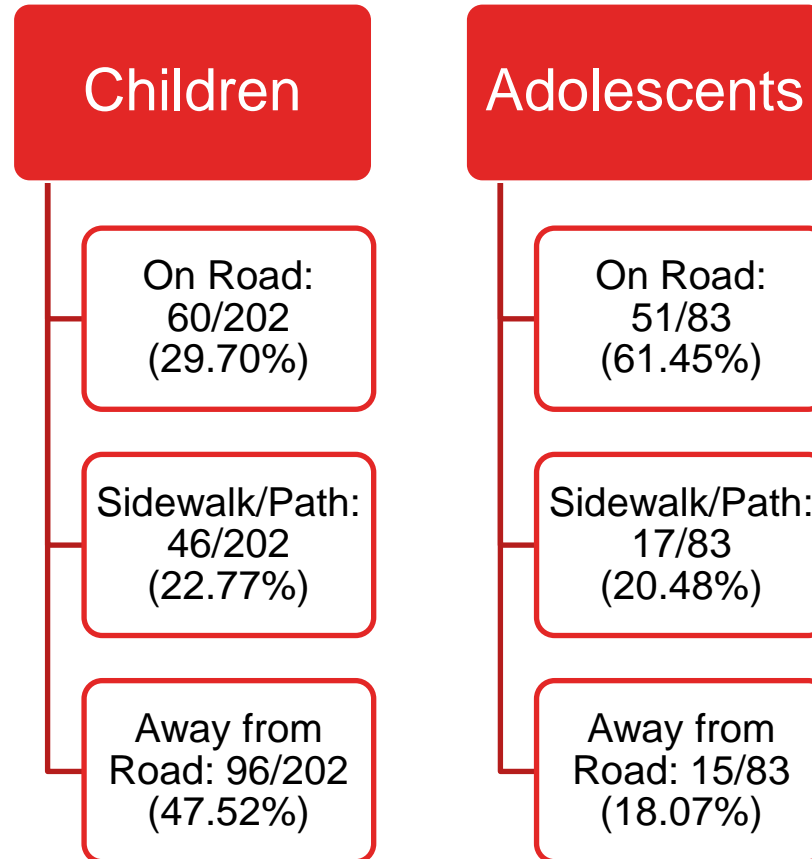
16/202 at an
intersection
(8.42%)

Of the 93
Collisions, 14
(15.05%) occurred
at an intersection

Adolescents

21/83 at an
intersection
(29.17%)

Of the 53
Collisions, 16
(30.19%) occurred
at an intersection



Children

- Back Lane/Alley: 10 (7.81%)
- Local Street: 65 (50.78%)
- Collector/Minor Arterial: 15 (11.72%)
- Major Arterial: 13 (10.16%)
- Off Street: 25 (19.53%)
- Commercial Use: 22/202 (10.89%)
- Residential: 186/202 (92.08%)

Adolescents

- Back Lane/Alley: 1 (1.69%)
- Local Street: 33 (55.93%)
- Collector/Minor Arterial: 11 (18.64%)
- Major Arterial: 10 (16.95%)
- Off Street: 2 (3.39%)
- Commercial Use: 14/83 (16.87%)
- Residential: 64/83 (77.11%)

Children

- Downhill: 83/202 (41.09%)
- Flat: 87/202 (43.07%)
- Uphill: 32/202 (15.85%)

Adolescents

- Downhill: 36/83 (43.37%)
- Flat: 30/83 (36.14%)
- Uphill: 17/83 (20.48%)

Children



- **Debris: 140/202 (69.31%)**
 - Gravel: 77/202 (38.12%)
 - Leaves: 54/202 (26.73%)
 - Grass: 19/202 (9.41%)
 - Manhole Cover: 15/202 (7.43%)

Adolescents

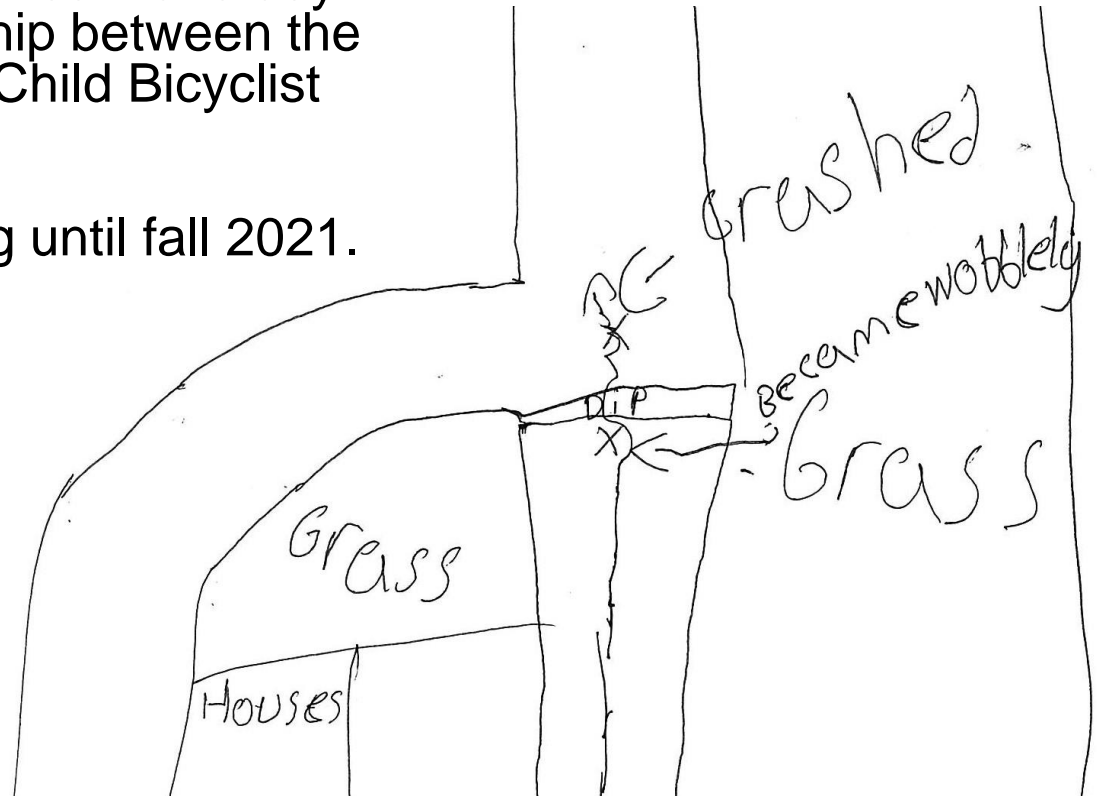


- **Debris: 50/83 (60.24%)**
 - Gravel: 21/83 (25.30%)
 - Leaves: 20/83 (24.10%)
 - Grass: 2/83 (2.41%)
 - Manhole Cover: 2/83 (2.41%)

- Findings suggest that mechanisms of injury and some built environment risk factors for child bicyclists differ from adolescents.
- Adolescents (≥ 13 years old) reported a larger proportion of collisions compared to falls, collisions with motor vehicles and are more frequently injured at intersections, on road, and/or in commercial areas than children.



- Larger ongoing case-crossover study to assess the relationship between the Built Environment and Child Bicyclist Injuries.
- Data collection ongoing until fall 2021.





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Questions?