Is evidence in practice? A review of driver and cyclist education materials with respect to cycling safety evidence

Meghan Winters[1], Angie Weddell[2], Kay Teschke[2]
Faculty of Health Sciences, Simon Fraser University[1], School of Population & Public Health, University of British Columbia[2]
contact: mwinters@sfu.ca

Introduction

Countries with high cycling rates have national, school-based, mandatory cycling education programs whereas in North America cycling education is diverse and disparate. **The aim of this project was to understand what cycling safety content is delivered in Canadian jurisdictions and how training materials align with scientific evidence.**

1. Literature review on safety evidence

Search terms: "bicycle," "safety," "injury," "accident," "crash," "conflict," "infrastructure," "road," and "intersection."
Databases: PubMed, Medline, Transportation Research Information Service, published up to January 2012. Reference lists were searched for additional citations.
Inclusion criteria: Research had to investigate the relationship between a defined metric of bicyclist safety (injury, injury severity, crash/collision/fall, conflict) and: a riding practice (e.g., use of visible clothing, bicycling operations, or route choice), or an environmental factor (e.g., road grade, weather). It had to be peer-reviewed original research, use a measure of relative risk, and be in English.
Exclusion criteria: Studies examining gross numbers or types of injuries without either calculating risks (i.e., no denominator) or considering factors influencing risk of those injuries; studies only examining personal characteristics (e.g., age, sex, experience); studies that reported only subjective perceptions; studies of injuries or crashes that occurred when the bicycle was being used for racing, mountain-biking, trick/trials riding, or play; and studies of injuries not related to a crash event. We did not search the primary research literature on helmets, but instead considered two recent literature reviews on this issue.

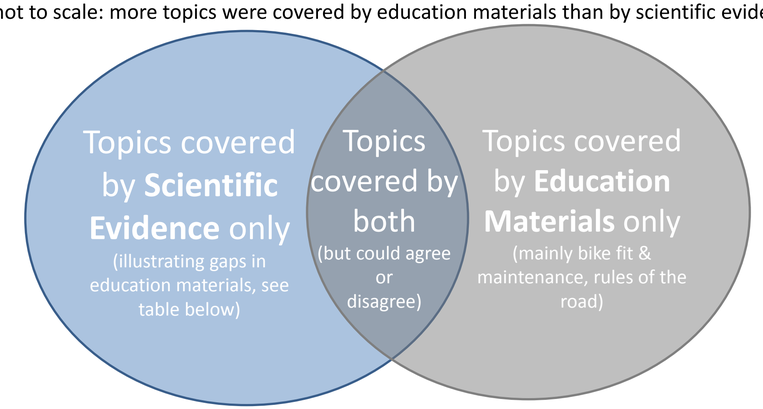
Results: Of over 400 articles identified in our search, most were excluded based on the above criteria (especially lack of a denominator) leaving 56 articles for our review. These studies were conducted all over the world, including North America (n=26 articles), Western Europe (11), Australia/New Zealand (6), Britain (5), Asia (3), South America (1), and Eastern Europe (1).

Main themes: Most of the evidence addressed two safety outcomes:
•injury or crash risk – "What is the risk of a crash or injury occurring?"
•injury severity – "Given an injury has occurred, how severe is it?"
The risks considered covered 5 overarching themes:

- bicycle-motor vehicle interactions
- route characteristics & conditions
- route types
- bicycling operations
- safety equipment.

Scientific Evidence vs. Education Materials

We analysed the topics covered in scientific evidence, and those covered in educational materials to determine where there were agreements, disagreements or gaps. *Venn diagram not to scale: more topics were covered by education materials than by scientific evidence.



Gaps and Incomplete Messages in Education Materials

Overarching Theme	Issue	Scientific evidence where there is a gap or an incomplete message in education materials
Route Characteristics & Conditions	Gap	Evidence indicates that roundabouts present an elevated injury risk for cyclists
	Gap	Evidence indicates that, after dark, routes without streetlights increase injury risk and severity
	Gap	Evidence indicates that foggy conditions increase injury severity
Route Types	Gap	Evidence indicates that bike-specific routes (cycle tracks, painted bike lanes, and off-street bike paths) decrease crash risk and injury severity
	Gap	Evidence indicates that routes separated from traffic (cycle tracks, residential streets with traffic diversion, bike paths) or with low traffic volumes (residential streets) decrease crash risk and injury severity
Bicycling Operations	Gap	Evidence indicates that listening to music while cycling reduces cyclist stability and perception
Bicycle – Motor Vehicle Interactions	Incomplete Message	Evidence indicates vehicles pass closer to cyclists riding further from the curb, and that passing distances are smaller with higher vehicle speeds, vehicles in the opposing direction, and heavy vehicles.
		Education message recommends cycling 1 m away from curb or parked cars. (included in 17/48 materials)
		Education message recommends taking the lane. (included in 11/48 materials)

2. Cycling Education Materials

Search: Cycling education materials meant for cyclists and drivers were identified using a systematic search of driver licensing agencies, cycling education and advocacy organizations, the web, and word of mouth.

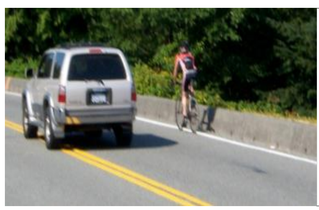
Results: 48 training materials were gathered from 12 provincial and territorial driver's licensing jurisdictions, 5 municipalities, and 7 advocacy organizations.

Main themes: bicycle-motor vehicle interactions, route characteristics & conditions, route types, bicycling operations, safety equipment., bike fit & maintenance, and rules of the road.

Implications for practice

Overall, we found that many of the principles covered in the cycling education materials were supported by scientific evidence.
A full report on these findings has been disseminated to all of the agencies who contributed materials, and is available at: http://cyclingincities.spph.ubc.ca/files/2012/09/EvidenceTrainingReport.pdf.
The findings were also discussed in webinars in Summer 2012 which included individuals and agencies across Canada.

Gaps in Route Planning Information: Guidance on the best route types to reduce injury risk would help cyclists plan their routes



Incomplete guidance on positioning: Advice on road positioning, which was commonly included, should indicate situations where motorists are likely to pass closer to cyclists.

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