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Perceptions of Yielding, Comfort and Safety for Pedestrians at Unsignalized Crossings (on 10th Avenue)

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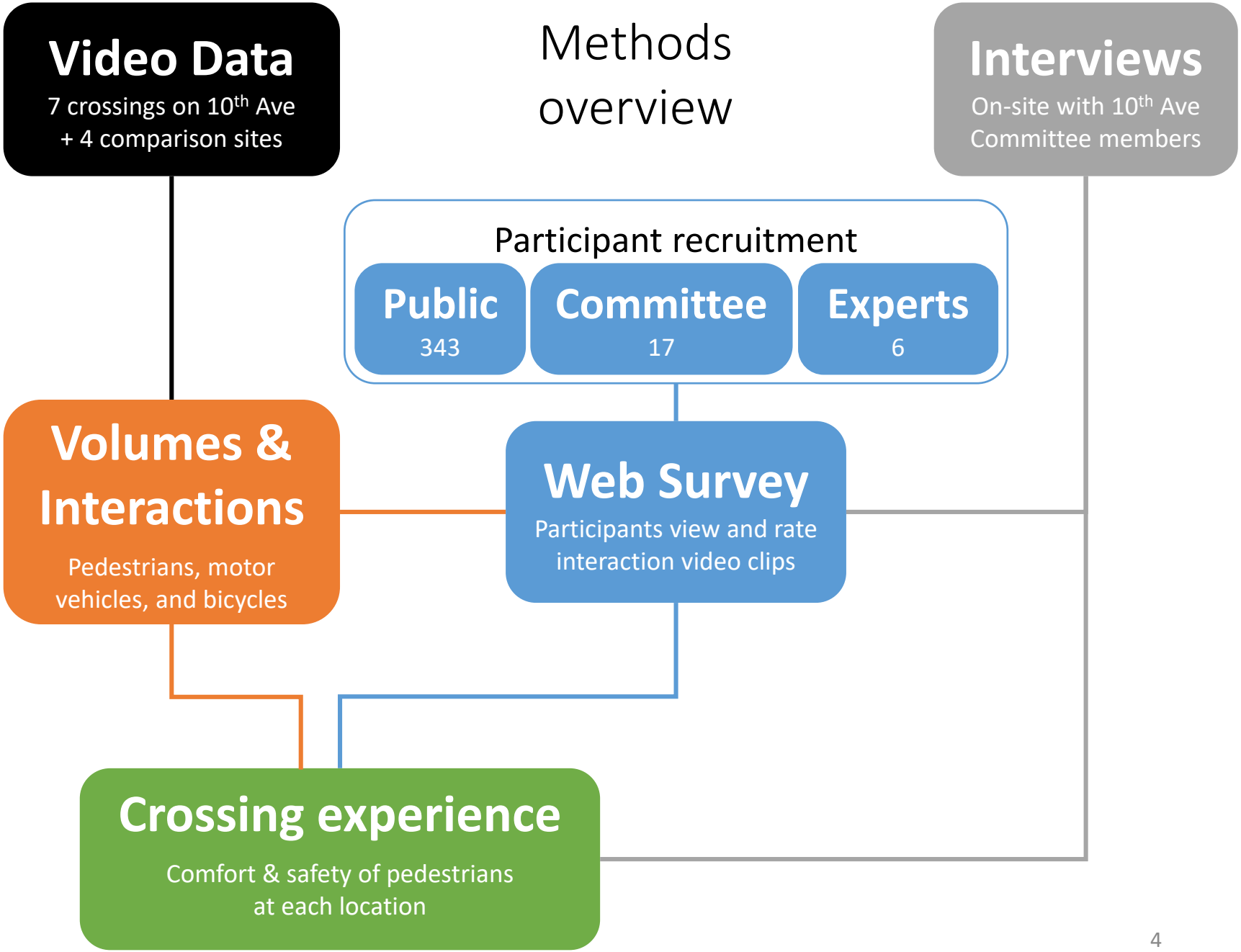
Project objectives

1. Describe the concerns of pedestrians in navigating the recently rebuilt portion of 10th Ave
2. Determine the frequency of road user interactions on 10th Ave and at comparable sites in the city
3. Determine the frequency of uncomfortable and unsafe interactions, as perceived by different groups of stakeholders
4. Examine systematic differences in the perceptions of interactions among stakeholders

Motivations

- Limitations of typical traffic safety analysis
  - Often relies on crash data, and vehicle-oriented
  - Expert evaluations may not reflect public perspectives
  - Unclear definitions of interactions and yielding, particularly for pedestrians and cyclists
- Compliance may not reflect public expectations
- Need to understand a broad range of perspectives
- Subjective nature of comfort and risk perception
- Limited data (but much interest) in ped-bike and ped-vehicle interactions

Methods overview



1. On-Site Interviews

March 2019

Interviews

Conducted by:

- Meghan Winters, Marie-Soleil Cloutier, Kate Hosford (notes)

Feedback from 9 10th Ave Evaluation Committee Members:

- 7 onsite, 1 phone, 1 e-mail
- Diverse perspectives: transport experts, citizens/advisory committee members, health care employees, patients, frequent and infrequent users of the corridor
- Different modes of travel on the corridor: walking, cycling, driving

Interview content:

- General feedback about 10th Ave corridor changes, specific areas of concern, and perceptions on yielding, comfort, and safety for pedestrian crossings

General Feedback (1)

- **Overall improvement**, more awareness and delineation of where people should be, perceived slower speeds
- **Wayfinding** is good, nicely done, and helpful especially for out of town visitors
- **Complexity**- a lot going on on the street (design, road users, signage), but changes are an improvement and for the most part clear where people are supposed to go
- **Many of the challenges inherited** (VGH emergency access, street geometry @ Laurel), but feeling the new design accommodates as best it can
- During **construction** flaggers were exceptional (with the exception of a comment about smoking)… a model for future city projects

General Feedback (2)

- Acknowledge **inherent conflicts** in design needs for different users (people using wheelchairs, people with seeing eye dogs)
- **Phased approach** taken by the city creates problems in and of itself
- Concerns about reduction of **on-street parking** for patients attending clinics
  - Reports from doctors at Diamond Centre saying patients late or don't show up because of difficulty in finding parking
  - Also heard employees and regular patients were aware of and used off-street options
  - Time to see action on the parking lot at 10th and Ash
- Pedestrian jaywalking may suggest need for **mid-block crossings**. May also need additional crossings for pedestrians with mobility limitations

Oak St & W 10th Ave

Laurel St (South) & W 10th Ave

Laurel St (North) & W 10th Ave

Access to VCH Cycling Centre

Willow St & W 10th Ave

Observations of Yielding, Comfort, and Safety

- Importance of **eye contact/non-verbal** communication in negotiating complex road user environment
- Many pedestrians **giving way** to bikes and cars at crossings
- Virtually all the interactions we saw were **considerate**
- Very **slow travel speeds** at mid-day time periods
- **Pick up/drop** off zones seemed to be working well
- **Driveways** are interaction zones (in addition to the intersections)

Themes

- **Visitors to the area vs. staff**
- **Separation of travel modes**
  - Overall good
  - Cues for blind are not consistent in some parts, surfaces inconsistent
  - Grade separation between bike lane and sidewalk – maybe should be larger – more distinction for road users/guide dogs
- **Interactions**
  - Concerns remain for more vulnerable pedestrians and patients, visitors
  - “Before improvements, as a cyclist I was worried about cars. Now there is a change… as a cyclist I am worried about pedestrians!”
- **Phased approach of the project**

2. Video data

Sept-Dec 2018

10th Ave. locations

Laurel St., south approach

West crosswalk

East crosswalk

Laurel St., north approach

West crosswalk

East crosswalk

Arthritis Centre Entrance

Willow St., north approach

West crosswalk

East crosswalk

Comparison locations

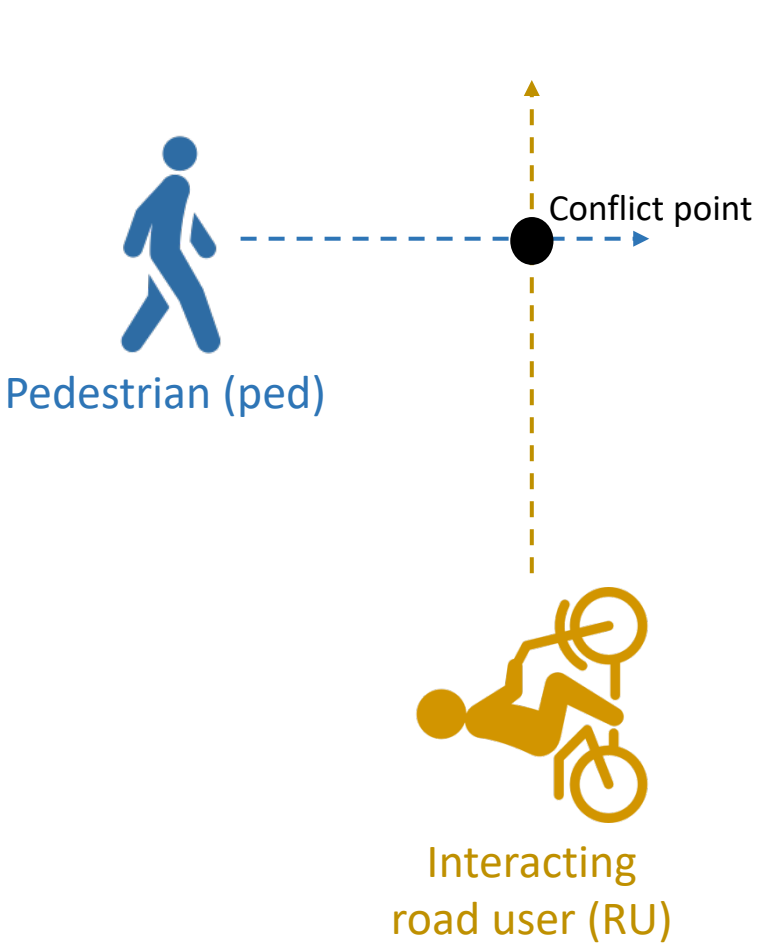
Laurel & 7th

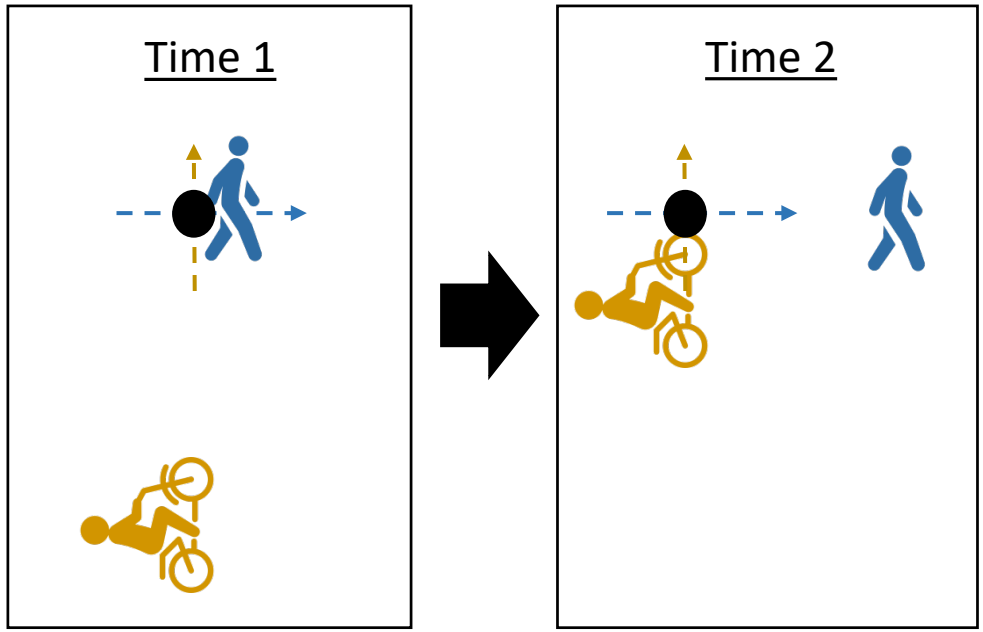
Heather & 11th

Lakewood & Adanac

Haro & Bute

Interactions defined by passing time





Time gap between when
the first RU exits the conflict point
and the second RU enters it

We began with a conservative definition of potential interactions as passing time < 5 sec

1. Video data review

2. Random samples by location

Code passing time and other features

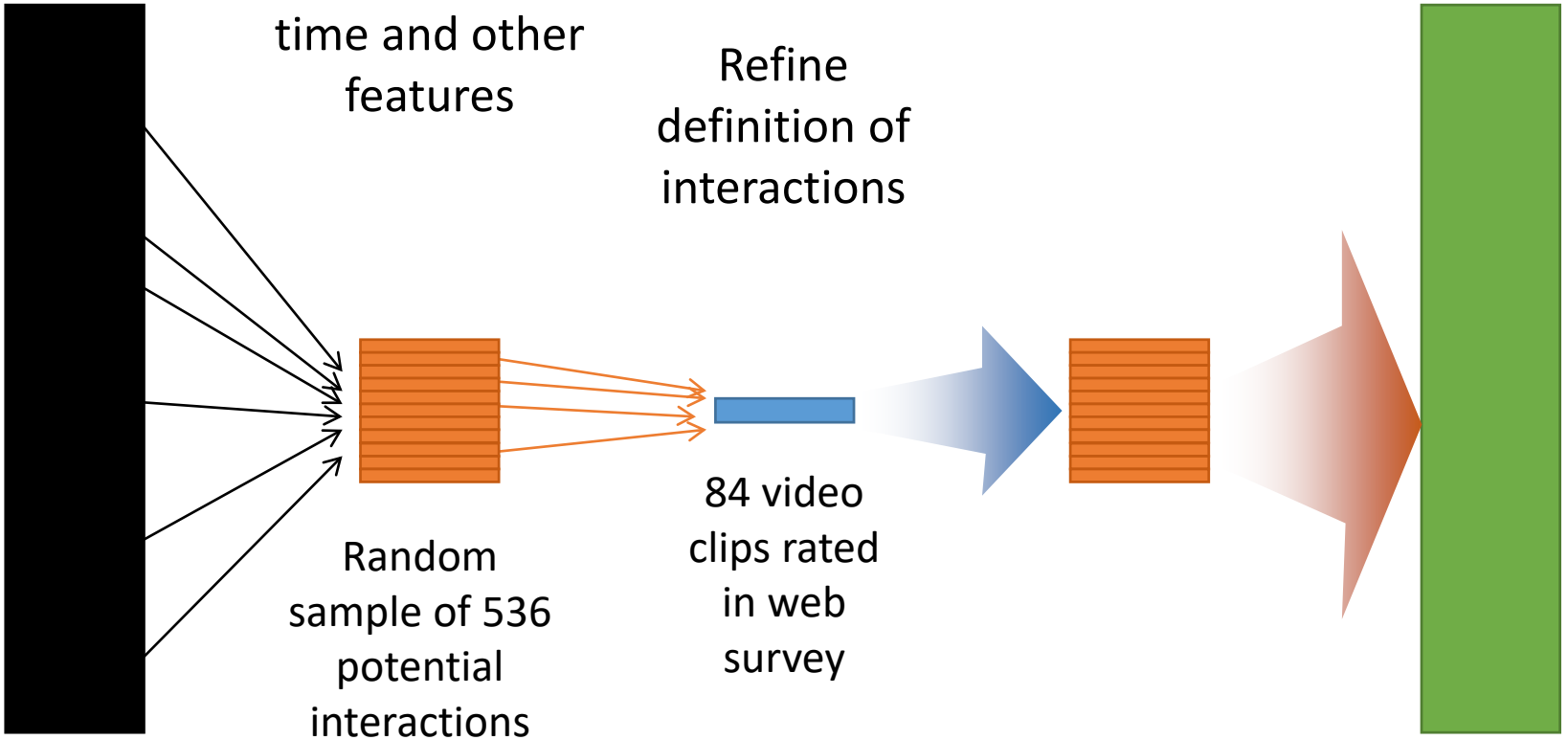
3. Web survey rating

Statistical models

Refine definition of interactions

4. Apply models of interaction severity

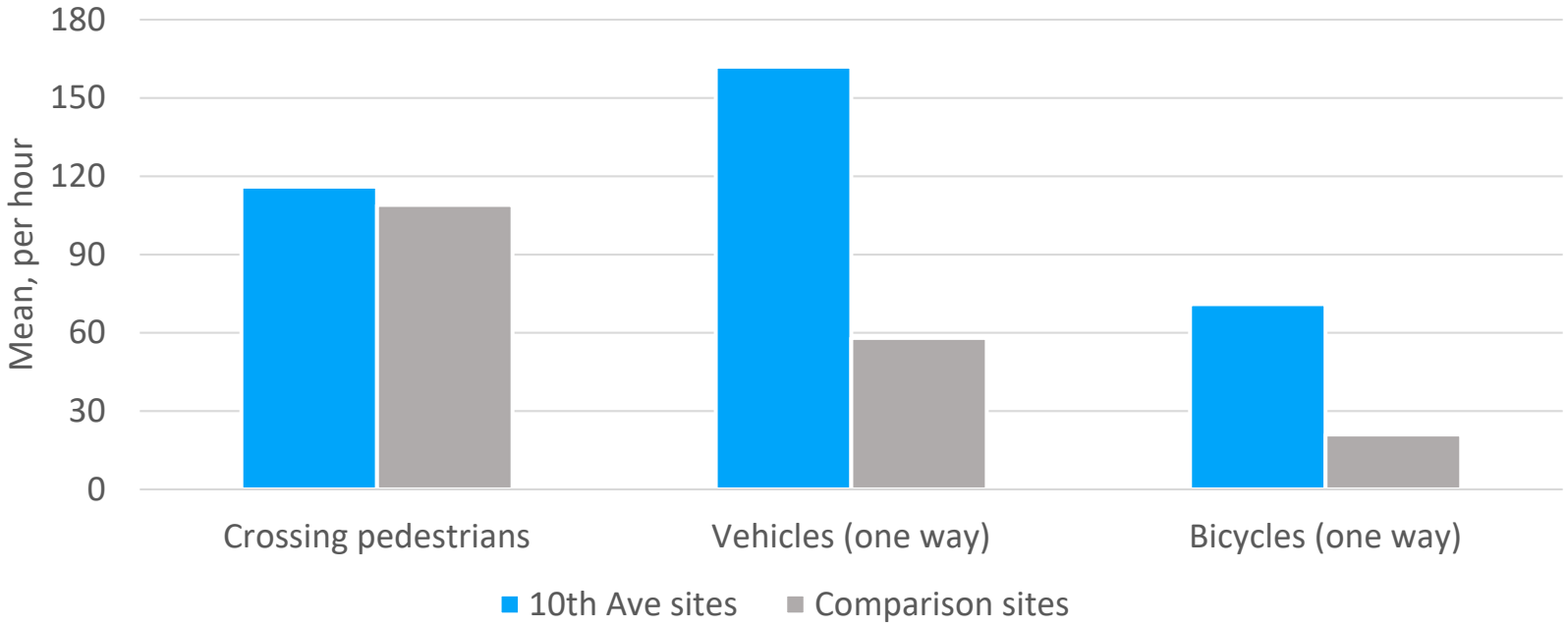
5. Extrapolate to pedestrian crossing experiences

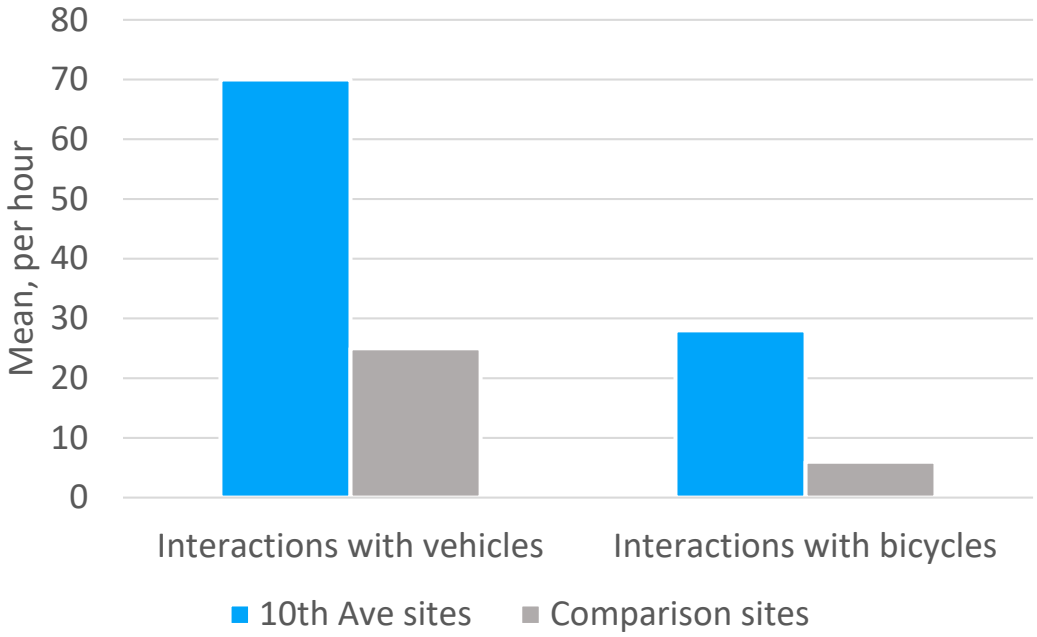


4400 potential interactions in 80 hours of video data

Random sample of 536 potential interactions

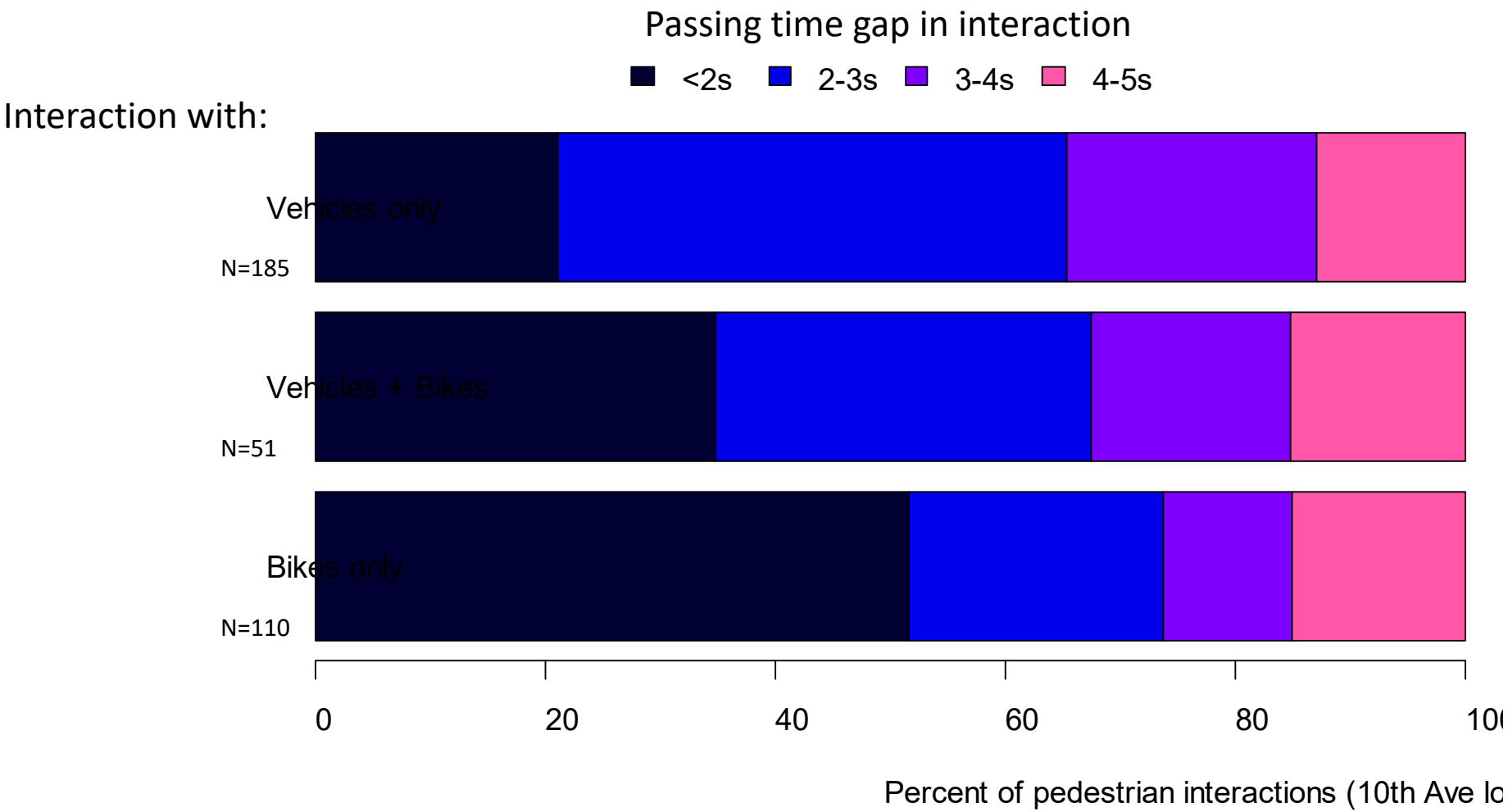
84 video clips rated in web survey


180
150
120
90
60
30
0
Mean, per hour
Crossing pedestrians
Vehicles (one way)
Bicycles (one way)
10th Ave sites
Comparison sites


80
70
60
50
40
30
20
10
0
Mean, per hour
Interactions with vehicles
Interactions with bicycles
10th Ave sites
Comparison sites

3. Sample interactions

Passing times in sample interactions

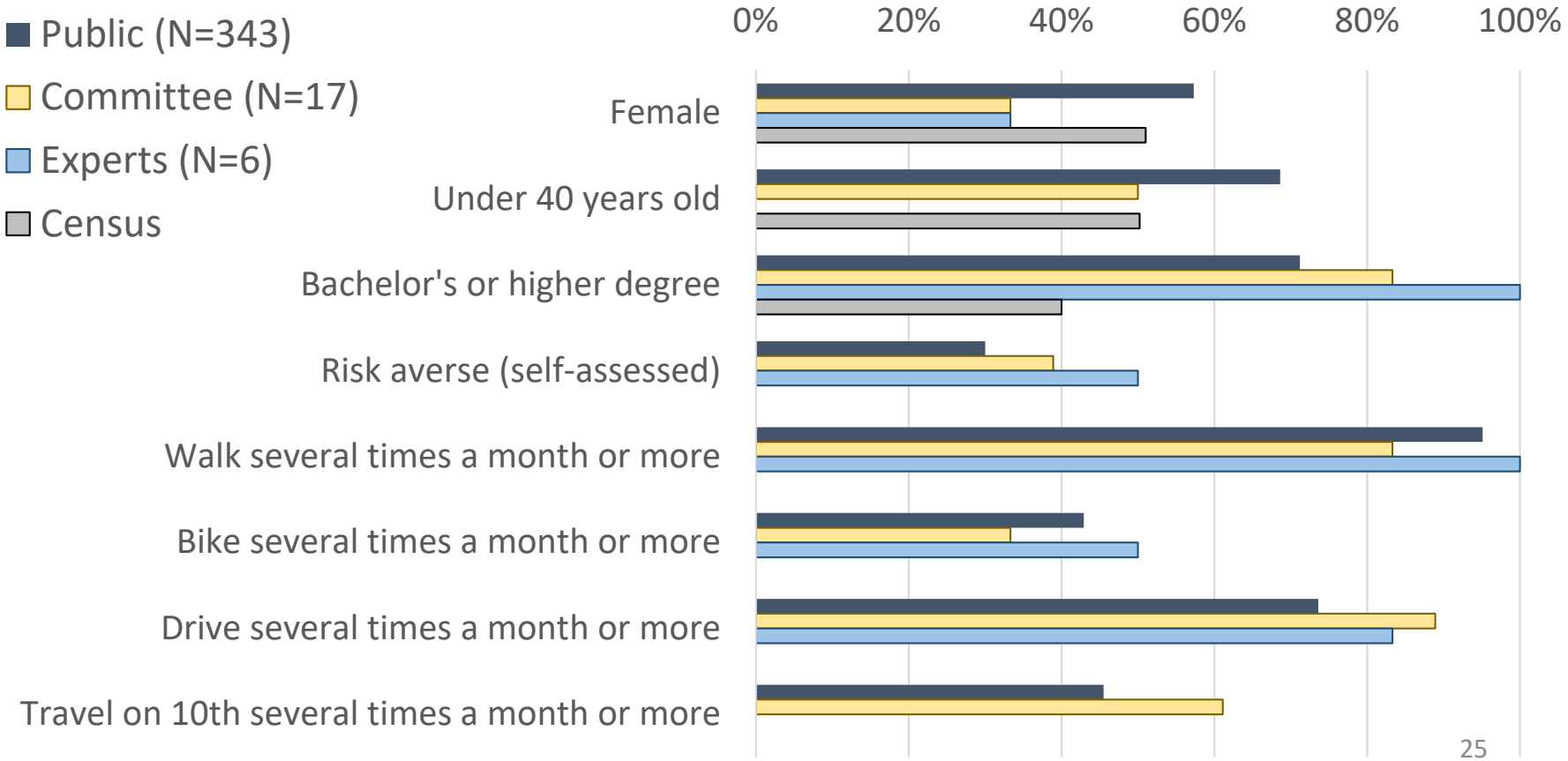


4. Web survey

April-May 2019

Web survey participants

Created sample weights on age, gender, income, & education to represent City demographics from Census



84 video clips rated in web survey

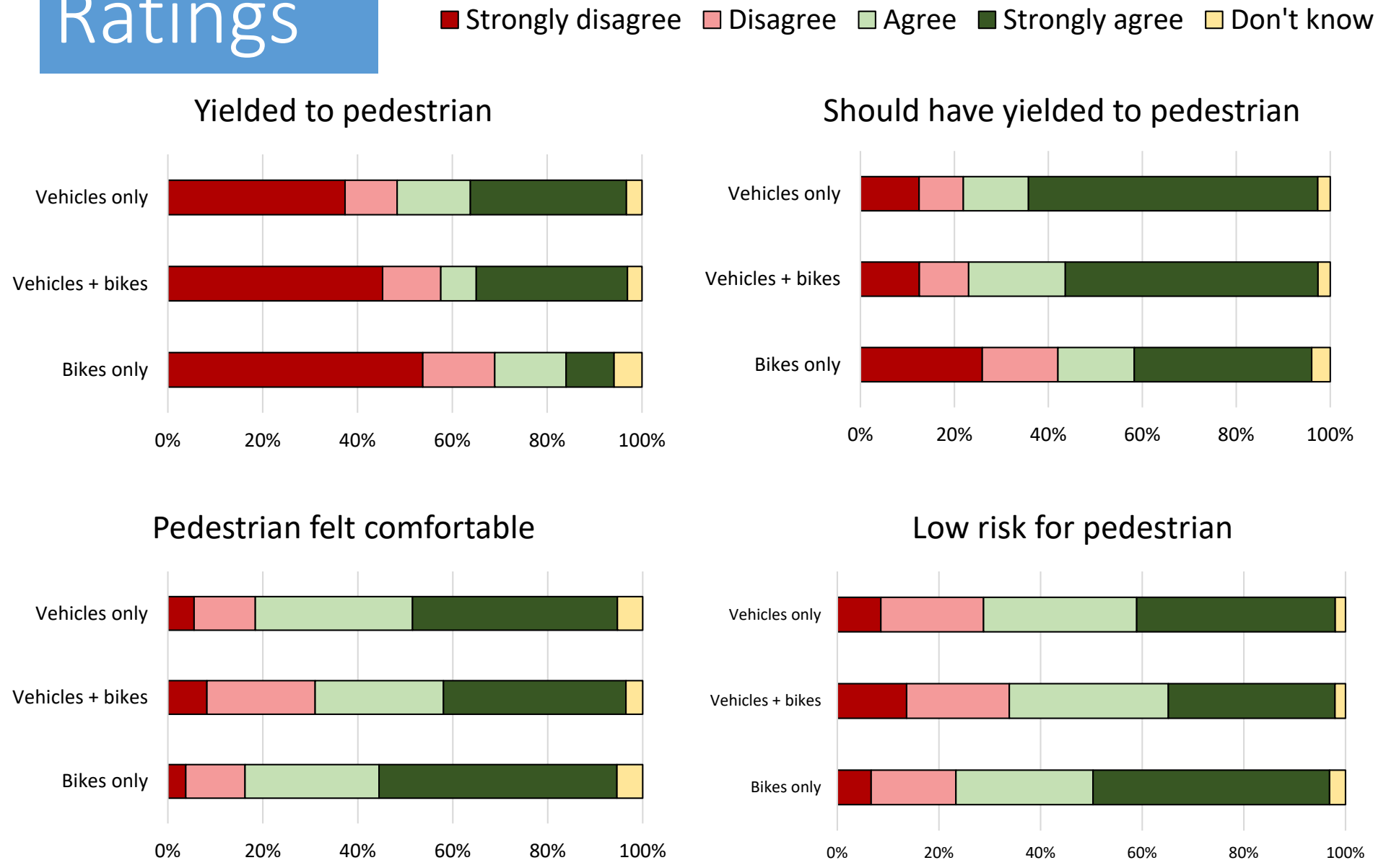
Stratum	Interacting road users	Passing time gap	Videos in survey (& shown to Expert pool)	Videos shown to Community and Public pools	Total ratings
1	1 bicycle	<2 sec	12	3	1080
2	1 bicycle	2-3 sec	10	2	734
3	1 bicycle	3-4 sec	8	1	381
4	1 vehicle	<2 sec	12	3	1081
5	1 vehicle	2-3 sec	10	2	728
6	1 vehicle	3-4 sec	8	1	383
7	2 or more vehicles	<4 sec	8	1	380
8	1+ vehicles and 1+ bicycles	<4 sec	8	1	381
9	2 or more bicycles	<4 sec	8	1	381

Rating video clips in web survey

Regarding the interaction between the crossing **pedestrian** and the closest **vehicle** shown in the video, please indicate your level of agreement with the statements below:

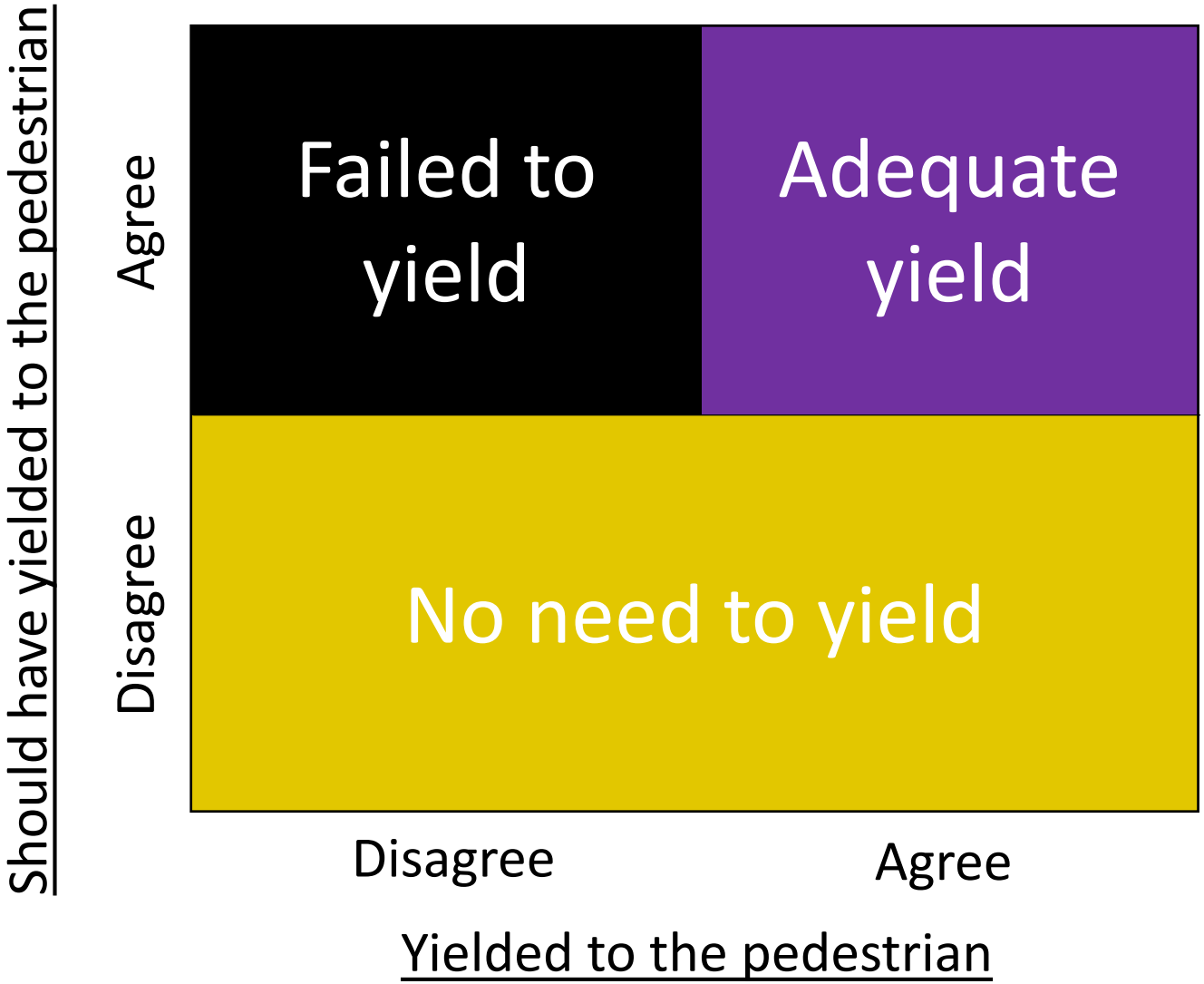
	Strongly disagree	Somewhat disagree	Somewhat agree	Strongly agree	I don't know
The driver yielded to the pedestrian.	○	○	○	○	○
The driver ***should*** have yielded to the pedestrian.	○	○	○	○	○
The pedestrian felt comfortable in this crossing.	○	○	○	○	○
The risk of injury for the pedestrian in this crossing was low.	○	○	○	○	○

Ratings

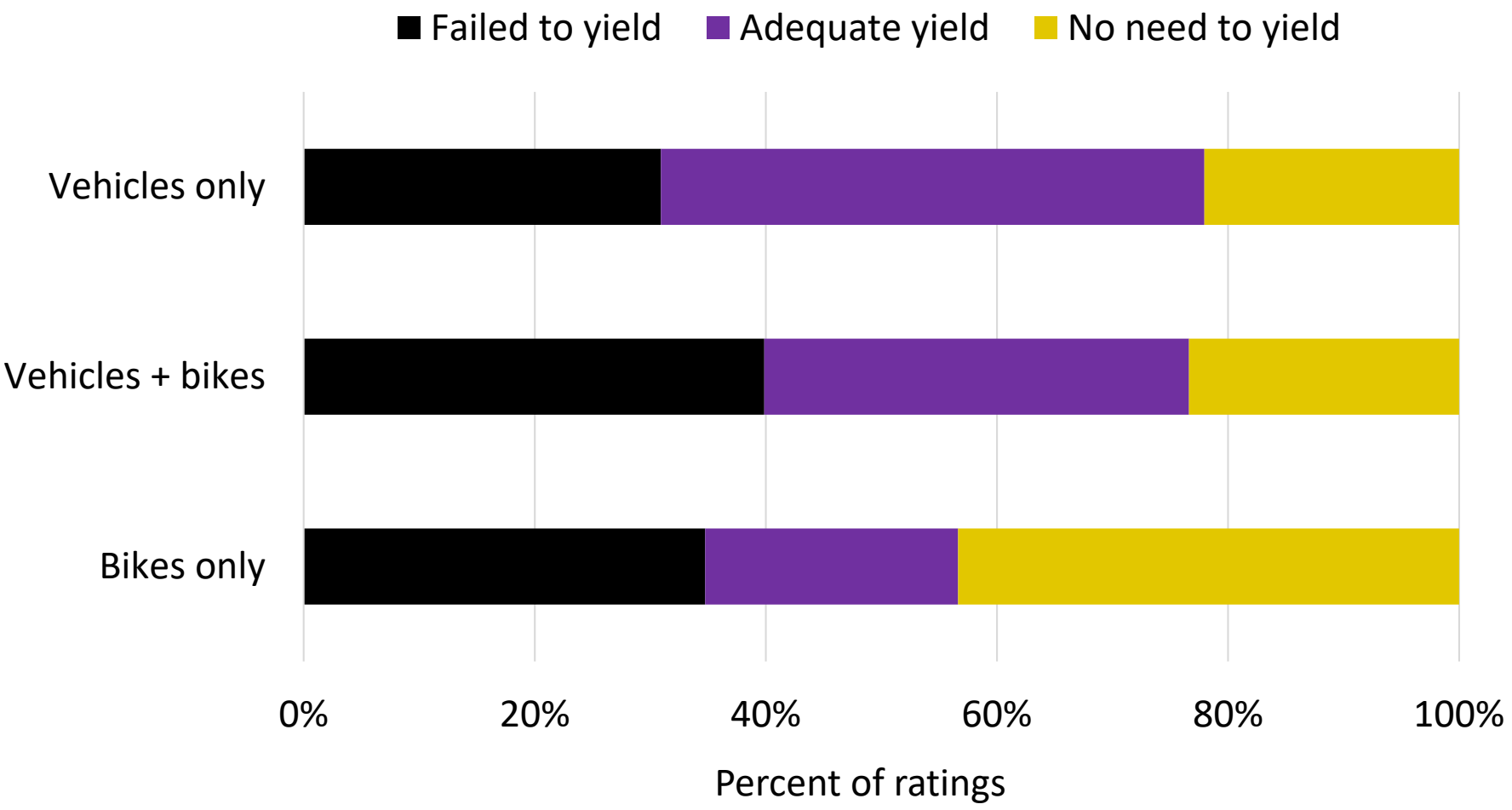


Percent of ratings (*not representative of all interactions*)

“Adequate” yielding



Ratings – “adequate” yielding



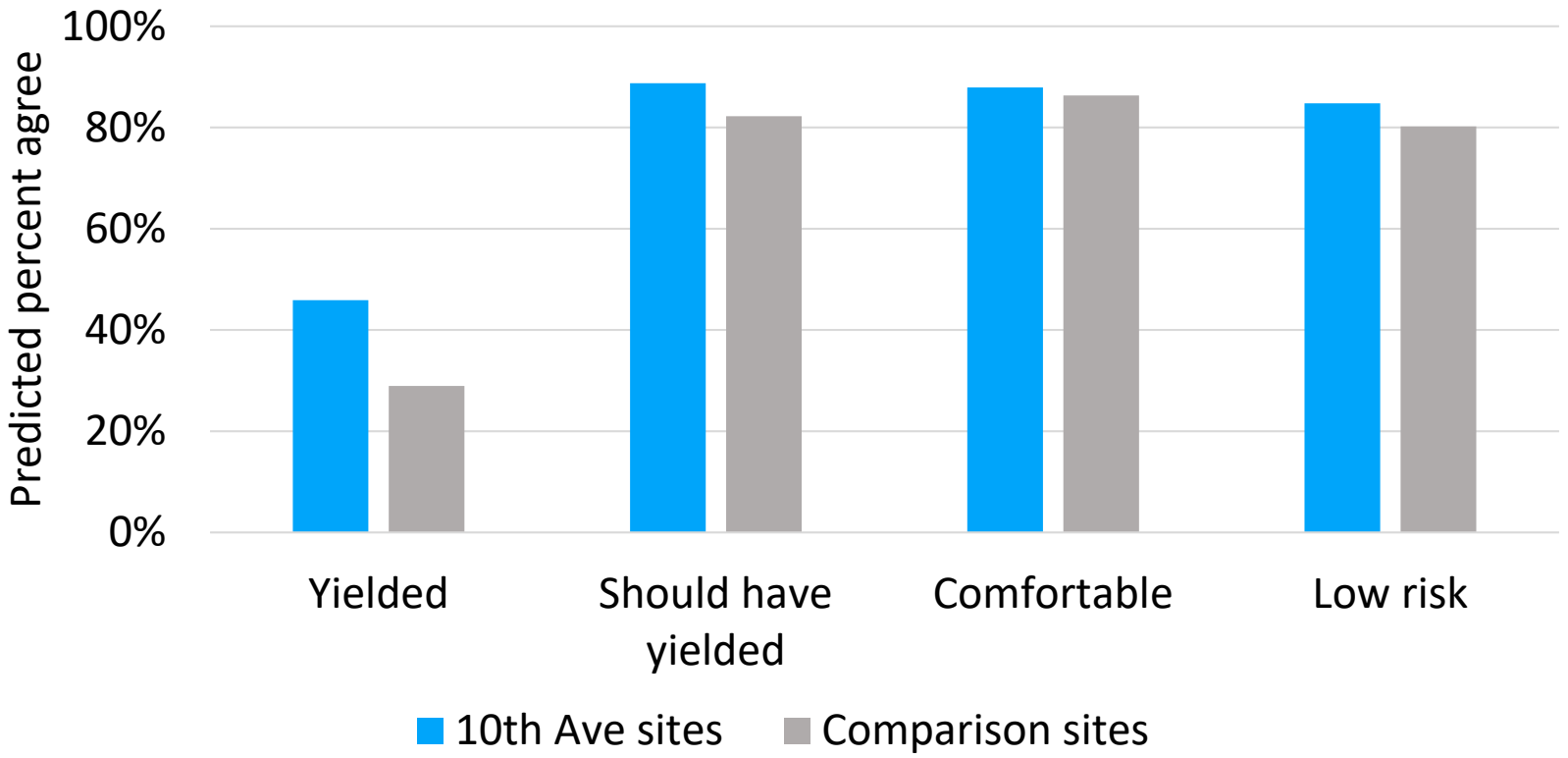
Highlights from statistical analysis

- Comfort is hardest to predict
  – followed by risk, obligation to yield, and yielding
- Passing time was the only significant predictor of all four severity outcomes

- *Controlling for other factors (road user, rater, etc…)*
  - Yielding and risk rated better on 10th Ave than at controls
  - Interactions with cyclists were rated as more comfortable
    - Rated as yielding less, but also less need to yield
  - Pedestrian passing first was crucial for perceived yielding
    - More important than speed/path deviations
    - Also perceived as more comfortable (not necessarily safer)

How do 10th Ave locations compare?

Given a pedestrian in the ramp crossing a 2-lane road with 2.5 sec passing time and other average features…



Different perspectives?

- No significant differences between public/committee
- Traffic safety experts rate risk as lower
  - For all interaction types (vehicles and bicycles)
  - No significant differences for yielding or comfort
- Raters who bicycle more also rate risk as lower
  - For all interaction types (vehicles and bicycles)
- Raters who walk more rate comfort as lower
  - Also more strongly agree road users "should have yielded"
- *No significant effects of socio-demographics or 10th Ave familiarity on ratings*

When has an “interaction” occurred?

Predicted passing time thresholds for ≥ 85% agreement that the road user…

	Interactions with:	
	Vehicles	**Bikes**
Should have yielded	≤ 3.3 s	≤ 1.2 s
Comfortable	≥ 2.7 s	≥ 2.1 s
Low risk (Public)	≥ 3.2 s	≥ 2.6 s
Low risk (Experts)	≥ 1.6 s	≥ 1.0 s

(assumes 2-lane road, with pedestrian in ramp)

A data-informed threshold for interactions

Based on the previous, we apply a 3-second passing time threshold to identify interactions

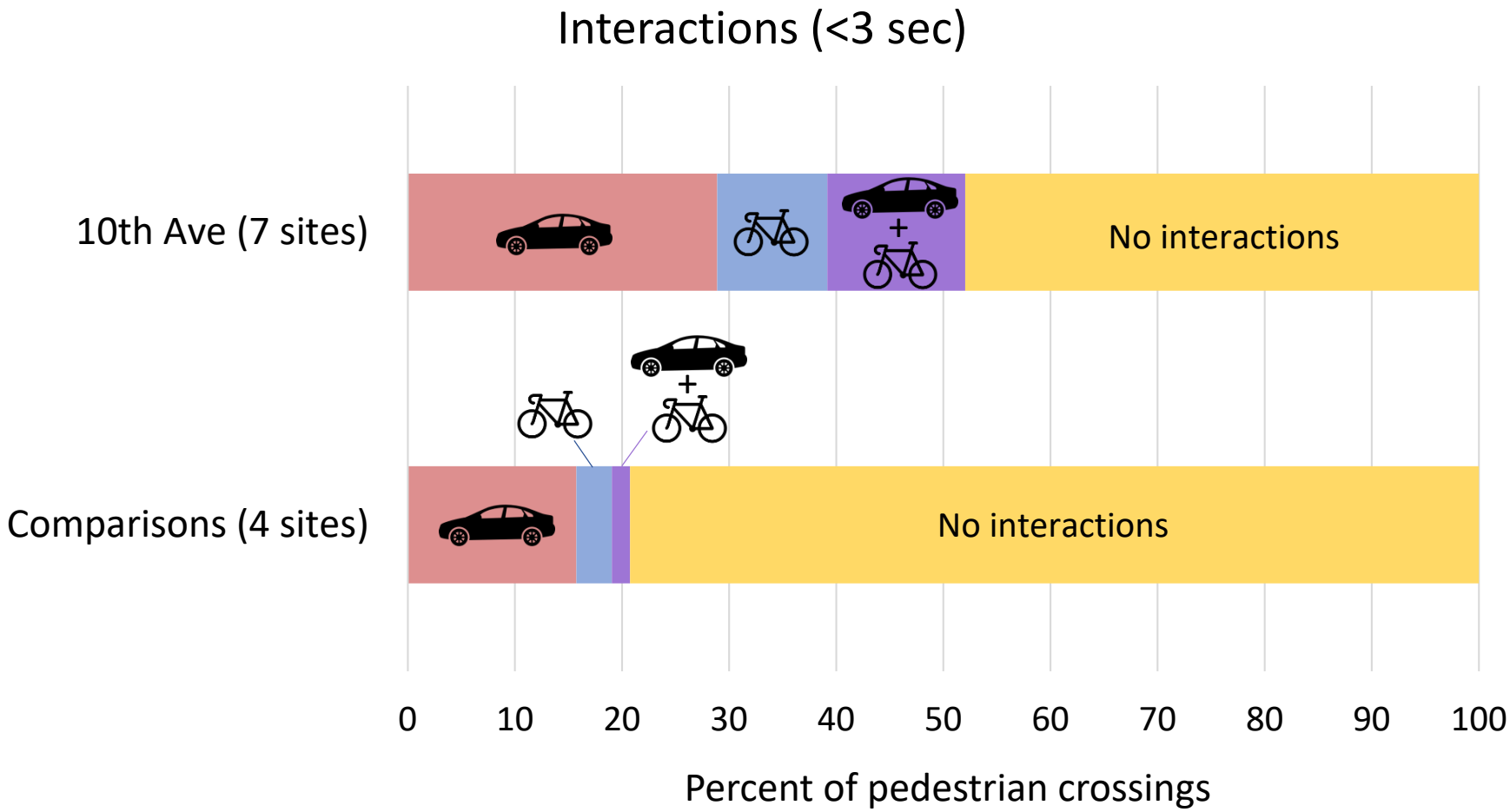
277 out of the 536 potential interactions were <3 sec

- 58% of potential interactions at 10th Ave locations
- 41% of potential interactions at comparison sites

5. Apply severity models &

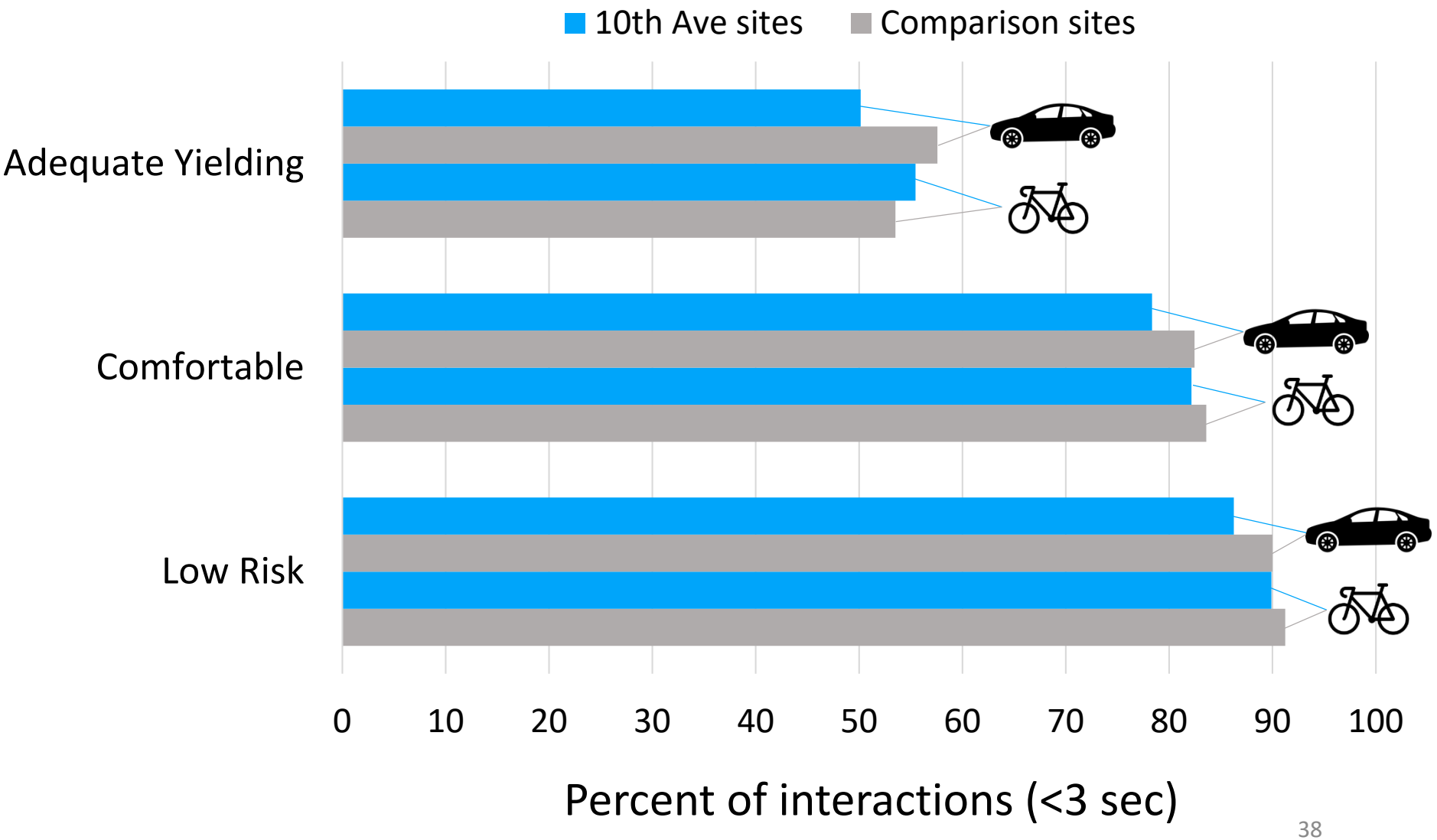
6. Extrapolate to crossing experience

Frequency of interactions by location

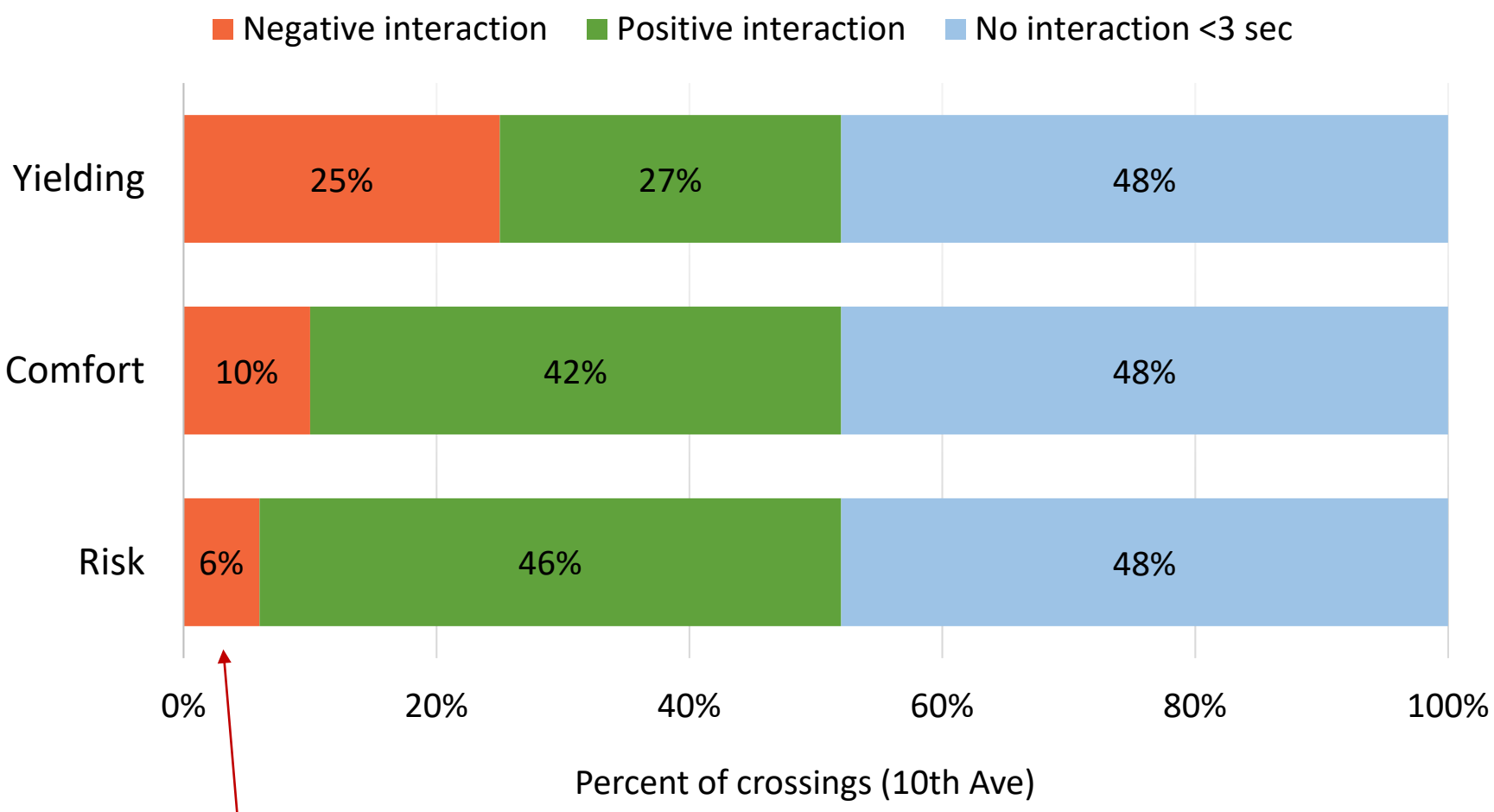


* Including 2-way interactions, based on ±3 sec passing time

What is the severity of those interactions?



What is the overall crossing experience?



Most of these are still not highly uncomfortable or high-risk

<2% "strongly disagree" Comfortable
<1% "strongly disagree" Low risk

10th Ave has high interaction rates during weekdays

50% of pedestrian crossings involve an interaction

Most crossings are “low risk” (94%) and “comfortable” (90%)

25% of crossings involve inadequate yielding

For *otherwise similar interactions*, 10th Ave has higher yielding rates and lower risk than comparison sites

This is partially offset by longer crossings, higher volumes, etc.

Traffic safety experts have similar views of yielding and comfort to the Public, but lower assessment of risk

Pedestrian interactions with bicycles are more comfortable and lower risk than interactions with vehicles

Thank you

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