

# Efectos sobre el comportamiento

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## *Infraestructura ciclista*



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A red bicycle is parked on a paved street. The bicycle is the primary focus on the left side of the image. On the pavement to the right of the bicycle, there is a white painted symbol of a bicycle, indicating a designated bike lane or parking area. The background is a blurred asphalt surface.

# Premisas

- **Incentivación de la bicicleta como modo de transporte: herramienta de planificación.**
- **Objetivos de crecimiento claros y medibles**
- **Necesidad de evitar incoherencias en la política de transporte**
- **Retraso ciudad de Madrid vs ciudades Españolas y Europeas**
- **Factor determinante: Eficiencia red ciclista**

# ***Factores determinantes***

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Lo fácil o difícil que resulta  
realizar comportamiento  
***PERCEPCIÓN DEL ENTORNO***

Valoración (+) (-) de esa  
conducta. Consecuencias de  
llevarla a cabo → ***ACTITUDES***

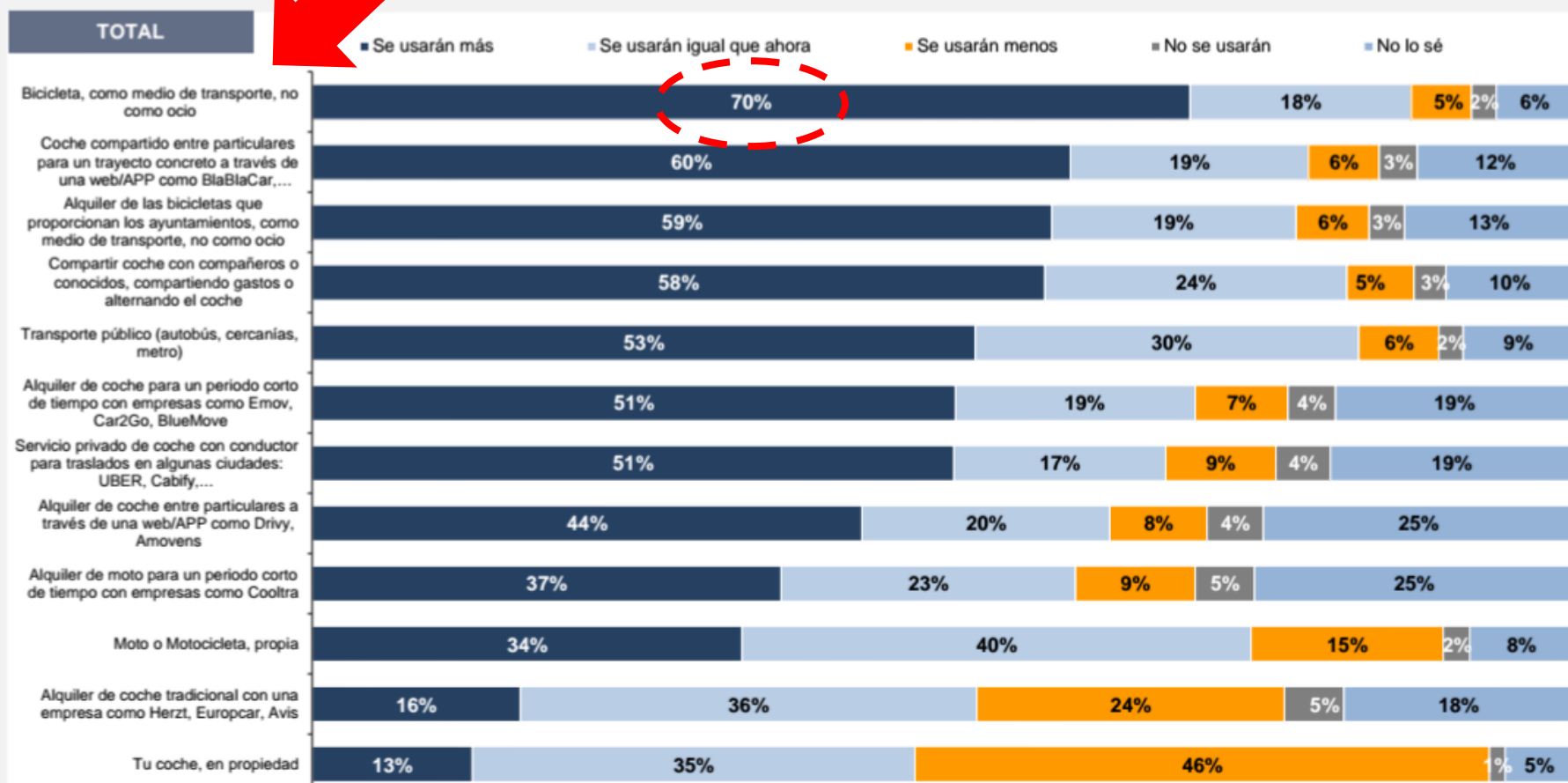
Sistema de valores y  
obligación moral  
***NORMA PERSONAL***

Las personas hacen lo que  
siempre han solido hacer  
***HABITO, INERCIA***

Lo que hacen o piensan amigos,  
familia o colegas de trabajo →  
***NORMA SOCIAL***

### B.3.2. Millennials: Cómo se mueven. Movilidad futura

¿CÓMO CREES QUE SERÁ LA EVOLUCIÓN A MEDIO PLAZO, LOS PRÓXIMOS 5 O 6 AÑOS, DE LOS SIGUIENTES MEDIOS DE TRANSPORTE? (P.7)

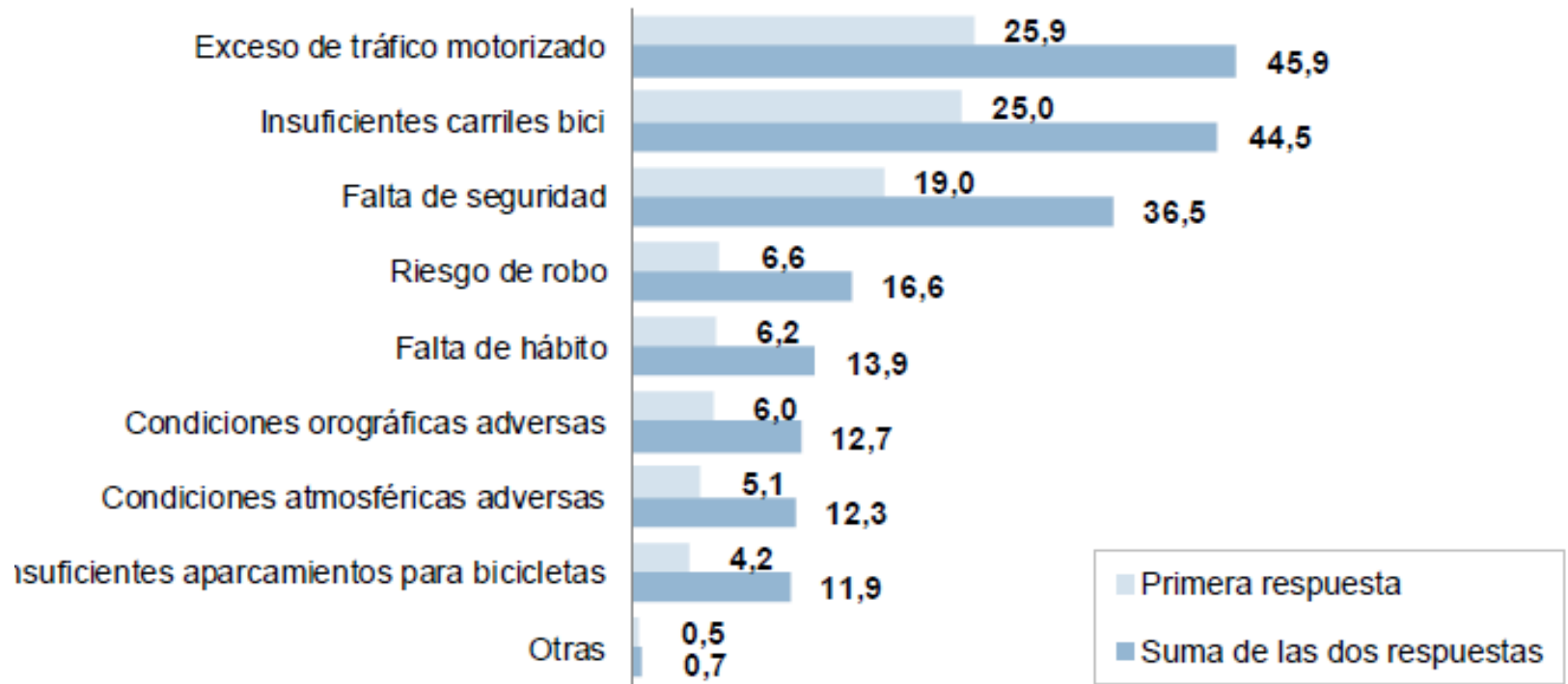


*Valoración (+) bicicleta y cambio en la norma social (2018)*

# Facilitar conducta objetivo: Fundamental en sostenibilidad y salud pública

DE LAS SIGUIENTES, ¿CUÁL CREE QUE ES LA PRINCIPAL DIFICULTAD PARA DESPLAZARSE EN BICICLETA POR LA CIUDAD? ¿Y LA SEGUNDA?\*

—Sugerida—



*Todo un clásico (BBE, 2017)*

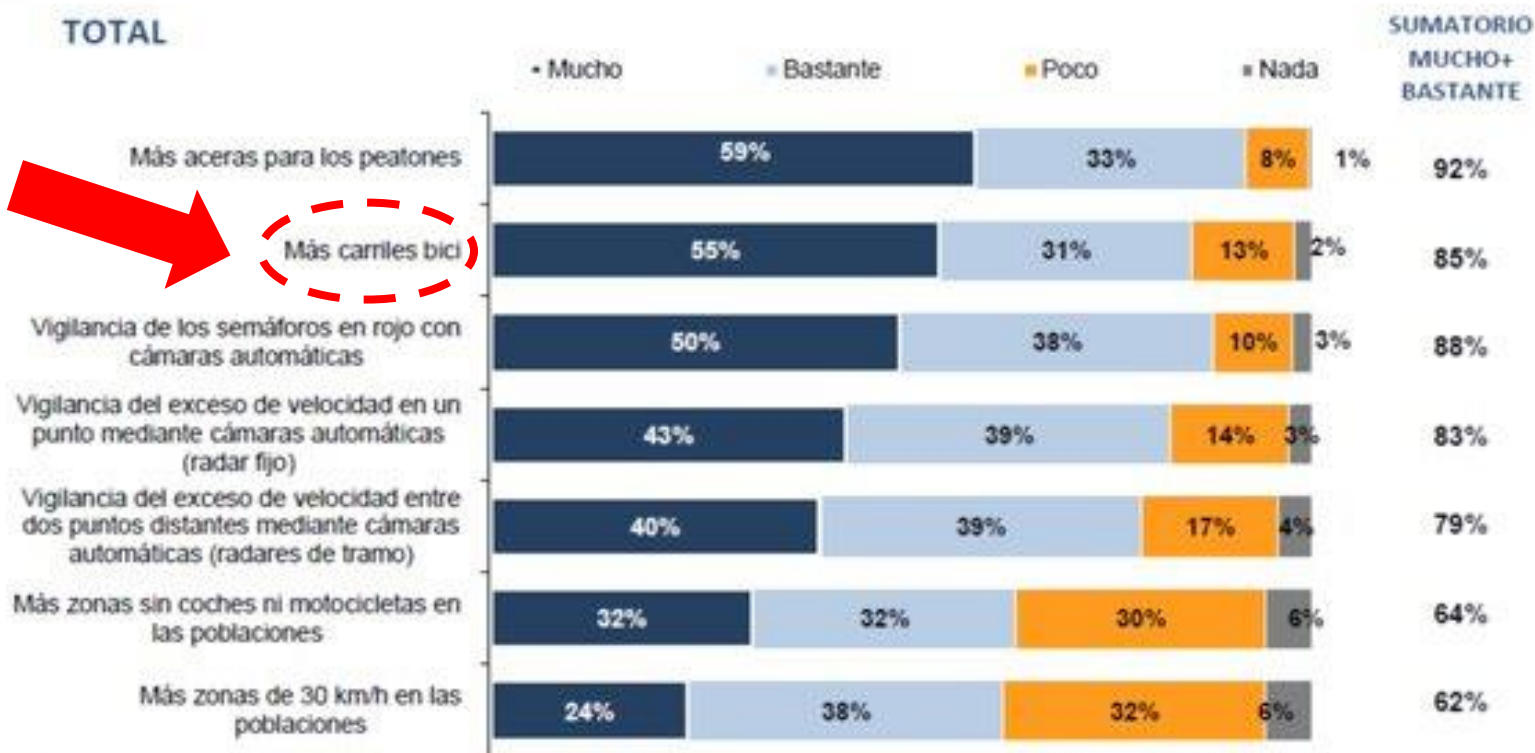
*Datos Madrid, similares (Muñoz, Monzón y Lois 2013)*

## 7. GRADO DE ACUERDO ANTE LA APLICACIÓN DE TECNOLOGÍAS Y SISTEMAS PARA LA SEGURIDAD VIAL Y ANTE EL ENDURECIMIENTO DE MEDIDAS SANCIONADORAS

Fundación  
**MAPFRE**

¿EN QUÉ GRADO ESTÁS A FAVOR DE LAS SIGUIENTES MEDIDAS? (P.10)

**TOTAL**



Base: Total de personas entrevistadas (1876)



**Table 1.** Key policies and innovative measures used in Dutch, Danish and German cities to promote safe and convenient cycling

**Extensive systems of separate cycling facilities**

- Well-maintained, fully integrated paths, lanes and special bicycle streets in cities and surrounding regions
- Fully coordinated system of colour-coded directional signs for bicyclists
- Off-street short-cuts, such as mid-block connections and passages through dead-ends for cars

**Intersection modifications and priority traffic signals**

- Advance green lights for cyclists at most intersections
- Advanced cyclist waiting positions (ahead of cars) fed by special bike lanes facilitate safer and quicker crossings and turns
- Cyclist short-cuts to make right-hand turns before intersections and exemption from red traffic signals at T-intersections, thus increasing cyclist speed and safety
- Bike paths turn into brightly coloured bike lanes when crossing intersections
- Traffic signals are synchronized at cyclist speeds assuring consecutive green lights for cyclists (green wave)
- Bollards with flashing lights along bike routes signal cyclists the right speed to reach the next intersection at a green light

**Traffic calming**

- Traffic calming of all residential neighbourhoods via speed limit (30 km/hr) and physical infrastructure deterrents for cars
- Bicycle streets, narrow roads where bikes have absolute priority over cars
- 'Home Zones' with 7 km/hr speed limit, where cars must yield to pedestrians and cyclists using the road

**Bike parking**

- Large supply of good bike parking throughout the city
- Improved lighting and security of bike parking facilities often featuring guards, video-surveillance and priority parking for women

**Coordination with public transport**

- Extensive bike parking at all metro, suburban and regional train stations
- 'Call a Bike' programmes: bikes can be rented by cell phone at transit stops, paid for by the minute and left at any busy intersection in the city
- Bike rentals at most train stations
- Deluxe bike parking garages at some train stations, with video-surveillance, special lighting, music, repair services and bike rentals

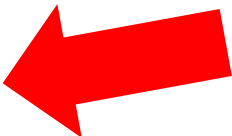
**Traffic education and training**

- Comprehensive cycling training courses for virtually all school children with test by traffic police
- Special cycling training test tracks for children
- Stringent training of motorists to respect pedestrians and cyclists and avoid hitting them

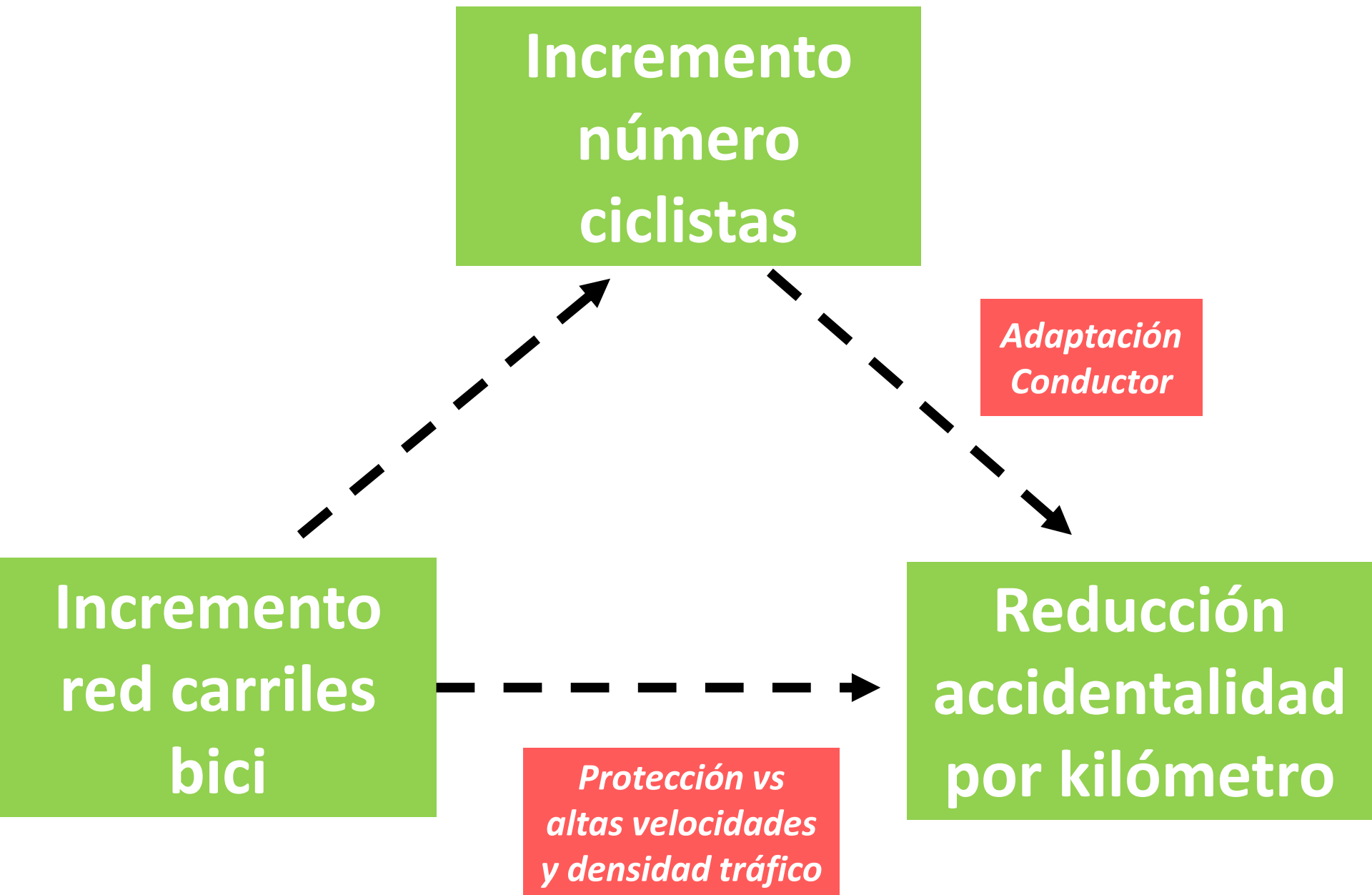
**Traffic laws**

- Special legal protection for children and elderly cyclists
- Motorists assumed by law to be responsible for almost all crashes with cyclists
- Strict enforcement of cyclist rights by police and courts

Source: Information provided directly to authors by bicycling coordinators in the Netherlands, Denmark and Germany



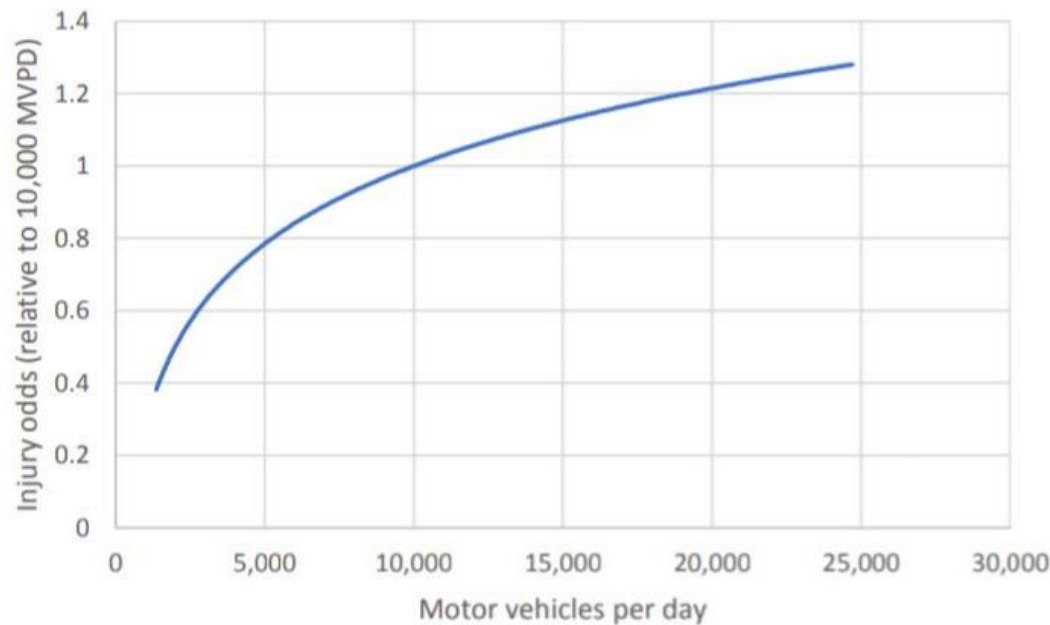
**Pucher y  
Buehler (2008)**



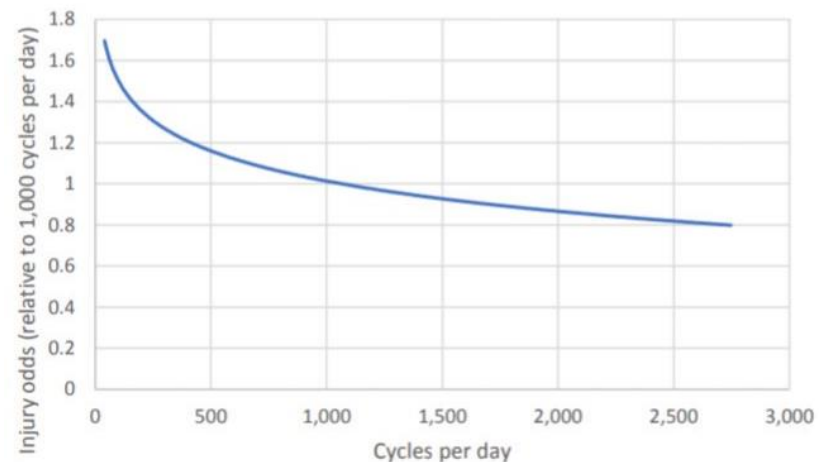
# I. Efectos ciudad redes ciclistas



Injury odds vs. motor vehicles per day



Injury odds vs. cycles per day



**Londres: Número de vehículos motor →**  
**Incremento +31% riesgo; Número bicicletas →**  
**Descenso -18% riesgo.**

Almond, B., Goodman, A., Gulliver, J., & Woodcock, J. (2018). Cycling injury risk in London: a case-control study exploring the impact of cycle volumes, motor vehicle volumes, and local characteristics including speed limits. *Accident Analysis & Prevention*, 117, 75-84.

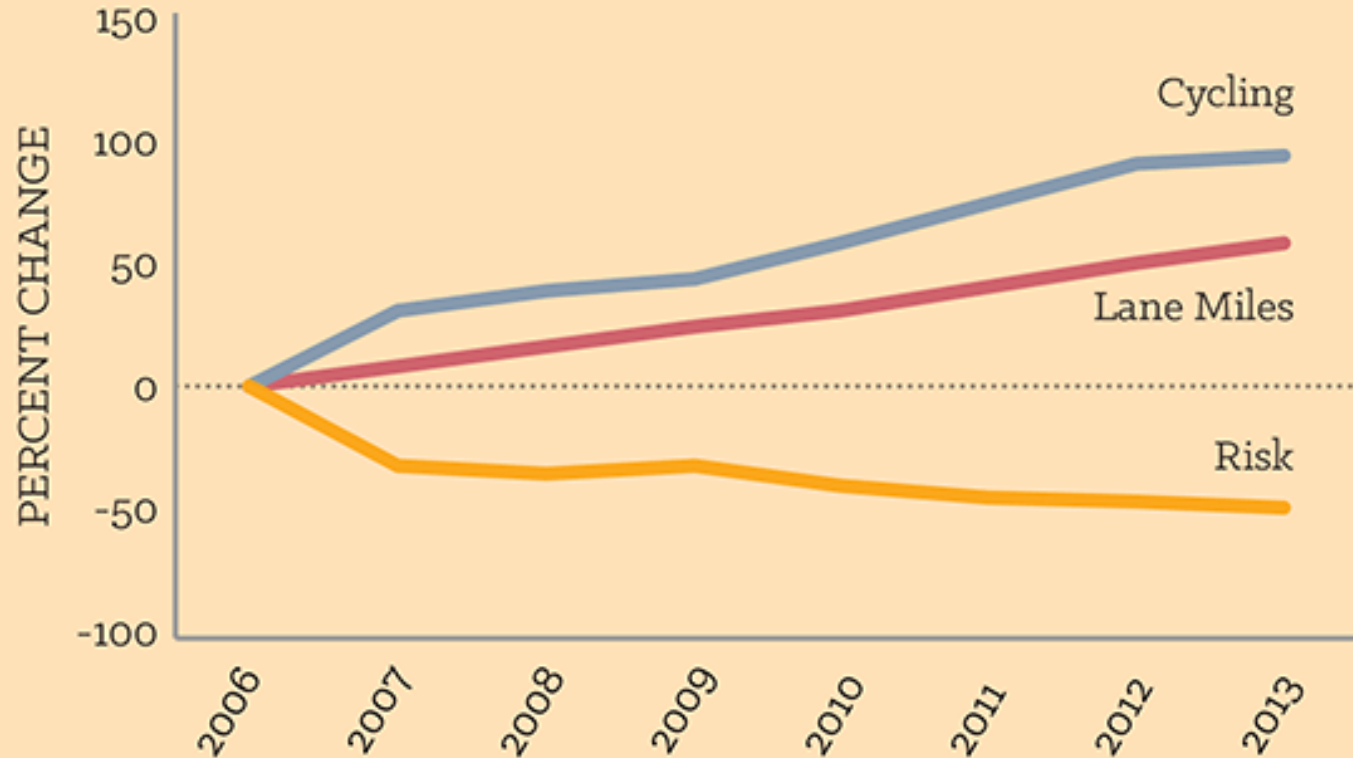
**TABLE 1—Better Bicycle Infrastructure, Improved Cyclist Safety, and Increased Cycling**

City	Years	Growth in Bikeway Network, <sup>a</sup> %	Growth in Bicycle Trips, %	Change in Crashes per 100 000 Trips, %	Change in Fatalities and Severe Injuries per 100 000 Trips, %
Portland, OR	2000–2015	53	391	–62	–72
Washington, DC	2000–2015	101	384	–46	–50
New York, NY	2000–2015	381	207	NA	–72
Minneapolis, MN	2000–2015	113	203	–75	–79
San Francisco, CA	2000–2015	172	167	–36	NA
Cambridge, MA	2000–2015	27	134	–57	NA
Chicago, IL	2005–2015	135	167	–54	–60
Seattle, WA	2005–2015	236	123	–25	–53
Los Angeles, CA	2005–2015	130	114	NA	–43
Philadelphia, PA	2008–2015	17	51	NA	–49

## **Ciudades Norteamericanas: Clara asociación red ciclista con crecimiento modo bicicleta.**

## Cycling is getting safer as more people ride.

Aggregate data from Chicago, Minneapolis, New York City, Philadelphia, Portland, OR, San Francisco and Washington, D.C.



Source: NACTO (2016)

**Efecto agregado y líneas de tendencia:  
Fuerte descenso en el riesgo relativo**

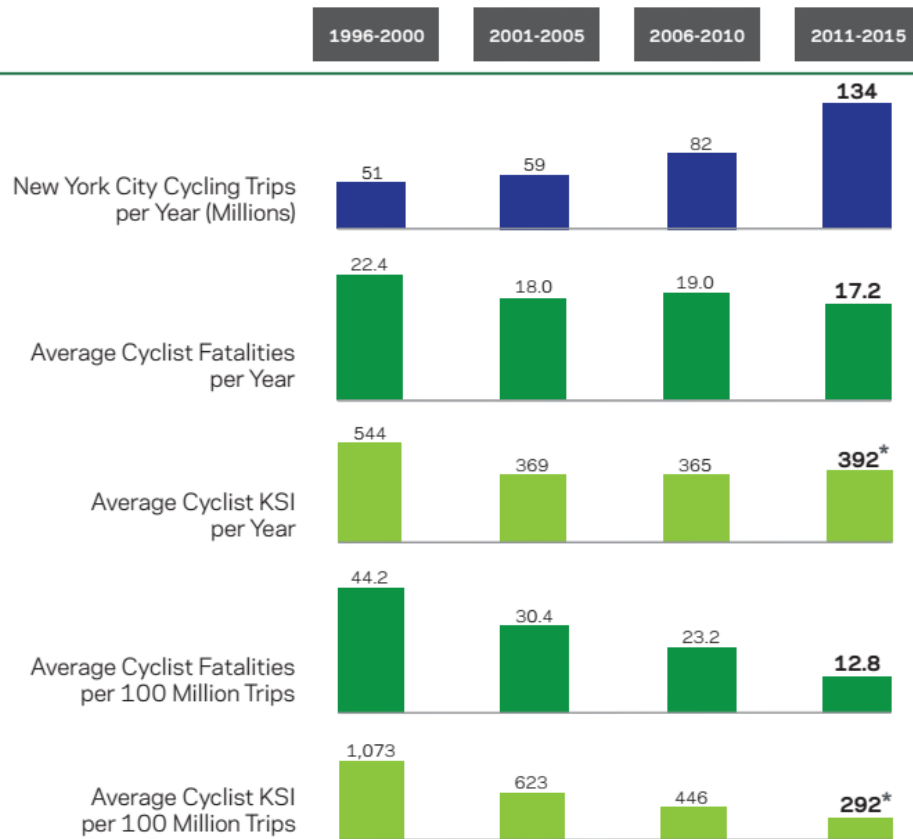
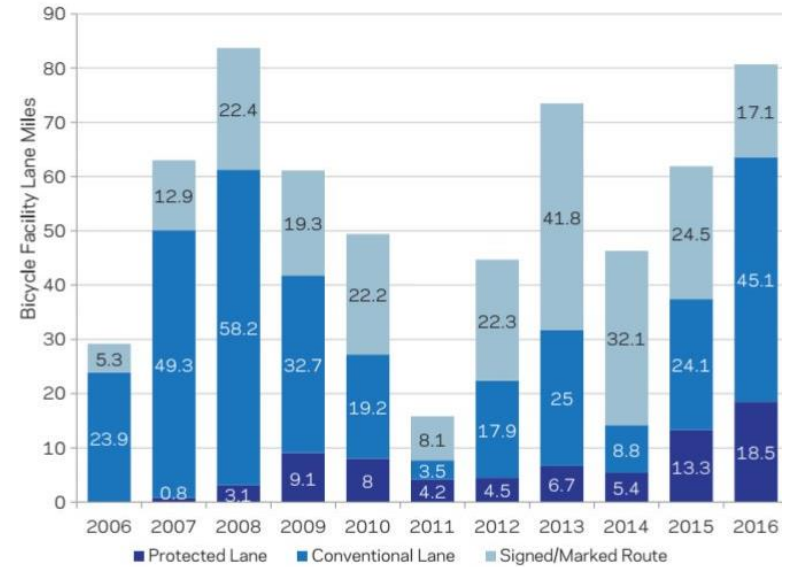
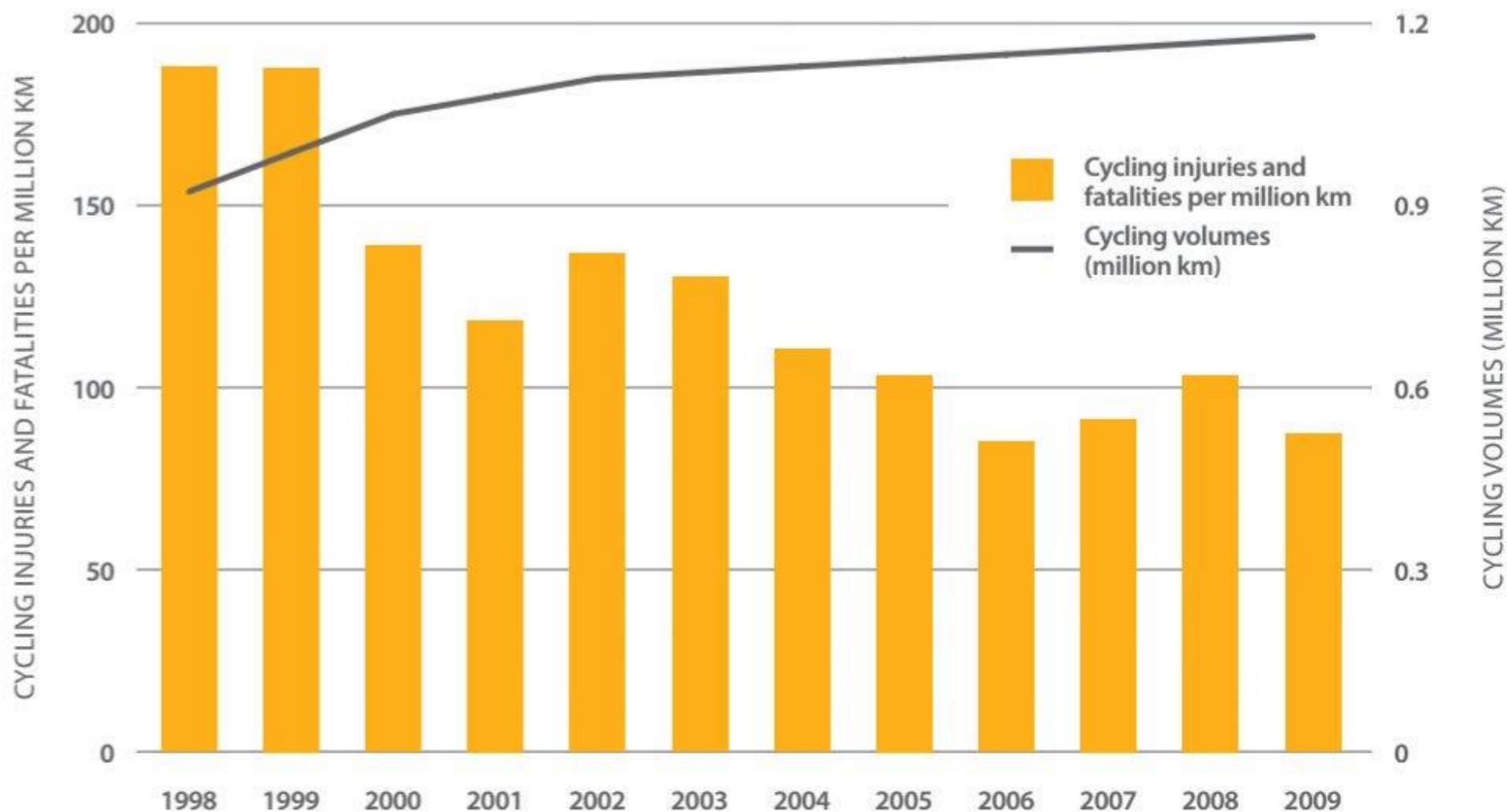


Figure 2. Bicycle Facilities Installed by Year: 2006 - 2016



**Tendencia en Nueva York:  
Fuerte descenso en el riesgo relativo**

**Figure 4** Cycling volumes and cycling risk in Copenhagen, 1998–2009



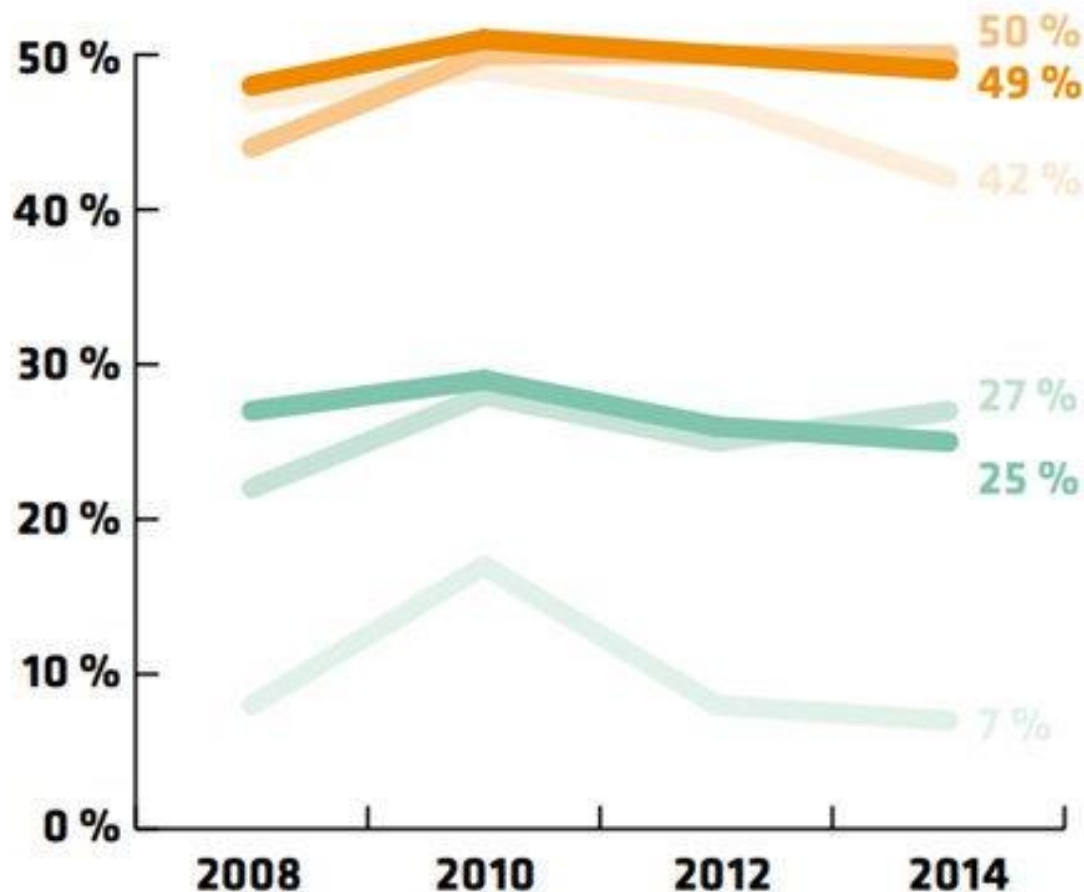
SOURCE: Computed from data provided by Consia Consultants, Copenhagen.





### **III. Actuaciones concretas: comodidad y sensación de seguridad**

## REASONS WHY COPENHAGENERS CYCLE



FASTEST OPTION  
EASIEST OPTION  
EXERCISE

CHEAP  
CONVENIENT  
SUSTAINABLE



**86%**

On bicycle paths far away from motor vehicles



**80%**

On major streets, provided they have bike lanes separated from traffic with a physical barrier



**62%**

On major streets, provided they have painted bike lanes



**23%**

On almost any street in the city and I don't worry much about the traffic conditions

**Preferencias  
de los ciclistas**

**Transportation  
Panel Survey  
Report 2017  
Vancouver (Canadá)**

**TABLE 4—Comparison of Route Types and Other Infrastructure Characteristics of the Injury Sites to Randomly Selected Control Sites Within the Same Trip Routes: Vancouver and Toronto, Canada; 2008–2009**

Variable	No. Injury Sites/No. Control Sites	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Major street route, parked cars <sup>a</sup>			
No bike infrastructure	155/114	1.00 (Ref)	1.00 (Ref)
Shared lane	9/7	0.78 (0.25, 2.41)	0.71 (0.21, 2.45)
Bike lane	25/28	0.53 (0.26, 1.07)	0.69 (0.32, 1.48)
Major street route, no parked cars			
No bike infrastructure	112/118	0.65* (0.44, 0.97)	0.63* (0.41, 0.96)
Shared lane	13/12	0.66 (0.24, 1.82)	0.60 (0.21, 1.72)
Bike lane	35/46	0.47* (0.26, 0.83)	0.54 (0.29, 1.01)
Local street route			
No bike infrastructure	89/116	0.44* (0.28, 0.70)	0.51* (0.31, 0.84)
Designated bike route	52/57	0.53* (0.30, 0.94)	0.49* (0.26, 0.90)
Designated bike route with traffic calming	49/47	0.59 (0.32, 1.07)	0.66 (0.35, 1.26)
Off-street route			
Sidewalk or other pedestrian path	52/47	0.73 (0.42, 1.28)	0.87 (0.47, 1.58)
Multiuse path, paved	64/56	0.75 (0.42, 1.34)	0.79 (0.43, 1.48)
Multiuse path, unpaved	12/11	0.63 (0.21, 1.85)	0.73 (0.23, 2.28)
Bike path	21/21	0.54 (0.20, 1.45)	0.59 (0.20, 1.76)
Cycle track	2/10	0.12* (0.03, 0.60)	0.11* (0.02, 0.54)

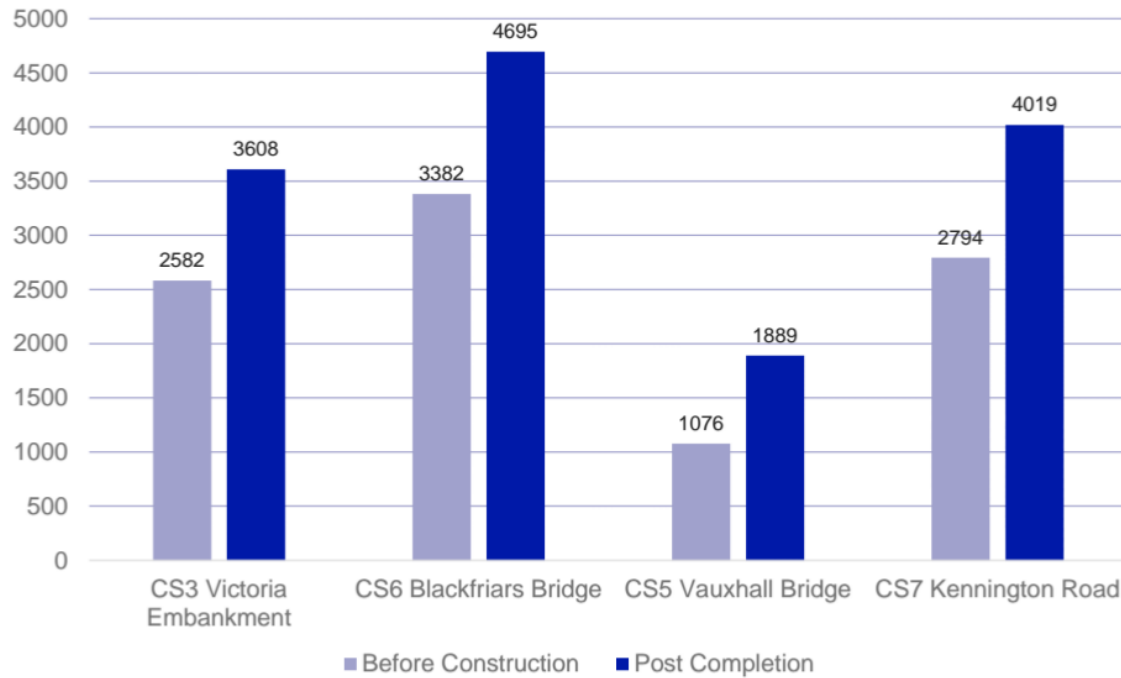
## Calle alta densidad tráfico, coches aparcados, no carril bici (CB)

- Alta densidad, sin coches aparcados: 37% menor riesgo.
- Alta densidad, sin coches aparcados, CB calzada: 46%
- Calle residencial: 49%
- CB protegido: 89%

Teschke, Kay, et al. "Route infrastructure and the risk of injuries to bicyclists: a case-crossover study." *American journal of public health* 102.12 (2012): 2336-2343. **700 ciclistas heridos.**



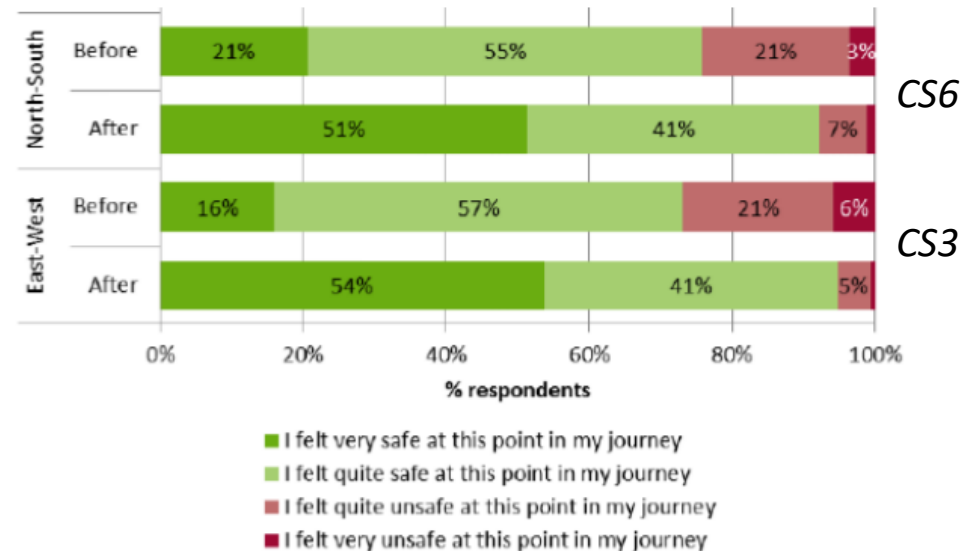
# Increase in cyclists in London (AM peak)



**Londres**  
(50%-70%  
tra. veh)



## Feeling of safety at that point in the journey





Location <sup>4</sup>	Cyclist Volume - Before	Cyclist Volume - After	Change in Volume
Richmond St W, Phase 1	220 (Sep 2013)	2,420 (Sep 2018)	+2,200 (+1,100%)
Adelaide St W, Phase 1	180 (Sep 2013)	2,355 (Sep 2018)	+2,175 (+1,308%)
Richmond St E, Phase 2	170 (Oct 2013)	1,371 (Sep/Oct 2018)	+1,201 (+806%)
Adelaide St E, Phase 2	160 (Oct 2013)	1,362 (Sep/Oct 2018)	+1,202 (+851%)
<b>Richmond-Adelaide, Phase 1</b>	<b>400 (Sep 2013)</b>	<b>4,776 (Sep/Oct 2018)</b>	<b>+4,376 (+1,194%)</b>
<b>Richmond-Adelaide, Phase 2</b>	<b>330 (Oct 2013)</b>	<b>2,733 (Sep/Oct 2018)</b>	<b>+2,403 (+828%)</b>

# Toronto

(Canadá; 33% tra. veh.)



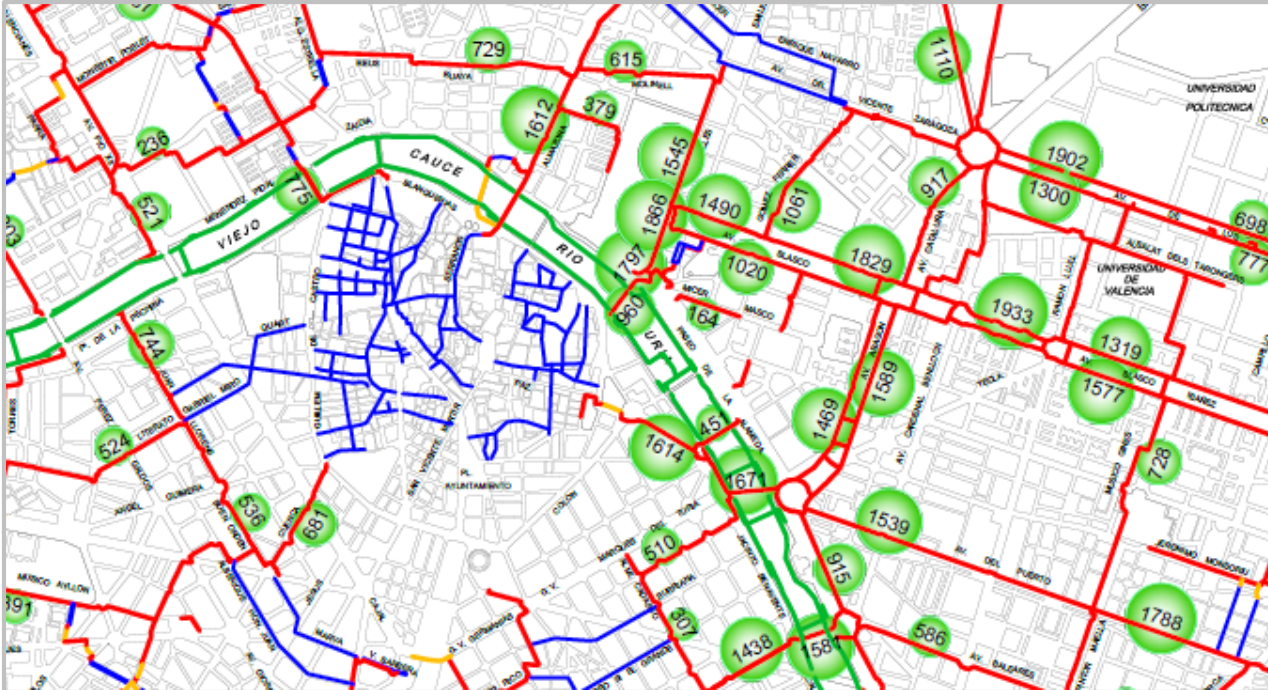
Table 5. Collision Rates - All Cyclist Collisions<sup>8</sup>

Location	Before Installation (annual collisions/1000 average daily weekday cyclists in good weather) <sup>9</sup>	After Installation (annual collisions/1000 average daily weekday cyclists in good weather)	Change
Richmond St E and Richmond St W	34.9	7.4	-27.4 (-79%)
Adelaide St E and Adelaide St W	38.4	12.2	-26.2 (-68%)
Overall	73.2	19.6	-53.6 (-73%)



10-16

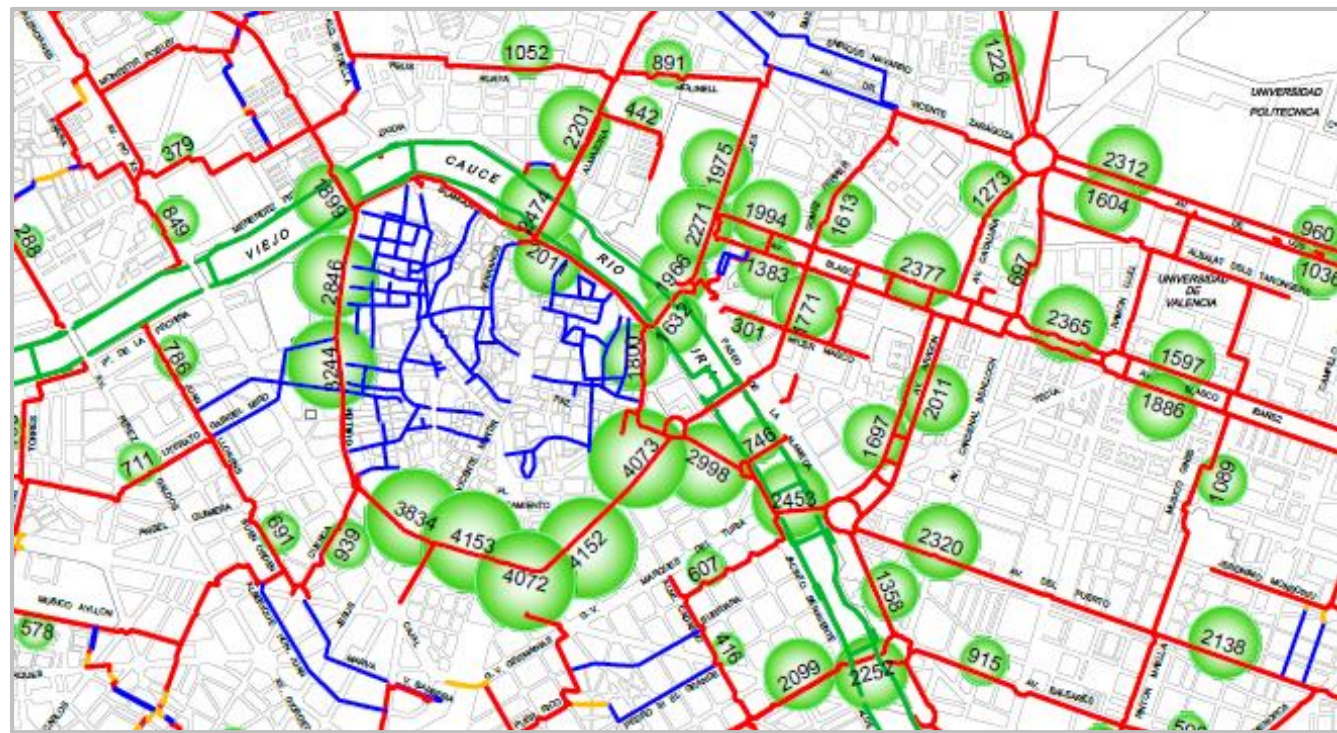
- CARRIL BICI
- CICLOCALLE
- ZONA PEATONAL
- VIEJO CAUCE



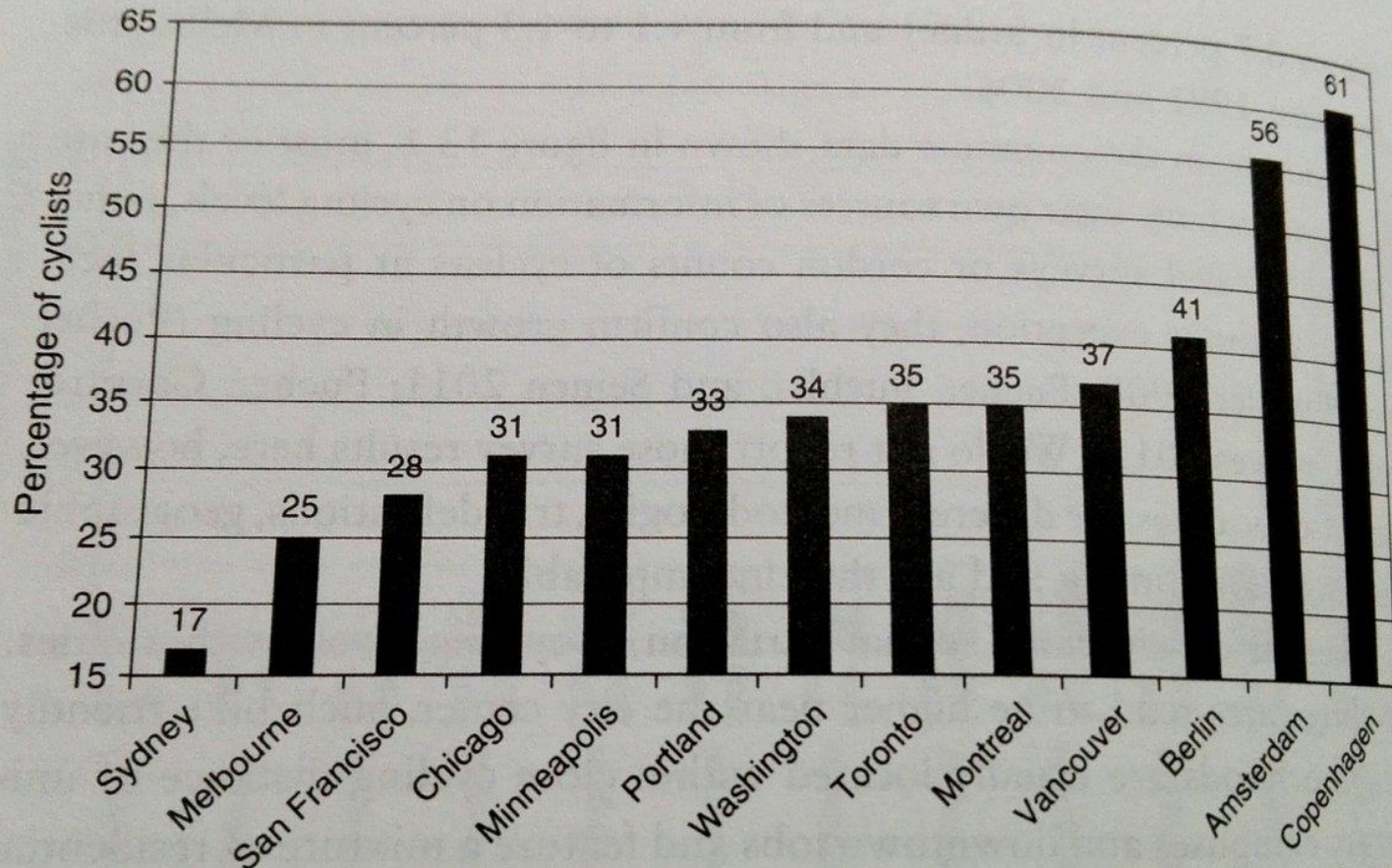
Valencia

10-18

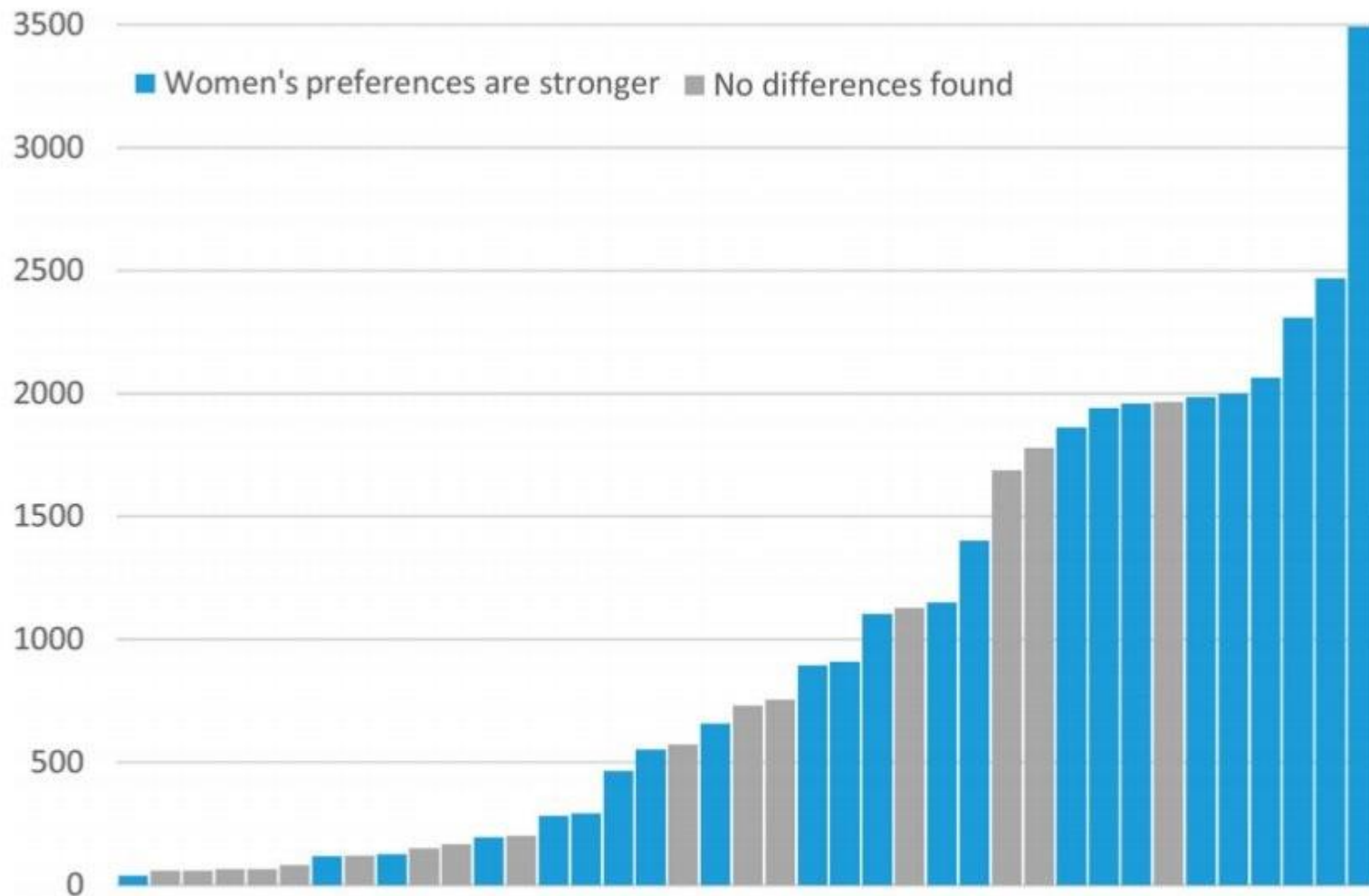
(Anillo 03/17;  
25% tra.  
veh.)







## IV. Brecha de género



**Figure 3.** Gender and preferences for separated infrastructure, by sample size (minus one study with missing sample size).

Aldred, R., Woodcock, J., & Goodman, A. (2016). Does more cycling mean more diversity in cycling?. *Transport reviews*, 36(1), 28-44.

**The percentage of children riding on the corridors increased.**



6 hour count  
(6:30 – 9:30 and  
15:30-18:30)

Calgary

## Centre City Cycle Track Network Pilot



- **18 month** pilot
- **6.5 km** of cycle tracks and shared space
- **80+** performance measures
- **1.2 million** bicycle trips

# Calgary

(Canadá)



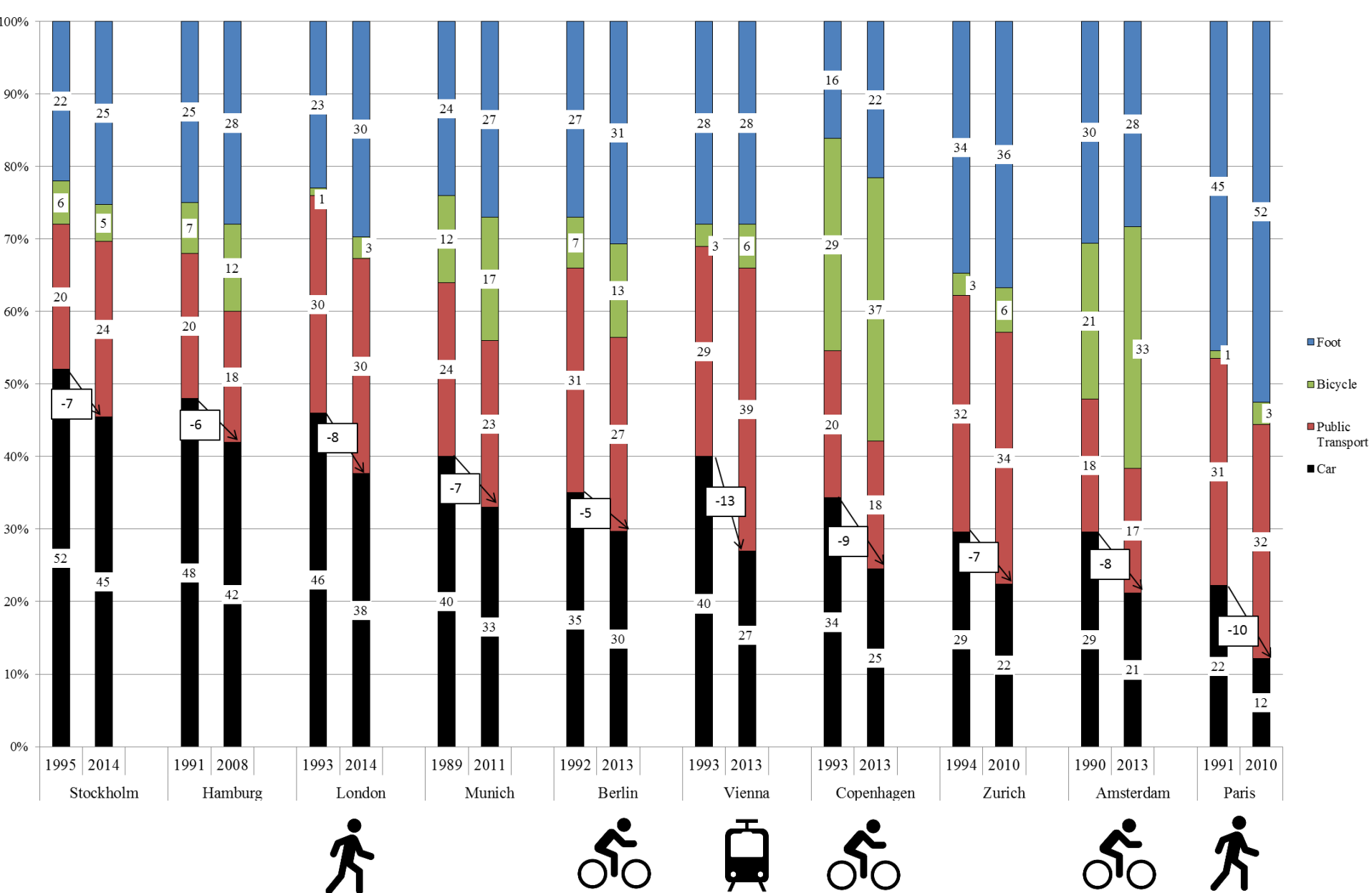


Gracias



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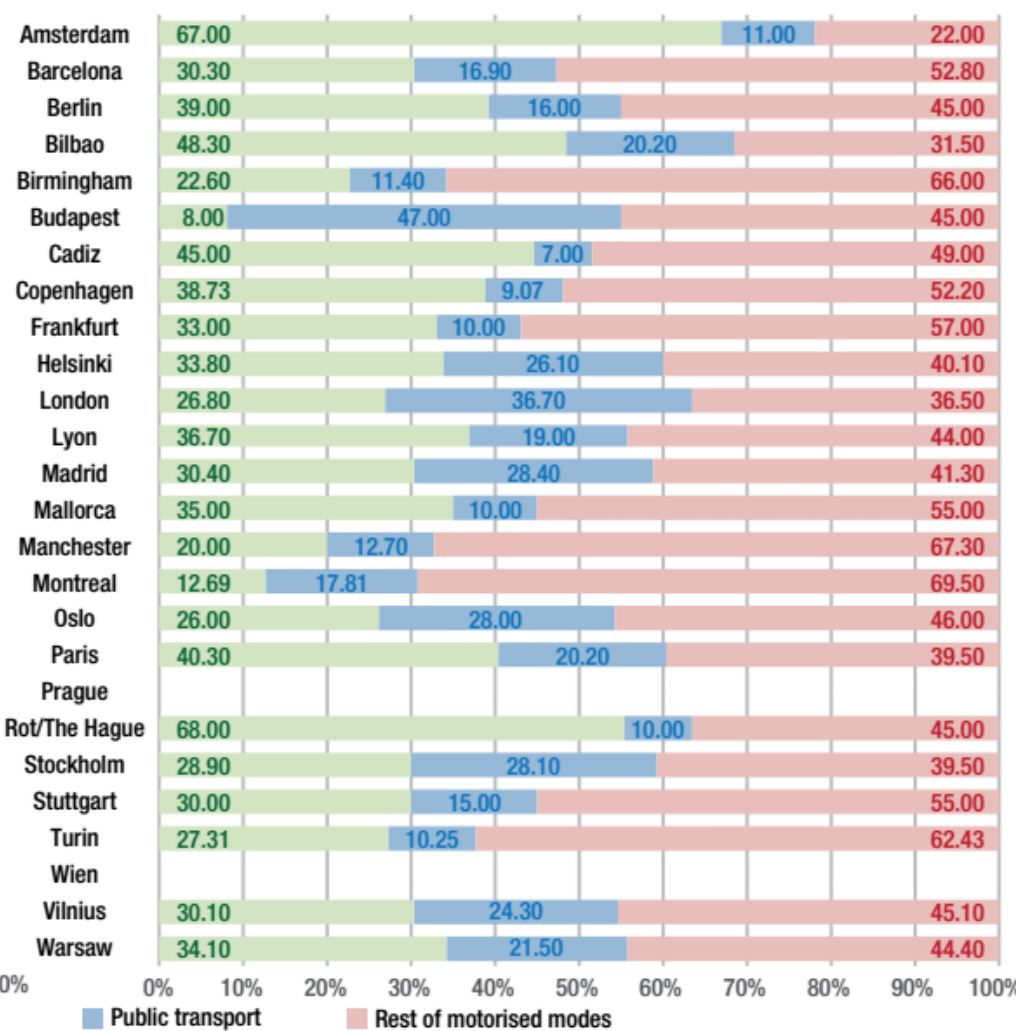
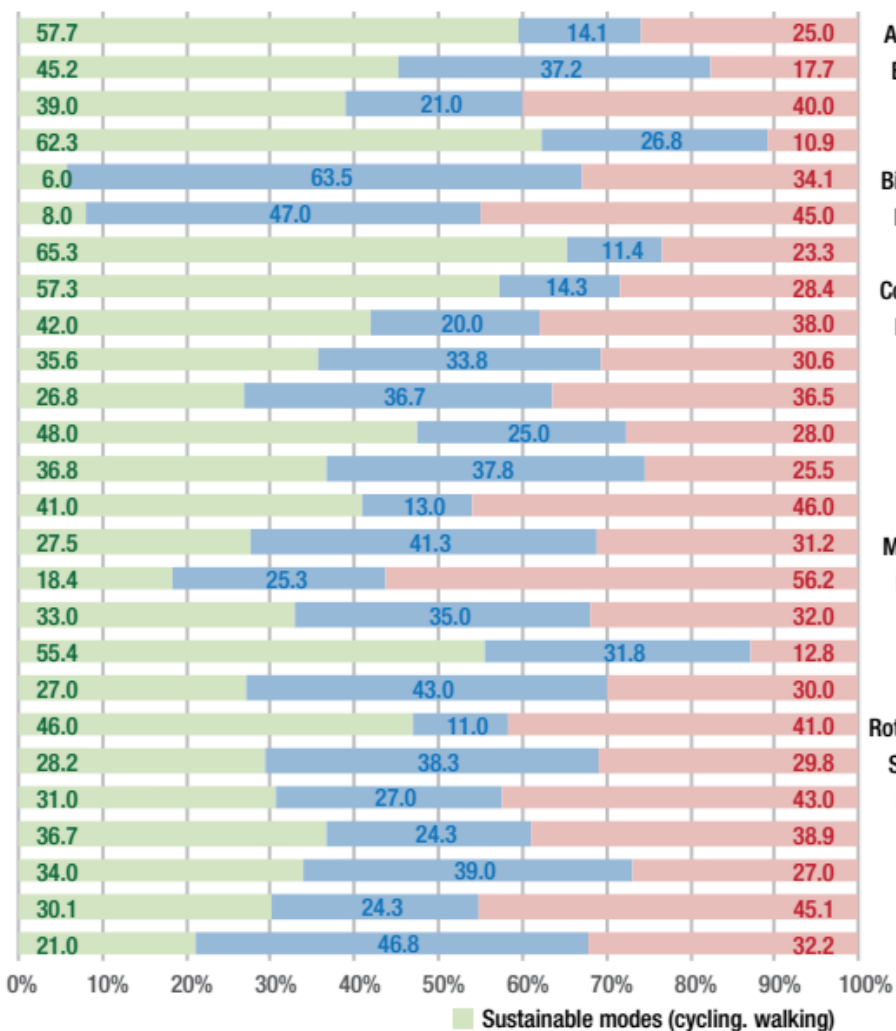


*Cada ciudad presenta diferentes patrones de cambio*

# Modal share in main cities & metropolitan areas

In main city

In PTA area



## Fatalities per billion passenger-kilometre

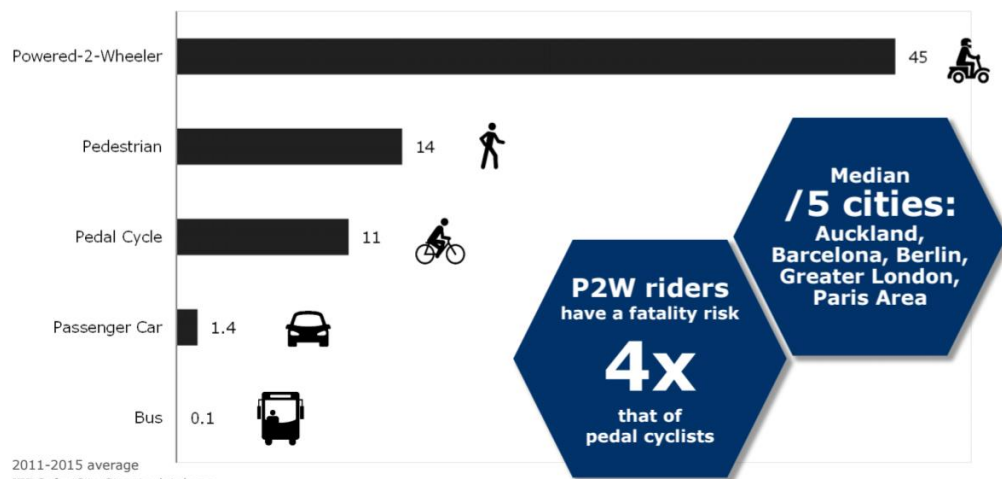
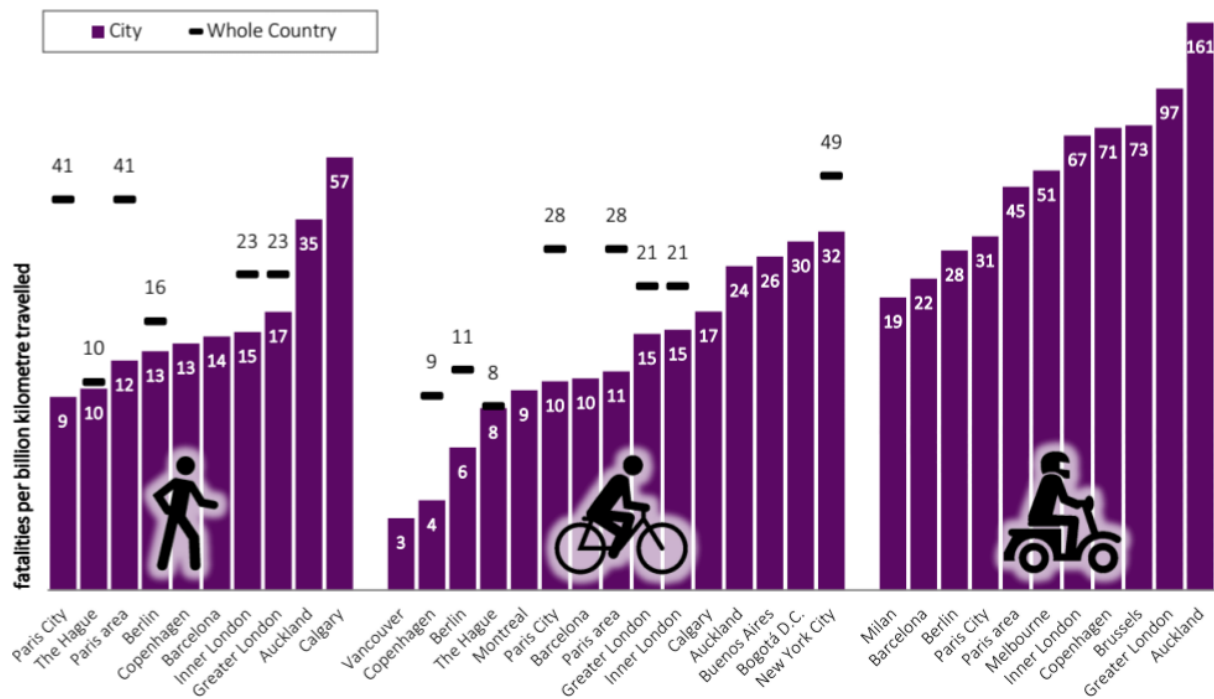


Figure 7. Risk of fatality per unit distance travelled, by mode, in cities and at country level, 2011-2015



NO ESTÁ BIEN VISTO

LLUEVE, HACE MUCHO VIENTO,  
NIEVA O HACE CALOR

SALGO O LLEGO DE NOCHE

ES ARRIESGADO

LLEGARÍA SUDANDO

HAY MUCHAS CUESTAS

HAY MUCHA CONTAMINACIÓN O RUIDO

DONDE VOY ESTÁ LEJOS

NO TENGO EDAD O  
CONDICIÓN FÍSICA



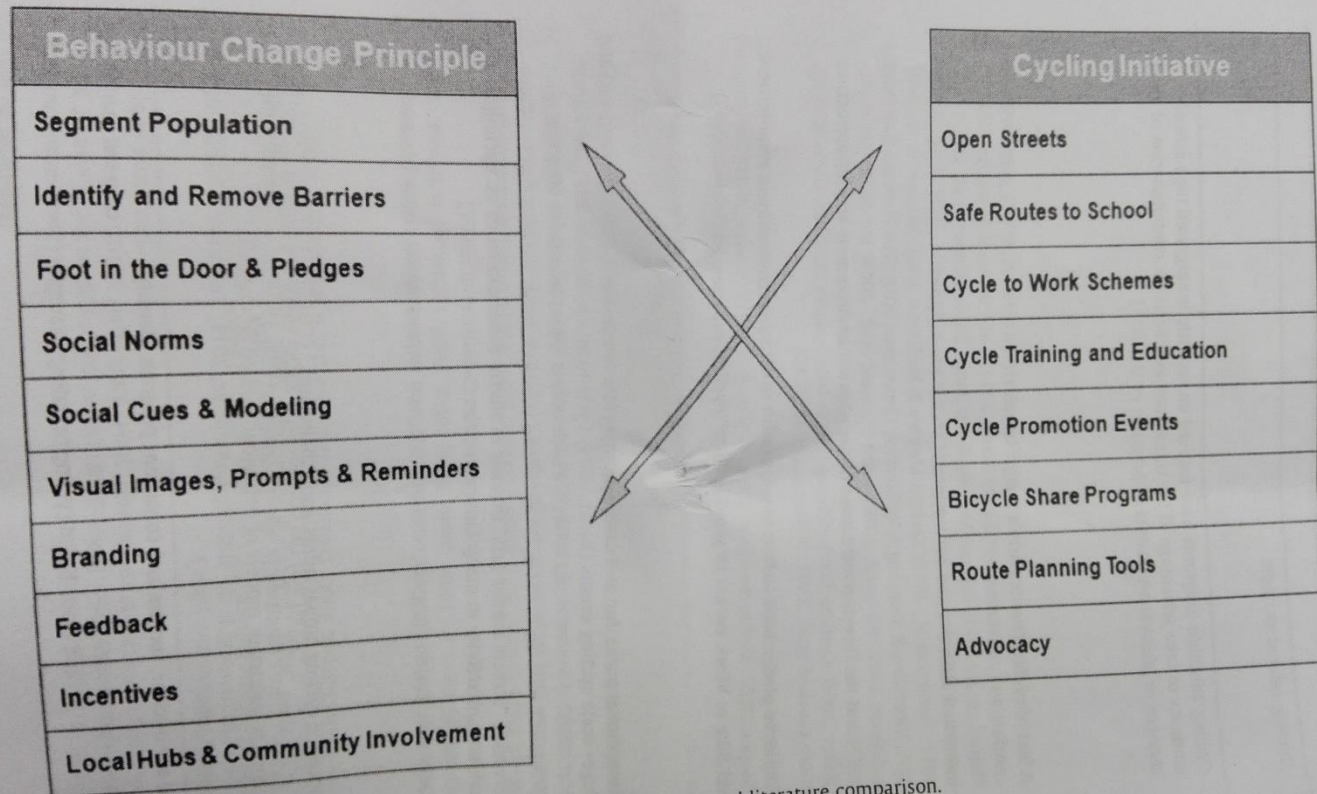


Fig. 1. Search terms and literature comparison.