

Exploring objective and subjective safety of cycling infrastructure

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AutoMat, z.s.



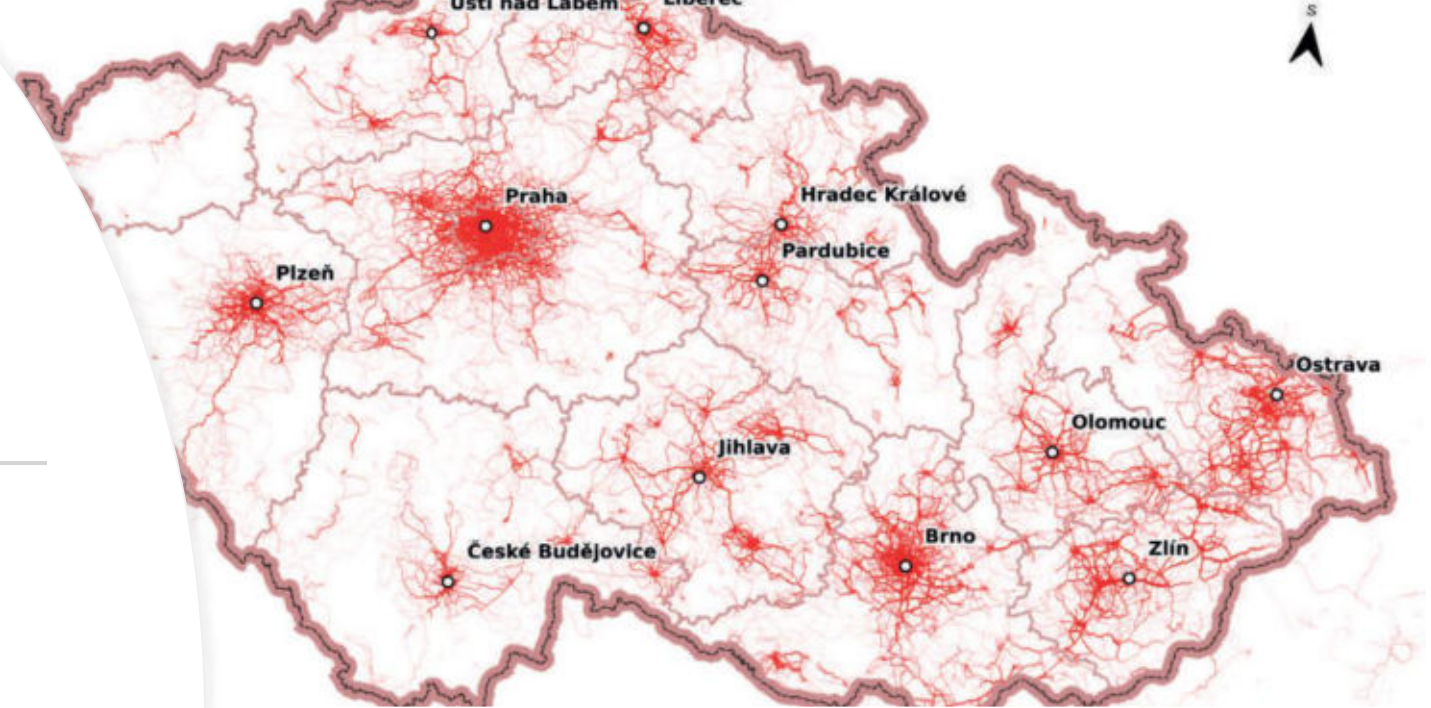


AutoMat, what we do: Take Back Your Street!

- festival celebrates neighbourly relationships and is made up of activities hosted by residents. Based on the principle of mutual aid, the festival incorporates a shared use of public space, local volunteers, and much more
- 150+ locations (104 in Prague, 49 in regions)
- 69 000 visitors
- <https://zazitmestojinak.cz/en>

AutoMat, what we do: Bike to Work

- annual challenge (May)
- 25 620 participants
- 2 499 companies
- 52 cities
- 739 tons of CO2 avoided
- <https://dopracenakole.cz/en>



AutoMat, what we do: LAB

- LAB = sustainable urbanism laboratory
- advocacy
 - active mobility, public space, urban development
- research
 - cycling and safety
- lobby & watchdog



laborator udržitelného urbanismu

WHAT IS SAFE?

objective safety

- relative exposure to crash risk
- recorded accidents & cycling passes data

subjective safety

- personal evaluation

ARE BIKE LANES DANGEROUS? INVESTIGATING CYCLING INFRASTRUCTURE EFFECT ON SAFETY

- research answers the question of the relationship between street layout and road safety
- based on quantitative data, it evaluates how the risk of a crash depends on the road layout and the presence of typical cycling measures such as cycle lanes and cycle paths
- bit.ly/bikelanessafety



1. SHARROWS



2. CYCLE LANE
(SOFT)



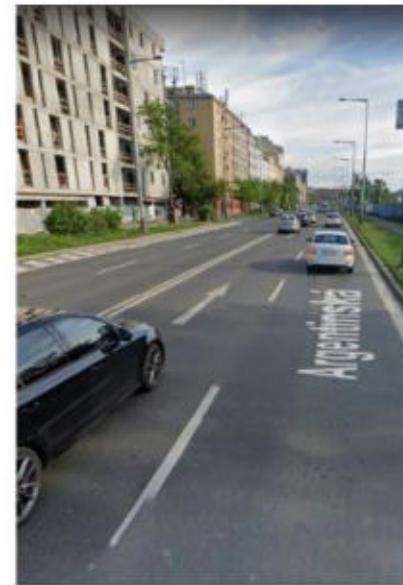
2. CYCLE LANE
(EXCLUSIVE)



4. CONTRA-FLOW
STREET



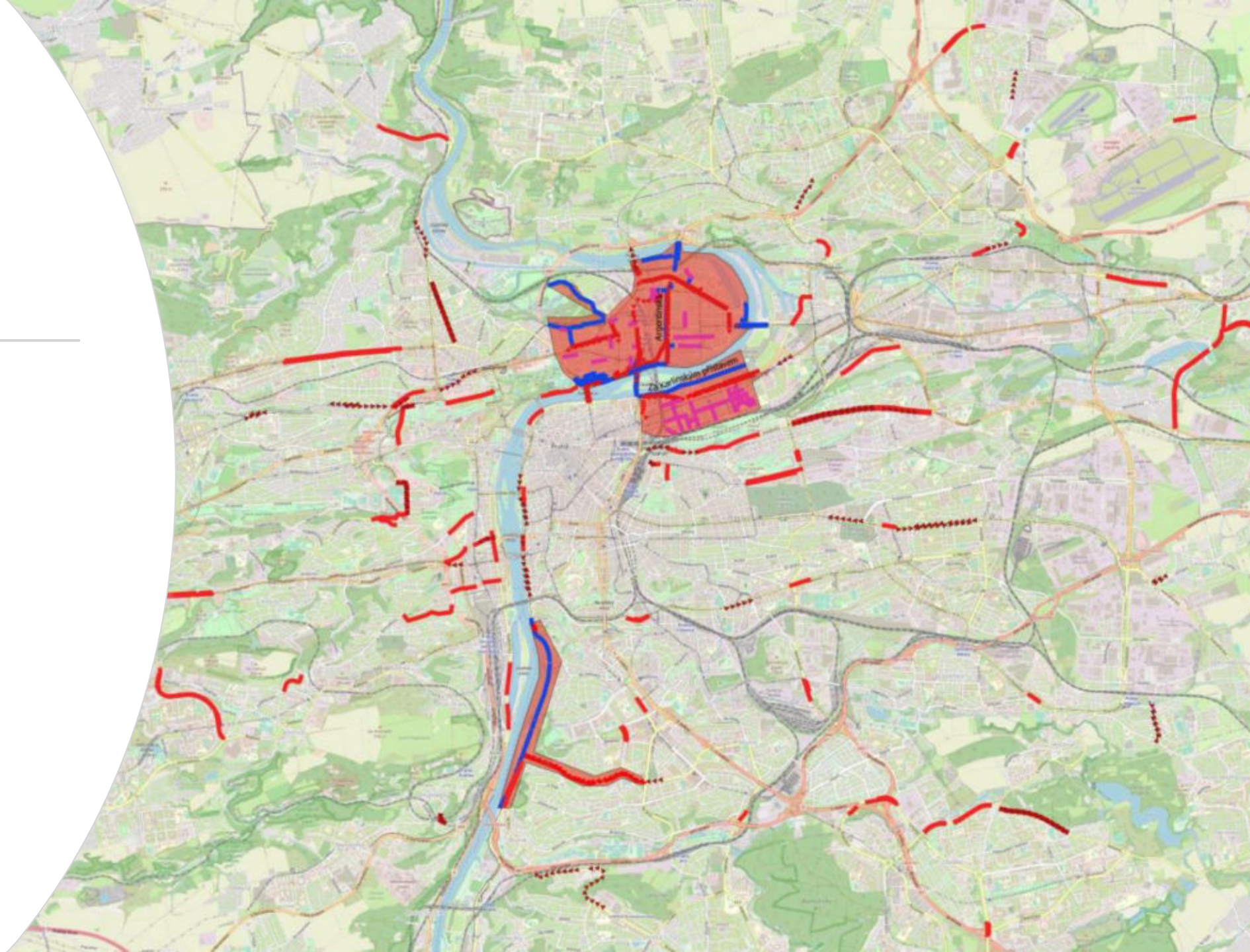
5. CYCLE PATH



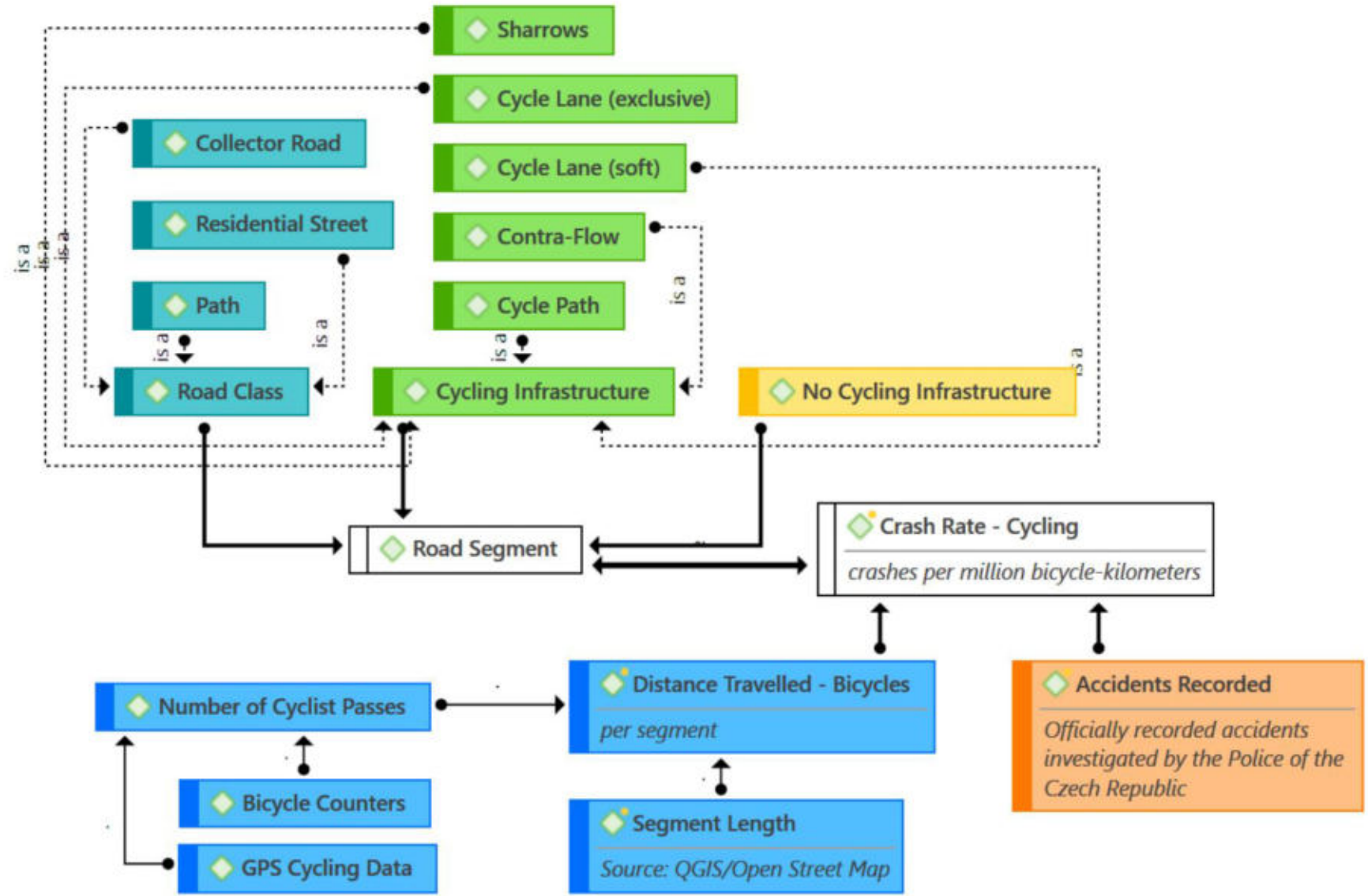
6. NO CYCLING
INFRASTRUCTURE

Dataset

- 899 street sections
- 197 km
- 34.4 million passenger-kilometers cycled
- 2013 to 2022
- 197 recorded accidents



Research Design





Dataset - descriptives

Type of Cycling Infrastructure	Length	Share of Length	Traffic Volume (bicycle kilometres)	Share of Volume
No Infrastructure	60.7 km	31%	8 927 036	26%
Formerly No Infrastructure	17.0 km	9%	813 668	2%
Contra-Flow	6.3 km	3%	729 029	2%
Cycle Lane - Soft	57.9 km	29%	2 089 819	6%
Cycle Lane - exclusive	9.2 km	5%	987 975	3%
Sharrow	31.5 km	16%	3 531 389	10%
Cycle Path	14.1 km	7%	17 283 876	50%
Total	196.8 km	100%	34 362 792	100%



Results

cycling crash rate = number of crashes per 1 million km cycled

- officially recorded accidents only

Type of Cycling Infrastructure	Cycling Crash Rate		
	no intersections, no fixed obstacles	with intersections, no fixed obstacles	with intersections, with fixed obstacles
No Infrastructure	6.16	9.97	10.42
Formerly No Infrastructure	3.69	9.83	9.83
Contra-Flow	2.95	5.89	8.84
Cycle Lane - Soft	3.35	*	*
Cycle Lane - Exclusive	3.04	7.09	8.10
Sharrow	4.67	*	*
Cycle Path	0.81	0.81	1.04

How many times does cycling infrastructure improve safety compared to roads without cycling infrastructure

Type of Cycling Infrastructure	no intersections, no fixed obstacles	with intersections, no fixed obstacles	with intersections, with fixed obstacles
No Infrastructure	1.0x	1.0x	1.0x
Contra-Flow	2.1x	1.7x	1.2x
Cycle Lane - Soft	1.8x	*	*
Cycle Lane - Exclusive	2.0x	1.4x	1.3x
Sharrow	1.3x	*	*
Cycle Path	7.6x	12.3x	10.0x

Subjective safety of cycling infrastructure

- an extensive evaluation of **non-segregated** cycling facilities from the perspective of perceived safety
- online survey amongst Prague's Bike to Work challenge participants
- up to 1891 participants who evaluated 10 situations, 1251 evaluated full set of 16 situations



VNÍMÁNÍ BEZPEČNOSTI INTEGRAČNÍCH OPATŘENÍ

Výzkumná zpráva

SUBJECTIVE SAFETY OF CYCLING INFRASTRUCTURE

Research Report

no infra

sharrows

soft cycle lane

exclusive cycle lane

curb-separated
cycle track

+1



+1
+park.



1+1



+2



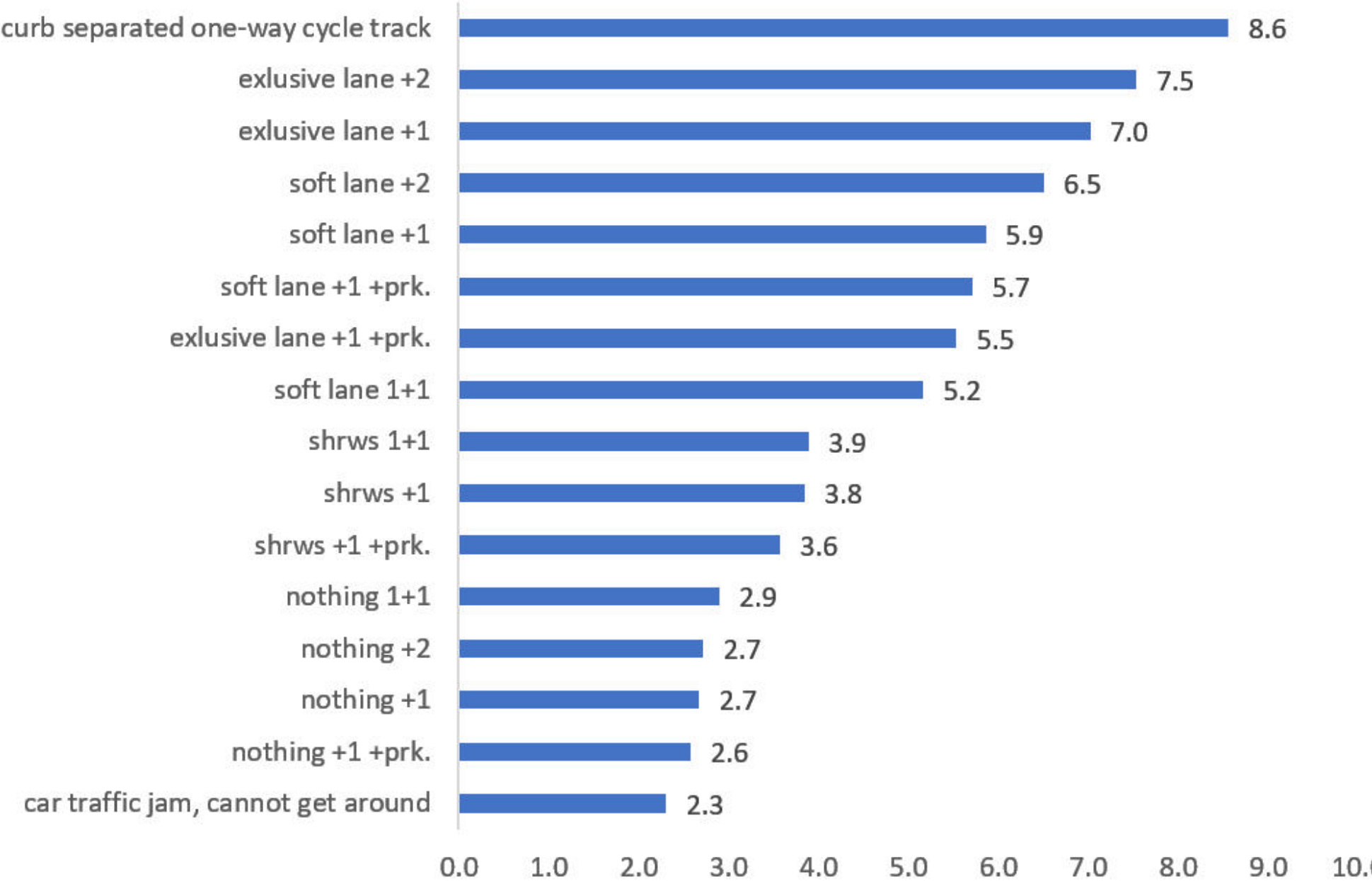
car traffic
jam,
cannot
get
around

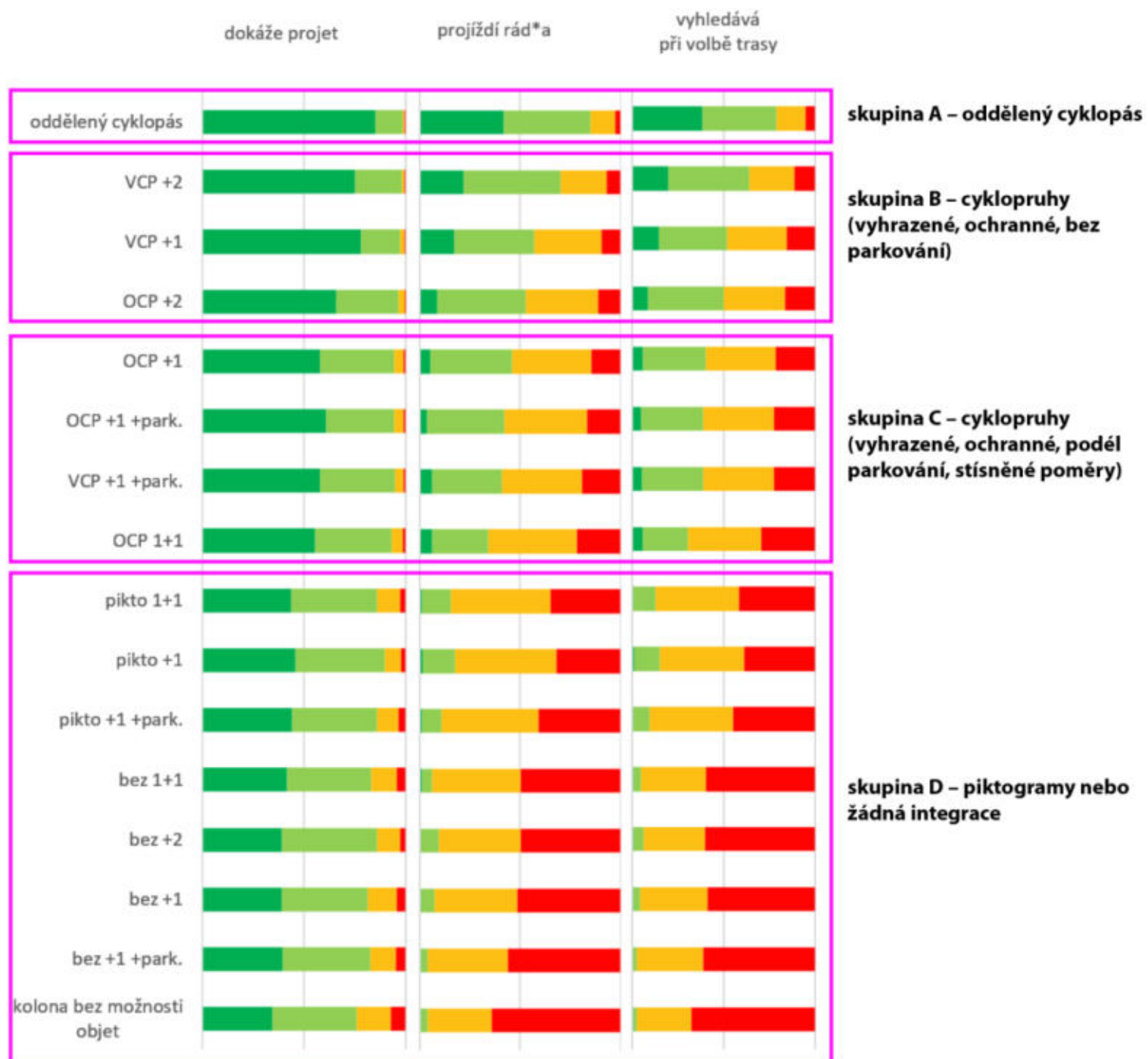




Safety Evaluation (median, 1 minimum 10 maximum)

- evaluation of the feeling of safety on 10 point scale
 - 1: I don't feel safe at all
 - 10: I feel completely safe





Safety perception vs. Gender & Age

	median				AGE			
	male	female	median share f/m		<34	35 to 44	45 to 54	55+
curb separated one-way cycle track	8.62	8.43	98%	curb separated one-way cycle track	102%	100%	100%	96%
exclusive lane +2	7.54	7.56	100%	exclusive lane +2	97%	101%	101%	98%
exclusive lane +1	7.11	6.66	94%	exclusive lane +1	101%	102%	102%	83%
soft lane +2	6.50	6.52	100%	soft lane +2	96%	101%	103%	97%
soft lane +1	6.01	5.50	92%	soft lane +1	97%	103%	102%	92%
soft lane +1 +prk.	5.82	5.44	94%	soft lane +1 +prk.	96%	102%	103%	96%
exclusive lane +1 +prk.	5.66	5.23	93%	exclusive lane +1 +prk.	98%	104%	101%	90%
soft lane 1+1	5.40	4.71	87%	soft lane 1+1	96%	104%	103%	91%
shrws 1+1	4.14	3.40	82%	shrws 1+1	91%	107%	102%	94%
shrws +1	4.13	3.26	79%	shrws +1	99%	106%	98%	88%
shrws +1 +prk.	3.72	3.31	89%	shrws +1 +prk.	96%	102%	106%	94%
nothing 1+1	3.16	2.21	70%	nothing 1+1	93%	111%	99%	91%
nothing +2	3.06	1.97	64%	nothing +2	91%	112%	101%	89%
nothing +1	3.07	1.87	61%	nothing +1	100%	113%	94%	79%
nothing +1 +prk.	2.84	1.92	68%	nothing +1 +prk.	101%	108%	99%	83%
car traffic jam, cannot get around	2.77	1.65	59%	car traffic jam, cannot get around	110%	113%	88%	80%

Experience length (years)

- very limited impact of experience of safety perception
- you cannot get used to danger

	0 - 3 yrs	4 - 7	8 - 21	22 yrs +	median total
curb separated one-way cycle track	8.54	8.78	8.70	8.44	8.56
exclusive lane +2	7.10	7.57	7.74	7.48	7.54
exclusive lane +1	6.90	7.15	7.15	6.88	7.02
soft lane +2	5.87	6.61	6.67	6.48	6.51
soft lane +1	5.49	5.76	6.15	5.75	5.86
soft lane +1 +prk.	5.06	5.83	5.91	5.64	5.71
exclusive lane +1 +prk.	5.42	5.65	5.84	5.37	5.54
soft lane 1+1	4.66	5.08	5.42	5.13	5.17
shrws 1+1	3.35	3.98	3.91	3.96	3.89
shrws +1	3.58	3.85	3.95	3.81	3.85
shrws +1 +prk.	3.08	3.86	3.64	3.54	3.57
nothing 1+1	2.17	3.02	2.78	3.10	2.90
nothing +2	2.34	2.93	2.65	2.78	2.72
nothing +1	2.20	2.66	2.77	2.72	2.67
nothing +1 +prk.	2.00	2.79	2.48	2.70	2.58
car traffic jam, cannot get around	1.94	2.38	2.30	2.39	2.31
	n = 85-109	126-152	311-380	508-610	

	0 - 3 yrs	4 - 7	8 - 21	22 yrs +
curb separated one-way cycle track	100%	103%	102%	99%
exclusive lane +2	94%	100%	103%	99%
exclusive lane +1	98%	102%	102%	98%
soft lane +2	90%	101%	102%	100%
soft lane +1	94%	98%	105%	98%
soft lane +1 +prk.	88%	102%	104%	99%
exclusive lane +1 +prk.	98%	102%	105%	97%
soft lane 1+1	90%	98%	105%	99%
shrws 1+1	86%	102%	101%	102%
shrws +1	93%	100%	103%	99%
shrws +1 +prk.	86%	108%	102%	99%
nothing 1+1	75%	104%	96%	107%
nothing +2	86%	107%	97%	102%
nothing +1	82%	100%	103%	102%
nothing +1 +prk.	77%	108%	96%	105%
car traffic jam, cannot get around	84%	103%	100%	103%

To conclude

the more segregation, the safer cycling

- vs. vehicular cycling ideology
- sharrows on collector roads
- parking bad

inclusive street design

- what we have: streets welcoming to younger, experienced males
- what we need: streets welcoming to everyone

Research reports to download at www.bicyclemind.cz

VÝZKUM, ANALÝZY, EVALUACE

Happy to cooperate! AutoMat

- <https://auto-mat.cz/en>
- we're open to project cooperation!
- michal.sindelar@auto-mat.cz

VNÍMÁNÍ BEZPEČNOSTI INTEGRAČNÍCH OPATŘENÍ

2023

Výzkum na vzorku 1251 respondentů vyhodnocuje, jak jsou vnímána různá cykloopatření. Zásadní vliv na vnímání bezpečnosti a oblíbenosti má druh integračního opatření, a to v pořadí piktokoridor, ochranný cyklopruh, vyhrazený cyklopruh, oddělený pás. Čím kvalitnější cykloopatření, tím lepší hodnocení od samotných uživatelů. Vliv má také přítomnost parkování a počet jízdních pruhů.

Či zjistit také rozdíly ve vnímání infrastruktury podle pohlaví, věku a zkušeností respondentů. Pokud jsou na vozovce piktogramy či opatření zcela chybí, pak toto hodnotí méně příznivě ženy, starší osoby a lidé, co na kole jezdí málo či začali jezdit teprve nedávno.

Studie je ke stažení zde.

CYKLODÁLNIČE – STUDIE ŠIRŠÍCH VZTAHŮ

2023

Studie představuje záměr vybudování cyklořádniče v kontextu širších vztahů – geologických, sociálních, ekonomických, dopravních. Cyklořádniče je projekt vybudování cyklostezky ve vysoké kvalitě v severojižním směru od městské části Medlánky po hlavní nádraží v Brně.

Studie je ke stažení zde.

ARE BIKE LANES DANGEROUS? INVESTIGATING CYCLING INFRASTRUCTURE EFFECT ON SAFETY

2023

The research explores the relationship between the implementation of cycling infrastructure and road safety. The relationship between different types of cycling infrastructure and cycling safety was verified on a vast dataset. Furthermore, the relationship between the provision of cycling infrastructure and the overall crash rate, which consists in 98% of car crashes, was verified. The effect of cycling infrastructure was shown for cycle infrastructure, with the implementation of a cycle lane increasing safety by a factor of 2, and a cycle path increasing safety by a factor of 8 to 12. The introduction of cycle lanes is not automatically associated with a reduction in car accidents, but if there is traffic calming and a reduction in the number of lanes implemented as well, then safety is increased.

Research report download.