Supplemental materials: The prevalence of high-stress paint-only bike lanes in 442 U.S. cities

2024-04-23

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Section 1. Supplemental results

eTable 1. Results by city

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
New York City	New York	8335897	585	17%	10%
Los Angeles	California	3822238	798	74%	73%
Chicago	Illinois	2665039	424	52%	21%
Houston	Texas	2302878	219	87%	87%
Phoenix	Arizona	1644409	1798	55%	55%
Philadelphia	Pennsylvania	1567258	413	46%	38%
San Antonio	Texas	1472909	442	39%	38%
San Diego	California	1381162	1013	78%	77%
Dallas	Texas	1299544	82	32%	31%
Austin	Texas	974447	500	54%	53%
Jacksonville	Florida	971319	411	80%	80%
San Jose	California	971233	905	73%	70%
Fort Worth	Texas	956709	127	51%	51%
Columbus	Ohio	907971	62	87%	87%
Charlotte	North Carolina	897720	220	59%	55%
Indianapolis	Indiana	880621	153	86%	85%
San Francisco	California	808437	159	43%	41%
Seattle	Washington	749256	193	28%	26%
Denver	Colorado	713252	363	22%	19%
Oklahoma City	Oklahoma	694800	13	56%	56%
Nashville	Tennessee	683622	124	66%	62%
El Paso	Texas	677456	86	81%	81%
Washington	District of Columbia	671803	105	32%	12%
Las Vegas	Nevada	656274	161	49%	49%
Boston	Massachusetts	650706	253	50%	24%
Portland	Oregon	635067	548	55%	55%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Louisville	Kentucky	624444	82	38%	38%
Memphis	Tennessee	621056	386	76%	75%
Detroit	Michigan	620376	130	55%	55%
Baltimore	Maryland	569931	80	49%	49%
Milwaukee	Wisconsin	563305	379	51%	51%
Albuquerque	New Mexico	561008	434	65%	65%
Tucson	Arizona	546574	749	82%	82%
Fresno	California	545567	365	75%	73%
Sacramento	California	528001	620	49%	48%
Mesa	Arizona	512498	920	69%	69%
Kansas City	Missouri	509297	96	83%	83%
Atlanta	Georgia	499127	148	45%	41%
Colorado Springs	Colorado	486248	323	54%	54%
Omaha	Nebraska	485153	23	70%	70%
Raleigh	North Carolina	476587	145	72%	72%
Virginia Beach	Virginia	455618	15	75%	75%
Long Beach	California	451307	194	70%	70%
Miami	Florida	449514	93	65%	64%
Oakland	California	430553	263	58%	52%
Minneapolis	Minnesota	425096	264	19%	18%
Tulsa	Oklahoma	411867	37	97%	97%
Bakersfield	California	410647	68	44%	44%
Tampa	Florida	398173	247	86%	86%
Wichita	Kansas	396192	12	34%	34%
Arlington	Texas	394602	10	16%	15%
Aurora	Colorado	393537	160	44%	43%
New Orleans	Louisiana	369749	93	86%	86%
Cleveland	Ohio	361607	92	71%	70%
Anaheim	California	344461	161	84%	84%
Honolulu	Hawaii	343421	31	49%	47%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Henderson	Nevada	331415	19	88%	88%
Stockton	California	321819	58	41%	41%
Riverside	California	320764	175	85%	85%
Lexington	Kentucky	320347	127	82%	82%
Corpus Christi	Texas	316239	5	0%	0%
Orlando	Florida	316081	307	69%	69%
Irvine	California	313685	325	90%	90%
Cincinnati	Ohio	309513	55	92%	92%
Santa Ana	California	308189	126	77%	77%
Newark	New Jersey	305344	22	27%	27%
St. Paul	Minnesota	303176	101	22%	22%
Pittsburgh	Pennsylvania	302898	47	49%	34%
Greensboro	North Carolina	301115	26	70%	70%
Lincoln	Nebraska	292627	21	82%	82%
Durham	North Carolina	291928	118	68%	68%
Plano	Texas	289547	10	33%	33%
Anchorage	Alaska	287145	49	74%	74%
Jersey City	New Jersey	286670	36	12%	11%
St. Louis	Missouri	286578	96	82%	82%
Chandler	Arizona	280711	533	60%	60%
Chula Vista	California	279170	61	88%	88%
Buffalo	New York	276486	61	38%	36%
Gilbert	Arizona	275346	158	65%	65%
Reno	Nevada	273448	346	79%	78%
Madison	Wisconsin	272903	413	49%	49%
Fort Wayne	Indiana	267927	12	74%	72%
Toledo	Ohio	266301	24	73%	73%
Lubbock	Texas	263930	18	19%	19%
St. Petersburg	Florida	261256	156	47%	47%
Chesapeake	Virginia	252488	9	61%	61%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Glendale	Arizona	252136	277	55%	53%
Winston-Salem	North Carolina	251350	27	66%	66%
Scottsdale	Arizona	243050	307	56%	56%
Garland	Texas	240854	11	42%	28%
Boise	Idaho	236634	266	60%	60%
Norfolk	Virginia	232995	18	53%	53%
Port St. Lucie	Florida	231790	59	91%	91%
Spokane	Washington	230160	126	31%	28%
Richmond	Virginia	229395	53	88%	87%
Fremont	California	223871	192	72%	71%
Huntsville	Alabama	221933	15	78%	78%
Tacoma	Washington	221776	131	43%	42%
Baton Rouge	Louisiana	221453	41	79%	79%
Santa Clarita	California	221345	65	79%	79%
San Bernardino	California	220328	85	83%	83%
Hialeah	Florida	220292	17	78%	78%
Frisco	Texas	219587	5	54%	54%
Modesto	California	218069	12	20%	20%
Cape Coral	Florida	216992	121	63%	63%
Fontana	California	212475	104	77%	77%
Moreno Valley	California	211924	4	100%	100%
Des Moines	Iowa	211034	48	65%	65%
Rochester	New York	209352	76	65%	38%
Fayetteville	North Carolina	208873	13	7%	7%
McKinney	Texas	207507	2	0%	0%
Worcester	Massachusetts	205319	18	81%	48%
Salt Lake City	Utah	204657	314	51%	50%
Little Rock	Arkansas	202864	37	51%	51%
Columbus	Georgia	202616	11	100%	100%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Sioux Falls	South Dakota	202078	5	59%	59%
Grand Prairie	Texas	201843	3	100%	100%
Tallahassee	Florida	201731	390	65%	65%
Amarillo	Texas	201291	24	6%	6%
Oxnard	California	200415	198	67%	67%
Peoria	Arizona	197866	190	56%	56%
Overland Park	Kansas	197726	142	46%	46%
Montgomery	Alabama	196986	2	0%	0%
Birmingham	Alabama	196910	22	60%	52%
Grand Rapids	Michigan	196908	137	56%	49%
Knoxville	Tennessee	195889	39	73%	71%
Vancouver	Washington	194512	269	69%	69%
Huntington Beach	California	194310	205	97%	97%
Providence	Rhode Island	189563	21	51%	41%
Glendale	California	189221	93	69%	68%
Akron	Ohio	188509	58	74%	73%
Tempe	Arizona	185950	28	54%	54%
Newport News	Virginia	184306	6	100%	100%
Chattanooga	Tennessee	184086	93	50%	39%
Fort Lauderdale	Florida	183146	160	82%	82%
Cary	North Carolina	180388	47	44%	44%
Shreveport	Louisiana	180153	4	0%	0%
Eugene	Oregon	177923	257	77%	72%
Aurora	Illinois	177866	5	19%	19%
Elk Grove	California	177558	74	49%	49%
Salem	Oregon	177487	286	78%	76%
Santa Rosa	California	177181	37	80%	80%
Clarksville	Tennessee	176974	4	100%	100%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Rancho Cucamonga	California	176336	51	96%	96%
Oceanside	California	172199	74	73%	73%
Springfield	Missouri	170067	36	52%	52%
Garden Grove	California	169254	98	80%	80%
Fort Collins	Colorado	169249	456	51%	51%
Lancaster	California	169185	51	65%	65%
Murfreesboro	Tennessee	162398	40	87%	86%
Salinas	California	161020	59	82%	77%
Corona	California	159567	65	89%	89%
Killeen	Texas	159172	1	100%	100%
Paterson	New Jersey	156661	5	93%	93%
Macon	Georgia	156197	12	96%	96%
Lakewood	Colorado	156120	68	26%	26%
Alexandria	Virginia	155525	17	46%	45%
Roseville	California	154817	325	79%	79%
Springfield	Massachusetts	154064	10	96%	20%
Charleston	South Carolina	153672	5	90%	90%
Kansas City	Kansas	153345	23	74%	72%
Sunnyvale	California	153091	167	68%	68%
Bellevue	Washington	152767	162	57%	54%
Denton	Texas	150353	18	12%	12%
Escondido	California	150270	39	89%	89%
Naperville	Illinois	149936	10	45%	45%
Bridgeport	Connecticut	148377	2	0%	0%
Savannah	Georgia	148004	8	58%	56%
Mesquite	Texas	147899	0	0%	0%
Pasadena	Texas	147662	10	100%	100%
Rockford	Illinois	146713	9	0%	0%
Pomona	California	146017	52	72%	72%
Jackson	Mississippi	145995	28	75%	75%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Olathe	Kansas	145616	31	77%	77%
Gainesville	Florida	145214	202	68%	67%
Syracuse	New York	144451	27	22%	15%
Waco	Texas	143984	6	31%	31%
Visalia	California	143966	46	44%	44%
Thornton	Colorado	143282	114	61%	61%
Torrance	California	141126	52	72%	62%
Fullerton	California	140541	55	72%	72%
Columbia	South Carolina	139698	12	82%	82%
New Haven	Connecticut	138915	24	60%	60%
Warren	Michigan	137107	4	8%	8%
West Valley City	Utah	136650	36	90%	90%
Cedar Rapids	Iowa	136429	72	46%	22%
Stamford	Connecticut	136188	9	55%	40%
Orange	California	136178	22	72%	72%
Dayton	Ohio	135944	10	33%	33%
Midland	Texas	134444	1	0%	0%
Kent	Washington	134392	87	73%	73%
Pasadena	California	134211	55	64%	64%
Carrollton	Texas	133820	3	0%	0%
Fargo	North Dakota	131444	17	28%	28%
Lewisville	Texas	131215	10	38%	26%
Meridian	Idaho	129736	63	80%	80%
Norman	Oklahoma	129627	17	41%	41%
Athens	Georgia	128561	29	71%	69%
Columbia	Missouri	128555	35	86%	86%
Abilene	Texas	127385	0	0%	0%
Round Rock	Texas	126697	3	45%	45%
Topeka	Kansas	125449	3	62%	62%
Allentown	Pennsylvania	125094	2	80%	80%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Clovis	California	124556	91	92%	92%
Simi Valley	California	124398	48	77%	77%
College Station	Texas	124319	89	38%	38%
Thousand Oaks	California	124265	87	79%	79%
Rochester	Minnesota	121878	54	70%	70%
Arvada	Colorado	121581	121	45%	44%
Lafayette	Louisiana	121389	13	14%	14%
Independence	Missouri	121202	8	66%	66%
West Palm Beach	Florida	120932	74	73%	68%
Hartford	Connecticut	120686	48	56%	54%
Wilmington	North Carolina	120324	43	29%	29%
Lakeland	Florida	120071	111	76%	68%
Billings	Montana	119960	35	33%	33%
Ann Arbor	Michigan	119875	114	71%	71%
Fairfield	California	119338	17	41%	41%
Berkeley	California	118950	11	34%	26%
Richardson	Texas	118802	5	59%	59%
Cambridge	Massachusetts	118488	16	62%	12%
Broken Arrow	Oklahoma	117911	2	70%	70%
Clearwater	Florida	117027	56	94%	93%
West Jordan	Utah	116664	83	80%	80%
Evansville	Indiana	115749	23	78%	69%
League City	Texas	115418	13	100%	100%
Antioch	California	115264	73	62%	62%
Manchester	New Hampshire	115141	5	66%	58%
High Point	North Carolina	115067	1	100%	100%
Waterbury	Connecticut	115016	1	94%	94%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Westminster	Colorado	114533	72	72%	71%
Richmond	California	114301	38	71%	71%
Carlsbad	California	114160	173	79%	78%
Las Cruces	New Mexico	113888	8	63%	63%
Murrieta	California	113783	84	84%	84%
Lowell	Massachusetts	113608	4	27%	23%
Provo	Utah	113523	95	34%	33%
Springfield	Illinois	113273	35	67%	67%
Elgin	Illinois	113177	12	8%	8%
Lansing	Michigan	112537	133	49%	49%
Pompano Beach	Florida	112302	121	96%	93%
Temecula	California	111752	60	91%	91%
Gresham	Oregon	111621	78	89%	89%
Allen	Texas	111551	3	0%	0%
Pueblo	Colorado	111456	12	60%	60%
Everett	Washington	111337	126	66%	66%
Peoria	Illinois	111021	21	36%	36%
Tuscaloosa	Alabama	110602	10	36%	36%
Miami Gardens	Florida	110497	45	71%	68%
Santa Maria	California	110125	84	62%	62%
Downey	California	109934	13	33%	33%
Concord	North Carolina	109896	1	100%	100%
Ventura	California	109527	72	75%	75%
Costa Mesa	California	109521	32	57%	57%
Menifee	California	109399	37	84%	84%
Tyler	Texas	109286	10	68%	68%
Greeley	Colorado	109209	138	20%	20%
Rio Rancho	New Mexico	108082	15	5%	5%
Sandy Springs	Georgia	107763	75	58%	58%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Dearborn	Michigan	107710	0	100%	100%
Spokane Valley	Washington	107325	112	71%	70%
Hillsboro	Oregon	107299	186	81%	81%
Davie	Florida	106513	103	92%	92%
Green Bay	Wisconsin	106095	19	14%	14%
Centennial	Colorado	105865	83	48%	48%
Boulder	Colorado	105485	125	61%	61%
Goodyear	Arizona	105406	189	61%	61%
El Monte	California	105312	9	51%	51%
Brockton	Massachusetts	104826	7	51%	17%
Burbank	California	103920	43	77%	74%
Rialto	California	103545	2	100%	100%
Lee’s Summit	Missouri	103465	2	100%	100%
Bend	Oregon	103254	149	88%	88%
South Bend	Indiana	103110	50	53%	49%
St. George	Utah	102519	45	32%	32%
Fishers	Indiana	101966	5	91%	91%
Carmel	Indiana	101964	7	54%	54%
Vacaville	California	101918	20	21%	21%
Quincy	Massachusetts	101727	55	55%	26%
Chico	California	101299	24	31%	20%
San Mateo	California	100984	85	72%	71%
Lynn	Massachusetts	100891	6	81%	81%
Albany	New York	100826	18	64%	64%
New Bedford	Massachusetts	100682	18	57%	37%
Davenport	Iowa	100486	16	63%	63%
Fayetteville	Arkansas	99285	37	63%	63%
Boca Raton	Florida	99009	133	85%	83%
Longmont	Colorado	98687	148	41%	41%
Yuma	Arizona	98527	29	48%	48%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Kenosha	Wisconsin	98484	48	38%	38%
Palm Coast	Florida	98411	15	59%	59%
Federal Way	Washington	97863	22	65%	65%
Roanoke	Virginia	97847	69	64%	58%
Beaverton	Oregon	97053	109	77%	77%
Yakima	Washington	97012	4	0%	0%
Sunrise	Florida	96306	70	81%	80%
Fort Myers	Florida	95949	51	89%	89%
Orem	Utah	95910	24	59%	58%
Lawrence	Kansas	95794	35	43%	43%
San Marcos	California	94854	20	80%	80%
Mount Pleasant	South Carolina	94545	7	100%	100%
Bellingham	Washington	93896	88	66%	62%
Livonia	Michigan	93779	22	94%	94%
Asheville	North Carolina	93776	16	65%	64%
Fall River	Massachusetts	93682	9	76%	69%
O'Fallon	Missouri	93663	20	86%	86%
Erie	Pennsylvania	93511	4	3%	3%
Chino	California	93140	49	81%	81%
Sandy	Utah	93022	91	82%	80%
Roswell	Georgia	92950	14	79%	79%
Redding	California	92906	117	76%	70%
Hoover	Alabama	92435	12	0%	0%
Carson	California	92388	14	67%	67%
Kirkland	Washington	92151	54	69%	69%
Indio	California	91980	54	86%	86%
Avondale	Arizona	91617	2	57%	57%
Norwalk	Connecticut	91401	8	75%	75%
Nashua	New Hampshire	91161	3	18%	18%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Santa Monica	California	89947	22	37%	36%
Trenton	New Jersey	89661	7	69%	69%
Westminster	California	89397	55	80%	80%
Champaign	Illinois	89241	39	43%	43%
Greenville	North Carolina	89233	14	66%	66%
Santa Fe	New Mexico	89008	53	61%	61%
Bloomington	Minnesota	87797	61	19%	16%
Springdale	Arkansas	87672	9	88%	88%
Santa Barbara	California	87533	133	71%	70%
Newton	Massachusetts	87381	15	82%	58%
Troy	Michigan	87201	3	37%	37%
Ogden	Utah	86825	37	47%	46%
Deerfield Beach	Florida	86772	91	90%	90%
Duluth	Minnesota	86619	13	66%	66%
Melbourne	Florida	86441	29	97%	97%
San Ramon	California	85953	137	73%	73%
Medford	Oregon	85556	64	54%	43%
Auburn	Washington	84858	16	61%	61%
Kennewick	Washington	84750	5	100%	100%
Livermore	California	84701	185	64%	60%
Folsom	California	83269	91	77%	77%
Warwick	Rhode Island	83016	1	100%	100%
Farmington Hills	Michigan	82737	11	83%	83%
Longview	Texas	82531	8	100%	100%
Johns Creek	Georgia	82453	13	100%	100%
Frederick	Maryland	82175	1	28%	28%
Mountain View	California	81059	83	62%	62%
Boynton	Florida	80859	43	85%	85%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Beach					
Redwood City	California	80512	89	53%	51%
Alhambra	California	80259	5	84%	84%
Miami Beach	Florida	80017	45	47%	46%
Flint	Michigan	79854	15	77%	77%
Somerville	Massachusetts	79762	1	100%	100%
Lynchburg	Virginia	79287	8	73%	72%
Bloomington	Indiana	79107	16	54%	46%
Bloomington	Illinois	78864	8	17%	14%
Rapid City	South Dakota	78824	2	0%	0%
Flower Mound	Texas	78486	11	48%	22%
Napa	California	78315	84	44%	44%
Daytona Beach	Florida	77958	16	100%	100%
Chino Hills	California	77949	27	73%	73%
Loveland	Colorado	77884	190	37%	37%
Missoula	Montana	76955	54	76%	75%
Pleasanton	California	76689	85	86%	86%
Hammond	Indiana	76575	4	67%	67%
Racine	Wisconsin	76462	34	29%	29%
Schaumburg	Illinois	76225	93	3%	2%
Apple Valley	California	75867	55	40%	40%
Evanston	Illinois	75544	22	51%	12%
Southfield	Michigan	75431	9	83%	82%
Rock Hill	South Carolina	75349	5	50%	50%
Iowa City	Iowa	75233	15	67%	66%
Arlington Heights	Illinois	75195	11	0%	0%
Appleton	Wisconsin	74511	63	51%	39%
Redlands	California	73849	50	68%	51%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Kalamazoo	Michigan	72873	78	34%	34%
Johnson City	Tennessee	72514	13	98%	98%
Gulfport	Mississippi	72236	19	100%	100%
Wilmington	Delaware	71569	5	97%	97%
Lafayette	Indiana	71402	21	23%	21%
Dothan	Alabama	71235	2	72%	72%
St. Charles	Missouri	71184	10	53%	53%
Camden	New Jersey	70996	6	38%	31%
Framingham	Massachusetts	70963	11	51%	29%
St. Joseph	Missouri	70656	3	100%	100%
Jacksonville	North Carolina	70420	5	100%	100%
Eau Claire	Wisconsin	69737	23	45%	43%
Canton	Ohio	69671	9	72%	72%
Baldwin Park	California	69455	2	60%	60%
Shawnee	Kansas	69198	11	11%	11%
Yuba City	California	69014	57	57%	57%
Walnut Creek	California	68969	73	70%	70%
Gaithersburg	Maryland	68952	20	83%	83%
Redondo Beach	California	68918	49	68%	57%
Grand Junction	Colorado	68034	128	73%	73%
Gary	Indiana	67972	1	0%	0%
Alpharetta	Georgia	67267	5	100%	100%
Albany	Georgia	67192	8	89%	89%
Yorba Linda	California	67089	8	83%	83%
Waterloo	Iowa	66562	2	0%	0%
Palo Alto	California	66010	85	48%	47%
Skokie	Illinois	65497	32	67%	29%
Palatine	Illinois	65485	8	66%	66%
Ocala	Florida	65478	45	97%	97%

City name	State name	City population, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Muncie	Indiana	65076	9	34%	34%
Laguna Niguel	California	63742	126	99%	99%
Marietta	Georgia	62602	8	51%	51%
Stonecrest	Georgia	61087	3	82%	82%
Youngstown	Ohio	59144	5	100%	100%
North Miami	Florida	58906	44	60%	60%
St. Peters	Missouri	58523	17	45%	45%
Cupertino	California	57856	0	100%	100%
Kingsport	Tennessee	56150	14	100%	100%

eTable 2. Results by state

State name	Number of cities	Population of included cities, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted	Between-city variability (standard deviation) in adjusted prevalence
Alabama	7	1073390	63	48%	46%	34%
Alaska	1	287145	49	74%	74%	NA%
Arizona	12	4434090	5179	63%	63%	9%
Arkansas	4	479813	83	60%	59%	19%
California	91	20434037	10428	72%	71%	19%
Colorado	15	2974422	2501	45%	44%	17%
Connecticut	6	750583	93	57%	57%	32%
District of Columbia	1	671803	105	32%	12%	NA%
Florida	28	5208956	3257	76%	75%	15%
Georgia	13	1877915	332	60%	59%	21%
Hawaii	1	343421	31	49%	47%	NA%
Idaho	2	366370	329	64%	64%	14%
Illinois	17	4310182	728	44%	24%	23%
Indiana	11	1931469	300	71%	68%	27%
Iowa	6	675241	153	56%	50%	30%
Kansas	7	1183320	258	50%	50%	23%
Kentucky	3	1019717	209	65%	64%	31%
Louisiana	5	971857	152	76%	76%	44%
Maryland	3	721058	100	55%	53%	28%
Massachusetts	13	1982099	425	56%	29%	27%
Michigan	13	1918955	655	57%	55%	28%
Minnesota	5	1024566	492	27%	26%	27%
Mississippi	2	218231	47	85%	85%	18%
Missouri	10	1613190	322	77%	75%	20%
Montana	2	196915	89	59%	59%	30%

State name	Number of cities	Population of included cities, 2022 est.	Total length of paint-only bike lanes (lane-miles)	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted	Between-city variability (standard deviation) in adjusted prevalence
Nebraska	2	777780	44	75%	75%	9%
Nevada	3	1261137	526	70%	68%	20%
New Jersey	6	1043615	75	29%	25%	34%
New Mexico	4	871986	511	63%	63%	29%
New York	6	9138726	767	25%	16%	22%
North Carolina	13	3206677	674	61%	60%	27%
North Dakota	1	131444	17	28%	28%	NA%
Ohio	8	2298660	315	78%	76%	20%
Oklahoma	5	1450491	69	75%	75%	24%
Oregon	8	1495260	1678	71%	69%	16%
Pennsylvania	7	2337084	466	46%	37%	31%
Rhode Island	4	430066	22	53%	42%	41%
South Carolina	4	463264	29	83%	83%	22%
Tennessee	9	2221069	713	72%	70%	22%
Texas	41	13191285	1734	52%	51%	35%
Utah	8	949770	725	57%	56%	22%
Virginia	9	1785998	196	70%	68%	18%
Washington	14	2452055	1398	56%	54%	25%
Wisconsin	7	1261497	978	48%	47%	13%

eTable 3. Results comparing California, Arizona, Florida vs other states

California, Arizona, Florida	Total length of paint-only bike lanes (mi)	Percent of all paint-only bike lanes in included cities	Prevalence of high-stress paint-only bike lanes, unadjusted	Prevalence of high-stress paint-only bike lanes, adjusted
Yes	18864	51%	70%	69%
No	18473	49%	55%	52%

Section 2. Potential impact of missingness in input criteria on results

In this section, we explore how missingness in input criteria (speed limit, number of lanes, parking, or facility width) could impact the stress results. Our major concern is the possibility that missingness could possibly be biasing the high-stress prevalence upwards.

Missingness in speed limit

This table shows the proportion of the total length of all paint-only bike lanes (conventional and buffered) that are missing OSM values for segment-level speed limit or number of lanes and the proportion classified as high stress in those categories.

Among the total length of paint-only bike lanes, 48% is missing speed-limit data at the segment level. Among segments missing speed limit, the high-stress prevalence of 50% is lower than where speed-limit data are not missing (high-stress prevalence=74%). compared with 74% where speed-limit data are not missing.

However, for some highway types and lane types, the high-stress prevalence of conventional bike lanes is higher where the speed-limit data are missing, suggesting it is possible that the assumptions may be upwardly biasing the result if not accounted for. Similarly, on secondary roadways, the high-stress prevalence of buffered bike lanes is 100% where speed limit is missing compared with 64% where it's not missing.

eTable 4. Prevalence of high stress by missingness status of speed limit among paint-only bike lanes

var	lane_type	miss	length_mi	length_mi_stress	prop_miss	prop_stress	speed_limit_mean	speed_limit_median
speed_limit	all paint-only	0	19587	14468	0.52	0.74	35	35
speed_limit	all paint-only	1	17750	8939	0.48	0.50	35	30
speed_limit	conventional	0	18704	14048	0.52	0.75	35	35

var	lane_type	miss	length_mi	length_mi_stress	prop_miss	prop_stress	speed_limit_mean	speed_limit_median
speed_limit	conventional	1	16939	8521	0.48	0.50	34	30
speed_limit	buffered	0	884	421	0.52	0.48	33	30
speed_limit	buffered	1	811	418	0.48	0.52	35	40

eTable 5. Prevalence of high stress by missingness status of speed limit by lane type by highway type

var	lane_type	hwy_type_collapse_link	miss	length_mi	length_mi_stress	prop_miss	prop_stress	speed_limit_mean	speed_limit_median
speed_limit	conventional	motorway	0	43.2	43.2	0.76	1.00	55	55
speed_limit	conventional	motorway	1	13.9	13.9	0.24	1.00	40	40
speed_limit	conventional	trunk	0	554.3	554.3	0.89	1.00	44	45
speed_limit	conventional	trunk	1	66.7	66.7	0.11	1.00	40	40
speed_limit	conventional	primary	0	4191.2	4050.2	0.72	0.97	40	40
speed_limit	conventional	primary	1	1646.0	1646.0	0.28	1.00	40	40
speed_limit	conventional	secondary	0	6908.4	6255.1	0.54	0.91	36	35
speed_limit	conventional	secondary	1	5769.8	5769.8	0.46	1.00	40	40
speed_limit	conventional	tertiary	0	7004.4	3145.1	0.43	0.45	30	30

var	lane_type	hwy_type_collapse_link	miss	length_mi	length_mi_stress	prop_miss	prop_stress	speed_limit_mean	speed_limit_median
speed_limit	conventional	tertiary	1	9438.4	1024.4	0.57	0.11	30	30
speed_limit	conventional	living_street	0	1.9	0.0	0.31	0.00	23	30
speed_limit	conventional	living_street	1	4.2	0.0	0.69	0.00	NaN	NA
speed_limit	buffered	trunk	0	8.0	8.0	0.70	1.00	39	35
speed_limit	buffered	trunk	1	3.4	3.4	0.30	1.00	40	40
speed_limit	buffered	primary	0	190.8	153.2	0.71	0.80	37	35
speed_limit	buffered	primary	1	78.6	78.6	0.29	1.00	40	40
speed_limit	buffered	secondary	0	329.4	209.2	0.49	0.64	34	35
speed_limit	buffered	secondary	1	336.1	336.1	0.51	1.00	40	40
speed_limit	buffered	tertiary	0	355.6	50.1	0.48	0.14	30	30
speed_limit	buffered	tertiary	1	393.0	0.0	0.52	0.00	30	30

Missingness in number of lanes

Among the total length of paint-only bike lanes, 33% are missing data on the number of lanes at the segment level. Among segments missing number of lanes, the prevalence of high stress is 45% compared with 72% where the number of lanes is not missing.

eTable 6. Prevalence of high stress by missingness status of number of lanes among paint-only bike lanes

var	lane_type	miss	length_mi	length_mi_stress	prop_miss	prop_stress	n_lanes_mean	n_lanes_median
n_lanes	all paint-only	0	24852	17832	0.67	0.72	1.9	2
n_lan	all paint-	1	12486	5575	0.33	0.45	1.4	1

var	lane_type	miss	length_mi	length_mi_stress	prop_miss	prop_stress	n_lanes_mean	n_lanes_median
es	only							
n_lanes	conventional	0	23685	17197	0.66	0.73	1.9	2
n_lanes	conventional	1	11958	5372	0.34	0.45	1.4	1
n_lanes	buffered	0	1167	635	0.69	0.54	1.8	2
n_lanes	buffered	1	528	204	0.31	0.39	1.4	1

eTable 7. Prevalence of high stress by missingness status of number of lanes by lane type by highway type

var	lane_type	hwy_type_collapse_link	miss	length_mi	length_mi_stress	prop_miss	prop_stress	n_lanes_mean	n_lanes_median
n_lanes	conventional	motorway	0	53.5	53.5	0.94	1.00	2.4	2
n_lanes	conventional	motorway	1	3.6	3.6	0.06	1.00	2.0	2
n_lanes	conventional	trunk	0	603.6	603.6	0.97	1.00	2.9	3
n_lanes	conventional	trunk	1	17.4	17.4	0.03	1.00	2.0	2
n_lanes	conventional	primary	0	4950.2	4809.4	0.85	0.97	2.5	2
n_lanes	conventional	primary	1	887.1	886.9	0.15	1.00	2.0	2
n_lanes	conventional	secondary	0	9082.4	8438.6	0.72	0.93	2.0	2
n_lanes	conventional	secondary	1	3595.8	3586.3	0.28	1.00	2.0	2
n_lanes	conventional	tertiary	0	8992.7	3292.1	0.55	0.37	1.3	1
n_lanes	conventional	tertiary	1	7450.0	877.4	0.45	0.12	1.0	1
n_lanes	conventional	living_street	0	2.3	0.0	0.38	0.00	1.1	1
n_lanes	conventional	living_street	1	3.8	0.0	0.62	0.00	NaN	NA

var	lane_type	hwy_type_collapse_link	miss	length_mi	length_mi_stress	prop_miss	prop_stress	n_lanes_mean	n_lanes_median
n_lanes	buffered	trunk	0	11.4	11.4	1.00	1.00	2.9	3
n_lanes	buffered	primary	0	244.4	208.9	0.91	0.85	2.5	2
n_lanes	buffered	primary	1	25.0	22.9	0.09	0.92	2.0	2
n_lanes	buffered	secondary	0	478.2	372.7	0.72	0.78	1.9	2
n_lanes	buffered	secondary	1	187.4	172.7	0.28	0.92	2.0	2
n_lanes	buffered	tertiary	0	432.8	42.2	0.58	0.10	1.3	1
n_lanes	buffered	tertiary	1	315.9	8.0	0.42	0.03	1.0	1

Missingness in parking and roadway width

Parking presence and roadway width are also used in certain combinations to define the stress levels. Segment-level parking data are missing in a large majority of the mileage of conventional (98.5%) and buffered bike lanes (93.5%). Segment-level data on facility width are similarly missing in almost all of the mileage of both conventional (99.6%) and buffered bike lanes (98.0%).

Examining the specific combinations where these attributes would impact the stress results, we show that missingness of these values cannot be biasing the high-stress prevalence upwards.

eTable 6. Prevalence of high stress by missingness status of parking and facility width among paint-only bike lanes

var	lane_type	miss	length_mi	length_mi_stress	prop_miss	prop_stress
parking	all paint-only	0	656.4	413.3	0.018	0.630
parking	all paint-only	1	36681.1	22994.2	0.982	0.627
parking	conventional	0	546.5	354.0	0.015	0.648
parking	conventional	1	35096.0	22214.7	0.985	0.633
parking	buffered	0	110.0	59.2	0.065	0.539
parking	buffered	1	1585.0	779.4	0.935	0.492
width_infra	all paint-only	0	159.1	117.3	0.004	0.737
width_infra	all paint-only	1	37178.4	23290.1	0.996	0.626
width_infra	conventional	0	117.0	81.8	0.003	0.699

var	lane_type	miss	length_mi	length_mi_stress	prop_miss	prop_stress
width_infra	conventional	1	35525.5	22487.0	0.997	0.633
width_infra	buffered	0	42.1	35.5	0.025	0.844
width_infra	buffered	1	1652.9	803.1	0.975	0.486

Conventional bike lanes

We first examine how missingness in parking and facility width may impact the stress results of conventional bike lanes. In general, conventional bike lanes with parking may either be treated 1) as buffered bike lanes with parking, 2) as conventional bike lanes without parking, or 3) as a shared lane.

Possibility 1: Assuming conventional bike lanes with parking are treated as buffered bike lanes with parking

According to the stress criteria in Table 1 of the main text, conventional bike lanes with parking are treated as buffered bike lanes (not explicitly stated but presumably with parking) if the facility width is greater than or equal to 15 feet. Of all the mileage classified as conventional bike lanes, 11% have a combination of speed limit and number of lanes such that the values of parking would affect the result, were the conventional bike lanes treated as a buffered bike lane. In other words, in 75% of speed-limit and number-of-lanes combinations, the presence or absence of parking is not relevant to the result, for example, because the speed limit is 35 or greater and the number of lanes is more than one. In this 11%, the presence of parking always makes the facility more stressful according to the criteria. Consequently, knowledge of parking cannot decrease the stress prevalence, which means that the stress results cannot logically be lower for this combination, given values of the other criteria.

eTable 7. Proportion of conventional bike lanes with speed and lane criteria such that, if they were classified as a buffered bike lane with parking, the presence or absence of parking would impact the stress result

parking_or_width_matters_conv_to_buff	n	length_mi	prop_length
0	853313	31698	0.889
1	120365	3944	0.111

Possibility 2: Assuming conventional bike lanes with parking are treated as conventional bike lanes without parking

If the facility width is 13-14 feet, then a bike lane with parking would be treated as a bike lane without parking. Under that scenario, the stress result only depends on the values of speed limit and number of lanes.

Possibility 3: Assuming conventional bike lanes with parking are treated as a shared lane.

Finally, if the facility width is less than 13 feet, the conventional bike lane with parking would be treated as a shared lane. Under that scenario, the stress result only depends on the values of speed limit and number of lanes.

Buffered bike lanes

The presence or absence of parking would affect the stress result of buffered bike lanes in 14% of the lane-miles of buffered bike lanes. As we noted for this set of criteria when considering conventional bike lanes, the presence of parking would only make the stress result more stressful, implying that the stress classification of these 14% cannot be any lower.

eTable 8. Proportion of buffered bike lanes with speed and lane criteria such that the presence or absence of parking would impact the stress result

parking_or_width_matters_buff	length_mi	prop_length
0	1465	0.864
1	230	0.136

Section 3. Prevalence of bicycle infrastructure

eTable 9. Percent of primary, secondary, or tertiary roadway miles with bicycle infrastructure

bike_infra_table	length_mi	length_mi_tot	prop_infra_of_all_ways	any_infra	prop_infra_of_any_infra
conventional bike lane	34958	290445	0.120	1	0.823
buffered bike lane	1684	290445	0.006	1	0.040
cycle track	1074	290445	0.004	1	0.025
sharrow	4785	290445	0.016	1	0.113
NA	247944	290445	0.854	0	NA

Section 4. Potential impact of misclassification of paint-only bike lanes

We finally consider the possibility that segments classified as paint-only bike lanes are not actually paint-only bike lanes. Ferster and colleagues (2023) (*Developing a national dataset of bicycle infrastructure for Canada using open data sources*) estimated that, in 15 Canadian cities, 18% of paint-only bike lanes mapped by OpenStreetMap were not paint-only bike lanes (i.e., a sensitivity of 82%). This potential misclassification could upwardly bias the stress results if those false-positive paint-only bike lanes (those classified as bike lanes that really are not) were more likely to be high stress than true-positive paint-only bike lanes.

(Ferster and colleagues also estimated that paint-only bike lanes were classified with 93% specificity. We do not consider the specificity in this bias analysis because doing so would require an estimate of the high-stress prevalence among segments not classified as having a paint-only bike lane, a value we do not estimate in this study.)

We consider the potential impact on the overall high-stress prevalence of this possibly imperfect sensitivity under three possible scenarios.

1) Under Scenario 1 (extremely differential misclassification), we assume false-positive paint-only bike lanes were all (100%) high-stress, a strong assumption that can be viewed as placing a lower bound on the prevalence under the 82% sensitivity assumption.

2) Under Scenario 2 (less extreme differential misclassification), we assume false-positive paint-only bike lanes were 81.3% high-stress, half-way between 100% and the estimated high-stress prevalence of paint-only bike lanes in the study, adjusted for speed-limit assumption.

3) Under Scenario 3 (non-differential misclassification), we assume that false-positive paint-only bike lanes had the same high-stress prevalence of true-positive paint-only bike lanes. In other words, this scenario assumes that misclassification of paint-only bike lanes is independent of the traffic stress. If so, then high-stress prevalence would be the same as that reported in Table 2.

We begin with a total of 37337 miles of paint-only bike lanes, 22668 of which are classified as high-stress according to the stress-assumption-adjusted prevalence of 62.7% (Table 2, main text). Assuming an 82% sensitivity, 6721 miles would be false-positive bike lanes, which means 30617 miles of paint-only bike lanes would remain. Scenario 1 assumes that all of the misclassified miles were high stress. If so, then 15948 miles (22668-6721) of the remaining 30617 would be high stress, a prevalence of 52.1%.

Under Scenario 2, 17201 miles of the remaining 30617 miles would be high stress, a prevalence of 56.2%.

Under Scenario 3 (non-differential misclassification), the high-stress prevalence would be the same.