

1 **Cycling behaviour in 17 countries across 6 continents: levels of cycling, who**  
2 **cycles, for what purpose, and how far?**

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# 28 **Cycling behaviour in 17 countries across 6 continents: levels of cycling, who** 29 **cycles, for what purpose, and how far?**

## 30 **Abstract**

31 International comparisons of cycling behaviour have typically been limited to high-income countries  
32 and often limited to the prevalence of cycling, with lack of discussions on demographic and trip  
33 characteristics. We used a combination of city, regional, and national travel surveys from 17 countries  
34 across the six continents, ranging from years 2009 through 2019. We present a descriptive analysis of  
35 cycling behaviour including level of cycling, trip purpose and distance, and user demographics, at the  
36 city-level for 35 major cities (>1 million population) and in urbanised areas nationwide for 11  
37 countries. The Netherlands, Japan and Germany are among the highest cycling countries and their  
38 cities among the highest cycling cities. In cities and countries with high cycling levels, cycling rates  
39 tend to be more equal between work and non-work trips, whereas in geographies with low cycling  
40 levels, cycling to work is higher than cycling for other trips. In terms of cycling distance, patterns in  
41 high- and low-cycling geographies are more similar. We found a strong positive association between  
42 the level of cycling and women's representation among cyclists. In almost all geographies with  
43 cycling mode share greater than 7% women made as many cycle trips as men, and sometimes even  
44 greater. The share of cycling trips by women is much lower in geographies with cycling mode shares  
45 less than 7%. Among the geographies with higher levels of cycling, children (<16 years) are often  
46 overrepresented. Older adults (>60 years) remain underrepresented in all geographies but have  
47 relatively better representation where levels of cycling are high. In low-cycling settings, females are  
48 underrepresented across all the age groups, and more so when older than 16 years. With increasing  
49 level of cycling, representation of females improves across all the age groups, and most significantly  
50 among children and older adults. Clustering the cities and countries into homogeneous cycling  
51 typologies reveals that high cycling levels always coincide with high representation of females and  
52 good representations of all age groups. In low-cycling settings, it is the reverse. We recommend that  
53 evaluations of cycling policies include usage by gender and age groups as benchmarks in addition to  
54 overall use. To achieve representation across different age and gender groups, making  
55 neighbourhoods cycling friendly and developing safer routes to school, should be equally high on the  
56 agenda as cycling corridors that often cater to commuting traffic.

57

## 58 **1. Introduction**

59 There is international academic and policy interest in cycling. Reasons range from spatial and  
60 temporal efficiency to health, the local environment, and climate change, compared to other modes.  
61 However, cycling levels vary widely. In Western Europe, variation in cycling mode share (e.g. 2% in  
62 United Kingdom (UK) vs. 26% in the Netherlands: Buehler and Pucher 2012) indicates substantial  
63 scope for increasing levels of cycling. Such variation also exists within countries; for instance, many  
64 cities in the UK have cycle commuting rates of ~1%, but in Cambridge this figure is 33% (Goodman  
65 and Aldred 2018). Likewise, cycling prevalence in the adult population of Argentinian cities ranged  
66 from 1.3% (Parana) to 9.3% (Santa Fe) (Sá et al. 2018).

67 Cycling levels are affected by national and subnational policy (Buehler and Pucher 2012), which  
68 shape cycling experience through factors including infrastructure availability and quality (Mueller et  
69 al. 2018). Other factors affecting the likelihood of cycling include trip distance (Lovelace et al. 2017,  
70 Schneider et al. 2018) and demographic variables. Demographic correlates of cycling vary  
71 substantially across the countries. Cycle commuting is gender-equal in some contexts (e.g. the  
72 Netherlands), but not others such as the United States of America (USA) or England, where male to  
73 female ratios are around 3:1 (Heinen, Van Wee, and Maat 2010; Pucher et al. 2011), or in cities such  
74 as Sao Paulo (Brazil) and Posadas (Argentina), with male to female ratios around 7:1 (Sá et al. 2018).  
75 Studies have reported that the ratio of male to female cycling rates is greatest in areas that are less

76 attractive for cycling (Grudgings et al. 2018). Women use cycling for non-commute purpose relatively  
77 more than do men (Krizek, Johnson, and Tilahun 2005; Tin Tin et al. 2009), their cycling trips are  
78 shorter than men's (Garrard, Rose, and Lo 2008; Krizek, Johnson, and Tilahun 2005) and the gender  
79 division of household labour may affect cycling levels (Singleton and Goddard 2016; Shaw et al.  
80 2020). The relationship between cycling use and age has been found to be inconsistent (Heinen, van  
81 Wee, and Maat 2010). In England and the US, cycling declines dramatically from middle age, while  
82 in the Netherlands, cycling levels only decline after age 70 (Götschi et al. 2015; Pucher et al. 2011).

83 Much of the cross-national comparative work of cycling behaviour using travel surveys is limited to  
84 Western Europe and North America (Pucher and Buehler 2008; Pucher et al. 2010; Buehler and  
85 Pucher 2012b). These countries are among the world's richest. According to a global study analysing  
86 GPS traces of individuals, Western European countries have the highest gender equality in daily  
87 mobility, expressed in terms of spatial coverage, while countries such as India, South Korea and Chile  
88 are among the least equal (Alessandretti, Aslak, and Lehmann 2020). Further, there are large  
89 differences (up to 20 years) in the median age of population in the global North and those in the  
90 global South (Lutz, Sanderson, and Scherbov 2008). Given these differences, demographics of  
91 cycling behaviour from a handful of high-income countries are likely a poor representation of the rest  
92 of the world.

93 As far as cities are concerned, international comparison is limited to levels or prevalence of cycling,  
94 lacking discussion of demographic or trip characteristics (Pucher and Buehler, 2008; Sa et al., 2016).  
95 Comparison between cities is far more common as part of within-country analyses e.g. Buehler and  
96 Pucher (2012a) for the USA, Aldred, Woodcock, and Goodman (2016) for England, and Goel and  
97 Mohan (2020) for India. Single-country studies analysing the demographic correlates of cycling are  
98 also focused on the Global North (Aguilar-Farias et al. 2019), the exceptions being a growing  
99 literature on China (e.g. Zhao et al., 2018) and some Brazilian studies (e.g. Reis et al., 2013; Sá et al.,  
100 2016). There is less work on other Latin American countries, although some have achieved substantial  
101 growth in cycling: for instance, Bogotá, in Colombia (Rosas-Satizábal and Rodriguez-Valencia 2019).  
102 There is no study that we are aware of that studied cycling behaviour in a mix of low-and-middle  
103 income and high-income cities or countries.

104 Thus, with both comparative and demographically focused literature limited to a relatively small  
105 number of countries, we lack an international landscape of cycling prevalence in relation to  
106 demographic variation. This study starts to fill this gap, reviewing cycling prevalence and trip  
107 characteristics alongside variation in age and gender. Data are presented both at city and country  
108 level, due to variation in the availability of travel survey data. Seventeen countries are covered,  
109 including low-, middle- and high-income contexts across six continents.

110 With a focus on cycling levels, trip characteristics, and demographics of the users, we address the  
111 following research questions:

- 112 1. What is the mode share of cycling across countries and cities for all trips, and for work and non-  
113 work trips?
- 114 2. How does cycling mode share by distance vary across countries and across cities and how does  
115 this relate to level of cycling?
- 116 3. How does cycling mode share for age and gender groups differ across countries and across cities,  
117 and does this relate to cycling levels?
- 118 4. What is the interaction between age and gender representation of cyclists, and how does this vary?
- 119 5. Can we establish a global typology of cities based on level of cycling, and representation of  
120 gender and age among cyclists?

121 **2. Methods**

122 **2.1 Survey data**

123 To answer these questions, we needed comparable travel survey data from a range of different  
124 contexts. We used a combination of city-, region- and country-level travel surveys from 17 different  
125 countries across six different continents. The countries include Kenya and South Africa in **Africa**,  
126 India and Japan in **Asia**, **Australia**, England, Finland, Germany, Netherlands and Switzerland in  
127 **Europe**, Canada, Mexico and USA in **North America**, and Argentina, Brazil, Chile, and Colombia in  
128 **South America**. We selected cities based on availability of data and to ensure representation of  
129 different world regions. We obtained data from city/regional websites for Argentina, Australia, Brazil,  
130 Canada, Colombia, Chile, from collaborators with access to data for Brazil, Colombia, India, Kenya,  
131 Netherlands, Mexico, South Africa, USA, and by applying to specific data agencies for access for the  
132 rest. The included countries represent a wide range of income levels (World Bank 2019). Among  
133 these, seven are low-and-middle income countries and ten are high income countries. The latter  
134 include Australia, Canada, Chile, Japan, USA, and all five European countries. We refer to Argentina,  
135 Brazil, Chile, Colombia, and Mexico as Latin American countries.

136 Travel survey datasets typically report travel activities of sampled individuals using a travel diary.  
137 The duration of reporting is one day for most datasets. The exceptions are country-level datasets of  
138 England and Germany where respondents reported their travel activities for a week. For the  
139 corresponding cities of the two countries included in city-level analysis (London, Berlin, Cologne,  
140 Hamburg, and Munich) we used different city-level datasets with a reporting duration of one day. The  
141 other exceptions are the US cities of Chicago, where a fraction of respondents reported for one day  
142 and the rest reported 2 days, and Seattle, where the reported data is a mix of one day for some  
143 respondents and a week for the rest.

144 We present two sets of results. One refers to selected cities and the other refers to all urban areas in an  
145 entire country. We make this distinction of city- and country-level as travel patterns often vary within  
146 a country and are developed locally. For the city-level analysis, we included the largest cities within  
147 their respective countries and cities with a population size of at least a million. We have two  
148 exceptions. We included Kisumu city in Kenya with a population of 560,000, as we had access to  
149 only two cities from the African continent (other is Cape Town in South Africa). The other exception  
150 is Gran Valparaiso in Chile with a population of 964,565 in 2014.

151 For the country-level analysis, we selected data of those respondents who resided in urban areas, and  
152 we refer to these geographies as nationwide urban areas. Our definition of urban was based on how it  
153 was categorised in each country’s travel survey dataset. In general, we excluded all areas that were  
154 categorised as ‘rural’, although definitions of rural areas may differ across the countries. Limiting to  
155 urban areas makes the two sets of analyses at city- and country-level comparable, though at different  
156 levels of aggregation.

157 **Table 1: Cities or regions contributing to country-level analysis (countries for which dataset was**  
158 **combined from multiple cities/regions)**

Country	Geographies included for country-level analysis
Argentina	Buenos Aires; Cordoba; Mendoza; Neuquén y Cipolletti; Posadas; Resistencia-Corrientes; Rosario; Salta; Tucuman
Australia	Cairns Region; Darling Downs and Lockyer; Gladstone; Gympie, Gayndah, Kingaroy and Tin Can Bay/Cooloola; Mackay; Rockhampton Region; South East Queensland; Townsville; Toowoomba region; Wide Bay Burnett; Victoria Region
Brazil	Belo Horizonte; Feira de Santana; Salvador; Sao Paulo
Chile	Antofagasta; Arica; Copiapo; Coquimbo-La Serena; Gran Valparaiso; Iquique; Puerto Montt; Santiago; Temuco-Padre Lascasas; Valdivia

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160 For country-level analysis, we used two types of datasets. First, nationally representative travel  
161 surveys—these were available for all the high-income countries except Australia and Chile and not  
162 available for any of the low-and-middle income countries. Second, for Argentina, Australia, Brazil,  
163 and Chile, we combined data from multiple individual cities or urban part of the regions for their  
164 country-level analysis (see Table 1). The cities/regions included represent 53% of the urban  
165 population of Argentina, 35% in Australia, 18% in Brazil, and 65% in Chile. For Colombia, Kenya,  
166 Mexico, and South Africa, we have data for one city each, and for India, two cities, and therefore not  
167 enough for a country-level analysis. In total, we present city-level analysis for 35 geographies and  
168 country-level analyses for 11 geographies. The average population of the cities is 4.98 million.  
169 Without double counting those cities with their respective countries included in our analysis, we  
170 present cycling behaviour representing 648 million urban residents in the world (i.e. circa 17% of  
171 global urban population(UNDESA 2019)). The average year of the datasets is 2013, ranging from  
172 2009 (3 geographies) to 2019. More details of the datasets in the Supplementary Information (SI)-1.

173 In case of Finland, we could not identify urban residents and therefore used rural-urban combined. We  
174 expect this to have minimal effect on the results as only 15% of Finland’s residents live in rural areas.  
175 The data for Amsterdam city in the Netherlands is represented by the urban residents of the Noord-  
176 Holland municipality, of which Amsterdam is the largest city. For Helsinki in Finland, we report data  
177 for Helsinki Capital Region, for Brisbane in Australia, Greater Brisbane Area, for Melbourne in  
178 Australia, Metropolitan Melbourne, for Zurich in Switzerland, Zurich agglomeration, and for Seattle  
179 in the US, Seattle Metropolitan Area.

## 180 **2.2 Analysis**

181 Our units of analysis are trips and the individuals who made those trips. For trips with multiple stages  
182 and multiple mode, we assigned main modes. For most datasets, this was already assigned. If not, we  
183 used stage-level data and assigned the mode used for the stage with the longest duration. If stage-level  
184 duration was not available, we used a hierarchy of modes (all modes except walking have higher level  
185 than cycling). We defined trip distance and duration as the total distance and duration, respectively,  
186 from origin to the destination of the trip including all the stages. We defined trip purpose as a  
187 dichotomised variable—work and non-work. In work, we also included trip purpose classified as  
188 work-related or business. We classified trips to work and the following trip back home as work trips,  
189 and trip back home was classified as work trip only if it immediately followed a trip to work. In some  
190 datasets, this classification was already available, and in country-level dataset of Germany, used a  
191 different criterion. In that dataset, returning home trips were classified as work trips if there were a  
192 maximum of three trips away from the trip to work, therefore, allowing two trips between work and  
193 trip home.

194 We present multiple metrics of cycling and overall travel behaviour, using either trips or individuals  
195 as units of analysis. The metrics using trips as units of analysis include overall mode share of cycling,  
196 mode share of cycling classified by work and non-work trips, mode share of cycling classified by  
197 males and females, percentage share of cycle trips that are made by women, and median distance and  
198 duration of cycle trips. Datasets of Africa, Japan, and Latin America (except Sao Paulo) do not report  
199 trip distance, and that of Montreal (Canada) do not report distance or duration, and therefore we do  
200 not report their corresponding metrics in the city-level and country-level results. When available, we  
201 used trip weights or person weights to ensure analysis is representative of the population .

202 The metrics using individuals as units of analysis include median age for the following four  
203 categories—cyclists (those who reported at least one cycle trip), all other road users (those not  
204 reporting any cycle trips), male cyclists, and female cyclists. The data on age in the four German  
205 cities (Berlin, Cologne, Hamburg, and Munich) and the four US cities (Los Angeles, Philadelphia,  
206 New York city, and Seattle) were only reported as categories of age bins, and Gran Valparaiso city  
207 has no age data in any form. For these six settings, we do not report these metrics of age.

208 Next, we present mode share of cycling by distance, where distance is classified into five bands: 0-2  
 209 km, 2-5 km, 5-10 km, 11-20 km, >20 km. To aid comparison across the settings with very different  
 210 overall cycling mode shares, we present distance distribution ratios, which we define as the ratio of  
 211 cycling mode share within each distance range to overall cycling mode share of the geography (see  
 212 **Box 1**). Mathematically, this is the same as the ratio of proportion of cycle trips in that distance range  
 213 to the proportion of all trips in that range. Using this ratio, we control for the overall distance  
 214 distribution in each setting and enable comparison across settings.

**Box 1**  
**Distance distribution ratio:** Ratio of cycling mode share within each distance range to overall cycling mode share of the geography.  
 For example, if following is the data:

	0-2 km	2-5 km	6-10 km	11-20 km	>20 km
Number of cycle trips	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>
Number of all trips by all modes (including cycle trips)	<i>f</i>	<i>g</i>	<i>h</i>	<i>i</i>	<i>j</i>

Then distance distribution ratio for 0-2 km bin is defined as:  $\frac{\text{mode share of cycling in 0-2 km bin}}{\text{overall mode share of cycling for the geography}}$ ,  
 which is:  $\frac{a/f}{(a+b+c+d+e)/(f+g+h+i+j)}$ ,  
 which can be expressed as:  $\frac{\text{proportion of cycle trips in 0-2 km bin}}{\text{proportion of all trips in 0-2 km bin}}$

**Female representation ratio by age group:** For a given age group, the ratio of proportion of cycle trips made by females to the proportion of all trips made by females. For example, if following is the data, with values shown only for 0-15 years:

		0-15 years	16-59 years	60+ years
Number of cycle trips	Female	<i>a</i>		
	Male	<i>b</i>		
Number of all trips by all modes (including cycle trips)	Female	<i>c</i>		
	Male	<i>d</i>		

Female representation ratio for 0-15 age group is defined as:  $\frac{\text{proportion of cycle trips made by females}}{\text{proportion of all trips made by females}}$   
 which is:  $\frac{a/(a+b)}{c/(c+d)}$   
 which can be expressed as:  $\frac{\text{mode share of cycling among trips made by females}}{\text{mode share of cycling for 0-15 age group}}$

215 Next, we present age representation of cyclists. We classified age into three groups— children (<16  
 216 years), working age (16-59 years), and older adults (>60 years). The age cut-off of older adults  
 217 matches retirement age in many countries. We decided to focus on three age groups to be able to  
 218 identify potential under- or over-representation among both older and younger individuals, which  
 219 could be obscured by presenting this for overall population or as mean or median ages alone. For each  
 220 age group, we calculated age representation ratio (see Box 1 for distance-based ratios, except distance  
 221 bins are replaced by age bins). In case of the German cities and three US cities, where age is available  
 222 only as categories, the cut-offs of the age band coincided with our definitions. For New York City, we  
 223 included 60-64-year-old in the category of working age.

224 Next, we present gender representation in cycling stratified by three age groups. Specific to each age  
 225 group, we calculate the ratio of proportion of cycle trips in that age group that are made by females to  
 226 the proportion of all trips in that age group made by females (see Box 1). We refer to this as female  
 227 representation ratio. Note that proportion used in the denominator of this ratio controls for overall  
 228 female representation in daily travel. A value less than one represents poor representation of females  
 229 in cycling compared to all trips combined, and a value greater than one represents overrepresentation.

230 To quantify the association between these different metrics with the mode share of cycling we report  
 231 Pearson’s and Spearman’s rank correlation along with their P-values of significance. Pearson’s  
 232 correlations report the strength of linear association, while Spearman’s rank order correlation gives  
 233 the strength of monotonic relationship (even if non-linear) and is not sensitive to outliers.

234 We develop typologies of the cities and countries based on the metrics of levels of cycling, gender  
 235 representation, and age representation of cyclists. The typologies aim to classify geographies into  
 236 clusters with relative homogeneity across these metrics. Here, for gender representation, the metric  
 237 used is the share of all cycle trips that are made by females. We used k-means cluster method for

238 cities and countries combined. The five vectors used for clustering include— mode share of cycling,  
 239 female’s share in cycling, and the age representation ratios of the three age groups. For clustering,  
 240 each of these vectors are first individually scaled as z-scores. We excluded Argentina and Brazil as  
 241 many of their constituting cities were also included. This minimised double-counting between results  
 242 of these countries and their respective cities. We also excluded four cities for which age  
 243 representation could not be calculated for all age groups—Cape Town, Delhi, Kisumu, and Sao Paulo,  
 244 due to small number of data points (<10) among the older adults.

245 **Table 2: Cycling behaviour and characteristics of cyclists for urbanized areas nationwide (listed**  
 246 **in the descending order of cycling mode share)**

Country	Region	Mode share of cycling (%)					Share of females in cycle trips	Median age				Median distance of cycle trip (km)	Median duration of cycle trip (minutes)
		All trips	Non-work trips	Work trips	All trips Males	All trips Females		Cyclists	All other road users	Male cyclists	Female cyclists		
Netherlands	Europe	26.8	27.1	25.3	25.4	28.2	54.4	36	43	30	39	2	10
Japan	Asia	11.5	11.9	10.1	10.2	12.7	56.4	45	54	40	48		10
Germany	Europe	9.3	9.2	9.4	9.5	9.1	49.2	52	54	51	53	2	10
Finland	Europe	7.8	7.8	8.4	8	7.6	50.4	31	44	27	33	2	15
Switzerland	Europe	6.7	6.3	8.1	7.2	6.3	46.6	39	46	38	41	1.7	10
Argentina	Latin America	3.6	3.3	5	4.9	2.4	33.6	33	30	34	31		15
Chile	Latin America	2.7	2.3	3.7	3.9	1.6	30.8	36	32	40	29		20
England	Europe	2.1	1.6	3.9	3.2	1.1	26.5	38	41	39	38	3.2	16
Australia	Australia	1.8	1.8	1.2	2.4	1.2	35.5	34	40	34	33	2.5	15
USA	North America	1.1	1	1.3	1.6	0.6	30.2	39	50	40	37	1.9	15
Brazil	Latin America	0.8	0.4	1.3	1.4	0.2	13.2	35	31	36	31		20

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248 **Table 3: Cycling behaviour and characteristics of cyclists in the selected cities (listed in the**  
 249 **descending order of cycling mode share)**

City	Country	Mode share of cycling (%)					Share of females in cycle trips	Median age (years)				Median distance of cycle trip (km)	Median duration of cycle trip (minutes)
		All trips	Non-work trips	Work trips	All trips Males	All trips Females		Cyclists	All other road users	Male cyclists	Female cyclists		
Amsterdam	Netherlands	28.7	28.8	26.8	27.1	30.1	54.7	37	42	34	39	2	10
Osaka	Japan	28.4	28.4	28.4	21.8	34.3	64.2	52	56	53	51		10
Tokyo	Japan	18.7	19.2	17.1	16.9	20.2	57.5	46	49	45	46		10
Munich	Germany	16.3	16.6	15	15.7	16.9	51.4					2	15
Nagoya	Japan	15.7	15.4	16.5	12.1	18.9	63	44	52	41	45		10
Cologne	Germany	14.7	14.7	14.9	15	14.3	48.5					2	15
Berlin	Germany	14.1	14.3	13	13.1	15	53.3					2.5	15
Hamburg	Germany	13.7	14.4	11.1	13.4	14	51					2.2	15
Yokohama	Japan	8.3	8.6	7	7.8	8.7	52.8	44	48	39	46		10
Rosario	Argentina	8.3	7.9	10	9.8	6.9	42.3	29	32	28	30		15
Zurich	Switzerland	6.4	5.9	7.8	7	5.7	43.8	40	46	39	41	1.8	10
Bogota	Colombia	6.3	4.3	9.6	9.3	3.4	27.8	34	34	34	32		25
Helsinki	Finland	5.3	5.1	7.1	5.6	5.1	49.5	37	42	35	40	3	20
Delhi	India	4.8	1.3	9	6.9	1.1	8.1	38	28	40	16	3	30
Kisumu	Kenya	4.3	4.2	5	7	2.1	26.2	28	27	30	27	5	20
Bangalore	India	4	4.2	3.8	4.3	3.2	20.7	41	41	41	26	3	20
Santiago	Chile	3.7	3.4	4.6	5.1	2.5	33.3	36	36	40	30	1.6	20
Buenos Aires	Argentina	3.3	3	4.5	4.5	2.2	34.3	35	31	36	32		15
Montreal	Canada	2.7	2.3	3.8	3.5	2	36.7	39	43	40	38		
Cordoba	Argentina	2.7	2.3	3.5	3.5	1.9	35.8	31	30	35	26	2.2	15
London	England	2.6	2	4.7	4	1.3	25.3	35	37	36	34	1.9	15
Mendoza	Argentina	2.2	1.8	3.9	3.6	0.8	19.1	34	32	33	35		20
Mexico City	Mexico	2	1.8	2.9	3.2	1	24.1	34	34	37	29		15
Philadelphia	USA	1.9	1.8	2.4	3.1	1.1	33.5					2.3	15
Melbourne	Australia	1.9	1.7	2.4	2.4	1.2	26.3	35	39	36	33	2.9	20
Chicago	USA	1.5	1.5	1.5	2.2	0.9	32.2	37	46	36	37	1.5	15
Los Angeles	USA	1.3	1.3	1.6	2	0.7	29.9					2.3	20
Brisbane	Australia	1.2	1.1	1.7	1.9	0.6	27	34	38	33	36	2.8	15
New York City	USA	1.2	1.2	1.4	1.8	0.7	34.1					1.7	15
Seattle	USA	1.1	1.1	1	1.5	0.6	27.4					3.1	15
Belo Horizonte	Brazil	1	0.6	1.6	1.8	0.2	9.8	36	31	36	31		20
Salvador	Brazil	0.9	0.5	1.5	1.6	0.2	11.9	34	31	35	30		20
Gran Valparaiso	Chile	0.8	0.7	1.1	1.3	0.3	20.9						20
Sao Paulo	Brazil	0.6	0.3	1	1.1	0.2	12.3	30	34	31	28	2	20
Cape Town	South Africa	0.3	0.2	0.5	0.4	0.1	27	41	32	42	25		30

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\*blank cells: age data not available for Gran Valparaiso, and not available as a continuous variable for the four German cities and the four US cities (Los Angeles, Philadelphia, New York City, Seattle); distance not available for cities in Japan and Latin America, and in Kisumu and Cape Town

252

253 **3. Findings**

254 **3.1 Mode share of cycling and its purpose**

255 **Table 2** presents mode share, gender representation of cycling, and age of cyclists and other road  
 256 users, and distance and duration of cycling trips for the countries, and **Table 3** present these data for  
 257 the selected cities. For all tables, data are presented by descending order of mode shares of cycling in  
 258 all trips, unless otherwise mentioned. Among the countries, the Netherlands has the highest level of  
 259 cycling followed by Japan, Germany, and Finland. The lowest levels are in Brazil and the USA with  
 260 about 1% mode share. Of the 35 cities, 13 have a mode share greater than 5% (median mode share is  
 261 3.3%). Cities with the highest levels of cycling are Amsterdam and Osaka, followed by Tokyo,  
 262 Munich, and Nagoya.

263 In most geographies, cycling is used for work trips more frequently than for other purposes. On  
 264 average, cycling to work in the urban areas of selected countries is 40% more likely than cycling for a  
 265 non-work trip, and in the selected cities, about 60% more likely. Among the countries, England and  
 266 Brazil have relatively extreme differences in cycling mode shares between work and non-work trips  
 267 (ratios of 2.4 and 3.3, respectively), and Delhi has the highest ratio at 6.9 among the cities.

268 In some of the highest cycling geographies, cycling is more frequently used among non-work trips.  
 269 Most prominent examples among the countries are the Netherlands, Japan, and Germany with an  
 270 average ratio of 0.83, and among cities are Hamburg, Yokohama, and Tokyo, with a similar average.  
 271 The correlations between this ratio and overall mode share of cycling are negative for the urban areas  
 272 of selected countries as well as the selected cities, with values of -0.45 ( $P=0.17$ ) and -0.32 ( $P=0.06$ )  
 273 respectively, using Pearson’s method, and -0.54 ( $P=0.09$ ) and -0.60 ( $P<0.001$ ), respectively, using  
 274 Spearman’s method. Negative associations imply that at higher levels of cycling, this ratio decreases,  
 275 and cycling is either as frequently used for non-work trips as for work trips, or even more frequently  
 276 for non-work trips.

277 **Table 4: Distance-based ratios of cycling across countries (ratio of proportion of cycle trips in a**  
 278 **distance bin to the proportion of all trips in that distance bin; heat map shows gradation of all**  
 279 **values combined; correlations are presented between mode shares and ratios within each**  
 280 **distance bin)**

Country	Region	Mode share	0-2 km	2-5 km	5-10 km	10-20 km	20+ km
Netherlands	Europe	26.8	1.40	1.30	0.70	0.30	0.10
Germany	Europe	9.3	1.70	1.30	0.60	0.30	0.10
Finland	Europe	7.8	2.10	1.20	0.60	0.30	0.10
Switzerland	Europe	6.7	1.50	1.30	0.50	0.30	0.20
England	Europe	2.1	1.50	1.30	0.90	0.60	0.20
Australia	Australia	1.8	1.20	1.30	1.20	0.60	0.30
USA	North America	1.1	2.00	1.30	0.70	0.30	0.10
Spearman correlation			-0.02	-0.20	-0.45	-0.47	-0.48
P-values			0.97	0.66	0.31	0.28	0.28
Pearson correlation			-0.19	0.01	-0.32	-0.46	-0.46
P-values			0.69	0.99	0.48	0.30	0.30

281 **3.2 Cycling mode share by distance**

282 We present distance distribution ratios for 7 countries (**Table 4**) and 20 cities (**Table 5**), excluding the  
 283 geographies that did not report travel distance. Also shown in the tables are the correlation values  
 284 between distance-specific ratios and mode share, along with P-values of significance. Across all the  
 285 geographies, the distance distribution ratios are usually greater than one for distance shorter than 5 km  
 286 (distance bins of 0-2 km and 2-5 km), and less than one for distance greater than 5 km. Among the  
 287 countries, the average ratio is the highest for the shortest distance bin (0-2 km), and among the cities,  
 288

289 for the 2-5 km bin. In other words, the likelihood of cycling for longer distance is higher in the  
 290 selected cities than in all urban areas combined. The percentage distributions of cycle trips and all  
 291 trips by distance categories are presented in SI-2.

292

293 **Table 5: Distance-based ratios of cycling trips in selected cities (ratio for each distance bin is the**  
 294 **ratio of proportion of all cycle trips in a distance range to the proportion of all trips in that**  
 295 **range; heat map shows gradation of all values combined; correlations are presented between**  
 296 **mode shares and ratios within each distance bin)**

City	Country	Mode share	0-2 km	2-5 km	5-10 km	10-20 km	20+ km
Amsterdam	Netherlands	28.7	1.34	1.37	0.82	0.31	0.08
Munich	Germany	16.3	1.35	1.25	0.78	0.33	0.13
Cologne	Germany	14.7	1.28	1.34	0.69	0.35	0.16
Berlin	Germany	14.1	1.28	1.42	0.83	0.34	0.20
Hamburg	Germany	13.7	1.30	1.39	0.75	0.34	0.10
Zurich	Switzerland	6.4	1.45	1.43	0.61	0.24	0.19
Helsinki	Finland	5.3	1.89	1.22	0.89	0.36	0.14
Delhi	India	4.8	0.64	2.64	1.58	1.15	0.00
Bangalore	India	4.0	0.99	2.21	0.27	0.15	0.11
Santiago	Chile	3.7	1.46	1.19	0.74	0.21	0.09
Cordoba	Argentina	2.7	1.35	1.28	0.67	0.46	0.00
London	England	2.6	1.02	1.22	1.15	0.51	0.13
Philadelphia	USA	1.9	1.43	1.64	0.61	0.33	0.19
Melbourne	Australia	1.9	0.94	1.45	1.36	0.58	0.19
Chicago	USA	1.5	1.42	1.15	0.61	0.14	0.36
Los Angeles	USA	1.3	1.72	1.21	0.79	0.57	0.25
Brisbane	Australia	1.2	1.33	1.29	1.03	0.49	0.26
New York City	USA	1.2	1.17	1.40	0.88	0.34	0.03
Seattle	USA	1.1	1.20	1.24	0.86	0.81	0.63
Sao Paulo	Brazil	0.6	1.12	1.71	0.65	0.35	0.39
Spearman correlation			0.17	0.07	-0.08	-0.33	-0.47
P-values			0.47	0.76	0.75	0.16	0.04
Pearson correlation			0.08	-0.08	-0.08	-0.21	-0.31
P-values			0.75	0.75	0.74	0.37	0.18

297

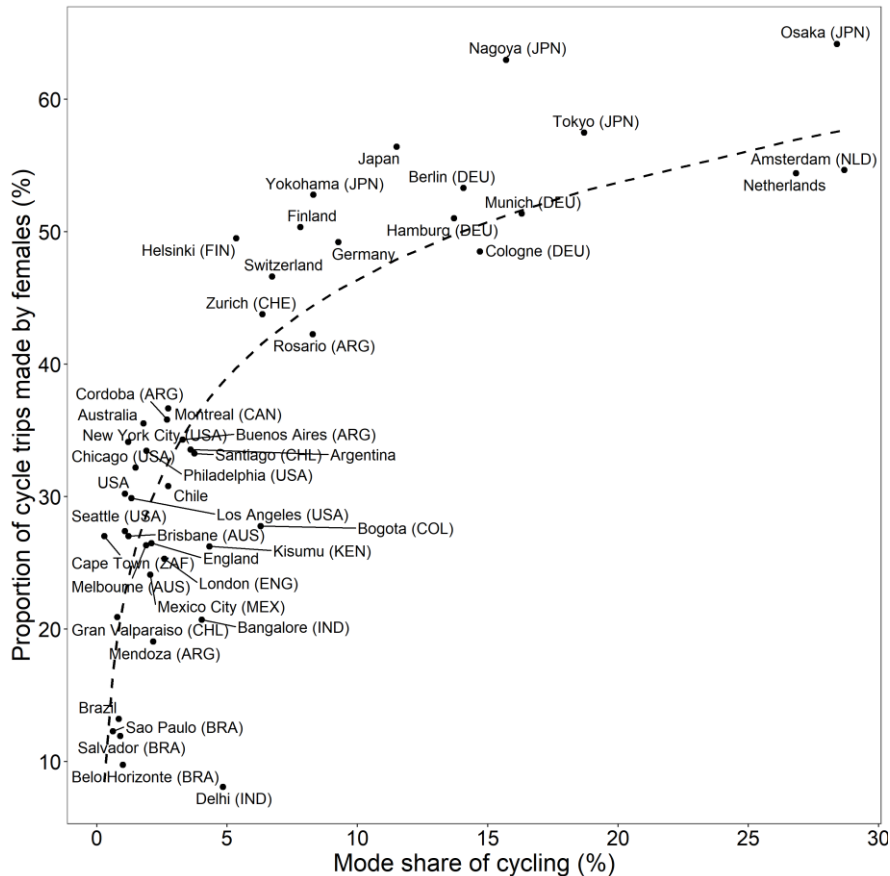
298 The distance distribution ratios are generally similar across the settings, with even greater similarity  
 299 among the countries. The ratios are not significantly associated with mode share. The high cycling  
 300 Netherlands and Germany have similar likelihood of cycling at different distance ranges as low-  
 301 cycling settings such as England and Chile. Similarly, Finland and USA have similar propensities  
 302 across all the distance bins, and both have the highest propensity for 0-2 km, but differ widely in the  
 303 levels of cycling. Among the cities, high cycling geographies such as Amsterdam, Zurich and the  
 304 German cities have remarkably similar distance propensities as low cycling geographies of New York  
 305 City and Santiago. The cities that differ greatly from all others are Bangalore and Delhi, where the  
 306 propensity is among the lowest for 0-2 km, and much higher from longer distance bins of 2-5 km and  
 307 5-10 km. Also worth noting is the highest propensity for 20+ km among the cities of USA and  
 308 Australia, as well as Sao Paulo.

309

### 310 **3.3 Representation of women in cycling**

311 In 8 out of 11 countries and 27 out of 35 selected cities, mode share of cycling among females is less  
 312 than the mode share among males (see **Tables 1 and 2**). In other words, in a large majority of the  
 313 geographies, females are less likely to cycle for their trips than males. To express this gender  
 314 difference as a single metric, we use the ratio of mode shares of cycling among females to those  
 315 among males. The Pearson correlations between this ratio and overall mode share of cycling are 0.77

316 ( $P < 0.01$ ) for the countries and  $0.81 (P < 0.001)$  for the cities, and the Spearman correlations are  $0.92$   
 317 ( $P < 0.001$ ) and  $0.85 (P < 0.001)$ , respectively. These strong correlations show that gender gap in the  
 318 likelihood of cycling is highly associated with the level of cycling. In cities and countries with cycling  
 319 levels greater than 7%, females are at least as likely as males to cycle. In comparison, in geographies  
 320 with cycling levels lower than 7%, females are on an average 50-60% less likely to cycle than males.



321  
 322 **Figure 1: Gender representation and level of cycling in cities and countries (cities are mentioned**  
 323 **along with their respective country 3-letter codes—ARG: Argentina, AUS: Australia, BRA:**  
 324 **Brazil, CAN: Canada, CHL: Chile, COL: Colombia, ENG: England, DEU: Germany, IND:**  
 325 **India, JPN: Japan, KEN: Kenya, MEX: Mexico, NLD: Netherlands, ZAF: South Africa, CHE:**  
 326 **Switzerland, USA: United States of America)**

327 An alternate metric to measure gender representation in cycling is the proportion of all cycle trips that  
 328 are made by females (see Table 3). Unlike the ratio presented above, this metric expresses the gender  
 329 gap in terms of number of trips made (and not as relative likelihood to cycle). Figure 1 shows this  
 330 relationship for cities and countries combined. The curve shown in the figure is a logarithmic  
 331 relationship fitted using 46 data points (35 cities and 11 countries). There is a strong positive  
 332 association between level of cycling and female representation in cycling, with a steep increase in  
 333 representation of females up to 5% mode share of cycling.

334 Next, we present female representation ratios of cyclists stratified by age groups as described in the  
 335 analysis section above (section 2.2 and see Box 1). Table 6 presents these results for countries and  
 336 Table 7 for the cities. Percentage share of females in cycle and all trips by age groups are presented in  
 337 SI-2.

338 The representation of women deteriorates in every age group with decreasing levels of cycling. This  
 339 association is also evident from the correlation values between mode shares and these ratios. Person's  
 340 and Spearman's correlations for the working age group are between 0.7 and 0.9, and for the older

341 adults are between 0.65 and 0.8, and are statistically significant. The correlations for children are  
 342 weak among the countries, but of moderate strength among the cities. Children have moderate  
 343 underrepresentation to proportional representation of females across more geographies than the other  
 344 two age groups.

345 Among the countries, for geographies with cycling mode share greater than 6%, females are  
 346 moderately underrepresented or over-represented across **all** the age groups. Among the countries with  
 347 mode share less than 6%, representation of females is the highest among the children and then  
 348 worsens among the adults, with average ratios of 0.8, 0.5 and 0.5, for children, working age group,  
 349 and older adults, respectively, indicating a strong age gradient in the representation of females.  
 350 Among the cities, it is only with cycling mode share greater than 13% that females have equal  
 351 representation across **all** the age groups. In the cities with mode share less than 13%, the average  
 352 ratios are 0.8, 0.6 and 0.5 for children, working age group and older adults, respectively, indicating a  
 353 similar age gradient as for the countries.

354 **Table 6: Age-specific female representation ratios of the urbanised areas countrywide (ratio of**  
 355 **the proportion of women in cycling trips to the proportion of women in all trips within each age**  
 356 **group; heat map shows gradation of all values combined, red: underrepresentation (ratio <0.7),**  
 357 **yellow/green: moderate to proportional representation (0.7 <ratio< 1) and green:**  
 358 **overrepresentation (>1); correlations of the representation ratios for each age group with the**  
 359 **cycling mode shares, along with their P-values of statistical significance)**

Country	Region	Mode share	0-15 years	16-59 year	60+ years
Netherlands	Europe	26.8	0.99	1.08	1.07
Japan	Asia	11.5	0.90	1.07	1.21
Germany	Europe	9.3	0.80	0.96	1.06
Finland	Europe	7.8	0.85	1.01	1.19
Switzerland	Europe	6.7	0.84	0.97	0.90
Argentina	Latin America	3.6	0.88	0.66	0.30
Chile	Latin America	2.7	1.19	0.58	0.14
England	Europe	2.1	0.54	0.51	0.47
Australia	Australia	1.8	0.73	0.66	0.74
USA	North America	1.1	0.59	0.59	0.52
Brazil	Latin America	0.8	0.81	0.23	0.10
Spearman correlation			0.57	0.90	0.79
P-values			0.07	<0.001	<0.001
Pearson correlation			0.39	0.73	0.64
P-values			0.24	0.01	0.03

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369 **Table 7: Age-specific female representation ratios for the selected cities (ratio of the proportion**  
370 **of women in cycling trips to the proportion of women in all trips within each age group; heat**  
371 **map shows gradation of all values combined, red: underrepresentation (ratio <0.7),**  
372 **yellow/green: moderate to proportional representation (0.7 <ratio< 1) and green:**  
373 **overrepresentation (>1); correlations of the representation ratios for each age group with the**  
374 **cycling mode shares, along with their P-values of statistical significance)**

City	Country	Mode share	0-15 years	16-59 year	60+ years
Amsterdam	Netherlands	28.7	0.99	1.08	1.05
Osaka	Japan	28.4	1.03	1.22	1.18
Tokyo	Japan	18.7	0.92	1.11	1.06
Munich	Germany	16.3	1.00	1.05	1.03
Nagoya	Japan	15.7	0.91	1.23	1.21
Cologne	Germany	14.7	1.07	0.97	0.90
Berlin	Germany	14.1	1.00	1.16	0.85
Hamburg	Germany	13.7	0.92	1.06	1.06
Yokohama	Japan	8.3	0.54	1.06	1.21
Rosario	Argentina	8.3	0.83	0.84	0.64
Zurich	Switzerland	6.4	0.74	0.95	0.79
Bogota	Colombia	6.3	0.71	0.55	0.24
Helsinki	Finland	5.3	0.75	1.01	1.07
Delhi	India	4.8	1.11	0.12	0.00
Kisumu	Kenya	4.3	0.94	0.46	0.34
Bangalore	India	4	1.25	0.68	1.21
Santiago	Chile	3.7	1.23	0.63	0.14
Buenos Aires	Argentina	3.3	0.97	0.66	0.32
Montreal	Canada	2.7	0.77	0.74	0.59
Cordoba	Argentina	2.7	0.79	0.78	0.10
London	England	2.6	0.51	0.49	0.45
Mendoza	Argentina	2.2	0.73	0.36	0.28
Mexico City	Mexico	2	0.82	0.47	0.14
Philadelphia	USA	1.9	1.34	0.47	0.56
Melbourne	Australia	1.9	0.90	0.57	0.68
Chicago	USA	1.5	0.68	0.54	1.00
Los Angeles	USA	1.3	0.84	0.49	0.22
Brisbane	Australia	1.2	0.49	0.50	0.60
New York City	USA	1.2	0.76	0.62	0.43
Seattle	USA	1.1	0.17	0.58	0.92
Belo Horizonte	Brazil	1	0.27	0.19	0.11
Salvador	Brazil	0.9	0.63	0.20	0.17
Sao Paulo	Brazil	0.6	1.15	0.20	0.00
Cape Town	South Africa	0.3	0.00	0.68	0.00
Spearman correlation			0.45	0.76	0.64
P-values			<0.01	<0.001	<0.001
Pearson correlation			0.34	0.77	0.63
P-values			0.05	<0.001	<0.001

375

### 376 **3.4 Representation of age groups in cycling**

377 We calculated age representation ratio for the three age groups as described in section 2.2. A ratio less  
378 than one represents underrepresentation and greater than one represents overrepresentation. The tables  
379 for countries and selected cities are presented in SI-2. Among the nationwide urban areas, children  
380 have the highest representation in cycling, followed by working age group, and the older age group  
381 has the lowest representation, with average age representation ratios of 1.25, 1.06, 0.7, respectively,  
382 for the three age groups.

383 Among the countries, the representation of children and working age group do not show any  
384 relationship with cycling levels (correlations are statistically insignificant). Children are either

385 moderately underrepresented or overrepresented across most countries, except in all the Latin  
386 American countries where children are underrepresented. Working age adults are overrepresented in  
387 almost all the countries, except Finland. In Finland, Germany, and Switzerland children have high  
388 overrepresentation in cycling (ratios from 1.8 to 2.7). In contrast to the other two age groups, the  
389 representation of older adults among cyclists has a strong positive association with mode shares of  
390 cycling, with Pearson correlation of 0.61 ( $P=0.04$ ) and Spearman's correlation of 0.65 ( $P=0.03$ ). In  
391 other words, the representation of older adults improves with increasing mode share of cycling, even  
392 though this age group remains underrepresented across all the countries.

393 Among the selected cities, working age adults have the highest representation, followed by children  
394 and older adults, with the average representation ratios of 1.09, 0.91 and 0.67, respectively. Children  
395 and working age group have moderate correlations with mode shares, and the correlation values are  
396 statistically significant ( $P\leq 0.05$ ). The correlation is positive for children (Pearson: 0.35, Spearman:  
397 0.4), implying that representation of children in cycling improves with increasing mode share of  
398 cycling. At the lowest levels of cycling, children are severely underrepresented and at the highest  
399 levels of cycling, they are often overrepresented. Children are also the only age group for which  
400 representation ratio reaches greater than 1.5, both within the cities and the countries. Berlin, Hamburg,  
401 and Helsinki are the three cities with the highest overrepresentation of children, as is the case with  
402 their respective countries.

403

404 The correlation for the working age group is negative (Pearson: -0.34, Spearman: -0.37). This age  
405 group is almost never underrepresented. It has proportional representation in the cities with the  
406 highest levels of cycling and overrepresentation in cities with lower levels of cycling. Similar to the  
407 finding among the countries, the representation of older age group is positively associated with mode  
408 share of cycling, with Pearson correlation of 0.42 ( $P=0.02$ ) and Spearman correlation of 0.45  
409 ( $P=0.01$ ). This age group is underrepresented across most of the cities, though the underrepresentation  
410 is more often severe in settings with the lowest levels of cycling than those with higher levels of  
411 cycling.

### 412 **3.5 Global cycling typology of cities**

413 **Table 8** presents 5 clusters with a minimum of 6 geographies in one cluster and a maximum of 12. As  
414 described in section, clusters are formed using level of cycling, representation of females, and  
415 representation of age groups among cyclists. In the table, asterisk in place of cluster number indicates  
416 the two countries that were excluded for clustering but placed with same cluster as most of their  
417 constituting cities. The averages of the five vectors for each of the clusters are also presented in the  
418 table. The clusters could be summarised as follows:

- 419 • Cluster 1: low-cycling, gender-unequal, highly age-unequal
- 420 • Cluster 2: low-cycling, gender-unequal, age-equal (older adults)
- 421 • Cluster 3: low-cycling, gender-unequal, age-equal (children only)
- 422 • Cluster 4: medium-cycling, gender-equal, children over-represented
- 423 • Cluster 5: high-cycling, women over-represented, age-equal (some variation)

424

425 Clusters 1 through 3 include geographies with low levels of cycling with an average mode share  
426 ranging from 2 to 3.4 percent. In all three clusters, women are a minority among those making cycle  
427 trips, with an average share of all cycling trips that are made by women varying from 24% to 31%. In  
428 many of the geographies of clusters 1 and 2, there is underrepresentation of children in cycling. In  
429 cluster 1, older adults are also severely underrepresented while in Cluster 2, older adults have  
430 moderate underrepresentation or are equally represented. Among the five clusters, Cluster 2 has the  
431 highest average representation of older adults. In Cluster 3, only older adults are underrepresented.

432

433 In contrast clusters 4 and 5 have much higher levels of cycling with averages of 10% and 19%,  
 434 respectively. The two clusters are constituted entirely of geographies of Finland, Germany, Japan, the  
 435 Netherlands, and Switzerland. Women have either equal share (cluster 4) or are in majority (cluster 5)  
 436 among cyclists, and older adults are mostly moderately underrepresented. These two clusters differ  
 437 the most in terms of representation of children. This age group is overrepresented in all the  
 438 geographies of cluster 4. In Cluster 5 also, half the geographies have overrepresentation of children  
 439 while the other half have moderate underrepresentation. The only similarity across all the five clusters  
 440 is the equal or over representation of working age group.

441 **Table 8: Cycling typology of cities and countries based on overall mode share of cycling, share**  
 442 **of women among cycling trips, and age representation ratios (asterisks represent countries not**  
 443 **included for clustering analysis, but placed next to the cluster with most of their contributing**  
 444 **cities)**

City	Country	Mode share	Women's share	0-15 years	16-59 years	60+ years	Cluster	Cluster Description
	Brazil	0.8	13	0.35	1.24	0.48	*	low-cycling, gender-unequal, highly age-unequal
	Chile	2.7	31	0.68	1.26	0.68	1	
Belo Horizonte	Brazil	1	10	0.33	1.22	0.58	1	
Chicago	USA	1.5	32	1.08	1.16	0.35	1	
London	England	2.6	25	0.76	1.15	0.47	1	
Montreal	Canada	2.7	37	0.57	1.22	0.38	1	
Salvador	Brazil	0.9	12	0.45	1.22	0.39	1	
Santiago	Chile	3.7	33	0.7	1.17	0.54	1	
Seattle	USA	1.1	27	0.91	1.17	0.25	1	
	Argentina	3.6	34	0.66	1.11	0.95	*	
Buenos Aires	Argentina	3.3	34	0.64	1.11	1.01	2	
Cordoba	Argentina	2.7	36	0.84	1.06	0.9	2	
Mendoza	Argentina	2.2	19	0.29	1.18	0.99	2	
Mexico City	Mexico	2	24	0.77	1.04	0.99	2	
	Australia	1.8	36	1.06	1.07	0.67	3	low-cycling, gender-unequal, age-equal (children only)
	England	2.1	27	0.88	1.15	0.65	3	
	USA	1.1	30	1.58	1.04	0.54	3	
Bangalore	India	4	21	1.22	1.05	0.73	3	
Bogota	Colombia	6.3	28	0.67	1.11	0.71	3	
Brisbane	Australia	1.2	27	1.44	0.98	0.56	3	
Los Angeles	USA	1.3	30	1	1.05	0.61	3	
Melbourne	Australia	1.9	26	1	1.09	0.61	3	
New York City	USA	1.2	34	0.76	1.12	0.67	3	
Philadelphia	USA	1.9	33	0.85	1.11	0.49	3	
Rosario	Argentina	8.3	42	1.07	1.05	0.58	3	
Zurich	Switzerland	6.4	44	1.49	1.07	0.52	3	
	Finland	7.8	50	2.74	0.77	0.63	4	
	Germany	9.3	49	2.07	0.97	0.92	4	
	Switzerland	6.7	47	1.84	1	0.6	4	
Berlin	Germany	14.1	53	1.61	0.97	0.67	4	
Hamburg	Germany	13.7	51	1.53	0.96	0.75	4	
Helsinki	Finland	5.3	50	1.92	0.9	0.84	4	
	Japan	11.5	56	1.17	1.14	0.79	5	high-cycling, women over- represented, age-equal
	Netherlands	26.8	54	1.36	0.92	0.94	5	
Amsterdam	Netherlands	28.7	55	1.25	0.96	0.91	5	
Cologne	Germany	14.7	49	1.13	1.11	0.55	5	
Munich	Germany	16.3	51	1.27	0.99	0.83	5	
Nagoya	Japan	15.7	63	0.85	1.23	0.71	5	
Osaka	Japan	28.4	64	0.84	1.09	0.9	5	
Tokyo	Japan	18.7	58	0.97	1.05	0.91	5	
Yokohama	Japan	8.3	53	0.87	1.12	0.82	5	
Cluster 1 Average		2	24	0.61	1.2	0.48	1	
Cluster 2 Average		3.1	28	0.61	1.11	0.95	2	
Cluster 3 Average		3.4	31	1.12	1.07	0.62	3	
Cluster 4 Average		9.6	50	1.84	0.93	0.73	4	
Cluster 5 Average		18.8	56	1.08	1.07	0.82	5	

445

446

## 447 **4. Discussion**

### 448 **4.1 Summary of Findings**

449 We analysed cycling behaviour at the country-level for urbanised areas in 11 countries and at the city-  
450 level for 35 cities, with a mix of low-and middle-income and high-income countries. Among the  
451 countries, the Netherlands has the highest level of cycling (26.8%) and the lowest levels are in Brazil  
452 and USA (near 1%). Among the cities, median mode share is 3.3%, ranging from 0.3% (Cape Town)  
453 to 28.7% (Amsterdam). Distance distributions of cycling trips (normalised by distance distribution of  
454 all trips combined) are mostly similar across geographies irrespective of their cycling levels.  
455 Geographies with low levels of cycling have a higher likelihood of cycling for work trips than non-  
456 work trips, while those with high levels of cycling, have equal likelihood for the two purposes or  
457 higher likelihood for non-work trips. There is a strong positive association between representation of  
458 women among cyclists and the level of cycling, with almost all settings with cycling mode share  
459 greater than 8% have equal or overrepresentation of female cyclists. The representation of children  
460 and older adults varies greatly, although older people and children tend to be better represented in  
461 settings with higher levels of cycling, particularly at country-level. Finally, we classified cities and  
462 countries into typologies showing distinct patterns of representation of population demographics  
463 among cyclists with respect to levels of cycling.

### 464 **4.2 Strengths and weaknesses**

465 A major strength of our study is the inclusion of a wide range of settings with representation from  
466 multiple world regions and income levels, although our selection of settings is opportunistic within  
467 regions. By expressing metrics of cycling as ratios relative to general population or all trips, we  
468 highlighted differences and similarities across the settings that would otherwise be hidden by multiple  
469 confounders such as age, gender, distance, and cycling levels. We used classification of urban and  
470 non-urban as reported by different travel survey datasets. Given the variation in how different  
471 countries define urban areas, this may bring some inconsistency in the results at the country level. For  
472 the geographies that reported travel diary for more than a day, we are more likely to capture cycling  
473 trips that are not made on a regular basis, which may bring some bias with respect to the geographies  
474 where only one day of travel is reported (Shaw et al. 2020). Further, travel surveys are better at  
475 reporting cycling to reach a destination than recreational cycling, though they do report the latter to  
476 some extent. Activity-diary surveys are likely to report both equally well. It is likely that recreational  
477 cycling may have a relatively significant share in cities with low levels of cycling, such as the USA.  
478 Our definition of main mode also excludes cycling that is done for a part of the trip, for example, to  
479 access public transportation. Our analysis could not differentiate between age and cohort effect. This  
480 limitation can only be overcome by analysis of longitudinal data (Thakuria, Menchu, and Tang 2010;  
481 Scheiner and Holz-Rau 2013). An important confounder that we did not include in our analysis is  
482 household income. Breakdown of cycling use by income is also important from an equity perspective;  
483 however, it would be challenging to analyse in a comparable way, especially between countries with  
484 very different income levels.

### 485 **4.3 Meaning of our Findings**

486 The distance distribution of cycling seems unrelated to how common cycling is in a setting, although  
487 there is some evidence of regional differences. This is a novel finding as we did not find research  
488 studies comparing distance-based propensities across multiple different settings as we have done here.  
489 Since 50 to 60% of all trips (across all modes) are shorter than 5 km (see SI), a high propensity of  
490 cycling for shorter trips alone can result in high levels of cycling. We found that at higher levels of  
491 cycling, it is either as frequently used for non-work trips as for work trips, or even more frequently for  
492 non-work trips. This is also to our knowledge a novel finding in cross-national context. It suggests  
493 that, to grow cycling, a focus beyond the commute to work may be needed; which fits with greater  
494 age and gender equity, given patterning of trip purposes by age and gender (Collins and Tisdell 2002;  
495 Shaw et al. 2020). The findings on shorter distance and non-commute trips imply that making

496 neighbourhoods cycling friendly (e.g. mini-Hollands programme in London, UK; Aldred *et al.*, 2019),  
497 or developing safer routes to school, should be equally high on the agenda as cycling corridors that  
498 often cater to commuting traffic.

499 Our study, like other comparative work (e.g. Götschi *et al.*, 2015; Pucher & Buehler, 2006, Pucher,  
500 Garrard, and Greaves 2011) highlights associations between cycling levels and age and gender equity  
501 in cycling. Places with cycling levels greater than 7% have good representation of women as well as  
502 good representation of children and the working age group, and older adults are reasonably  
503 represented. In places with lower levels of cycling, women are always a minority and children and/or  
504 older adults are often severely under-represented. These findings imply that, in low-cycling cities,  
505 developing cycling infrastructure to meet the observed demand (e.g. middle-aged men commuting to  
506 work) may perpetuate gender and age inequalities. It is therefore important that evaluations of cycling  
507 policies should not only focus on overall use but also usage by gender and age, to ensure equitable  
508 growth in cycling.

509 Our cycling typologies provide further insight into equity and cycling. The three low-cycling clusters  
510 have high levels of gender inequality, suggesting that the path towards higher cycling levels must  
511 involve addressing gender inequalities in cycling. If this is done, the rewards are potentially great:  
512 cluster 5 shows an over-representation among women, thus the suppressed demand among this group  
513 is much larger than among men. Age shows somewhat different patterns. Some lower-cycling  
514 contexts have achieved higher levels of age equity for older adults or for children (but not, generally,  
515 for both). The highest-cycling contexts have generally good age equity although there is some  
516 variation, but the fourth cluster (containing contexts with medium levels of cycling – near 10% on  
517 average mode share) has notable over-representation among children. However, the same is true of  
518 some contexts (e.g. USA; Brisbane, Australia) in low-cycling Cluster 3. Thus, it seems possible to  
519 have cycling stuck at low levels alongside relatively good representation of children among cyclists,  
520 while the same is not true for women. Perhaps this is not surprising given the association of cycling  
521 with childhood, which can be a barrier to its consideration as a mainstream transport mode (Aldred  
522 2012).

523 Our study does not explain the various factors driving variation of cycling levels nor of gender and  
524 age representation across the settings. Other literature has suggested reasons why we might expect  
525 women, children, and older people to be under-represented in low-cycling contexts. Specifically,  
526 many studies highlight differences in risk tolerance (e.g. Garrard *et al.*, 2008), in other words, where  
527 risk and/or perceived risk of cycling are higher, women, children (or parents on their behalf), and  
528 older people are even more likely to be deterred than are men and younger adults. The concern for  
529 safety among children has been found to be greater in large cities than in smaller towns (Jones, Davis,  
530 and Evers 2000), possibly due to differences in traffic volume. This may explain our finding of  
531 greater underrepresentation of children in the selected cities than in nationwide urban areas, as the  
532 latter is dominated by multiple smaller urban areas.

533  
534 In our typologies, we found that the clusters representing high levels of cycling and good gender and  
535 age representation include Germany, Japan, and the Netherlands. In these countries, there is  
536 infrastructure provision for cyclists such as protected cycle paths and secure parking facilities. These  
537 are complemented with motor traffic reduction and calming in residential neighbourhoods, and land-  
538 use, taxation, and transport policies that discourage use and ownership of cars, such as mixed-use and  
539 high population density, higher taxes on car purchase and fuel, and limited parking spaces (Pucher  
540 and Buehler 2008; Pucher, Dill, and Handy 2010; Berent and Yoshida 2017). Unlike the high-cycling  
541 group, the geographies of low-cycling clusters represent a greater diversity of world regions and  
542 income levels. Across most of these geographies, cycling supportive infrastructure is rare, and  
543 policies to deter car use are often lacking, as in the USA and Australia (Pucher, Garrard, and Greaves  
544 2011; Buehler 2011). In many low-and-middle income countries, while land-use is comparatively less  
545 car dependent and ownership of vehicles is still low, transport policies are often car-centric and traffic  
546 danger is high. Bogota city, with the highest cycling level among low-cycling clusters, is an

547 encouraging example, where cycling infrastructure supported by political will and advocacy groups  
548 have resulted in improved levels of cycling in the recent times (Rosas-Satizábal and Rodriguez-  
549 Valencia 2019).

550

#### 551 **4.4 Unanswered questions and future research**

552 The unit of analysis in our study is a trip or an individual that suited our research questions to identify  
553 those who cycle and those who don't. Future work should explore if the use of a tour as unit of  
554 analysis is a better approach to study cycling propensities. Further research could focus on other  
555 dimensions of equity not considered here, for instance, disability, ethnicity, or income levels, although  
556 these factors are harder to compare across diverse contexts than gender or age. Research should  
557 examine the different factors that could potentially explain differences in the levels of cycling, for  
558 example, injury risk, traffic mix, infrastructure provision, speed limits and urban form. We found that  
559 Delhi, Bengaluru, Kisumu and Bogota, all located in low-and-middle income countries across three  
560 different continents, have much lower representation of women than expected at their levels of  
561 cycling (see Figure 1). Future studies should investigate what gender norms and cultural factors are in  
562 play in these settings that result in unequal access to transport modes (and specifically cycling), of  
563 which there is some evidence from India and Colombia (Phadke 2013; Montoya-Robledo et al. 2020).  
564 Future work should include other major settings like China and many parts of Southeast Asia. Finally,  
565 longitudinal research could explore the extent to which patterns change over time as levels of cycling  
566 change.

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**Supplementary Information- 1: Table describing datasets used in the study**

Country/City	Included in study	Survey Name and Access	Sample Unit	Sample Size (response rate)	Diary Method	Duration of Travel Diary	Survey Frequency	Years Analysed	Population	No of Trips Analysed
<b>Argentina, Buenos Aires</b>	All	Household Mobility Survey 2009-2010: Mobility in the Buenos Aires Metropolitan Area; <a href="http://datar.info/pt_BR/dataset/enmodo-2014">http://datar.info/pt_BR/dataset/enmodo-2014</a>	Households in Greater Buenos Aires	22170	face to face	1 random day	One time	2009-2010	12,985,885	102784
<b>Argentina, Cordoba</b>	All	Origin / Destination Survey 2009: Mobility in the Córdoba Metropolitan Area; <a href="http://datar.info/pt_BR/dataset/encuesta-origen-destino-cordoba-2009">http://datar.info/pt_BR/dataset/encuesta-origen-destino-cordoba-2009</a>	Households in Córdoba Metropolitan Area	2801	face to face	1 random day	One time	2009	1,581,113	15919
<b>Argentina, Mendoza</b>	All	Origin / Destination Survey 2010: Mobility in the Mendoza Metropolitan Area; <a href="http://datar.info/pt_BR/dataset/encuesta-origen-destino-mendoza-2010">http://datar.info/pt_BR/dataset/encuesta-origen-destino-mendoza-2010</a>	Households in Mendoza Metropolitan Area	4055	face to face	1 random day	One time	2010	1,086,633	24888
<b>Argentina, Neuquen y Cipolletti</b>	All	Household Mobility Survey (EMD) 2012: Household Mobility in the Neuquén-Cipolletti Metropolitan Area; <a href="http://datar.info/pt_BR/dataset/encuesta-de-movilidad-domiciliaria-area-metropolitana-neuquen-cipolletti-2012">http://datar.info/pt_BR/dataset/encuesta-de-movilidad-domiciliaria-area-metropolitana-neuquen-cipolletti-2012</a>	Households in the Metropolitan Areas of Neuquén and Cipolletti	1759	face to face	1 random day	One time	2012	409,000	7139
<b>Argentina, Posadas</b>	All	Origin / Destination Survey 2010: Mobility in the Posadas Metropolitan Area; <a href="http://datar.info/pt_BR/dataset/encuesta-de-origen-destino-2010-posadas">http://datar.info/pt_BR/dataset/encuesta-de-origen-destino-2010-posadas</a>	Households in Posadas Metropolitan Area	1721	face to face	1 random day	One time	2010	348,871	10241

Country/City	Included in study	Survey Name and Access	Sample Unit	Sample Size (response rate)	Diary Method	Duration of Travel Diary	Survey Frequency	Years Analysed	Population	No of Trips Analysed
<b>Argentina, Resistencia and Corrientes</b>	All	Household Mobility Survey (EMD) 2013: Household Mobility in the Metropolitan Area of Resistencia-Corrientes; <a href="http://datar.info/pt_BR/dataset/encuesta-movilidad-domiciliaria-2013-resistencia-corrientes">http://datar.info/pt_BR/dataset/encuesta-movilidad-domiciliaria-2013-resistencia-corrientes</a>	Households in Metropolitan Areas of Resistencia and Corrientes	2814	face to face	1 random day	One time	2012 - 2013	733,340	12013
<b>Argentina, Rosario</b>	All	Origin / Destination Survey 2008: Mobility in the Rosario Metropolitan Area; <a href="http://datar.info/pt_BR/dataset/encuesta-origen-destino-2008-rosario">http://datar.info/pt_BR/dataset/encuesta-origen-destino-2008-rosario</a>	Households in Rosario Metropolitan Area	5096	face to face	1 random day	One time	2008	1,300,000	23013
<b>Argentina, Salta</b>	All	Household Mobility Survey (EMD) 2012: Household Mobility in the Metropolitan Area of Salta; <a href="http://datar.info/pt_BR/dataset/encuesta-de-movilidad-domiciliaria-area-metropolitana-salta-2012">http://datar.info/pt_BR/dataset/encuesta-de-movilidad-domiciliaria-area-metropolitana-salta-2012</a>	Households in Salta Metropolitan Area	1238	face to face	1 random day	One time	2012	637,910	9691
<b>Argentina, Tucuman</b>	All	Origin / Destination Survey 2011: Mobility in the Tucumán Metropolitan Area; <a href="http://datar.info/pt_BR/dataset/encuesta-origen-destino-2011-tucuman">http://datar.info/pt_BR/dataset/encuesta-origen-destino-2011-tucuman</a>	Households in Tucumán Metropolitan Area	2634	face to face interviews	1 random day	One time	2011	988,806	14186
<b>Australia, Brisbane</b>	Greater Brisbane Area	Same as Australia, South East Queensland Travel Survey (SEQTS) - see below							1,900,000	32536
<b>Australia, Cairns City</b>	All	Cairns Household Travel Survey; <a href="https://data.qld.gov.au/dataset/2014-cairns-region-household-travel-survey">https://data.qld.gov.au/dataset/2014-cairns-region-household-travel-survey</a>	Households in Carins Region	2371 (51)	self	1 nominated day	One time	2014	146,329	18259

Country/City	Included in study	Survey Name and Access	Sample Unit	Sample Size (response rate)	Diary Method	Duration of Travel Diary	Survey Frequency	Years Analysed	Population	No of Trips Analysed
<b>Australia, Darling Downs and Lockyer Valley</b>	All	Darling Downs and Lockyer Household Travel Survey; <a href="https://data.qld.gov.au/dataset/2012-darling-downs-and-lockyer-household-travel-survey">https://data.qld.gov.au/dataset/2012-darling-downs-and-lockyer-household-travel-survey</a>	Households in Darling Downs and Lockyer	1654	self	1 nominated day	One time	2012	187,160	10188
<b>Australia, Geelong Greater Area</b>	Geelong Greater Area	Same as The Victorian Integrated Survey of Travel & Activity (VISTA) below							236,535	
<b>Australia, Gladstone</b>	All	Gladstone and Biloela Household Travel Survey; <a href="https://data.qld.gov.au/dataset/2010-gladstone-household-travel-survey">https://data.qld.gov.au/dataset/2010-gladstone-household-travel-survey</a>	Households in urban Gladstone and Biloela	2000	self	1 nominated day	One time	2010	54,800	18164
<b>Australia, Gympie Gayndah, Kingaroy and Tin Can Bay/Cooloola</b>	All	Wide Bay Burnett Household Travel Survey; <a href="https://data.qld.gov.au/dataset/2010-wide-bay-burnett-household-travel-survey">https://data.qld.gov.au/dataset/2010-wide-bay-burnett-household-travel-survey</a>	Households in Gympie Gympie Gayndah, Kingaroy and Tin Can Bay/Cooloola Regions	2675	self	1 nominated day	One time	2010	29,551	21266
<b>Australia, Mackay, Isaac and Whitsunday</b>	All	Mackay, Isaac and Whitsunday Household Travel Survey; <a href="https://data.qld.gov.au/dataset/2011-mackay-household-travel-survey/resource/b09c6b01-feda-4073-829e-0f67fd5f1d1d">https://data.qld.gov.au/dataset/2011-mackay-household-travel-survey/resource/b09c6b01-feda-4073-829e-0f67fd5f1d1d</a>	Households in Mackay, Isaac and Whitsunday region	2210	self	1 nominated day	One time	2011	171,564	19045
<b>Australia, Melbourne</b>	Metropolitan Melbourne	The Victorian Integrated Survey of Travel & Activity (VISTA); <a href="https://transport.vic.gov.au/about/data-and-research/vista">https://transport.vic.gov.au/about/data-and-research/vista</a>	Households in 5 Metropolitan Melbourne regions and the Regional City region1	5780 - 17000 (48 -52%)	self	1 nominated day	2015-16 is final phase of VISTA project that started in 2012	2012-13 to 2017-18	2,300,000	128685

Country/City	Included in study	Survey Name and Access	Sample Unit	Sample Size (response rate)	Diary Method	Duration of Travel Diary	Survey Frequency	Years Analysed	Population	No of Trips Analysed
<b>Australia, Rockhampton and Yeppoon</b>	All	Rockhampton Household Travel Survey; <a href="https://data.qld.gov.au/dataset/2014-rockhampton-region-household-travel-survey">https://data.qld.gov.au/dataset/2014-rockhampton-region-household-travel-survey</a>	Households Rockhampton & Yeppoon urban	2226 (55%)	self	1 nominated day	One time	2014	97,076	16318
<b>Australia, South East Queensland</b>	All	South East Queensland Travel Survey (SEQTS); <a href="https://data.qld.gov.au/dataset/2009-south-east-queensland-household-travel-survey">https://data.qld.gov.au/dataset/2009-south-east-queensland-household-travel-survey</a>	Households in South-East queensland: Greater Brisbane, the Sunshine Coast and the Gold Coast.	10335 (50%)	self	1 nominated day	every three years from 2003 to 2009	2009	2,604,000	79790
<b>Australia, Toowoomba Region</b>	All	Toowoomba household travel survey; <a href="https://data.qld.gov.au/dataset/2012-toowoomba-region-household-travel-survey">https://data.qld.gov.au/dataset/2012-toowoomba-region-household-travel-survey</a>	Households in Toowoomba region	2224	self	1 nominated day	One time	2012	157,884	17630
<b>Australia, Townsville</b>	All	Townsville Household Travel Survey; <a href="https://data.qld.gov.au/dataset/2011-townsville-household-travel-survey">https://data.qld.gov.au/dataset/2011-townsville-household-travel-survey</a>	Households in Townsville local government area	1805	self	1 nominated day	One time	2011	170,885	15268
<b>Australia, Victoria</b>	All	The Victorian Integrated Survey of Travel & Activity (VISTA); <a href="https://transport.vic.gov.au/about/data-and-research/vista">https://transport.vic.gov.au/about/data-and-research/vista</a>	Households in 5 Metropolitan Melbourne regions and the Regional City region1	5780 - 17000 (48 -52%)	self	1 nominated day	2015-16 is final phase of VISTA project that started in 2012	2012 - 2016	2,536,535	128685
<b>Australia, Wide Bay Burnett</b>	All (including part of rural Bundaberg)	Wide Bay Burnett Household Travel Survey; <a href="https://www.data.qld.gov.au/dataset/2010-wide-bay-burnett-household-travel-survey">https://www.data.qld.gov.au/dataset/2010-wide-bay-burnett-household-travel-survey</a>	Households in Bundaberg region, Hervey Bay & Maryborough	2396	self	1 nominated day	One time	2010	167,472	18052

Country/City	Included in study	Survey Name and Access	Sample Unit	Sample Size (response rate)	Diary Method	Duration of Travel Diary	Survey Frequency	Years Analysed	Population	No of Trips Analysed
<b>Brazil, Belo Horizonte</b>	City	Origin Destination Survey; <a href="https://prefeitura.pbh.gov.br/bhtrans/informacoes/dados/pesquisa-origem-destino">https://prefeitura.pbh.gov.br/bhtrans/informacoes/dados/pesquisa-origem-destino</a>	Households in Belo Horizonte	30786	face to face	1 random day	Decade	2012	4,792,091	140540
<b>Brazil, Sao Paulo</b>	City	São Paulo Metropolitan Region Mobility Survey; <a href="https://www.mobilize.org.br/estudos/137/pesquisa-de-mobilidade-da-regiao-metropolitana-de-sao-paulo-2012.html">https://www.mobilize.org.br/estudos/137/pesquisa-de-mobilidade-da-regiao-metropolitana-de-sao-paulo-2012.html</a>	Households in Sao Paulo Metropolitan area	8115 (50%)	face to face	1 random day	Decade	2012 - 2013	20,012,000	53505
<b>Brazil, Feira de Santana</b>	City	Pesquisa Origem e Destino Domiciliar da RM de Feira de Santana	Households in Feira de Santana Metropolitan	5055 (32%)	face to face	1 typical business day		2014	542,476	28026
<b>Brazil, Salvador</b>	City	Pesquisa de Mobilidade Urbana da Região Metropolitana de Salvador	Households in El Salvador	20394 (98%)	face to face	1 typical business day		2012	3,575,000	98258
<b>Canada, Montreal</b>	City	2013 Origin Destination Survey of Greater Montréal Area; request from Agence métropolitaine de transport	Households in Greater Montreal Area	78731					1,940,000	181358
<b>Chile, Antofagastia</b>	All	Encuesta Origen Destino de Viages 2010; <a href="http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country">http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country</a>	Households in Antofagastia	2563	self	1 nominated day	Decade	2010	329,294	23789

Country/City	Included in study	Survey Name and Access	Sample Unit	Sample Size (response rate)	Diary Method	Duration of Travel Diary	Survey Frequency	Years Analysed	Population	No of Trips Analysed
<b>Chile, Arica</b>	All	Encuesta Origen Destino de Viages 2010; <a href="http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country">http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country</a>	Households in Arica	1694	self	1 nominated day	Decade	2010	193,073	18417
<b>Chile, Copiapo</b>	All	Encuesta Origen Destino de Viages 2013; <a href="http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country">http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country</a>	Households in Copiapo	1644	self	1 nominated day	Decade	2010	145,683	17247
<b>Chile, Coquimbo La Serena</b>	All	Encuesta Origen Destino de Viages 2010; <a href="http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country">http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country</a>	Households in Coquimbo	3033	self	1 nominated day	Decade	2010	366,463	27157
<b>Chile, Gran Valparaiso</b>	All	Encuesta Origen Destino de Viages 2014; <a href="http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country">http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country</a>	Households in Gran Valparaiso	8776	self	1 nominated day	Decade	2014	964,565	61609

Country/City	Included in study	Survey Name and Access	Sample Unit	Sample Size (response rate)	Diary Method	Duration of Travel Diary	Survey Frequency	Years Analysed	Population	No of Trips Analysed
<b>Chile, Iquique</b>	All	Encuesta Origen Destino de Viages 2010; <a href="http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country">http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country</a>	Households in Iquique	2402	self	1 nominated day	Decade	2010	267,887	21248
<b>Chile, Puerto Montt</b>	All	Encuesta Origen Destino de Viages 2014; <a href="http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country">http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country</a>	Households in Puerto Montt	2532	self	1 nominated day	Decade	2014	245,338	21848
<b>Chile, Santiago</b>	All	Encuesta Origen Destino de Viages 2012; <a href="http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country">http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country</a>	Households in Gran Santiago	18000	self	1 nominated day	Decade	2012	665,1735	113591
<b>Chile, Temuco-Padre Lascasas</b>	All	Encuesta Origen Destino de Viages 2013; <a href="http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country">http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country</a>	Households in Temuco	3002	self	1 nominated day	Decade	2013	311,873	26668

Country/City	Included in study	Survey Name and Access	Sample Unit	Sample Size (response rate)	Diary Method	Duration of Travel Diary	Survey Frequency	Years Analysed	Population	No of Trips Analysed
<b>Chile, Valdivia</b>	All	Encuesta Origen Destino de Viages 2013; access through <a href="http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country">http://www.sectra.gob.cl/encuestas_movilidad/encuestas_movilidad.htm#Results%20in%20reports%20and%20microdata%20available.High-income%20country</a>	Households in Vlavidia	2105	self	1 nominated day	Decade	2013	161,245	18646
<b>Colombia, Bogota</b>	All	Mobility Survey - Prudecia Bogota; <a href="https://www.simur.gov.co/portal-simur/datos-del-sector/encuestas-de-movilidad/">https://www.simur.gov.co/portal-simur/datos-del-sector/encuestas-de-movilidad/</a>	Households in Bogota	28200	self	1 random day	Quinquennial	2015	7,400,000	147252
<b>England</b>	All urban	UK National Travel Survey; <a href="https://beta.ukdataservice.ac.uk/">https://beta.ukdataservice.ac.uk/</a>	Households in Great Britain	8300/yr (60%)	self	7 days	Continuous rolling survey	2013-2017	45,000,000	4449163
<b>England, London</b>	All	London Travel Demand Survey; <a href="mailto:ltidsenquiries@tfl.gov.uk">ltidsenquiries@tfl.gov.uk</a>	Households in London	8000/yr (50%)	face to face	1 nominated day	Continuous rolling survey	2011-2013	8,200,000	388240
<b>Finland</b>	All (including part of rural population)	National Travel Survey; <a href="https://vayla.fi/web/en/statistics/national-travel-survey/resultshhttps://vayla.fi/web/en/statistics/national-travel-survey">https://vayla.fi/web/en/statistics/national-travel-survey/resultshhttps://vayla.fi/web/en/statistics/national-travel-survey</a>	Individuals in Finland	23088 (52%)	Telephone, CATI	1 random day	Quinquennial	2016	5,503,297	68330
<b>Finland, Helsinki</b>	Municipalities of Helsinki, Espoo, Vantaa, Kauniainen	Same as for Finland above							1,173,000	9711
<b>Germany</b>	All urban residents	German Mobility Panel (MOP)	Households in Germany	1500/yr	CATI	7 nominated days	Panel survey	2014, 2015, 2016	64,242,000	73658

Country/City	Included in study	Survey Name and Access	Sample Unit	Sample Size (response rate)	Diary Method	Duration of Travel Diary	Survey Frequency	Years Analysed	Population	No of Trips Analysed
<b>Germany, Berlin</b>	City	The MiD (Mobilität in Deutschland) survey; <a href="https://daten.clearingstelle-verkehr.de/order-form.html">https://daten.clearingstelle-verkehr.de/order-form.html</a> .	Households in Germany	up to 150000/yr	CATI	1 nominated day	Quinquennial	2017	3,520,031	12045
<b>Germany, Cologne</b>	City	Same as for Berlin above							1,005,775	18968
<b>Germany, Hamburg</b>	City	Same as for Berlin above							1,787,408	52184
<b>Germany, Munich</b>	City	Same as for Berlin above							1,450,381	53308
<b>India, Bangalore</b>	City	Bangalore Household Interview Survey by Bangalore Metropolitan Region Development Authority; accessed through --- Indian Institute of Science Bengaluru, India	Households in Bangalore	50000	face to face	1 random day	One time	2010	8,430,000	83660
<b>India, Delhi</b>	City	accessed through Transportation Research and Injury Prevention Programme (TRIPP) at Indian Institute of Technology Delhi	Households in Delhi	1791	face to face	1 random day	One time	2013	16,700,000	8368
<b>Japan</b>	All urban	The nationwide person trip (PT) survey; accessed through the Ministry of Land, Infrastructure, Transport and Tourism	Individuals in Japan	188309 (29.2%)	self	1 nominated day	Quinquennial	2010 & 2015	127,094,745	568921
<b>Japan, Nagoya</b>	City	Same for country as above		2485				2010 & 2015	2,295,638	8180
<b>Japan, Osaka</b>	City	Same for country as above		2206				2010 & 2015	2,691,185	6478
<b>Japan, Tokyo</b>	City	Same for country as above		2360				2010 & 2015	9,214,130	7141

Country/City	Included in study	Survey Name and Access	Sample Unit	Sample Size (response rate)	Diary Method	Duration of Travel Diary	Survey Frequency	Years Analysed	Population	No of Trips Analysed
<b>Japan, Yokohama</b>	City	Same for country as above		2940				2010 & 2015	3,726,167	8349
<b>Kenya, Kisumu</b>	City	Kisumu Household travel Survey; Institute for Transportation & Development Policy	Households in Kisumu	2700	face to face	1 random day	One time	2016	560,000	6892
<b>Mexico, Mexico City</b>	Metropolitan area of the Valley of Mexico	Encuesta Origen-Destino en Hogares de la Zona Metropolitana del Valle de México 2017; <a href="https://www.inegi.org.mx/programas/eod/2017/">https://www.inegi.org.mx/programas/eod/2017/</a>	Households in the Mexico City Metropolitan Area	66625	face to face	1 random day	One time	2017	19,383,068	930771
<b>Netherlands</b>	All urban residents	National Travel Survey; <a href="https://easy.dans.knaw.nl/ui/home">https://easy.dans.knaw.nl/ui/home</a>	Residents in the Netherlands	42000/yr (55%)	face, phone, CATI	1 day	Continuous rolling survey	2010-2016	15,060,000	682028
<b>Netherlands, Amsterdam</b>	Noord-Holland province	Same as Netherlands above							2,880,000	103598
<b>South Africa, Cape Town</b>	City	National Household Travel Survey; <a href="http://www.statssa.gov.za">www.statssa.gov.za</a>	Households in Cape Town	25000 (90%)	face to face	1 random day	Quinquennial	2013	3,740,000	15495
<b>Switzerland</b>	All urban residents	Microcensus Mobility and Transport 2015; Office fédéral de la statistique OFS, Section Mobilité	Households in Switzerland	57000 (53%)	CATI	1 nominated day	Quinquennial	2015	6,118,760	193880
<b>Switzerland, Zurich</b>	Zurich agglomeration (2012)	Same as Switzerland above							1,660,000	17723
<b>USA</b>	All urban residents & add-ons*	National Household Travel Survey (NHTS) 2017; <a href="http://nhts.ornl.gov">http://nhts.ornl.gov</a>	Households in USA (national and add-ons)	129696 (15.6%)	CATI, Telephone	1 nominated day	every 8 years	2017	266,770,558	923572

Country/City	Included in study	Survey Name and Access	Sample Unit	Sample Size (response rate)	Diary Method	Duration of Travel Diary	Survey Frequency	Years Analysed	Population	No of Trips Analysed
<b>USA, California State</b>	Los Angeles	2010–2012 California Household Travel Survey; <a href="https://www.nrel.gov/transportation/secure-transportation-data/tsdc-california-travel-survey.html">https://www.nrel.gov/transportation/secure-transportation-data/tsdc-california-travel-survey.html</a>	Households in California State	42454	CATI, online, or self	1 nominated day	one time	2012		
<b>USA, Chicago</b>	Used Chicago city: Cook and Dupage counties	Chicago Regional Household Travel Inventory; <a href="https://www.cmap.illinois.gov/data/transportation/travel-survey">https://www.cmap.illinois.gov/data/transportation/travel-survey</a>	Households within the 11-counties: Chicago and NW Indiana	14000 (57%)	CATI	1 or 2 days	One time	2007 - 2008	2,696,000	36816
<b>USA, Philadelphia</b>	Philadelphia City: county of the same name	2012-2013 Household Travel Survey for the Delaware Valley Region; <a href="https://www.dvrpc.org/Transportation/Modeling/Data/">https://www.dvrpc.org/Transportation/Modeling/Data/</a>	Households in Southern New Jersey Southeastern Pennsylvania	9,235	CATI, online, or self	1 nominated day	Decade	2012	1,526,006	11530
<b>USA, Los Angeles</b>	Los Angeles County	Same as USA, California State above							3,792,621	62649
<b>USA, New York city</b>	Used New York City	2010/2011 Regional Household Travel Survey; Selected New York City residents for the analysis; <a href="http://www.njtpa.org/Data-Maps/Modeling-Surveys/Household-Travel-Survey/Data-Disclaimer.aspx?ext=">http://www.njtpa.org/Data-Maps/Modeling-Surveys/Household-Travel-Survey/Data-Disclaimer.aspx?ext=.</a>	Households in 28counties in New York / New Jersey / Connecticut metropolitan area	18965 (61%)	self	1 - nominated day	One time	2010 -2011	8,175,000	35222
<b>USA, Seattle</b>	Used Seattle Metropolitan area: King, Pierce, Snohomish counties	Puget Sound Regional Travel Survey (2017 and 2019); <a href="https://www.psrc.org/household-travel-survey-program">https://www.psrc.org/household-travel-survey-program</a>	Households within Puget Sound Regional Council (PSRC) four-county region	6027	online/CATI	1 or 7 nominated days	every three years from 2014	2017 & 2019	3,979,845	119517

## Supplementary Information - 2

**Table S1: Summary statistics (mean and 95% confidence interval) of distance and duration of cycle trips for country-wide urban areas**

Country	Region	Cycling distance	Cycling duration
Australia	Australia	4.4 (0.5, 14.5)	22.1 (5, 60)
England	Europe	5.2 (0.8, 16)	23.4 (5, 60)
Finland	Europe	3.8 (1, 12)	25.7 (5, 75)
Germany	Europe	3.5 (0.5, 10.5)	18 (3, 51)
Netherlands	Europe	3.4 (0.5, 10)	17 (3, 45)
Switzerland	Europe	3.7 (0.4, 12)	19 (2, 60)
USA	North America	4.3 (0.3, 14.6)	22.8 (3, 65)

**Table S2: Summary statistics (mean, 5<sup>th</sup> and 95<sup>th</sup> percentile) of distance and duration of cycle trips for selected cities**

City	Country	Cycling distance	Cycling duration
Bangalore	India	3.1 (0.5, 6)	24.4 (10, 45)
Belo Horizonte	Brazil	NA	22.4 (5, 55)
Berlin	Germany	4 (0.5, 11.8)	21.7 (5, 60)
Bogota	Colombia	NA	37.1 (6, 113)
Brisbane	Australia	5.1 (0.7, 16.2)	24.4 (5, 60)
Buenos Aires	Argentina	NA	19.2 (5, 60)
Cape Town	South Africa	NA	28.9 (10, 60)
Chicago	USA	3.3 (0, 9.7)	24.6 (3, 73.5)
Cologne	Germany	3.7 (0.5, 9.8)	21.1 (5, 55)
Cordoba	Argentina	3.5 (0.7, 10.2)	17.7 (5, 45)
Delhi	India	4.9 (0.5, 15)	39.7 (10, 90)
Gran Valparaiso	Chile	NA	24.1 (5, 60)
Hamburg	Germany	3.7 (0.5, 10.8)	21.2 (5, 60)
Helsinki	Finland	4.5 (1, 14)	26.7 (5, 78)
Kisumu	Kenya	5.6 (1.2, 12.5)	22.5 (5, 50)
London	England	3.2 (0.3, 10.1)	21.8 (5, 60)
Los Angeles	USA	5.3 (0.4, 23)	32.9 (5, 120)
Melbourne	Australia	4.9 (0.5, 14.9)	26.4 (5, 70)
Mendoza	Argentina	NA	21.4 (8.2, 49.5)
Mexico City	Mexico	NA	21.2 (5, 60)
Munich	Germany	3.7 (0.5, 11.4)	20.8 (5, 60)
New York City	USA	2.7 (0, 7.5)	19.8 (4, 56.1)
Amsterdam	Netherlands	3.3 (0.5, 10)	17.3 (3, 45)
Philadelphia	USA	5.3 (0.5, 11.9)	25 (3.2, 46.7)
Rosario	Argentina	NA	17.3 (5, 45)
Salvador	Brazil	NA	25.1 (5, 60)
Santiago	Chile	2.8 (0, 9.5)	24.6 (5, 60)
Sao Paulo	Brazil	3.3 (0.3, 10.4)	26 (5, 60)
Seattle	USA	5.3 (0.5, 15.8)	23.5 (4.1, 60)
Zurich	Switzerland	4.1 (0.4, 15)	19.6 (2, 65.2)
Bangalore	India	3.1 (0.5, 6)	24.4 (10, 45)

Belo Horizonte	Brazil	NA	22.4 (5, 55)
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**Table S3: Percentage distribution of cycle trips by distance categories (country-wide urban areas)**

Country	Region	Cycling share	0-2 km	2-5 km	5-10 km	10-20 km	20+ km
Netherlands	Europe	26.8	55.9	29.1	10.2	3.5	1.3
Germany	Europe	9.3	54.6	30.2	10.1	3.7	1.3
Finland	Europe	7.8	56	26.7	11.2	4.5	1.6
Switzerland	Europe	6.7	60	26.1	7.9	3.1	2.9
England	Europe	2.1	32.1	39.1	17.1	8.4	3.2
Australia	Australia	1.8	35.2	32.1	20.7	8.4	3.6
USA	North America	1.1	50.8	29.6	12.5	4.8	2.3

**Table S4: Percentage distribution of all trips by distance categories (country-wide urban areas)**

Country	Region	Cycling share	0-2 km	2-5 km	5-10 km	10-20 km	20+ km
Netherlands	Europe	26.8	39.8	22.2	13.6	10.4	14.1
Germany	Europe	9.3	32.6	23.5	16.7	13.3	13.9
Finland	Europe	7.8	26.2	22.2	17.7	15.8	18
Switzerland	Europe	6.7	40.2	20.6	14.6	10.7	14
England	Europe	2.1	22	29.8	19.3	14.9	13.9
Australia	Australia	1.8	30.2	25	17.7	14.6	12.5
USA	North America	1.1	25	23.2	19.2	15.6	17

**Table S5: Percentage distribution of cycle trips by distance categories (cities)**

City	Country	Cycling share	0-2 km	2-5 km	5-10 km	10-20 km	20+ km
Amsterdam	Netherlands	28.7	54.2	30.5	11.1	3.1	1.1
Munich	Germany	16.3	52.3	29.2	13.6	3.6	1.2
Cologne	Germany	14.7	51.5	32.8	11	3.2	1.6
Berlin	Germany	14.1	49.1	30.5	13.7	4.7	2
Hamburg	Germany	13.7	49.9	32	13.3	4	0.8
Zurich	Switzerland	6.4	56.9	28.2	9.4	3	2.5
Helsinki	Finland	5.3	47.7	26.2	17.1	7.1	2
Delhi	India	4.8	37.7	29.4	19.8	13.1	0
Bangalore	India	4.0	46.8	46	5.5	1.5	0.2
Santiago	Chile	3.7	63.3	21.5	11.2	3.3	0.7
Cordoba	Argentina	2.7	46.1	28.6	18.3	7	0
London	England	2.6	51.3	27	16.5	4.7	0.5
Philadelphia	USA	1.9	40.7	39.3	12.3	5.8	1.9
Melbourne	Australia	1.9	35.9	33.7	21.1	7.3	2
Chicago	USA	1.5	58.2	27.9	9.1	1.6	3.2
Los Angeles	USA	1.3	44.5	28.8	14	8	4.7
Brisbane	Australia	1.2	34.7	34	20.8	7.4	3.1
New York City	USA	1.2	54.7	29.3	12.1	3.7	0.2
Seattle	USA	1.1	31.5	31.2	15	12	10.3

Sao Paulo	Brazil	0.6	52	30.8	9.6	5	2.6
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**Table S6: Percentage distribution of all trips by distance categories (cities)**

City	Country	Cycling share	0-2 km	2-5 km	5-10 km	10-20 km	20+ km
Amsterdam	Netherlands	28.7	40.6	22.2	13.5	10.2	13.6
Munich	Germany	16.3	38.8	23.3	17.5	10.9	9.5
Cologne	Germany	14.7	40.2	24.5	15.8	9.4	10.1
Berlin	Germany	14.1	38.3	21.5	16.4	13.7	10
Hamburg	Germany	13.7	38.5	23	17.7	12	8.9
Zurich	Switzerland	6.4	39.4	19.7	15.3	12.2	13.4
Helsinki	Finland	5.3	25.2	21.5	19.3	19.7	14.4
Delhi	India	4.8	59	11.1	12.6	11.4	5.9
Bangalore	India	4.0	47.2	20.8	19.9	10.1	2
Santiago	Chile	3.7	43.2	18.1	15.2	15.9	7.6
Cordoba	Argentina	2.7	34.3	22.3	27.2	15.2	1.1
London	England	2.6	50.1	22	14.3	9.3	4.3
Philadelphia	USA	1.9	28.4	24	20.2	17.7	9.8
Melbourne	Australia	1.9	38.3	23.3	15.5	12.5	10.3
Chicago	USA	1.5	40.9	24.2	14.9	11.1	8.9
Los Angeles	USA	1.3	25.9	23.7	17.7	14	18.6
Brisbane	Australia	1.2	26	26.4	20.2	15.2	12.2
New York City	USA	1.2	46.8	20.9	13.7	11.1	7.5
Seattle	USA	1.1	26.3	25.2	17.3	14.9	16.3
Sao Paulo	Brazil	0.6	46.4	18.1	14.7	14.2	6.6

**Table S7: Percentage share of women in cycle trips in country-wide urban areas**

Country	Region	Cycling share	All age groups	0-15 years	16-59 years	60+ years
Netherlands	Europe	26.8	54.4	48.5	56.8	54.5
Japan	Asia	11.5	56.4	44.3	57.1	58.9
Germany	Europe	9.3	49.2	39.4	50.4	49.6
Finland	Europe	7.8	50.4	43.3	52.3	61.4
Switzerland	Europe	6.7	46.6	40.8	48.3	46.1
Argentina	Latin America	3.6	33.6	44.1	34.3	15.6
Chile	Latin America	2.7	30.8	58.9	29.5	7.7
England	Europe	2.1	26.5	26.5	27.2	23
Australia	Australia	1.8	35.5	36.4	35	37.1
USA	North America	1.1	30.2	29.4	30.8	27.4
Brazil	Latin America	0.8	13.2	39.7	11.7	4.9

Table S8: Percentage share of women in cycle trips in selected cities

City	Country	Cycling share	All age groups			
			0-15 years	16-59 years	60+ years	
Amsterdam	Netherlands	28.7	54.7	48.3	57.3	53.2
Osaka	Japan	28.4	64.2	49.1	68.6	58.8
Tokyo	Japan	18.7	57.5	45.3	61.2	52.9
Munich	Germany	16.3	51.4	47.7	51.9	53.5
Nagoya	Japan	15.7	63	52.6	65.1	60.8
Cologne	Germany	14.7	48.5	52.4	48.1	45.3
Berlin	Germany	14.1	53.3	50.8	55.6	47.7
Hamburg	Germany	13.7	51	44.7	52	56.3
Yokohama	Japan	8.3	52.8	30	53.7	57.5
Rosario	Argentina	8.3	42.3	39.1	44.1	32.3
Zurich	Switzerland	6.4	43.8	35.6	46.1	39.5
Bogota	Colombia	6.3	27.8	34.7	28.6	12.5
Helsinki	Finland	5.3	49.5	36.2	51.5	58.3
Delhi	India	4.8	8.1	50.5	3.8	0
Kisumu	Kenya	4.3	26.2	47.8	25.1	18.2
Bangalore	India	4	20.7	31.8	17.7	33.7
Santiago	Chile	3.7	33.3	60.8	31.6	7.7
Buenos Aires	Argentina	3.3	34.3	48.6	34.7	16.5
Montreal	Canada	2.7	36.7	37.6	37	31.6
Cordoba	Argentina	2.7	35.8	38.8	39.7	5
London	England	2.6	25.3	25.6	25.4	23.4
Mendoza	Argentina	2.2	19.1	36.4	18.8	14.9
Mexico City	Mexico	2	24.1	39.5	24.6	7.2
Philadelphia	USA	1.9	33.5	80.1	27.6	34.3
Melbourne	Australia	1.9	26.3	35	24	26.4
Chicago	USA	1.5	32.2	33.9	29.7	56.1
Los Angeles	USA	1.3	29.9	41.4	26.6	11.4
Brisbane	Australia	1.2	27	24	28.1	28.4
New York City	USA	1.2	34.1	36.9	34.8	23.9
Seattle	USA	1.1	27.4	8.1	29.7	39.1
Belo Horizonte	Brazil	1	9.8	13.2	9.9	5.5
Salvador	Brazil	0.9	11.9	31.2	10.3	9.2
Gran Valparaiso	Chile	0.8	20.9			
Sao Paulo	Brazil	0.6	12.3	56.2	9.8	0
Cape Town	South Africa	0.3	27	0	35.7	0

**Table S9: Age-representation in cycling for the country-wide urban areas (ratio of proportion of cyclists in an age category to the proportion of all road users in that age category)**

Country	Region	Cycling share	0-15 years	16-59 years	60+ years
Netherlands	Europe	26.8	1.36	0.92	0.94
Japan	Asia	11.5	1.17	1.14	0.79
Germany	Europe	9.3	2.07	0.97	0.92
Finland	Europe	7.8	2.74	0.77	0.63
Switzerland	Europe	6.7	1.84	1.00	0.60
Argentina	Latin America	3.6	0.66	1.11	0.95
Chile	Latin America	2.7	0.68	1.26	0.68
England	Europe	2.1	0.88	1.15	0.65
Australia	Australia	1.8	1.06	1.07	0.67
USA	North America	1.1	1.58	1.04	0.54
Brazil	Latin America	0.8	0.35	1.24	0.48
Spearman correlation			0.52	-0.55	0.65
P-values			0.10	0.08	0.03
Pearson correlation			0.30	-0.50	0.61
P-values			0.38	0.12	0.04

**Table S10: Age-representation in cycling for the selected cities (ratio of proportion of cyclists in an age category to the proportion of all road users in that age category)**

City	Country	Cycling share	0-15 years	16-59 years	60+ years
Amsterdam	Netherlands	28.7	1.25	0.96	0.91
Osaka	Japan	28.4	0.84	1.09	0.9
Tokyo	Japan	18.7	0.97	1.05	0.91
Munich	Germany	16.3	1.27	0.99	0.83
Nagoya	Japan	15.7	0.85	1.23	0.71
Cologne	Germany	14.7	1.13	1.11	0.55
Berlin	Germany	14.1	1.61	0.97	0.67
Hamburg	Germany	13.7	1.53	0.96	0.75
Yokohama	Japan	8.3	0.87	1.12	0.82
Rosario	Argentina	8.3	1.07	1.05	0.58
Zurich	Switzerland	6.4	1.49	1.07	0.52
Bogota	Colombia	6.3	0.67	1.11	0.71
Helsinki	Finland	5.3	1.92	0.9	0.84
Delhi	India	4.8	0.33	1.17	
Kisumu	Kenya	4.3	0.6	1.03	
Bangalore	India	4	1.22	1.05	0.73
Santiago	Chile	3.7	0.7	1.17	0.54
Buenos Aires	Argentina	3.3	0.64	1.11	1.01
Montreal	Canada	2.7	0.57	1.22	0.38
Cordoba	Argentina	2.7	0.84	1.06	0.9
London	England	2.6	0.76	1.15	0.47
Mendoza	Argentina	2.2	0.29	1.18	0.99

Mexico City	Mexico	2	0.77	1.04	0.99
Philadelphia	USA	1.9	0.85	1.11	0.49
Melbourne	Australia	1.9	1	1.09	0.61
Chicago	USA	1.5	1.08	1.16	0.35
Los Angeles	USA	1.3	1	1.05	0.61
Brisbane	Australia	1.2	1.44	0.98	0.56
New York City	USA	1.2	0.76	1.12	0.67
Seattle	USA	1.1	0.91	1.17	0.25
Belo Horizonte	Brazil	1	0.33	1.22	0.58
Salvador	Brazil	0.9	0.45	1.22	0.39
Sao Paulo	Brazil	0.6	0.3	1.27	
Cape Town	South Africa	0.3		1	
Spearman correlation			0.44	-0.37	0.45
P-values			0.01	0.03	0.01
Pearson correlation			0.35	-0.34	0.42
P-values			0.05	0.05	0.02