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Evaluation of an Electric Bike Pilot Project at Three Employment Campuses in Portland, Oregon

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EVALUATION OF AN E-BIKE PILOT PROJECT AT THREE KAISER PERMANENTE EMPLOYMENT CAMPUSES

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TREC at Portland State University (former)

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Portland State UNIVERSITY

TREC

WHAT IS AN E-BIKE?

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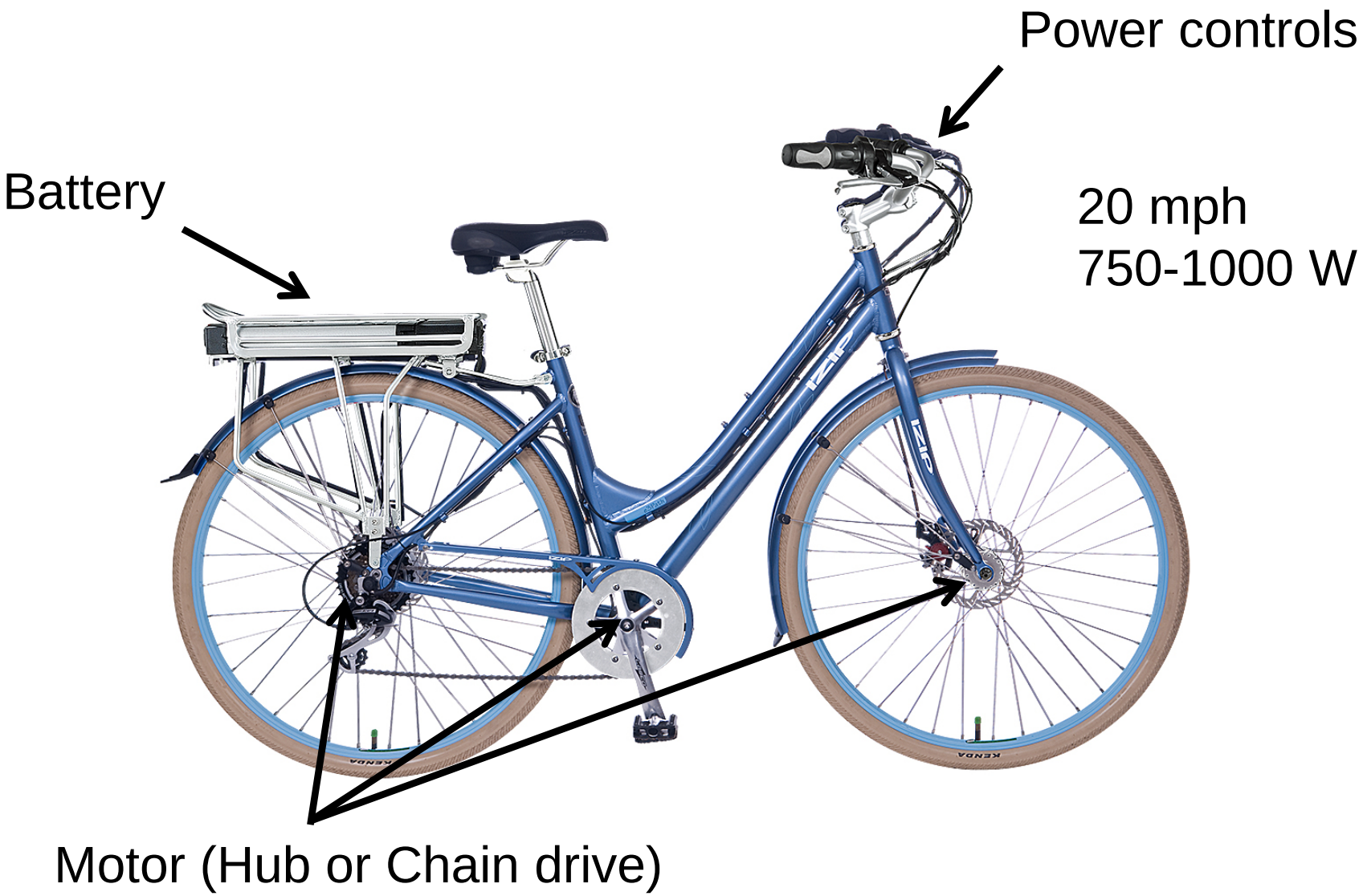
What is an electric bike?



Different types of the e-bikes

Throttle

Powered bicycle (PB) versus

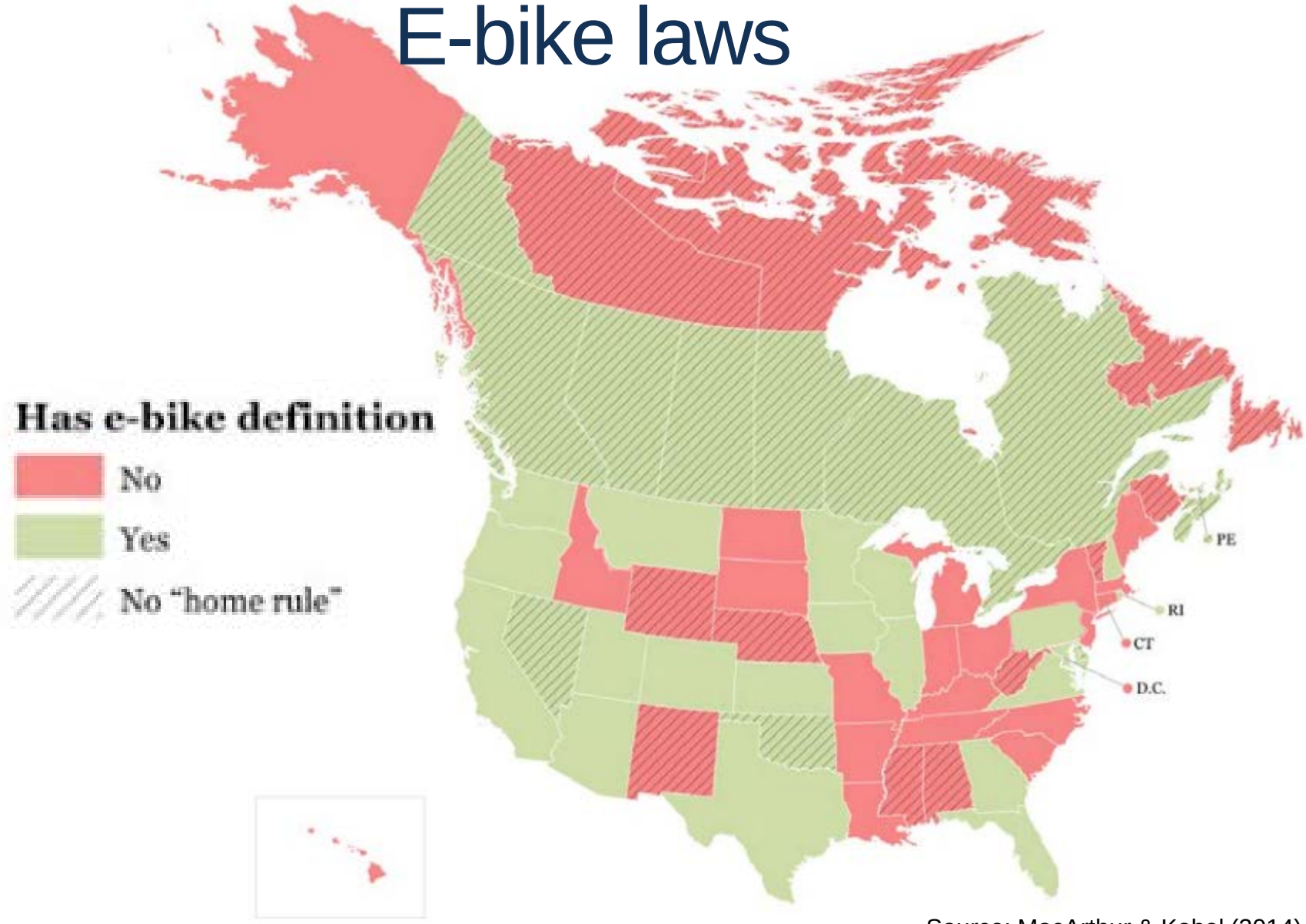
Pedelec

Power-assisted bicycle (PAB)


ORGANIC
Transit
ELF


B-line
showers pass

E-bike laws



Source: MacArthur & Kobel (2014).

WHY DO E-BIKES MATTER?

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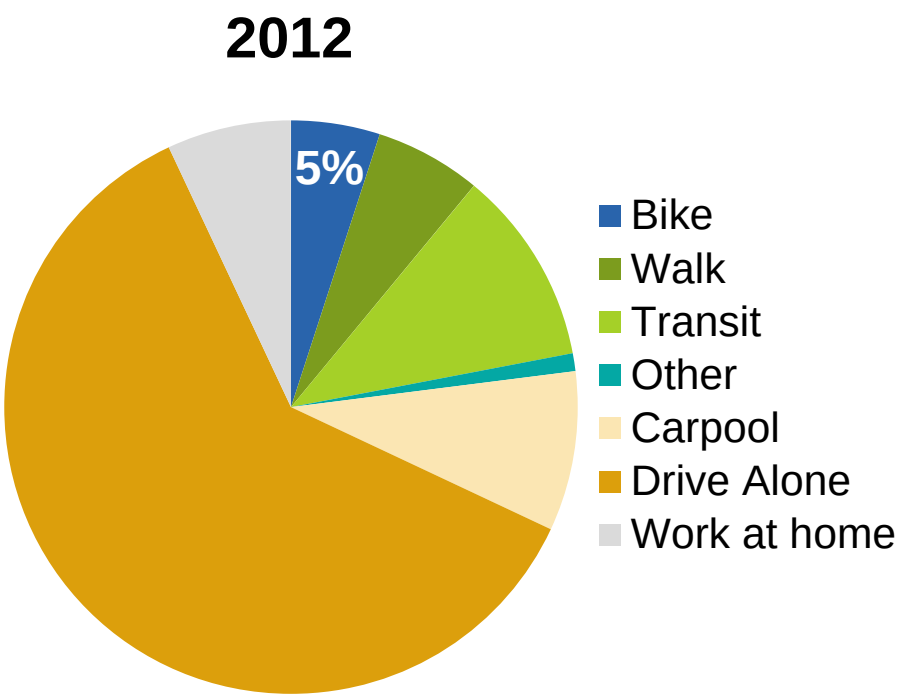
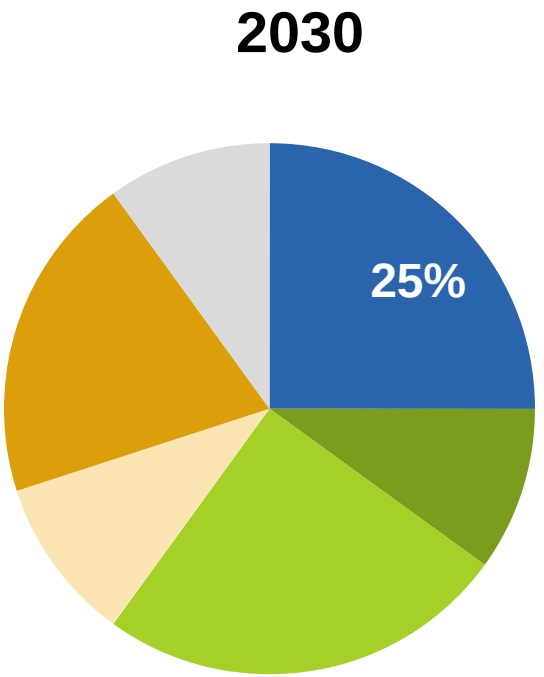
Commute Mode Share, Multnomah Co.





City of Portland Climate Action Plan, 2015

Shifting the four types of cyclists

<1% Strong & Fearless

7% Enthused & Confident

60% Interested but Concerned

33% No Way, No How

Geller, 2006 & Dill and McNeil, 2012

E-bikes help overcome barriers

- Older adults
- Physical limitations
- Topography
- Longer commutes
- Sweat
- Carrying capacity

KAISER PERMANENTE E-BIKE PILOT PROJECT

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Our research question

Will e-bikes…

- Get more people to bike?
- Get people to bike more often?

Kaiser Permanente E-bike Pilot Project

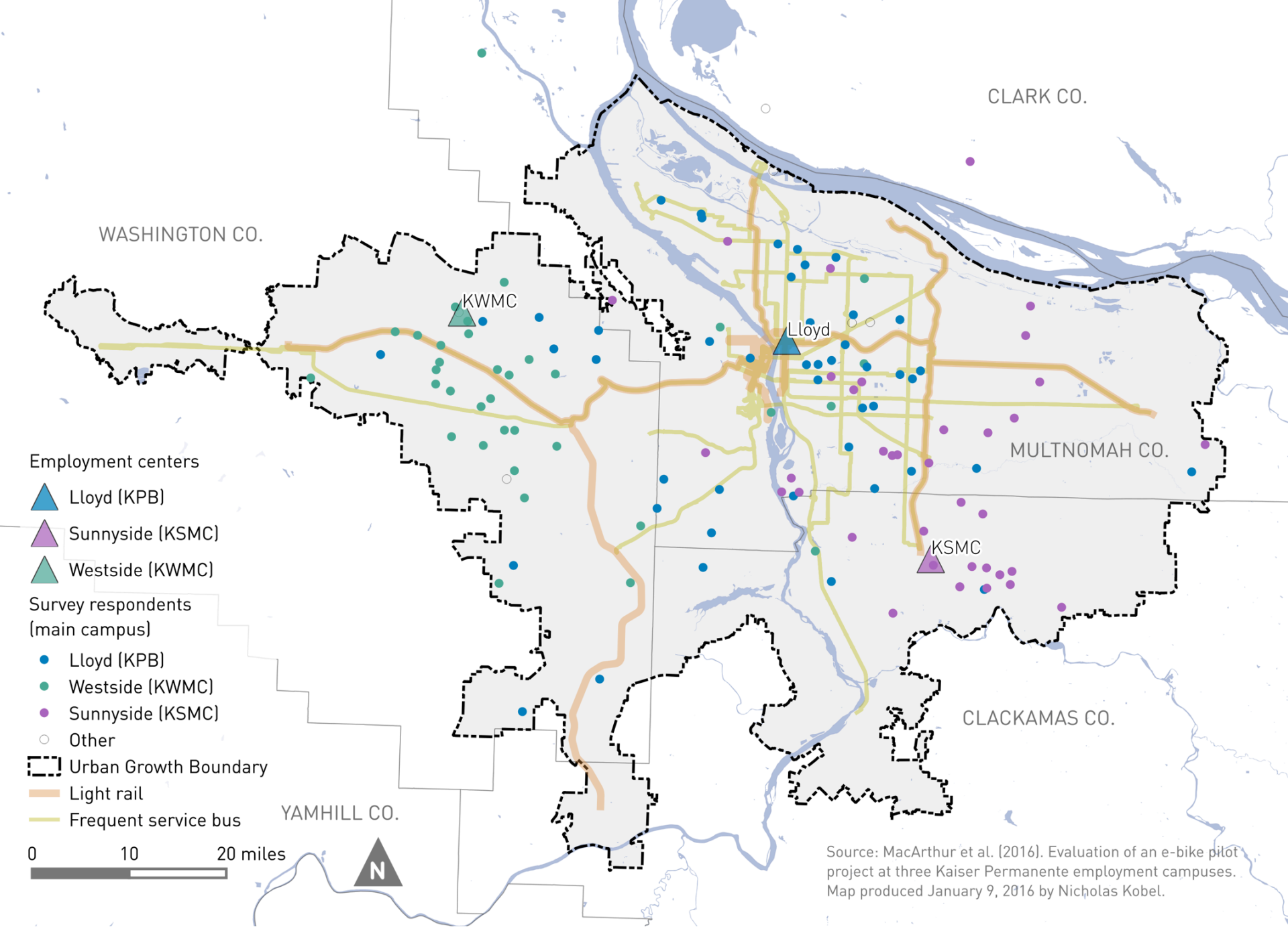
- 30 Currie iZip E3 Compact
  - Top Speed: 18 mph
  - Range: 15-22 miles
  - Weight: 42 lbs.
  - Folding
- Kaiser employees at 3 campuses (1st/last mile commuting)
- Three surveys
- 6 cohorts, 10 weeks
- 151 people
- *4 cohorts (106 people)*
- Spring 2014 ~ Fall 2015

KAISER PERMANENTE®

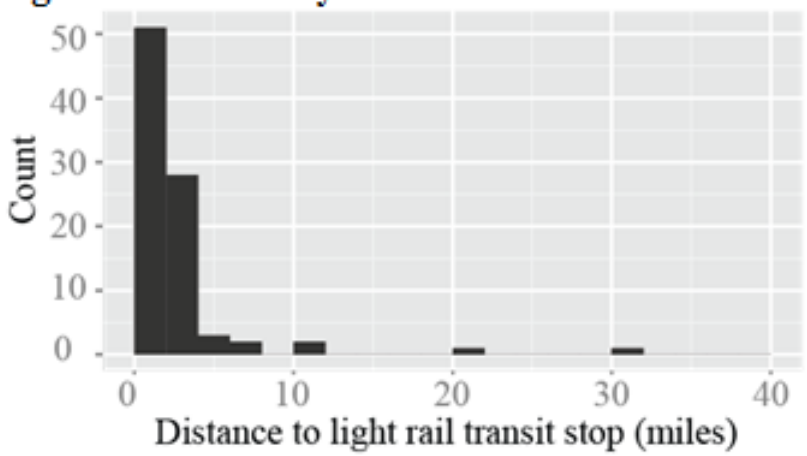
Drive Oregon
Innovation in Electric Mobility

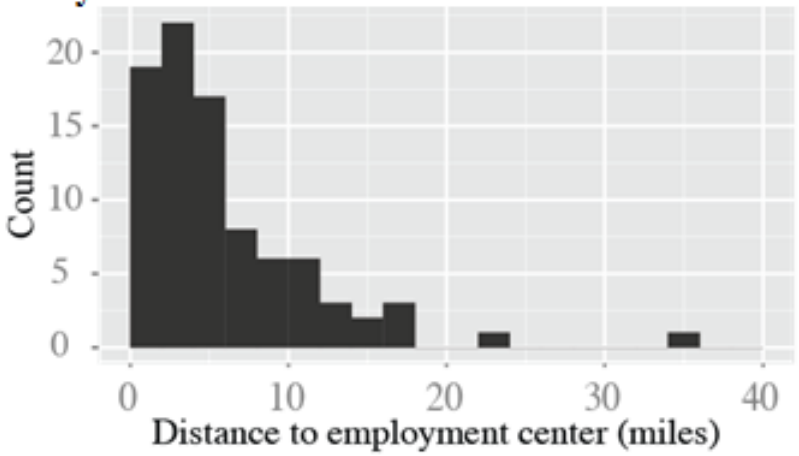
Metro

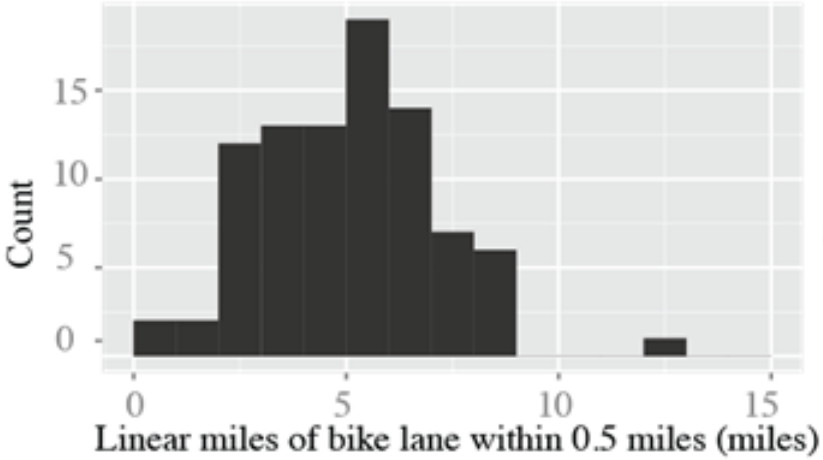
NITC
NATIONAL INSTITUTE for TRANSPORTATION and COMMUNITIES

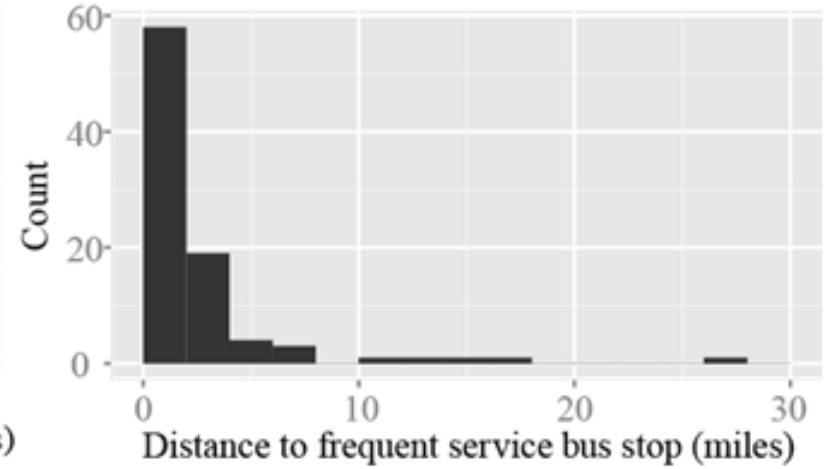

CLARK CO.
WASHINGTON CO.
KWMC
Lloyd
MULTNOMAH CO.
KSMC
CLACKAMAS CO.
YAMHILL CO.
Employment centers
Lloyd (KPB)
Sunnyside (KSMC)
Westside (KWMC)
Survey respondents (main campus)
Lloyd (KPB)
Westside (KWMC)
Sunnyside (KSMC)
Other
Urban Growth Boundary
Light rail
Frequent service bus
0
10
20 miles
N
Source: MacArthur et al. (2016). Evaluation of an e-bike pilot project at three Kaiser Permanente employment campuses.
Map produced January 9, 2016 by Nicholas Kobel.

Summary statistics for GIS analysis









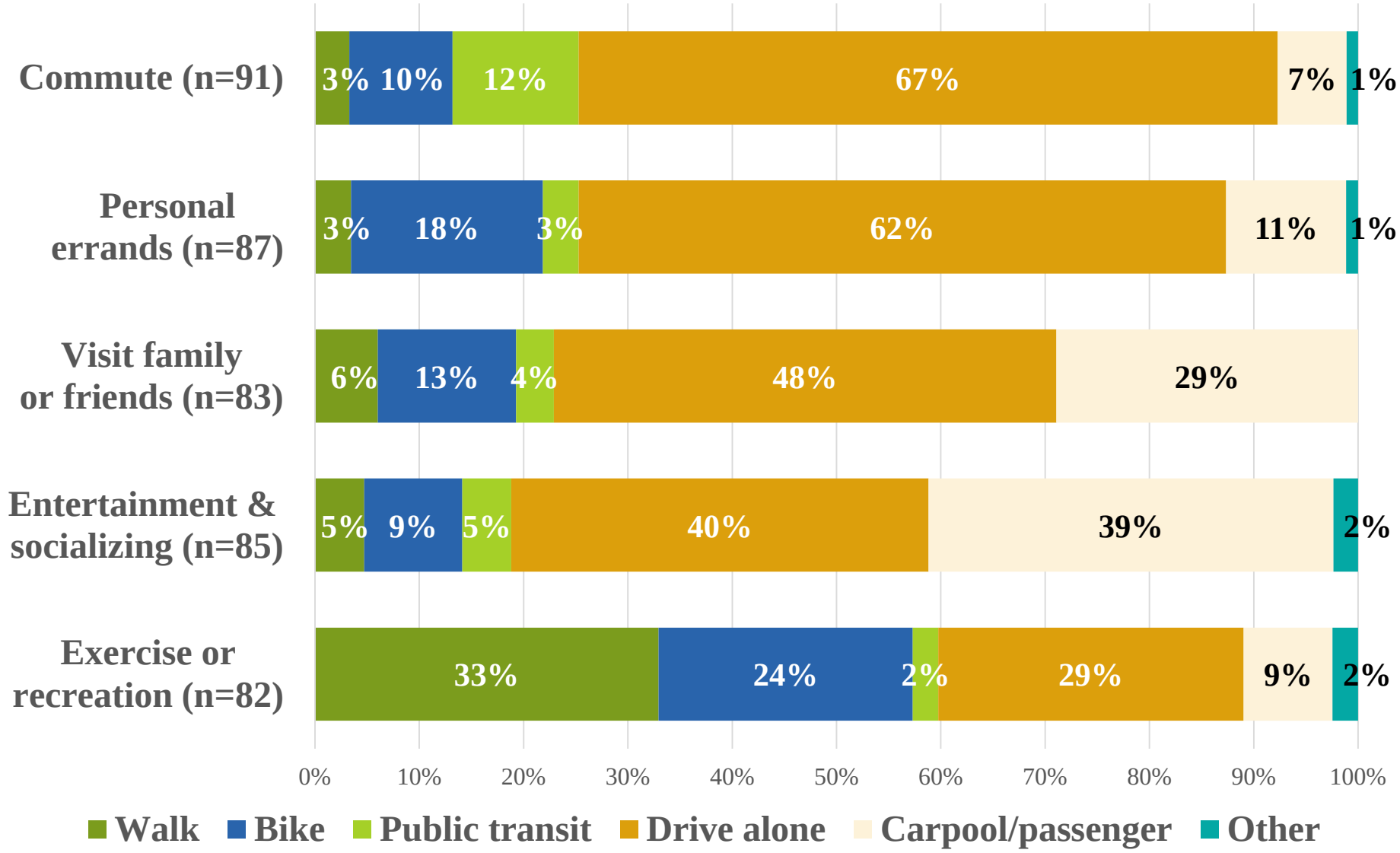
	n	Mean	Med	StDv	Range	Min	Max
Distance to main employment center	90	5.74	4.28	5.51	34.6	0	34.6
Distance to nearest frequent service bus stop	90	2.38	1.09	4.03	27.2	0	27.2
Distance to nearest light rail transit stop	90	2.68	1.79	4.05	30.2	0	30.2
Linear miles of bike routes within ½ mile	90	4.97	5.12	2.13	12.9	0	12.9

Spatial metrics

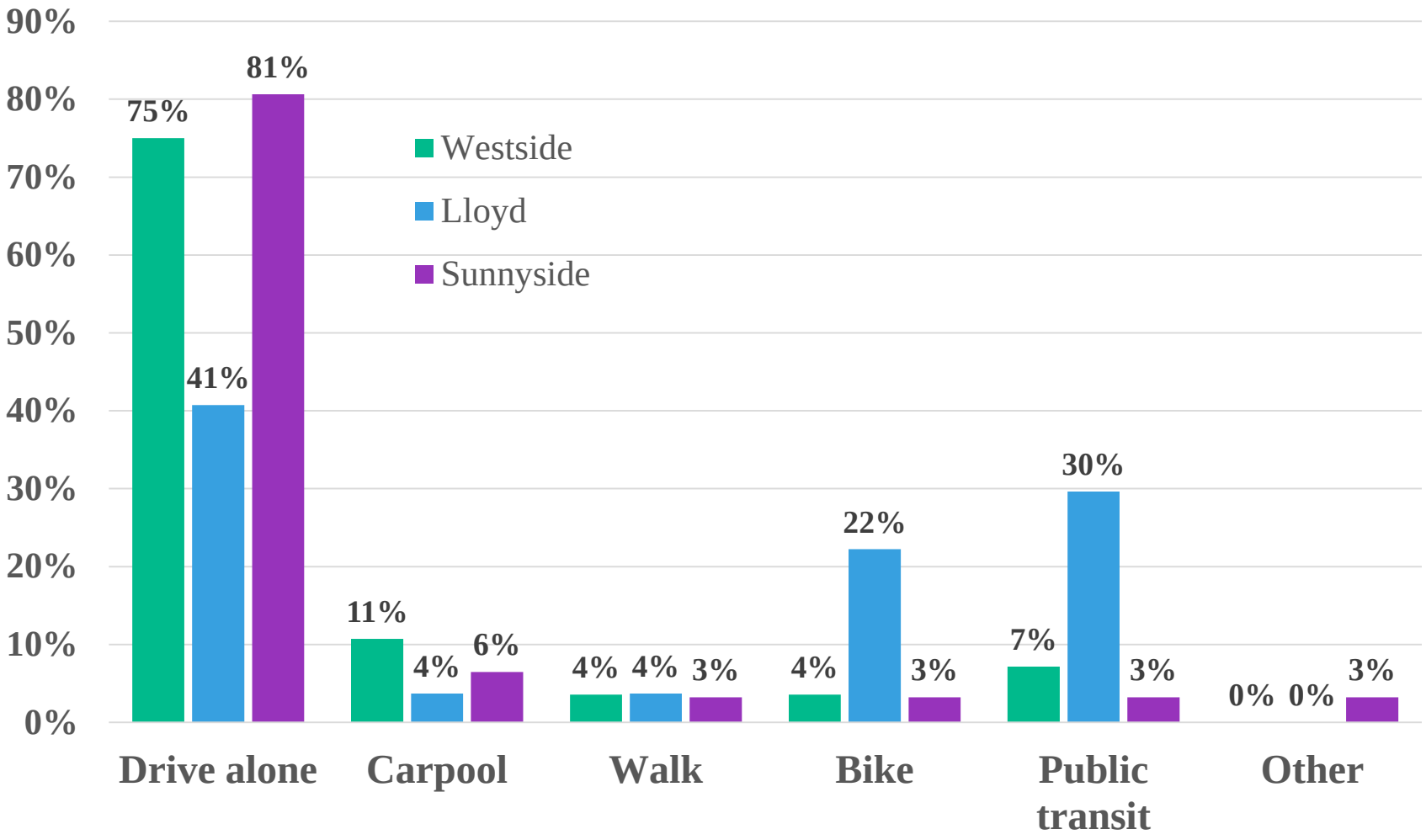
Demographic characteristics

Race/ethnicity	#	%	Household Income	#	%
White	71	78%	$15,000 – $24,999	1	1%
Black	4	4%	$25,000 – $34,999	1	1%
Hispanic/Latino	6	7%	$35,000 – $49,999	9	10%
Asian	5	6%	$50,000 – $74,999	18	21%
American Indian	2	2%	$75,000 – $99,999	17	19%
Native Hawaiian	2	2%	$100,000 – $149,999	33	38%
Two or more	1	1%	$150,000 or more	9	10%
Total (n)	**91**	100%	**Total (n)**	**88**	100%
Sex	**#**	**%**	**Physical limitations**	**#**	**%**
Male	37	41%	No	70	78%
Female	54	59%	Yes	20	22%
Total (n)	**91**	100%	**Total (n)**	**90**	100%
Age group	**#**	**%**	**BMI index by age**	**Male**	**Female**
18-24	4	4%	18 – 24	25.7	23.7
25-34	15	17%	25 – 34	25.0	26.2
35-44	31	34%	35 – 44	29.1	26.5
45-54	27	30%	45 – 54	27.5	30.0
55-64	12	13%	55 +	27.7	27.9
65+	1	1%	**Average**	**27.7**	**27.7**
Total (n)	**90**	100%			
Educational attainment	**#**	**%**	**Reported health**	**#**	**%**
High school	3	3%	Excellent	12	13%
Some college	18	20%	Very Good	32	36%
College graduate	38	43%	Good	38	42%
Advanced degree	30	34%	Fair	8	9%
Total (n)	**89**	100%	**Total (n)**	**90**	100%

Mode choice by trip purpose (BEFORE study)



Commute mode by location



Barriers to participation in cycling cited by respondents

	Standard bicycle			E-bike	
	(A)	**(B)**	**(C)**	**(D)**	**(E)**
Sample size (*n*)	**37**	**20**	**90**	**61**	**60**
Weather conditions	49%	40%	50%	66%	67%
Trip logistics or carrying capacity	8%	5%	39%	39%	45%
My destination is too far	54%	15%	27%	16%	25%
The bike is uncomfortable or causes pain	0%	0%	0%	8%	17%
Preparation logistics, time constraints or too busy	46%	65%	13%	15%	15%
I am concerned for my safety	5%	5%	11%	16%	13%
I do not have access to a bicycle *OR* there was an issue with my e-bike	14%	30%	11%	2%	13%
There is no place to securely store my bicycle	0%	0%	2%	5%	12%
I don't like to arrive sweaty/no showers at work	5%	0%	32%	13%	10%
I am unable to bike for health concerns or am physically unable	19%	15%	6%	3%	8%
Transit connections are not easy or convenient	0%	0%	0%	8%	5%
"Laziness" (self-reported)	5%	0%	2%	0%	2%
Hills	5%	0%	29%	2%	0%
Other	3%	5%	0%	0%	5%

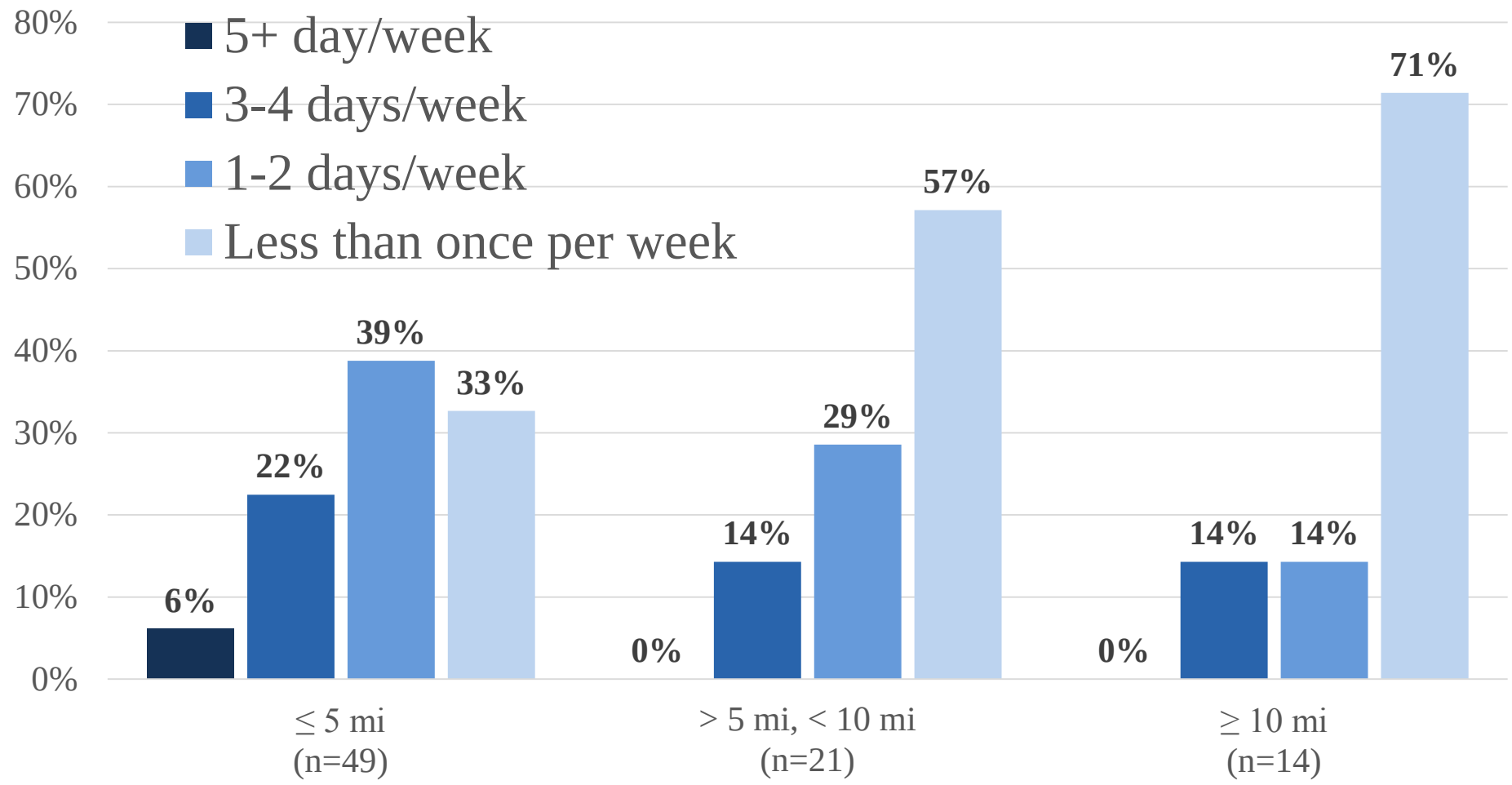
(A): Pre-use: Why did you stop biking for transportation to work?
(B): Pre-use: Why did you stop biking for recreation?
(C): Pre-use: What are the main factors keeping you from biking more often?
(D): Mid-use: If you would like to use the e-bike to commute to work more often, what prevents you from doing so?
(E): Post-use: If you weren't able to use the e-bike as often as you would have liked, what prevented you from doing so?
NOTE: Categories combined where appropriate.

Change in confidence (cyclist typology)

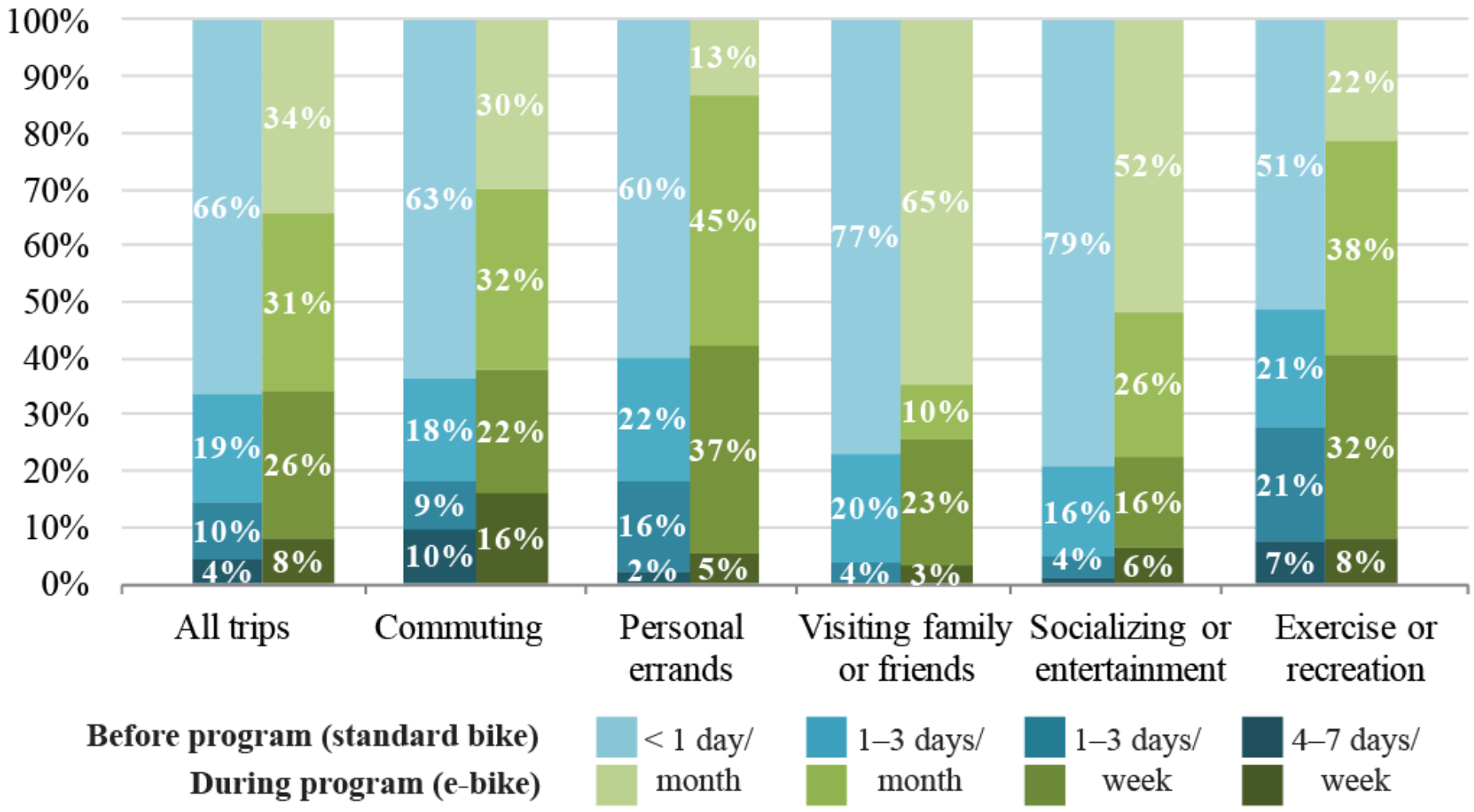
	"I ride a bike…"						Total		Portland regional average †
	"never"		"occasionally"		"regularly"				
	#	%	#	%	#	%	#	%	
Before	**9**	**100%**	**59**	**100%**	**23**	**100%**	**91**	**100%**	-
No way, no how	2	22%	5	8%	0	0%	7	8%	31%
Interested but concerned	6	67%	28	47%	15	65%	49	54%	56%
Enthused and confident	1	11%	25	42%	6	26%	32	35%	9%
Strong and fearless	0	0%	1	2%	2	9%	3	3%	4%
After	**9**	**100%**	**59**	**100%**	**23**	**100%**	**91**	**100%**	-
No way, no how	0	0%	4	7%	0	0%	4	4%	31%
Interested but concerned	3	33%	27	46%	9	39%	39	43%	56%
Enthused and confident	6	67%	23	39%	12	52%	41	45%	9%
Strong and fearless	0	0%	5	8%	2	9%	7	8%	4%
Total	**9**	**100%**	**59**	**100%**	**23**	**100%**	**91**	**100%**	-
Became less confident	0	0%	10	17%	3	13%	13	14%	-
No change	2	22%	36	61%	12	52%	50	55%	-
Became more confident	7	78%	13	22%	8	35%	28	31%	-

† Cyclist typology results from Dill & McNeil, 2012.

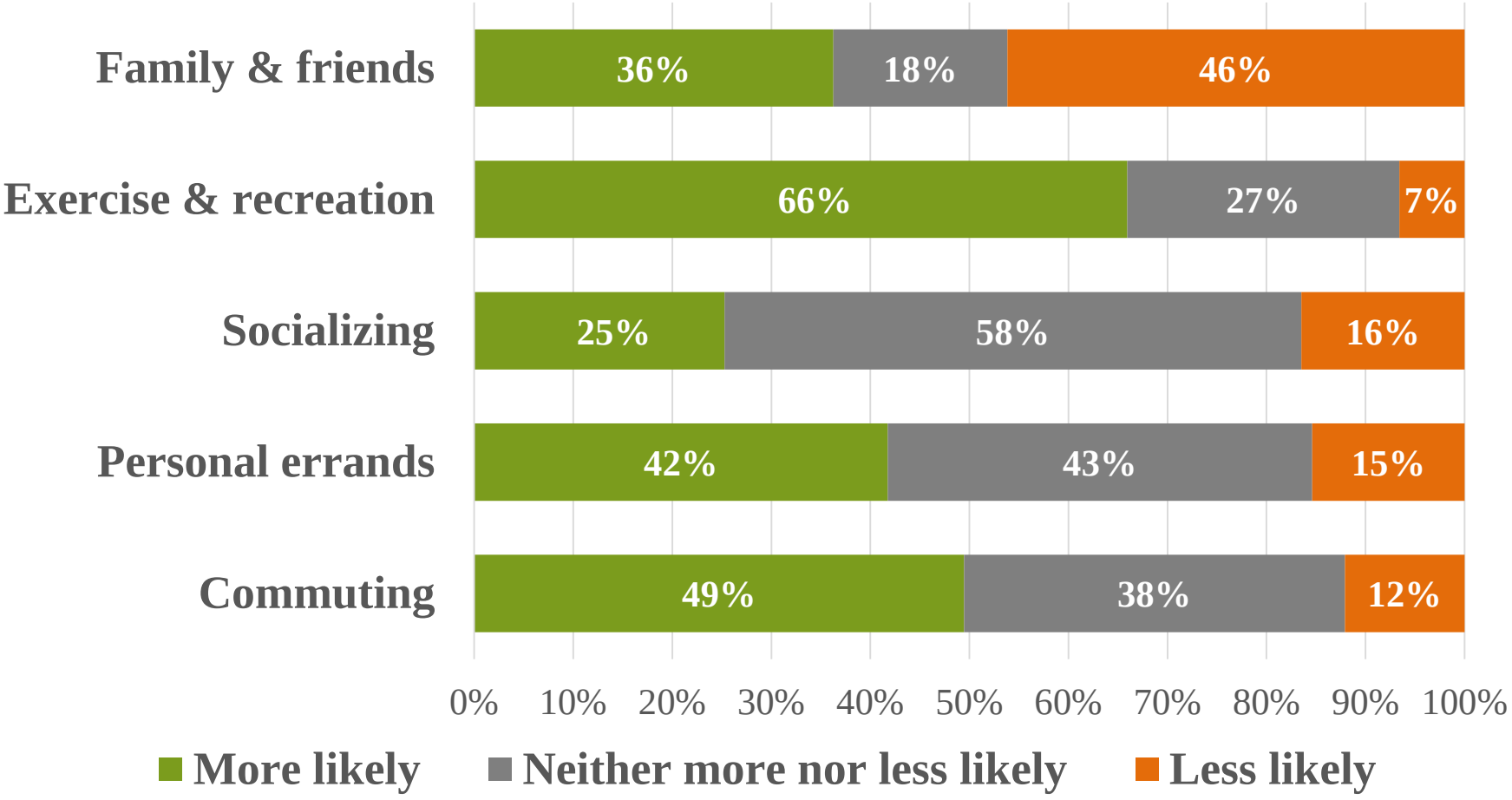
E-bike trip frequency by commute distance



Frequency of bicycle usage by trip purpose, before and during program.



After using an e-bike, how likely are you to bike for the following trip types?



Conclusions

- E-bikes reduce barriers to participation in cycling
- E-bikes may make people more comfortable on bicycles
- E-bikes encourage more trips by bicycle

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