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Links Between Public Transportation and Physical Activity

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University of Washington

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Links Between Public Transportation and Physical Activity

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TREC/PSU Friday Transportation Seminar Series
November 7, 2014

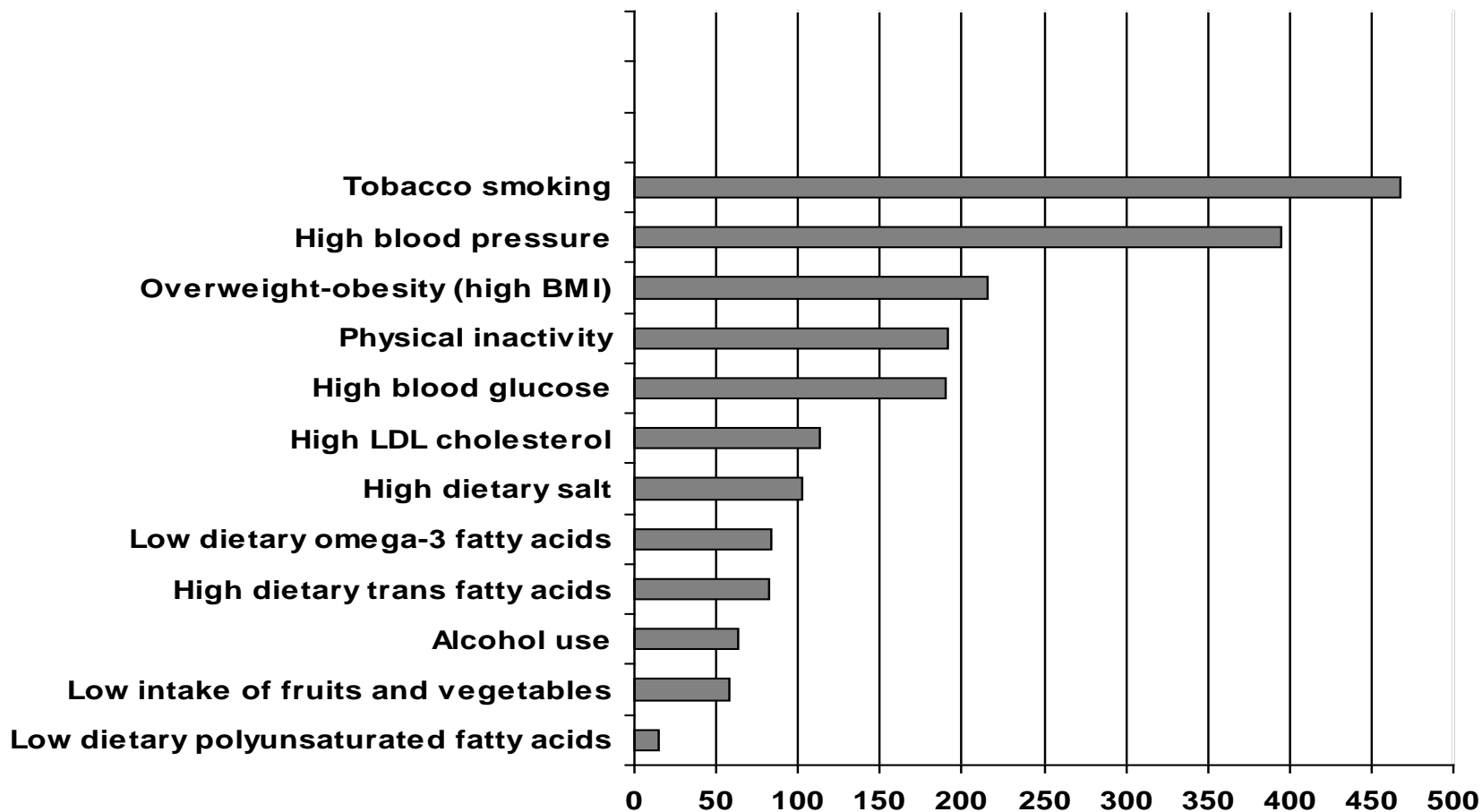
My Journey

- Health psychology
 - Focus on health behavior change
 - Long history of examining individual-level factors
- Exposure to urban planning and transportation
 - Paradigm shift (good mentoring)
 - Critical physical activity and health behaviors
 - Link to environment, spatial data and methodology
- Researcher! practitioner? dangerous?

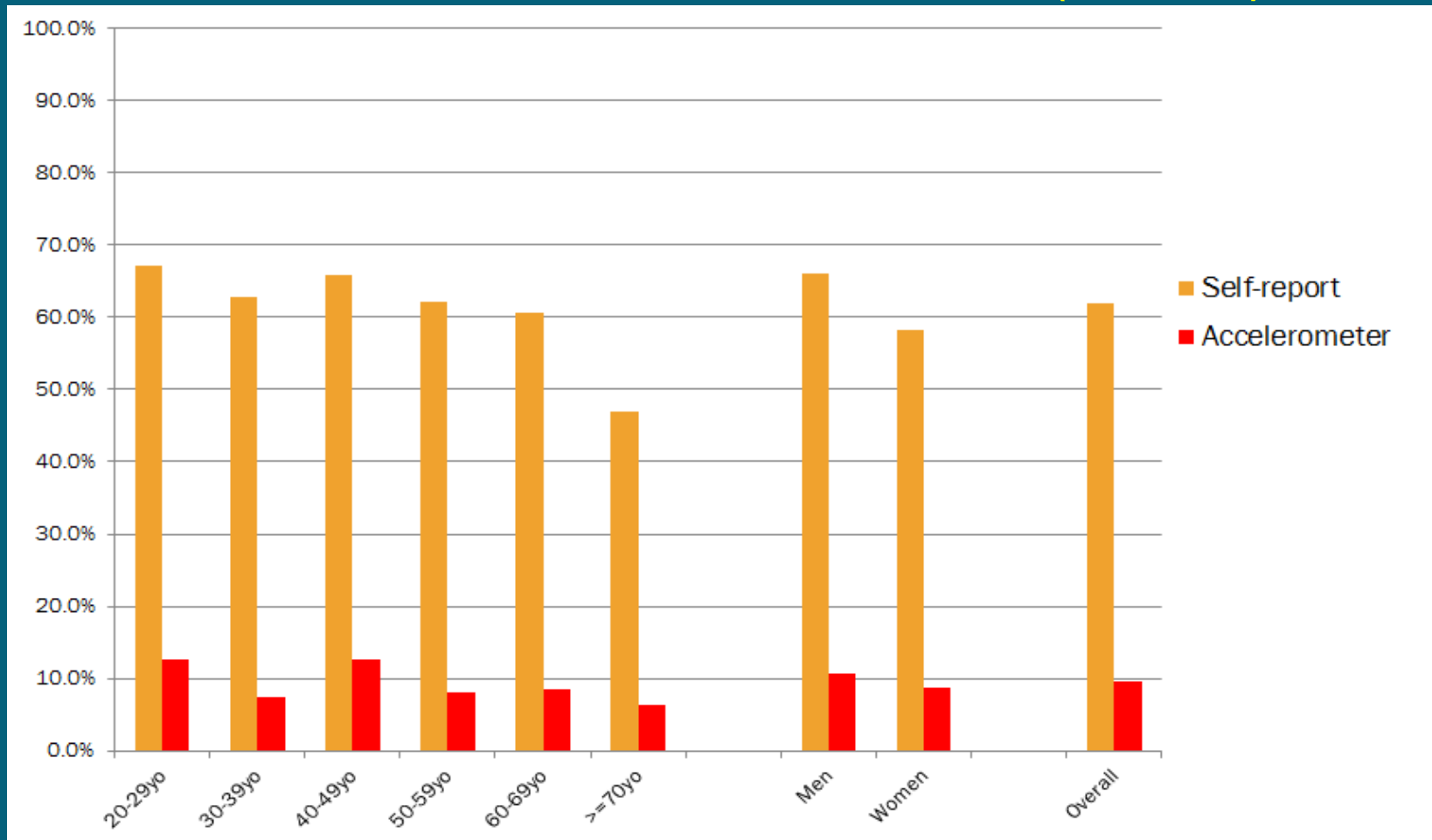
Objectives

- Rationale for public transportation focus within physical activity
- Evidence for link between public transport and physical activity (with increasing confidence?)
 - Transit-specific physical activity
 - Transit users versus non-users in overall physical activity
 - Same people, device-based transit specific
- ‘Natural experiments’
- Future work

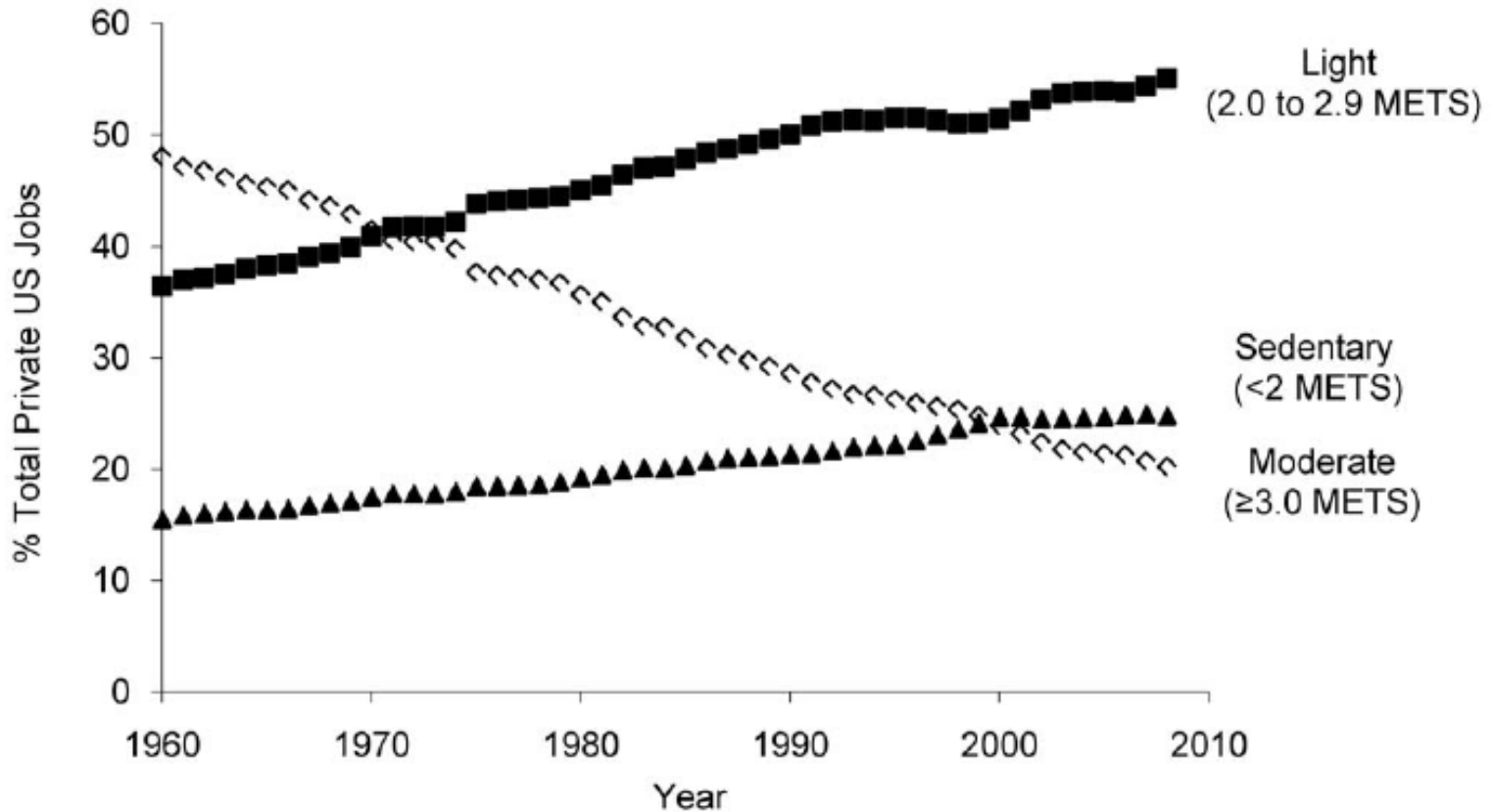
U.S. death (thousands) risk factors



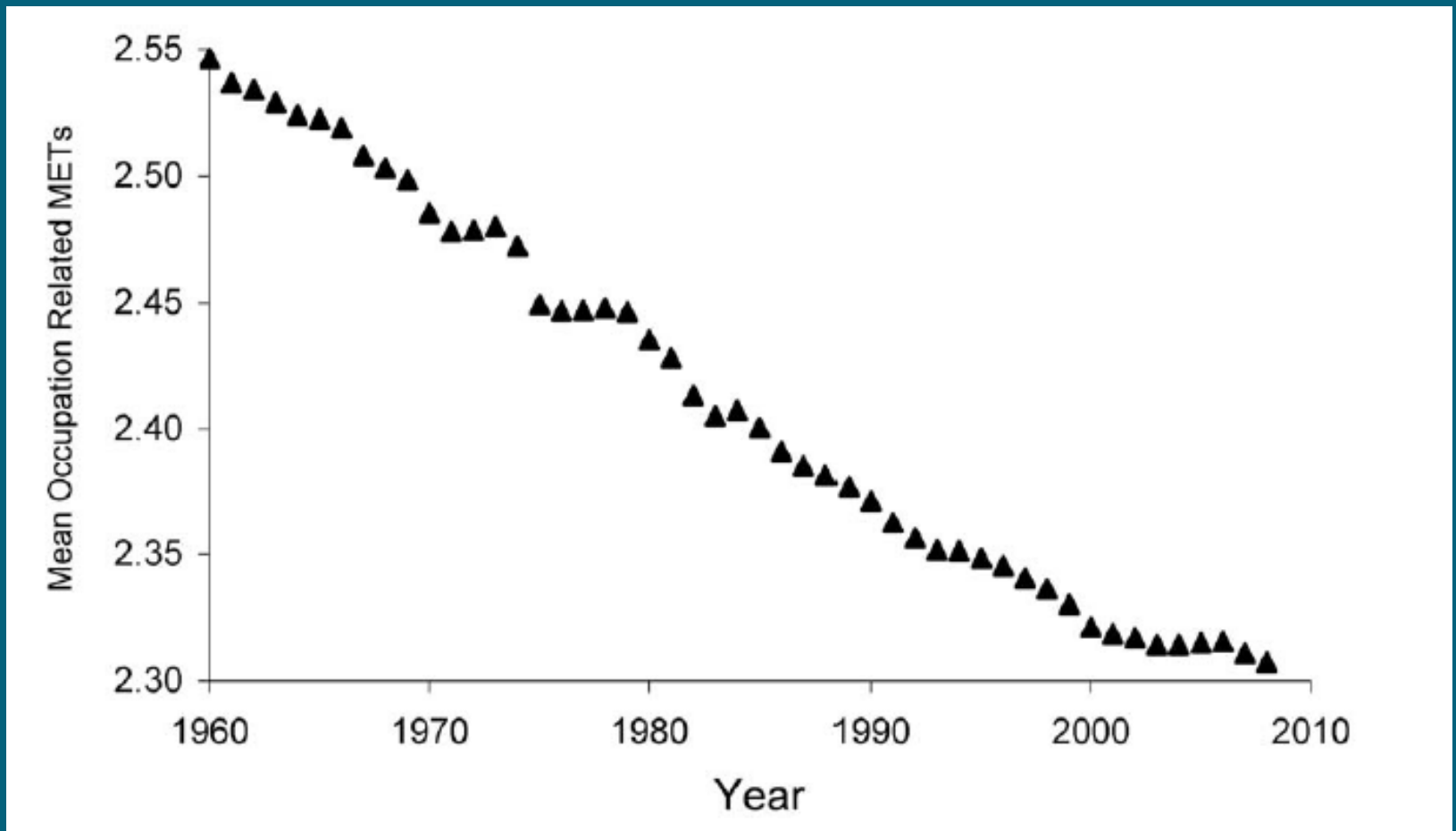
Percentage Meeting Physical Activity Recommendations in U.S. (Adults)



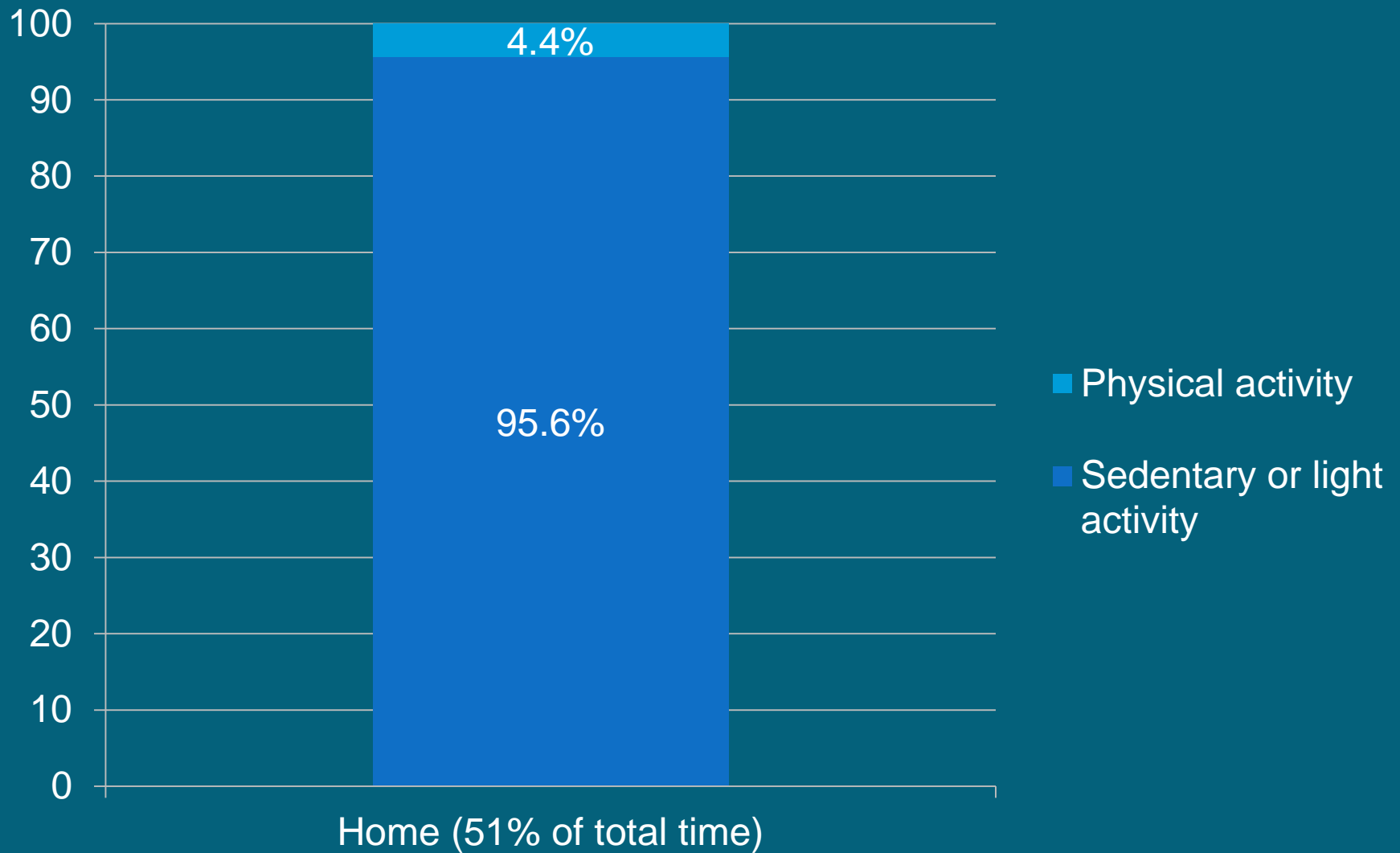
At Your Job?



Not likely at your job



At Home?



Get Physical Activity Through Programs?



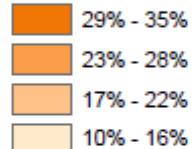
- PA programs among healthy adults - +14.7 minutes per week (**only 2.1 mins/day!**)
- Only get those already interested in physical activity (the 'gym' effect)
- Poor maintenance of effects after the program ends
- Programs require on-going funding and often end
- For those with resources (time, money)

Risk is Not Equitable

Indicator: Percent of Adults Who Are Obese, Health Reporting Areas, King County, 2007-2011

Legend

Adult obesity rate

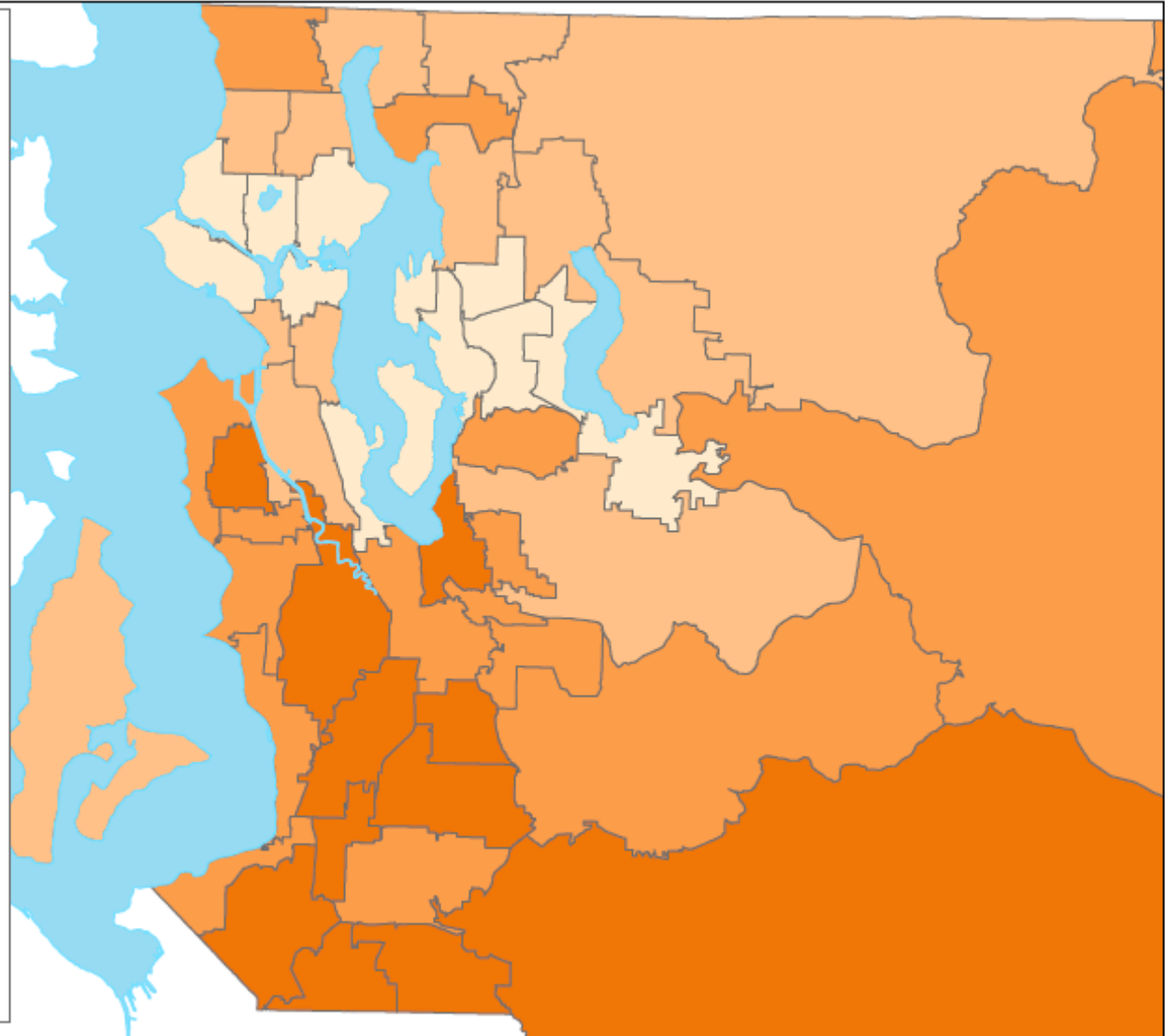


Public Health 
Seattle & King County

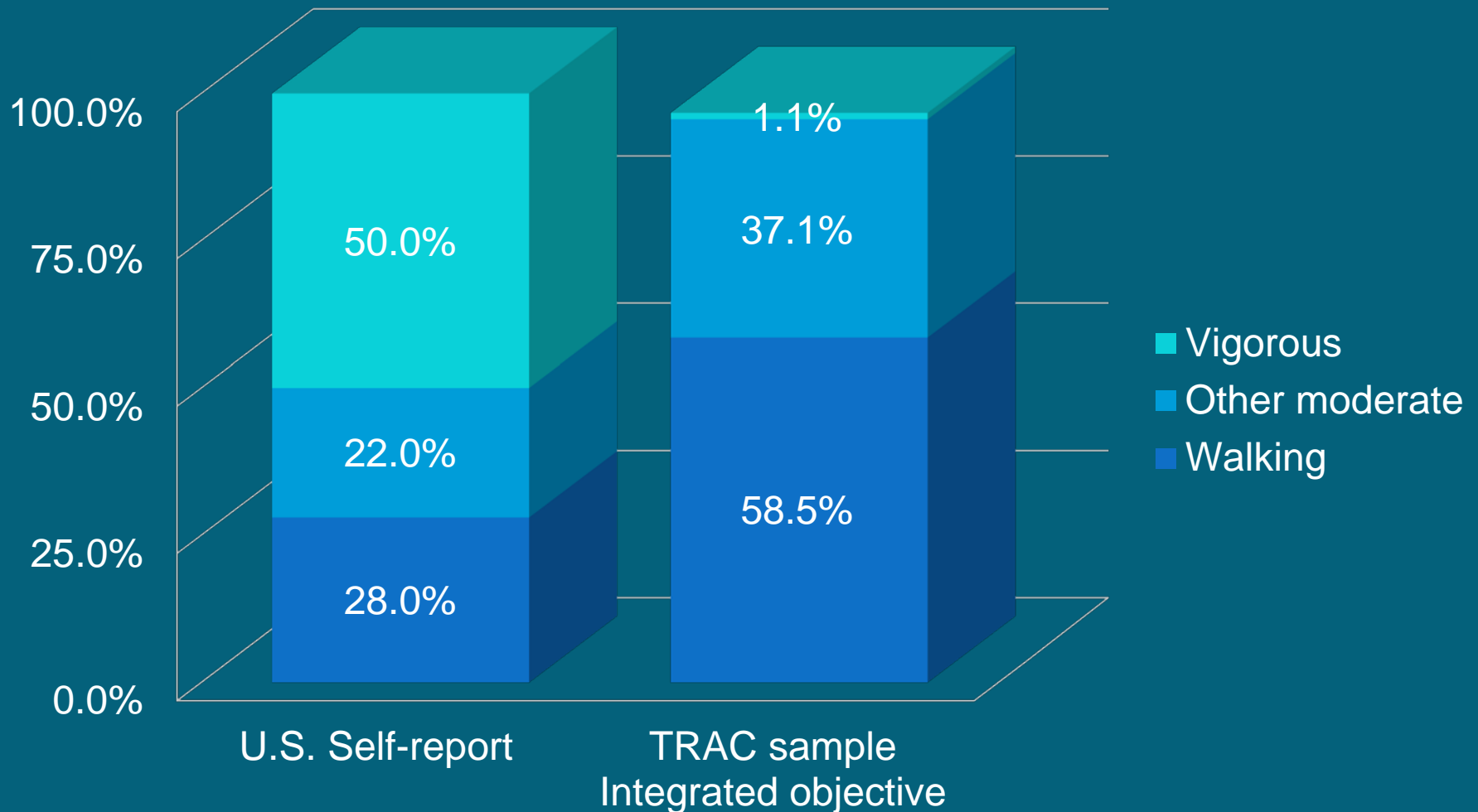
0 1.5 3 6 9 12 Miles

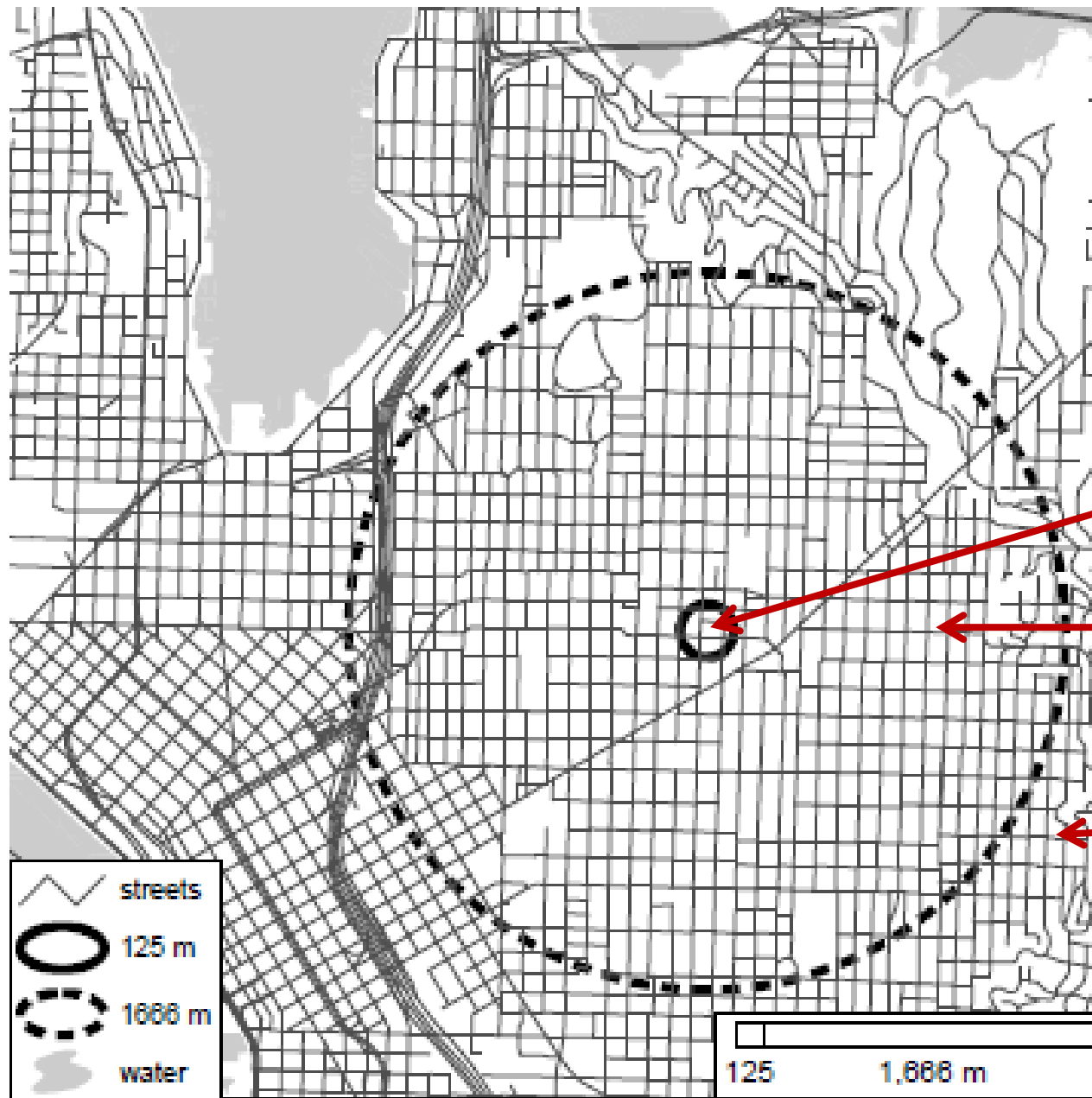
Rate = Percent of adults with Body Mass Index ≥ 30

Source: Washington State Department of Health, Center for Health Statistics, Behavioral Risk Factor Surveillance System supported in part by Centers for Disease Control and Prevention Cooperative Agreement
Produced by: Public Health-Seattle & King County Assessment, Policy Development & Evaluation
3/13/2013



Comparison of Self-Report and Integrated Objective



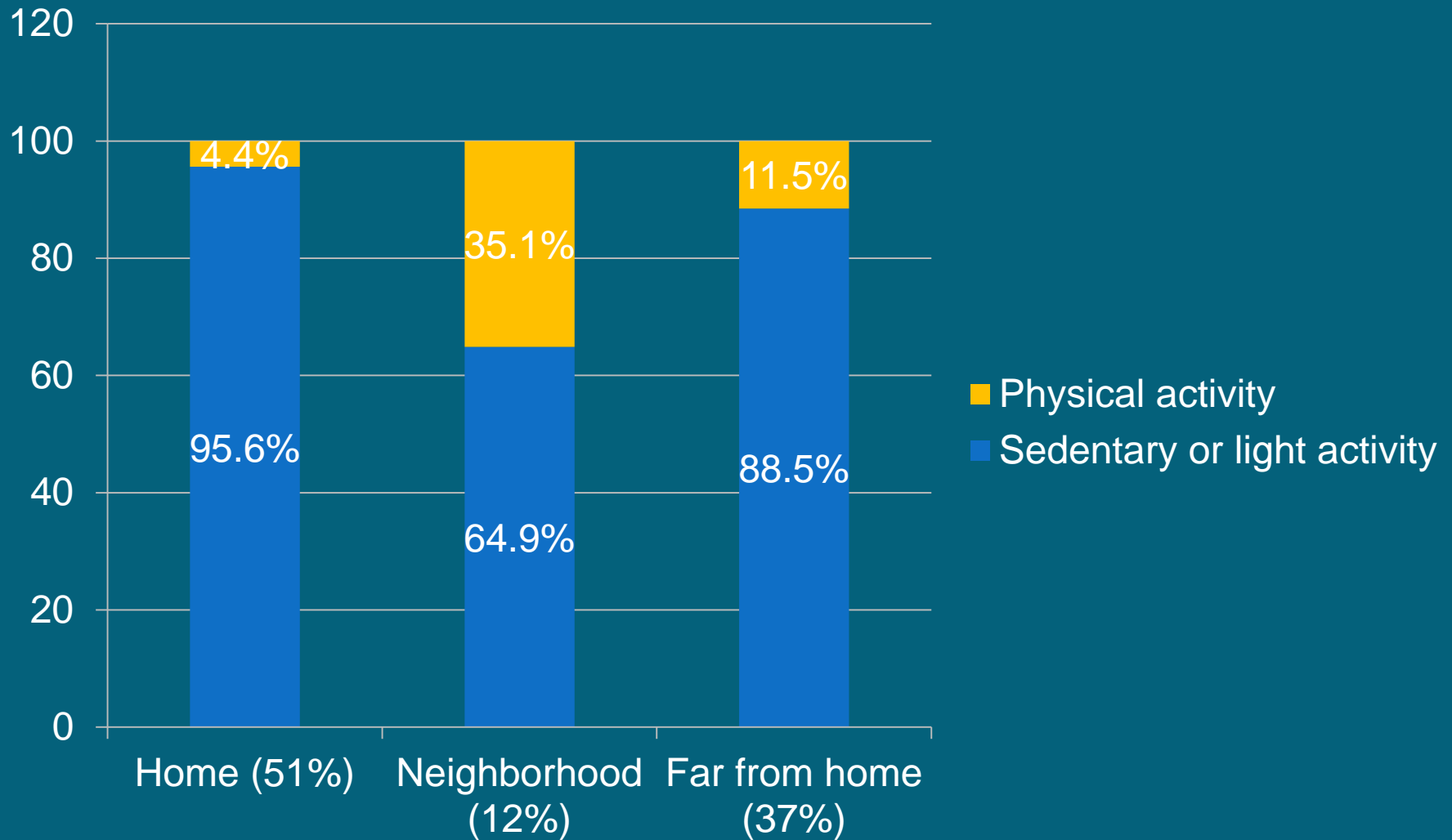


Home

Neighborhood

Far from home

Activity By Location: All TRAC Adults



People walk

to get to places they want to go
when places are nearby.

% of Trips to Shops by Walking

- Within 1 mile - 40%
- Within 3-4 miles - 1%

% of Trips to Work by Walking

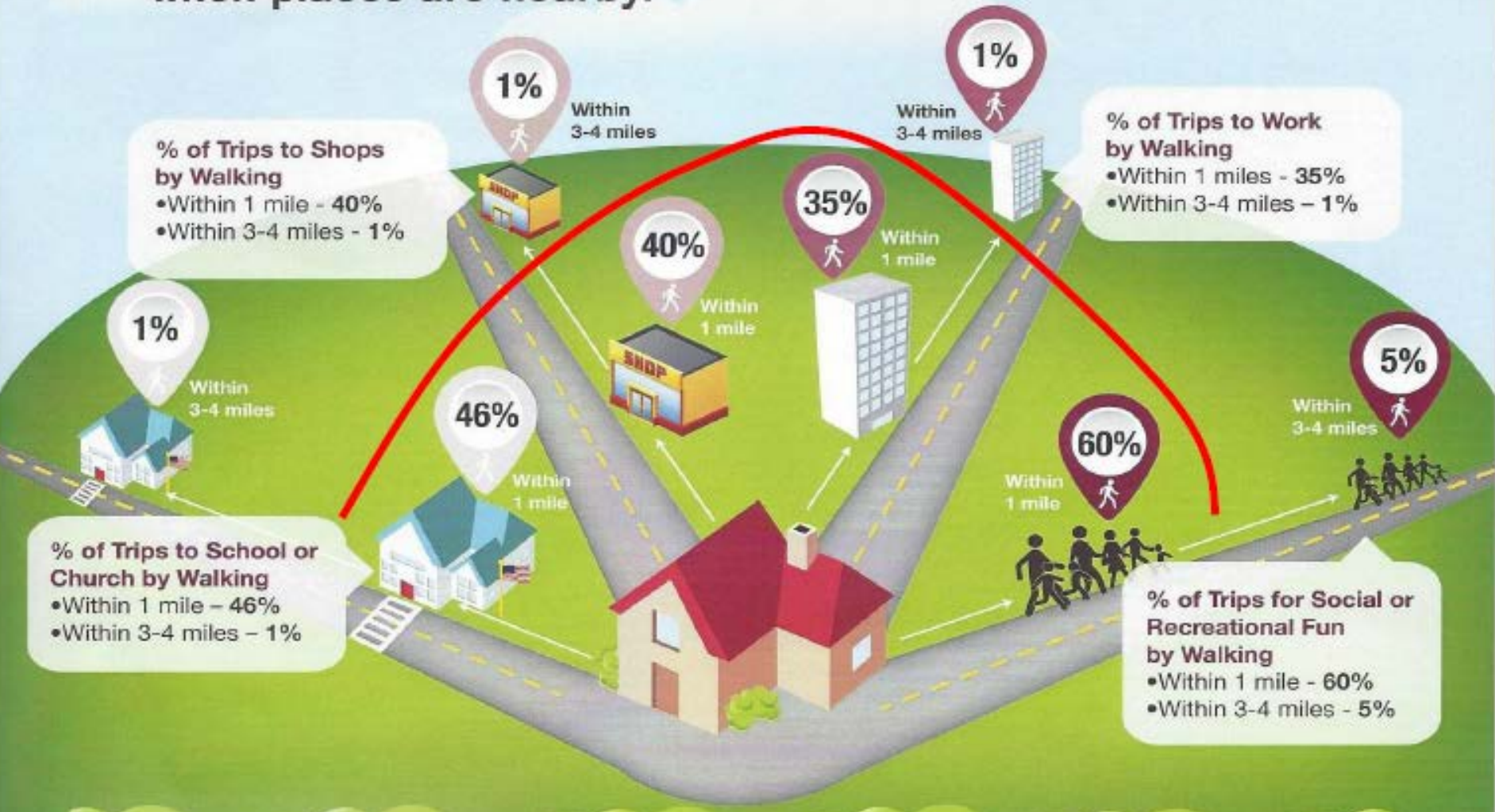
- Within 1 miles - 35%
- Within 3-4 miles - 1%

% of Trips to School or Church by Walking

- Within 1 mile - 46%
- Within 3-4 miles - 1%

% of Trips for Social or Recreational Fun by Walking

- Within 1 mile - 60%
- Within 3-4 miles - 5%



SOURCE: USDOT, Federal Highway Administration, 2009 National Household Travel Survey.

Why focus on PA in relation to public transportation?

- Many/most trips are $>1/2$ mile
- Involves walking – most popular, among easiest
- Part of everyday life (stealth PA?)
- Better address equity?
- Not perceived as physical activity - doesn't substitute?

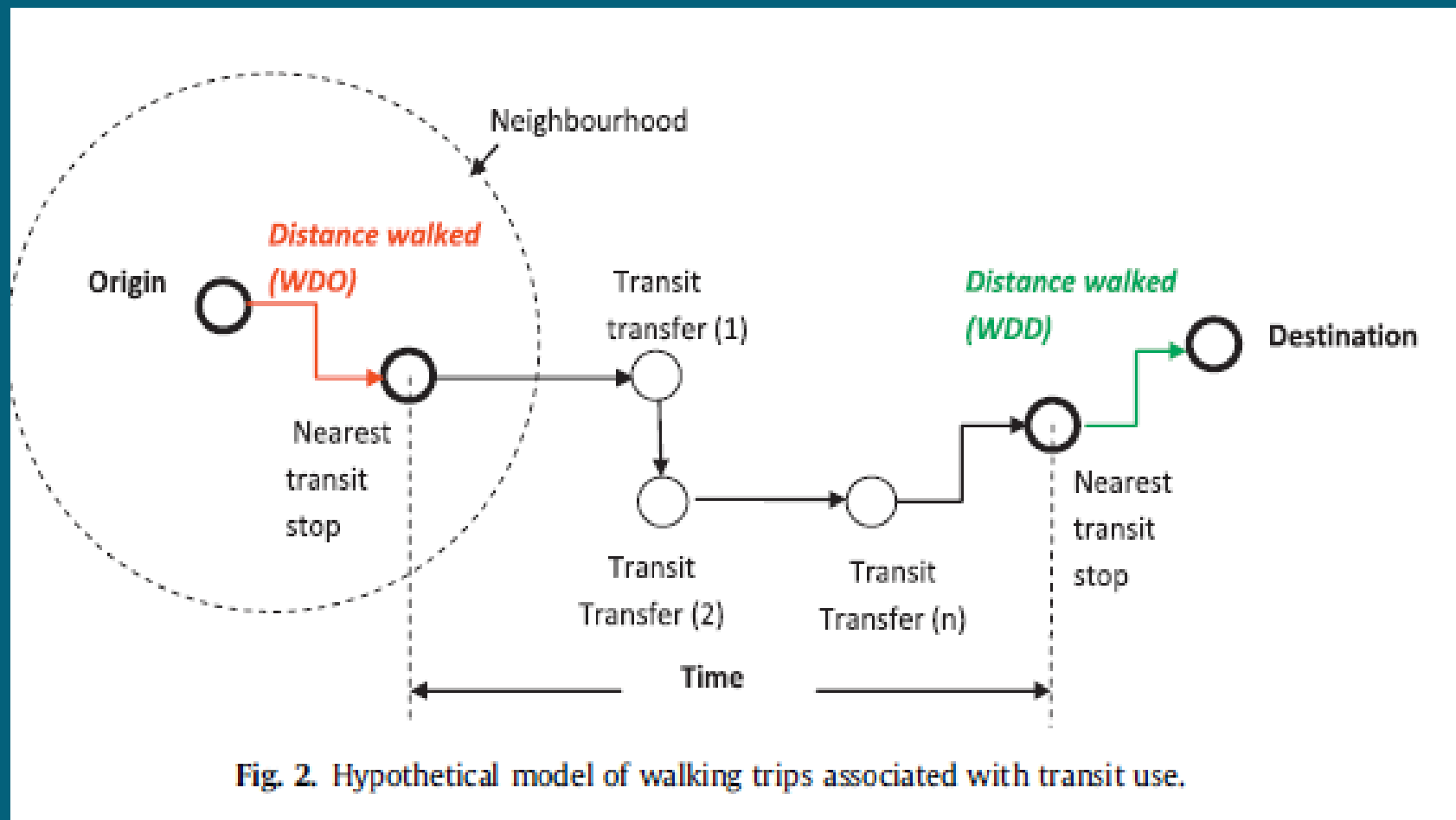


Fig. 2. Hypothetical model of walking trips associated with transit use.

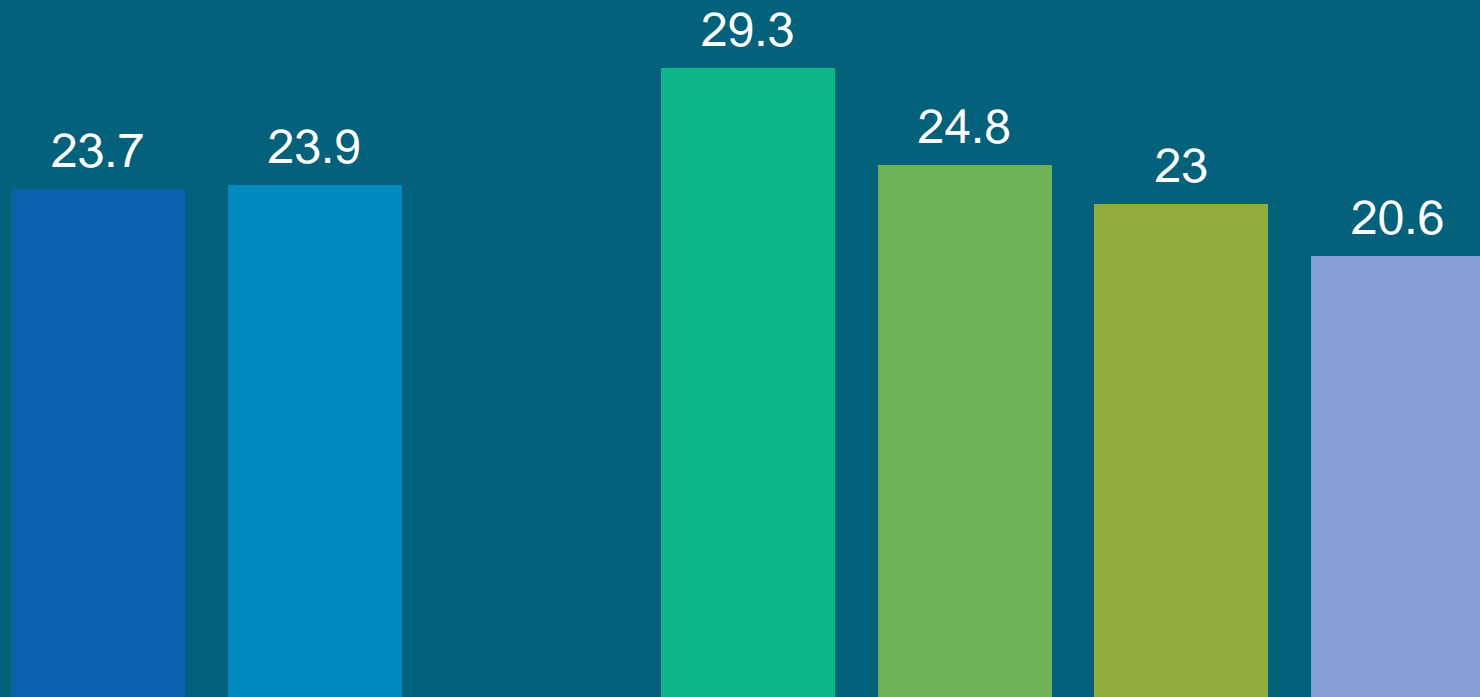
Different Designs

- Research design options (cross-sectional)
 - Examine transit-specific physical activity
 - Compare users versus non-users in overall physical activity
 - Person-day level examining both transit-specific and overall
- Threats to conclusions
 - Self-selection bias
 - Third variable confounding
 - Substitution
 - Same people (within transit users)
 - Measuring both global and transit-specific physical activity

Walking Associated with Transit

Walking (mins) to/from Transit

■ Bus ■ Rail ■ <HS degree ■ HS degree ■ Undergrad ■ Grad



Walking Trips to/from Transit

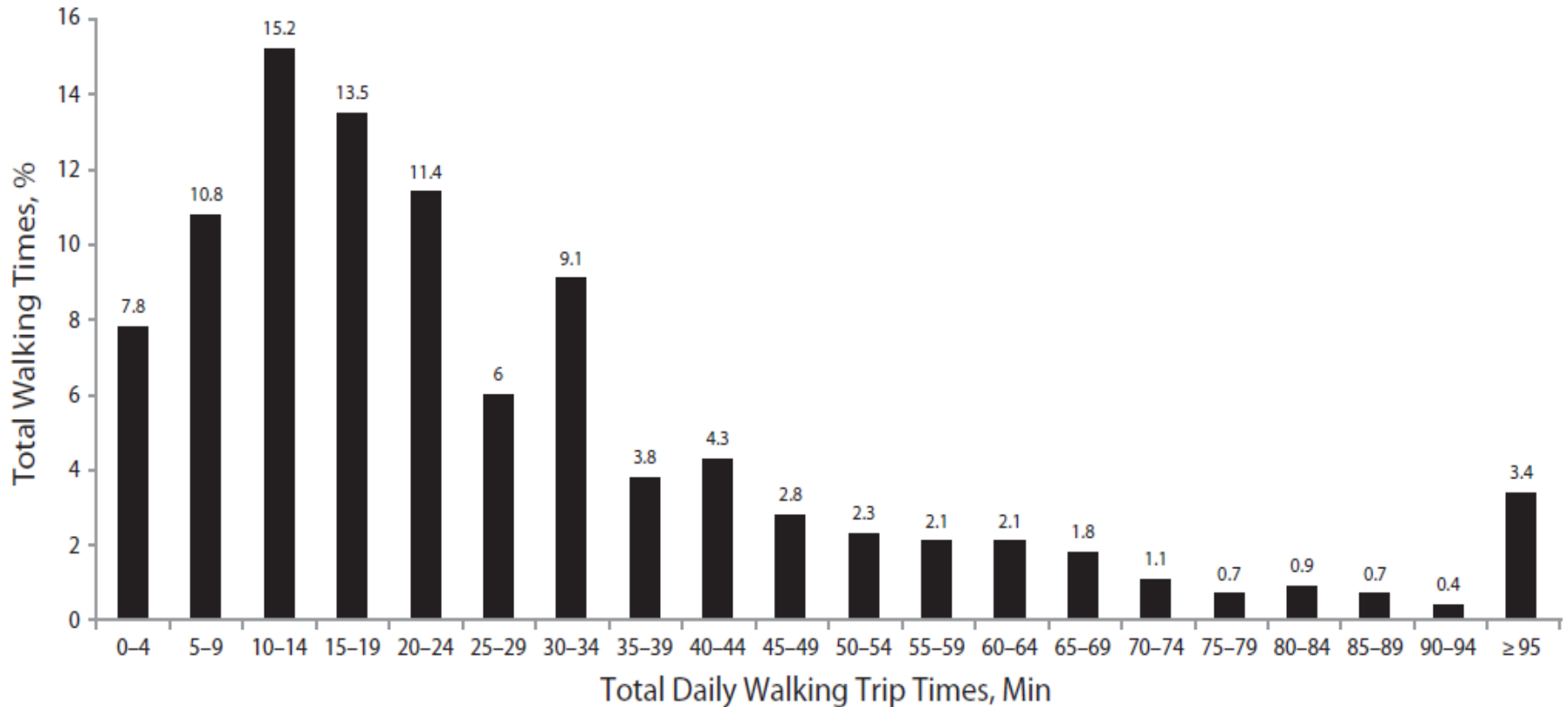


FIGURE 1—Total daily walking trip times to and from transit: United States, 2009 National Household Travel Survey.

Median = 21 minutes walking

Walking by Public Transportation Type

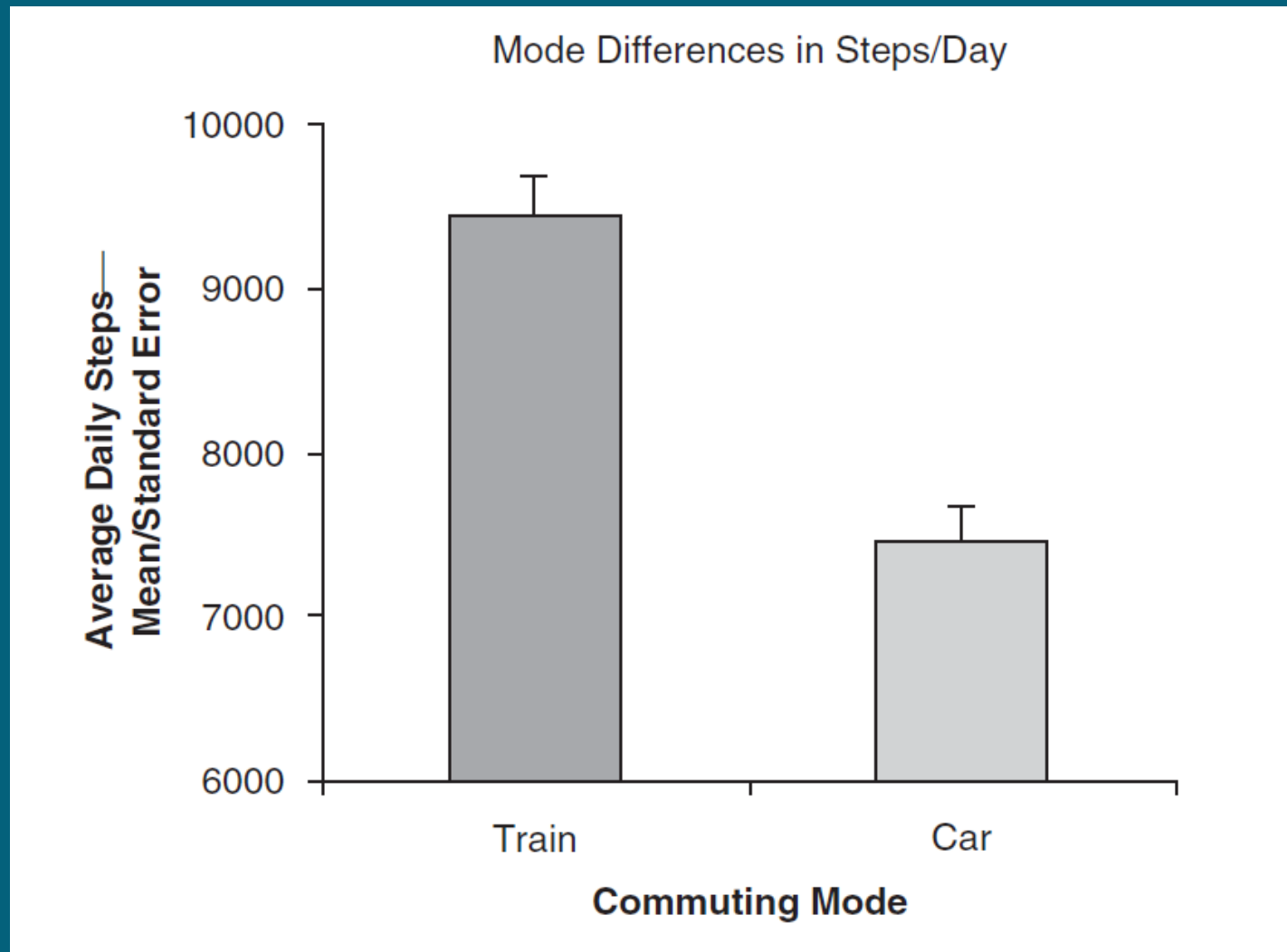
- City bus 11.7 - 25.6 minutes
- Suburban bus 15.7 – 29.6 minutes
- Peripheral bus 25.4 – 39.2 minutes
- Subway 19.6 – 33.5 minutes
- Commuter train 34.6 – 48.5 minutes

*Simulated based on distance; range based on # of transfers

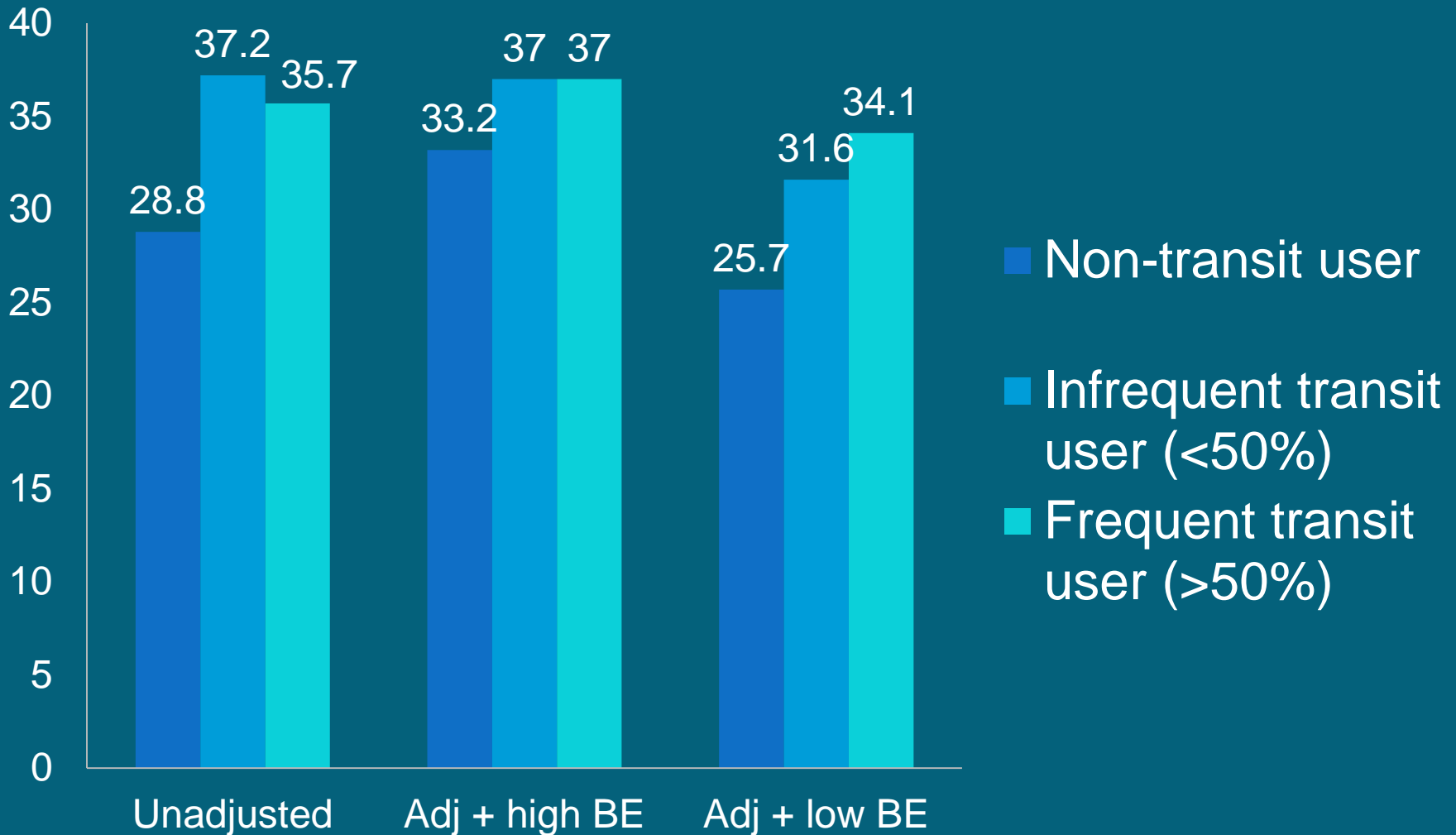
Walk Distances to LRT

Reference	Sampling frame and process	Mean distance	Longest distance walked
Beimborn	Portland regional travel diaries	~.24 miles	1.14 miles
Dill	Portland residents near LRT stations	~.33 miles	~.93 miles
Kim	St. Louis LRT users	.47 miles	95% walked <1.0 miles
Olszewski & Wibowo	Interviews at Singapore LRT stations	.40 miles	Upper quartile >.5 miles
O'Sullivan & Morrall	Interviews at Calgary LRT stations	.40 miles	N/A
Stringham	Toronto residents near LRT stations	.57 miles	Upper quartile >~.67 miles
Weinstein	Interviews at SF & Portland LRT stations	.58 miles	Upper quartile >.69 miles

Differences in PA by Commute Mode

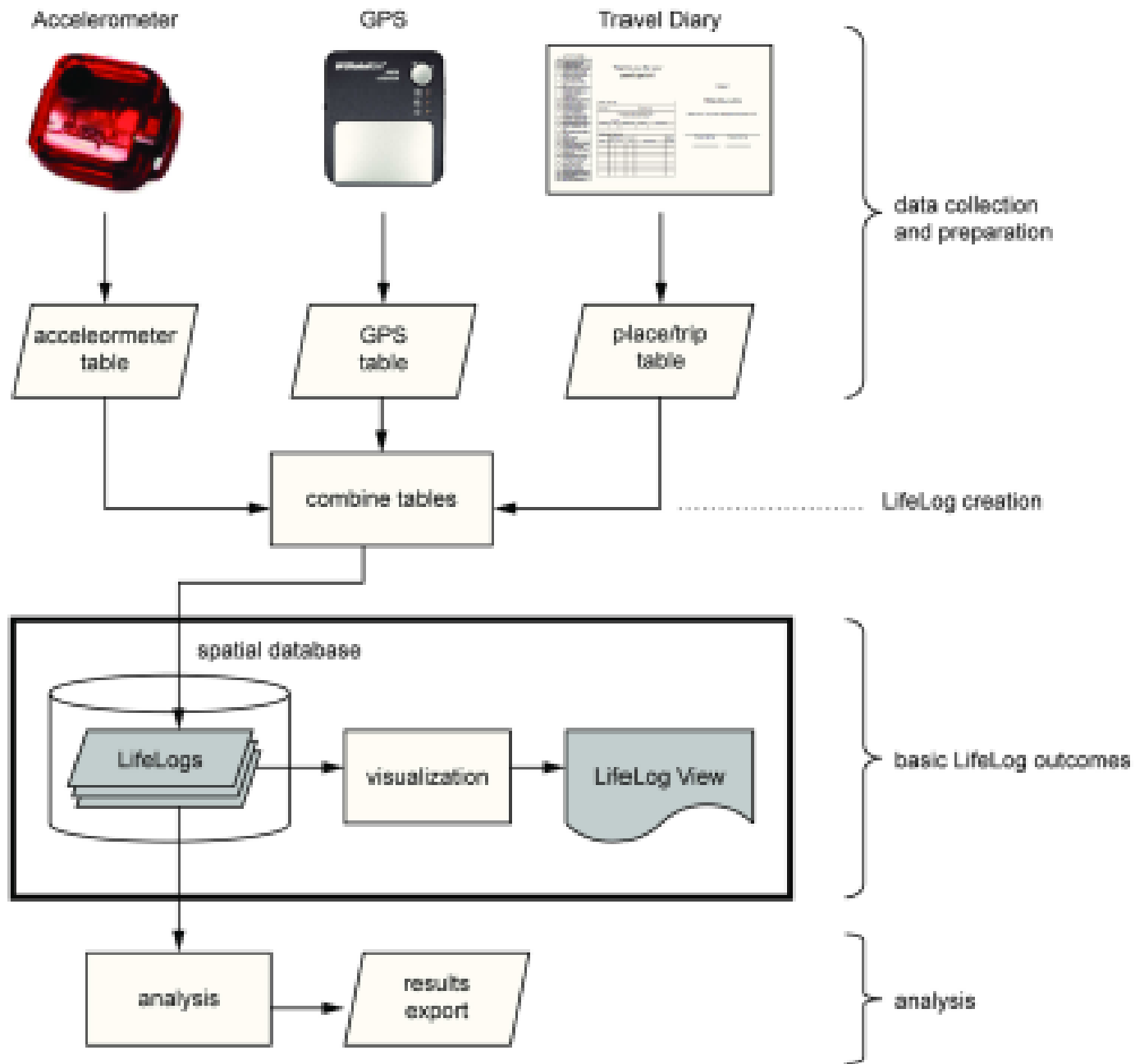


Differences in PA by Transit Usage

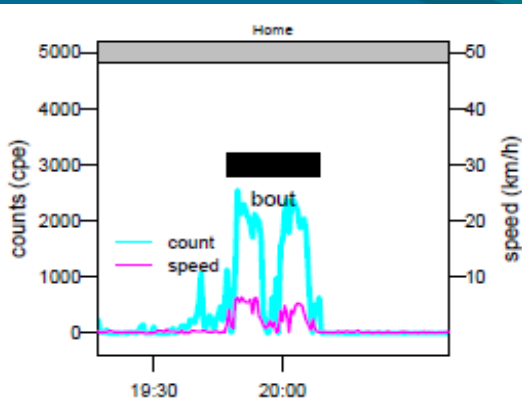
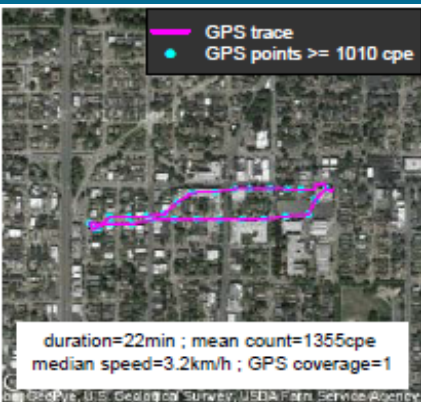


Rissel Evidence Review

- 27 studies
- Between 8-33 minutes of physical activity associated with public transport (several studies 12-15 minutes)
- 10-29% of population met 30+ minutes of daily physical activity (recommended) just by public transport-related walking



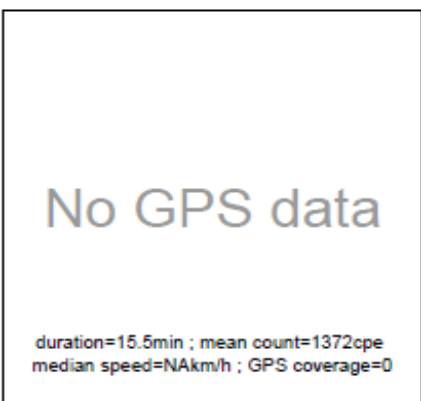
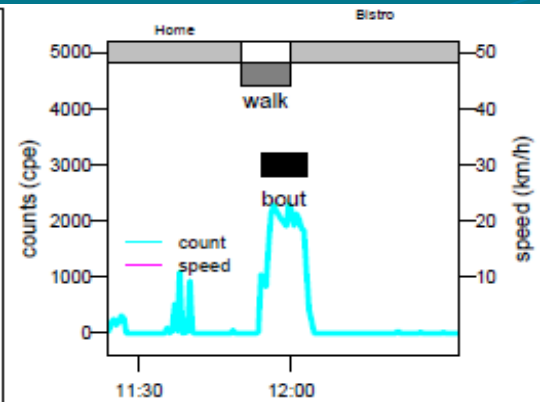




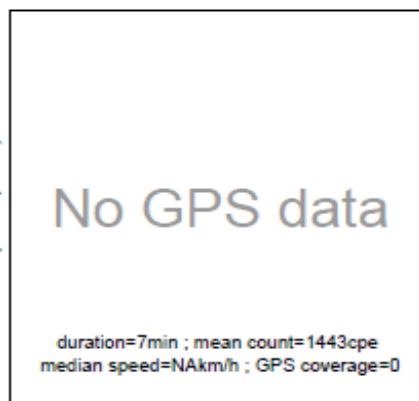
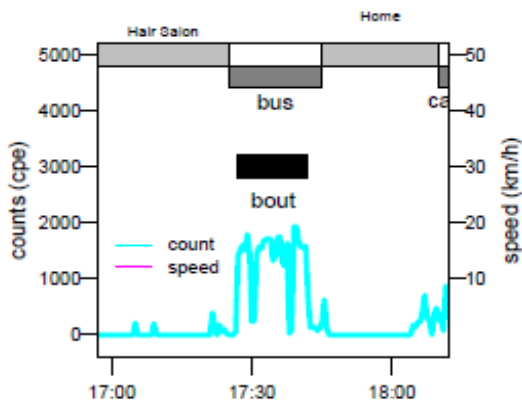
A: Walk1-GPS



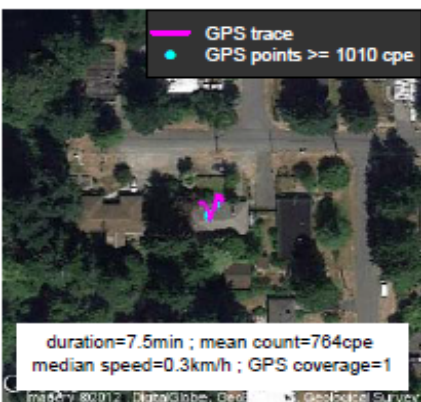
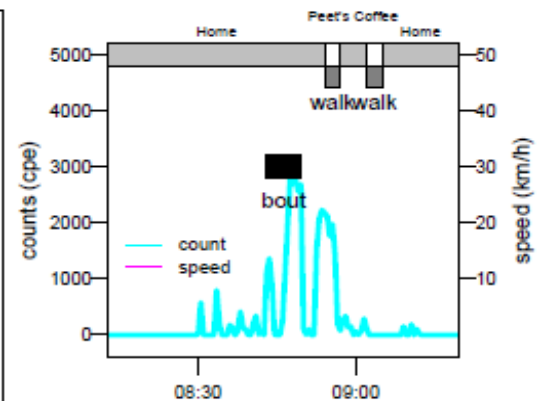
B: Walk2-Diary



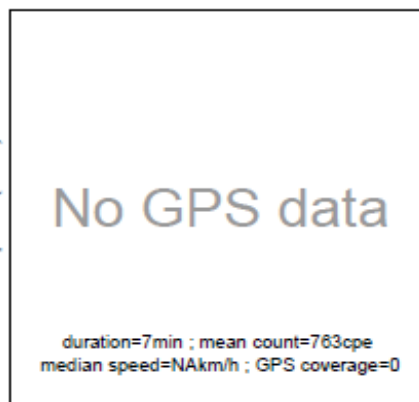
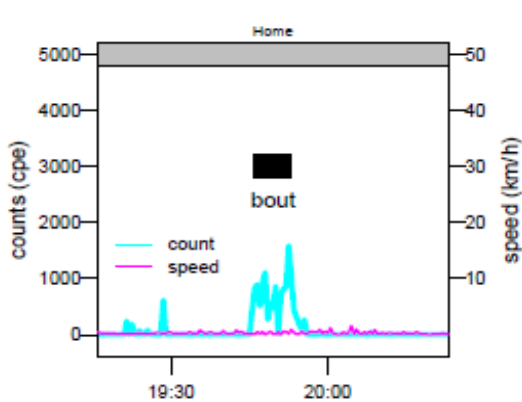
C: Walk3-Diary



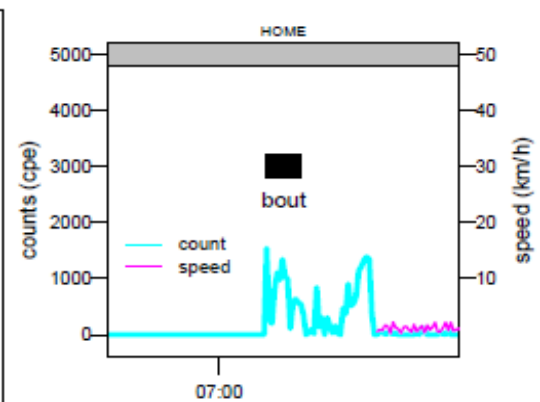
D: Walk4-Diary

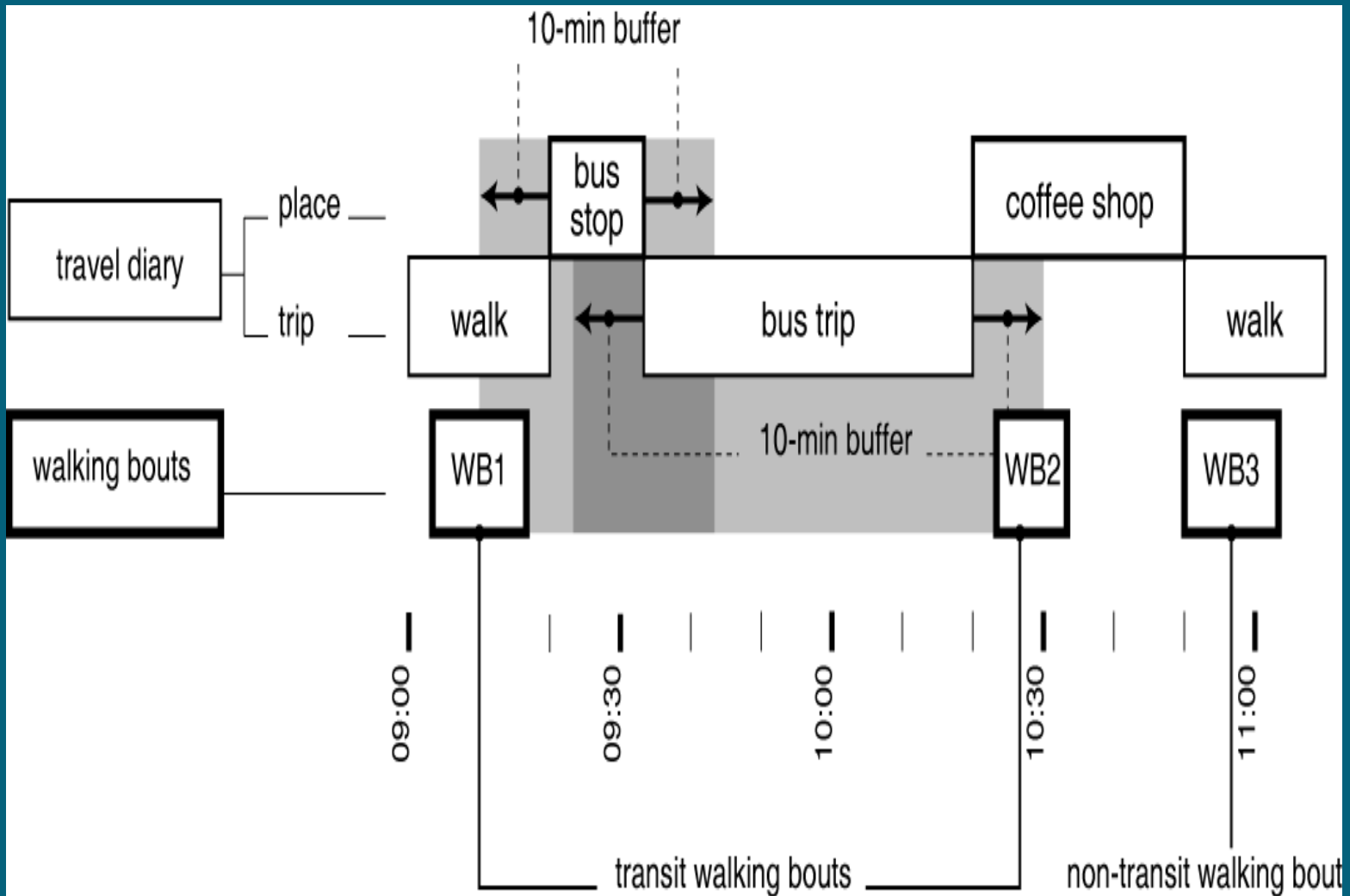


E: NonWalk2-GPS

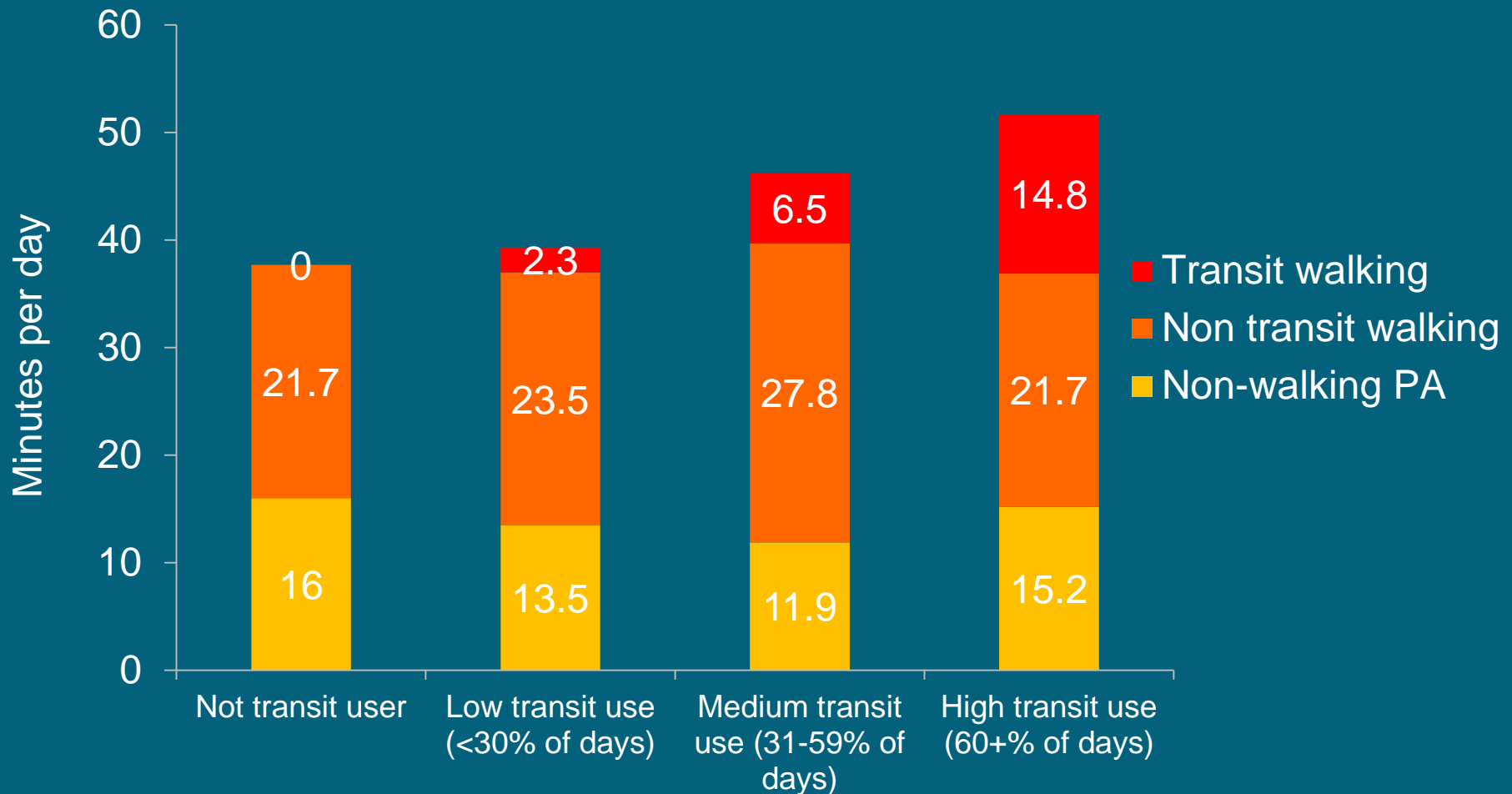


F: NonWalk3-Diary

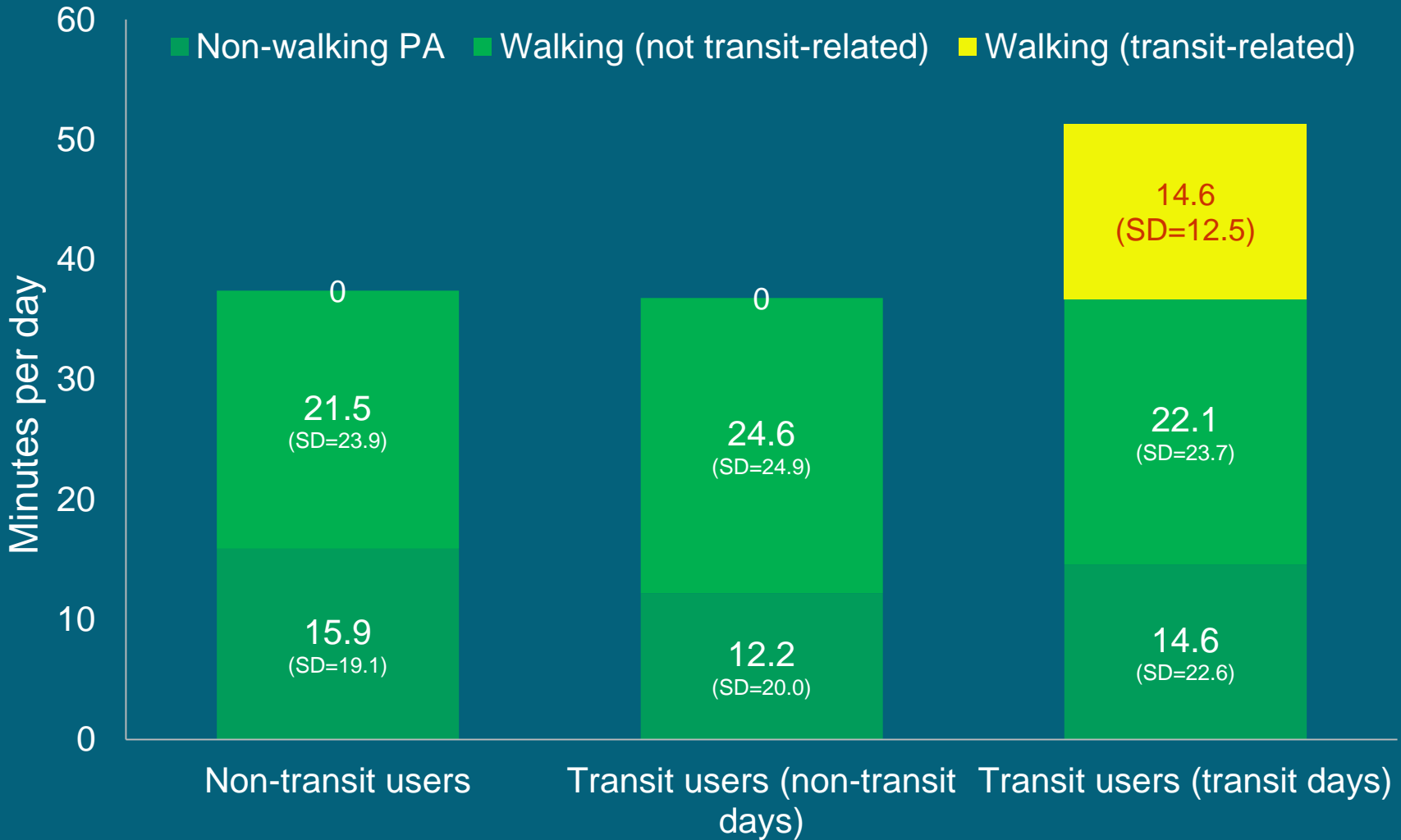




Transit Frequency and Walking/PA



Transit-Related Physical Activity is Additive!



Current Work

- Natural experiment or 'intervention' effects
 - Level of impact, for whom, for how long?
- Interaction of infrastructure/service changes with programmatic interventions
- Documentation of costs- How much? To whom?

Travel Assessment and Community (TRAC) Project

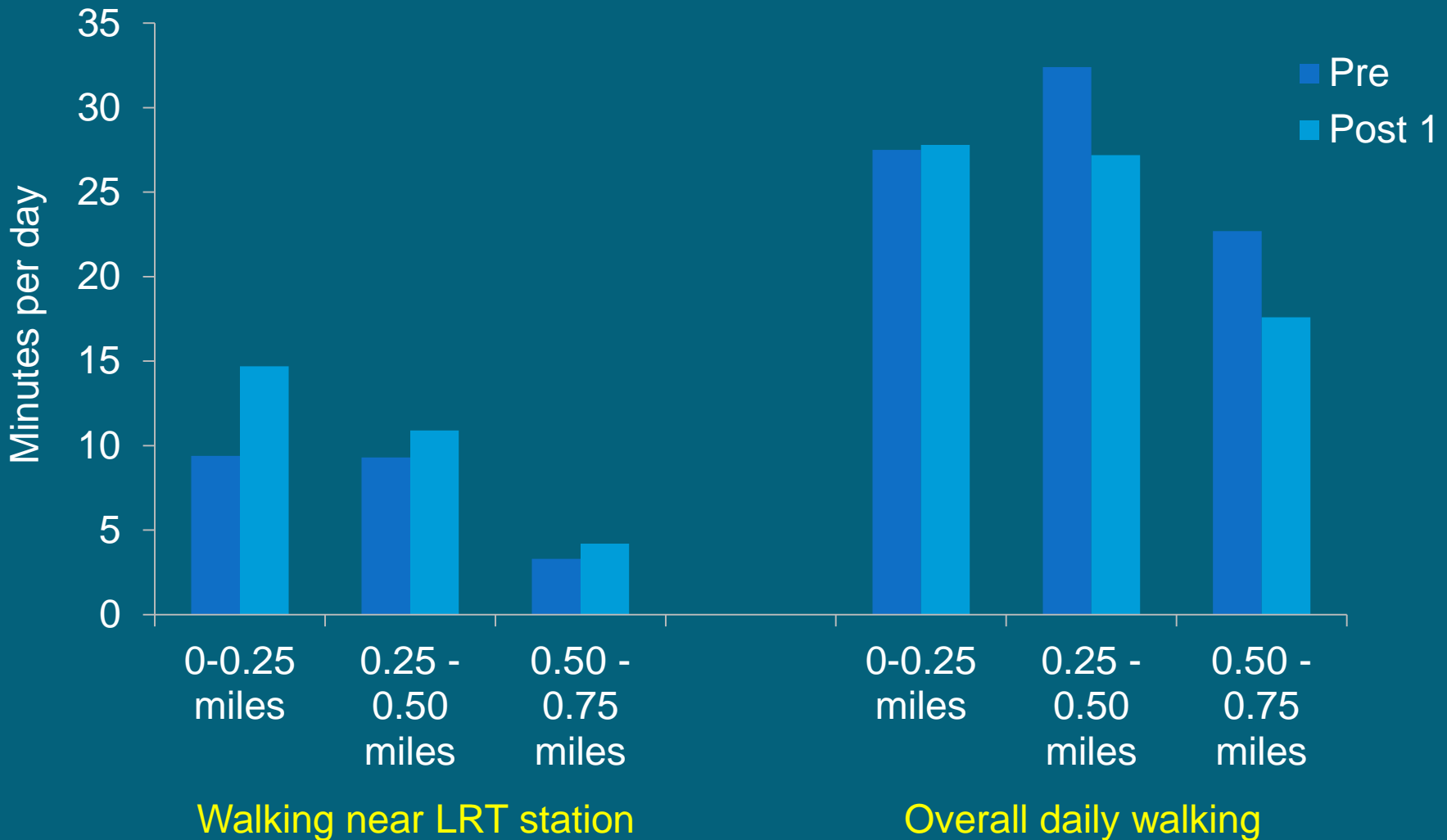
- A natural experiment in which an environment changed
 - Addresses some concern about residential self-selection confounding
 - Relative to a demographically and built environment matched sample
 - Examine behavior change in response to environmental change (temporality)
- Use the best possible set of methods to evaluate physical activity and context

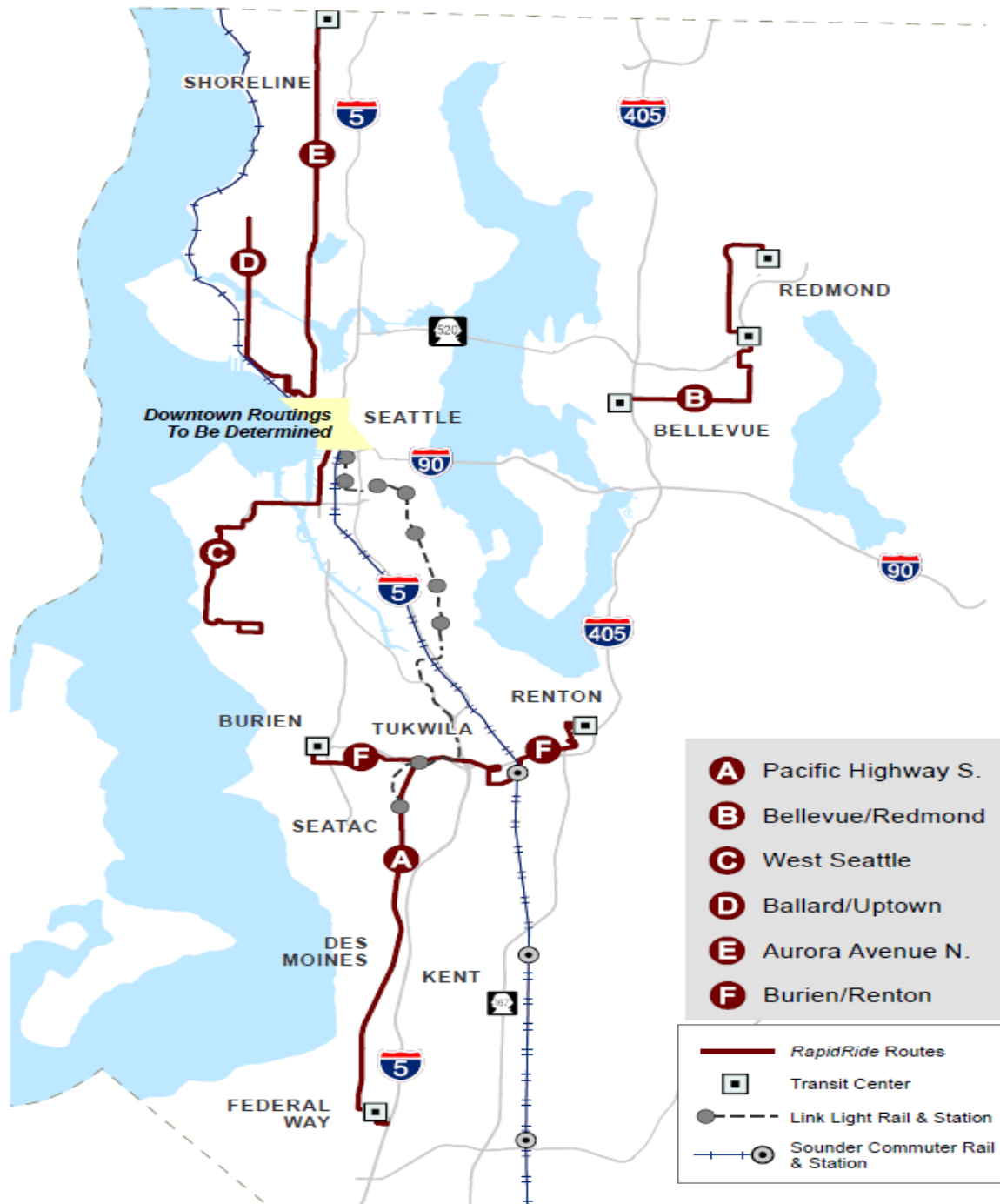


TRAC Design & Methods

- Pre-post group-matched cohort design
 - 'Cases' – adults living < 1 mile from LRT station
 - 'Controls' – adults in county living >1 mile from LRT station
- Attitudinal/psychosocial survey
- Congruent (for 7 days)
 - Accelerometer
 - Portable GPS
 - Travel log (place-based)
- Approximately 700 baseline participants
 - >500 participants 3-4 years later

TRAC: Preliminary Findings

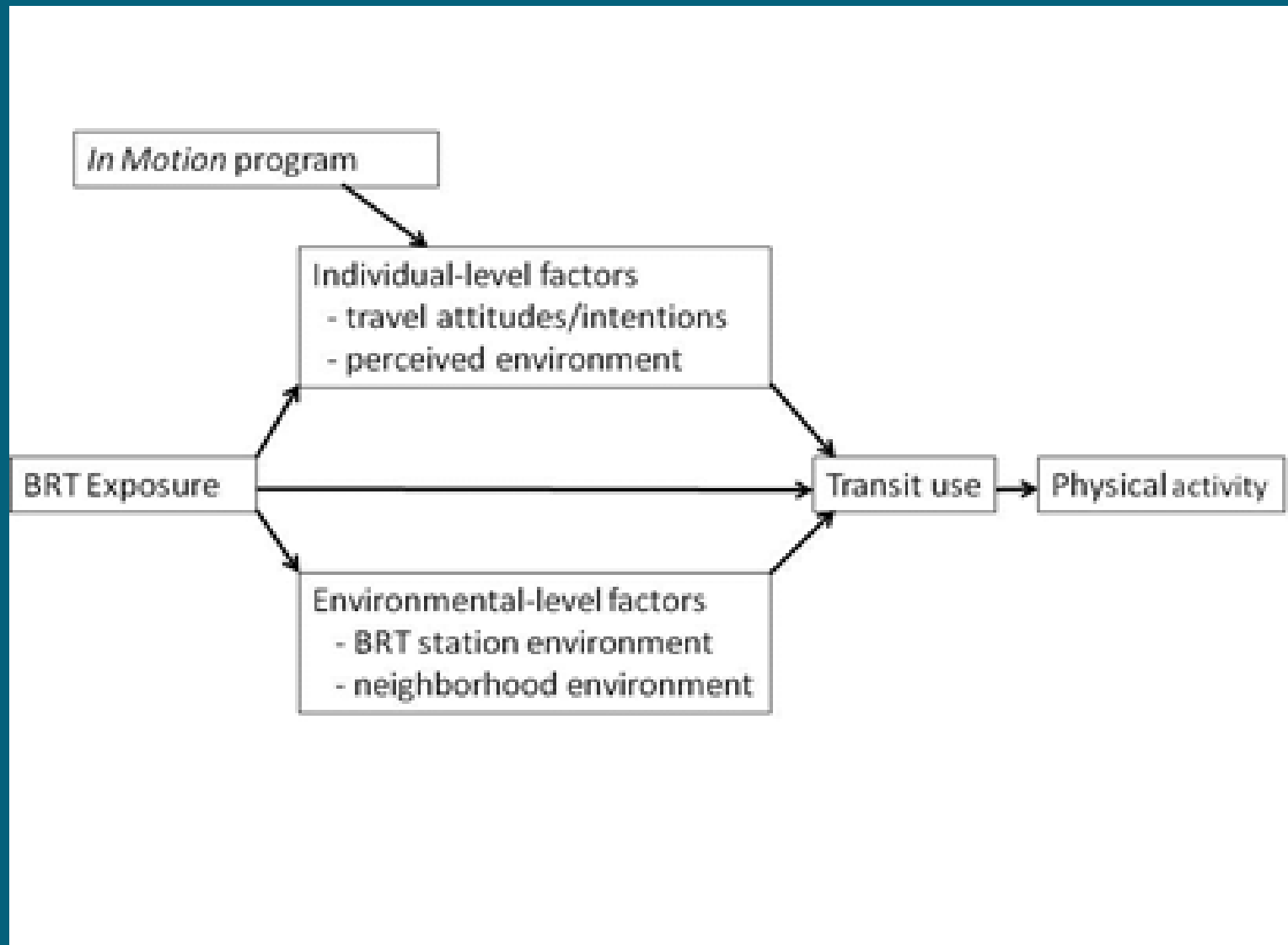




BRT ridership growth

BRT line (year open)	Baseline (before BRT) regular bus ridership per day	BRT ridership per day	% Growth
A (2010)	5570	8236	48%
B (2011)	5070	5763	14%
C (2012)	4650	6684	44%
D (2012)	7630	8527	12%
Totals (to date)	22920	29209	27%
E (2014)	15304	?	?
F (2014)	8274	?	?

ACTION Project Model





Get In Motion, North Seattle & Shoreline!

King County Metro is here to help you explore North Seattle, Shoreline, and beyond by walking, bicycling, riding the bus, and sharing rides.

Sign up below and choose your transportation information, including an ORCA card good for two weeks of unlimited travel*, and we'll send it all right to your door at no cost to you.

Pledge to shift two or more round trips per week from driving alone to another option. Log those trips online or by postcard, and you'll be entered into weekly reward drawings!

WHO IS ELIGIBLE?

You must live in North Seattle or Shoreline, be 16 or older, and have at least one car in the household.

Don't have a car?

Become a Car-Free Champion!

Earn rewards by sharing your story. Instead of filling out this form, just contact us to learn more.

Questions? Call us at 206-477-2005 or email inmotion@kingcounty.gov

SIGN UP NOW & EARN REWARDS.

Stay connected!  King County In Motion or  @kcmetrobus

Sign up at kingcounty.gov/inmotion or mail us your completed form.

1. Pledge to Drive Less Comprométase a Manejar Menos

I pledge to reduce my drive-alone trips by two or more trips each week.

I will log my trips:

online -OR- by postcard

If you're not ready to pledge, skip to Step 2.

Yo me comprometo a reducir mis viajes de manejar a solas por lo menos dos veces o más por semana.

Yo registrare mis viajes:

En Línea (en inglés) -O-

Con un postal

Si no está preparado para comprometerse, pásese al Paso 2.

2. Tell Us Where to Send Your Information Díganos Donde Mandar Su Información

NAME (PLEASE PRINT CLEARLY) / NOMBRE (POR FAVOR ESCRIBA CLARAMENTE)

HOME ADDRESS / DIRECCIÓN DE HOGAR

APT # / # DE APARTAMENTO

CITY / CIUDAD

ZIP / CÓDIGO POSTAL

PHONE / TELÉFONO

EMAIL / CORREO ELECTRÓNICO

Offer available until October 10, 2014 / Oferta disponible hasta el 10 de Octubre, 2014.

**Valid for two weeks from when you receive it: valid on regional buses, trains, streetcar, and ferries as a passenger*

3. Select Your Resources Seleccione Sus Recursos

ORCA Card*

In Motion Tote Bag

Recursos para Explorar sus Opciones

Metro Bus Schedules

Community Transit Bus Schedules

Bus and ORCA Information

Walking Maps and Info

Biking Maps and Info

Rideshare Information

Carshare Information

The Cost of Driving

ACCESS - for people unable to take the bus

4. Tell Us How You Get Around

• How many drivers are in your household? _____

• How many cars are in your household? _____

• In general, how much of your travel around town is by:

_____ % Driving Alone

_____ % Bicycle

_____ % Walking

_____ % Carpool/Shared Rides

_____ % Bus or Light Rail

100% = Total

• Think about the trips you made yesterday (even if it was not a typical day for you). How many separate round trips did you take by:

_____ Driving alone

_____ Bicycle

_____ Walking

_____ Carpool/Shared Rides

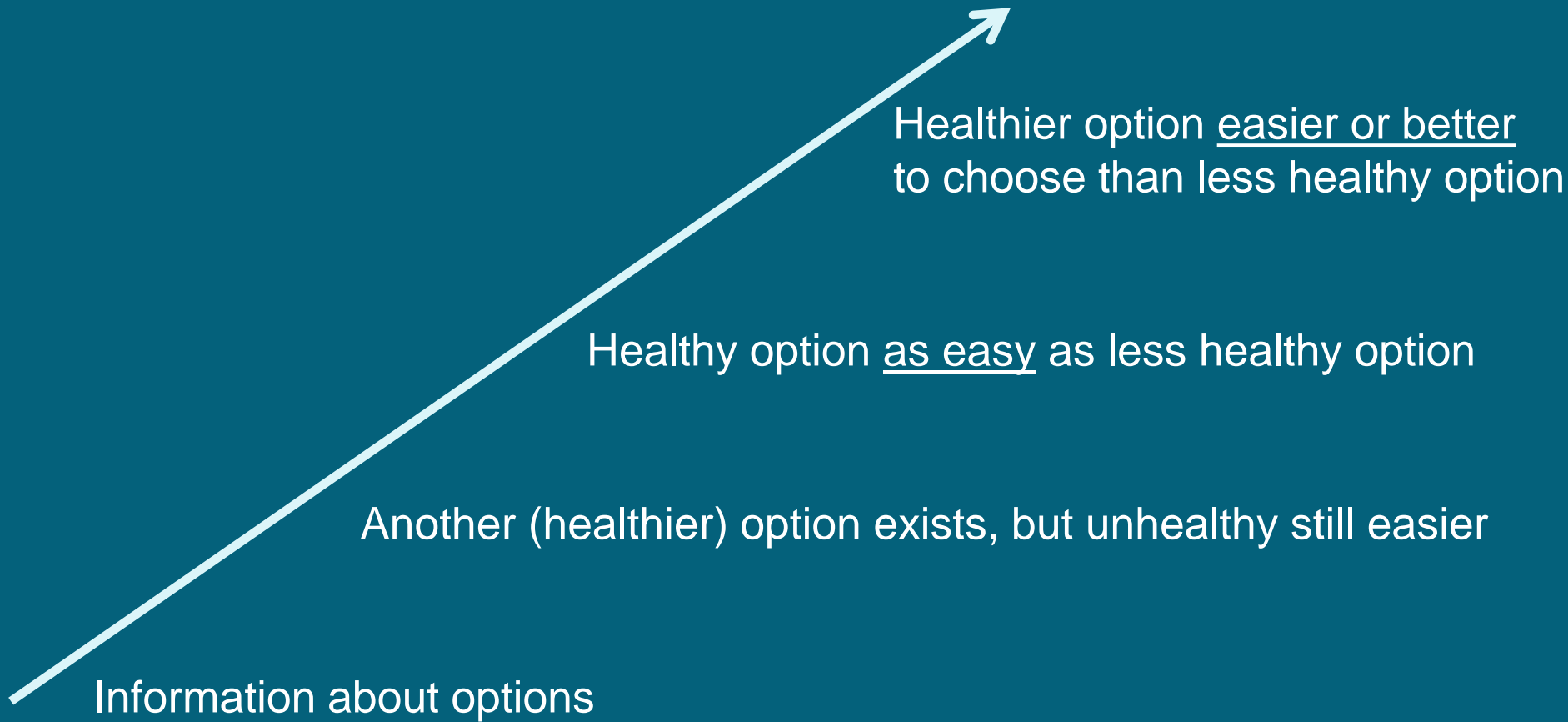
_____ Bus or Light Rail

No trips taken

Conclusions and Future Work

- Strong associations between public transportation use and physical activity
- Soon will have evidence about shifts in public transportation infrastructure/access and physical activity impacts
- Making the healthy choice the easy choice (convergence)
 - Interactions between public transportation change and programmatic interventions
 - Example - impact of work-based commute to work policies

Model & Vision: Likelihood of Making the Healthy Choice



Making the healthy option an easy choice



Making it an easy or easier choice?



Making it a much easier choice?

Seattle Children's
HOSPITAL • RESEARCH • FOUNDATION

Commute Tools
powered by lum.

Discover
Team Challenges

Me
My Dashboard

Brian ▾

Home
Commute Options
Resources
Shuttles
Commute Calendar

Today < >

October 2014

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
28			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	1
2			5	6	7	8

SINGLE MODE Distance (one-way):

PARKING

Tuesday, November 4, 2014

14.8miles
\$4.00

Pay Period Summary: Nov 1 - Nov 30

CHARGE	BONUS
\$0.00	\$8.00

My Active Challenges

2014 Ride in the Rain Chall...
see leaderboard

My Levels: Bike ▾

URBAN CYCLIST

LEVEL 3
147 TRIPS
93 TO NEXT LEVEL

Pay Period Details (November 1 - November 30)

Now: What is the choice?

Drive to work

- Time/convenience (50 mins)
- Cost to park (-\$12.00)
- Cost to drive (-\$6.00)
- Perceived safety
- Comfort

Not drive to work

- Convenience (bike - 90 mins; transit – 70 mins)
- Savings from not parking or driving
- Paid for not driving (+\$4.00)
- Similar comfort?
- Perceived safety (coming)





WHEN YOU
WALK IT,
YOU ROCK IT



King County
METRO
We'll Get You There

Sign up and pledge to drive less!
www.kingcounty.gov/inmotion
(206) 477-2005

 King County In Motion
 @kcmetrobus

Acknowledgments

- My excellent research staff
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- University of California San Diego (Sallis, Kerr)
- University of British Columbia (Frank)
- University of Pennsylvania (Glanz)
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