

# Transit and Physical Activity Studies: Design and Measures Considerations From the TRAC Study

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# Objectives

- Rationale for interest in transit and PA
  - Prior physical activity links to public transportation
- Cross-sectional evidence
  - Related threats to conclusions about physical activity
- TRAC study design (NIH R01 HL091881)
  - Case/control selection
  - Measures

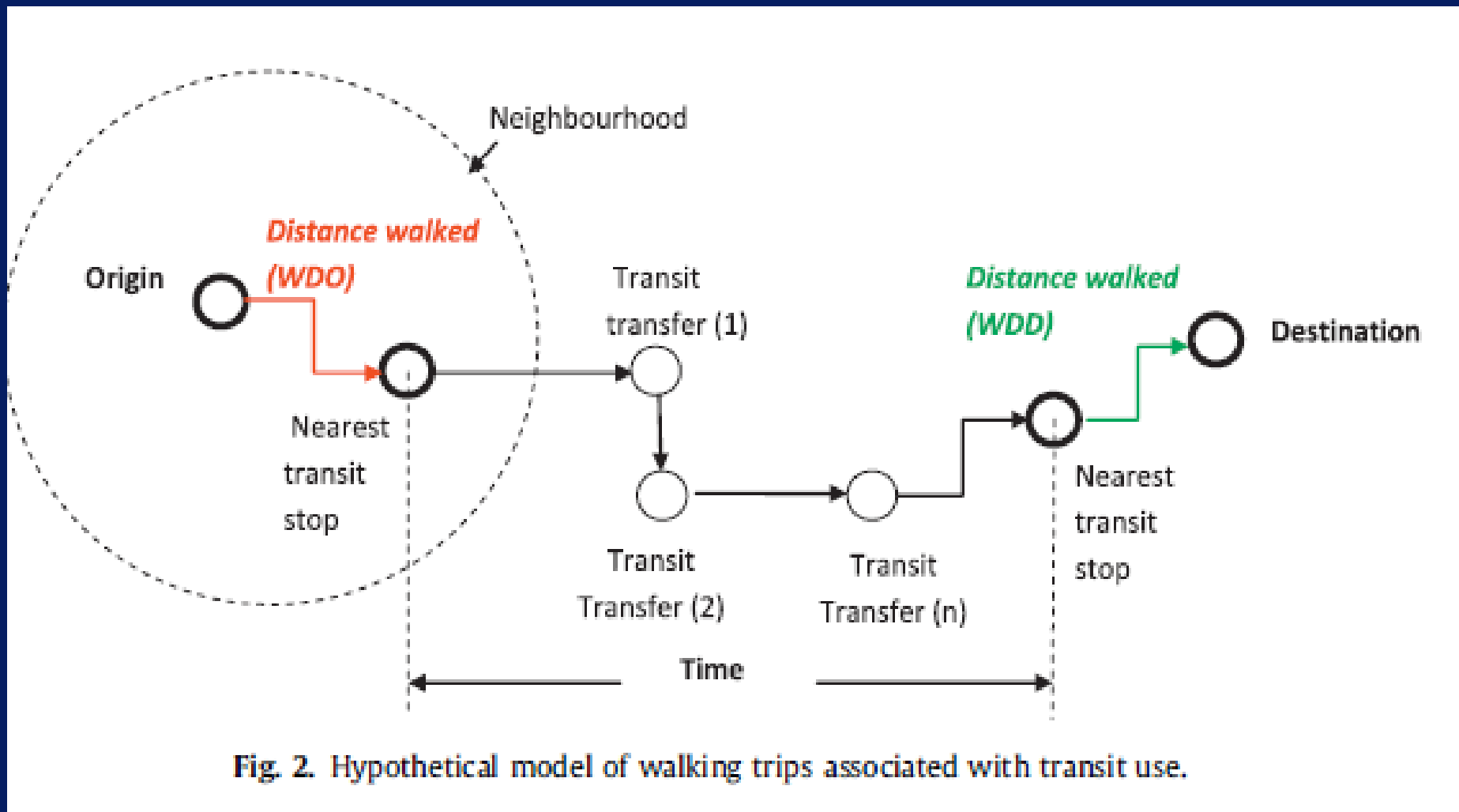


Fig. 2. Hypothetical model of walking trips associated with transit use.

# Walking Trips to/from Transit

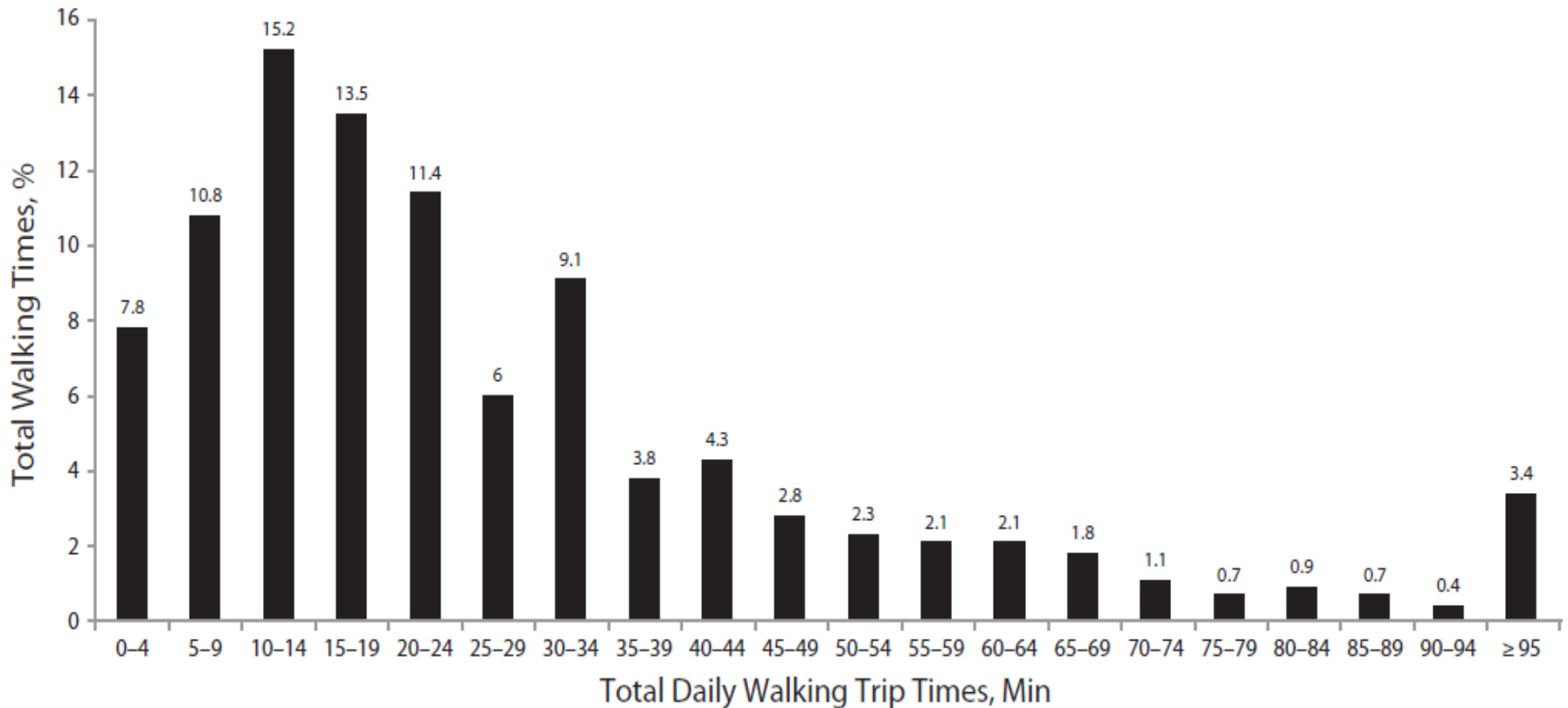


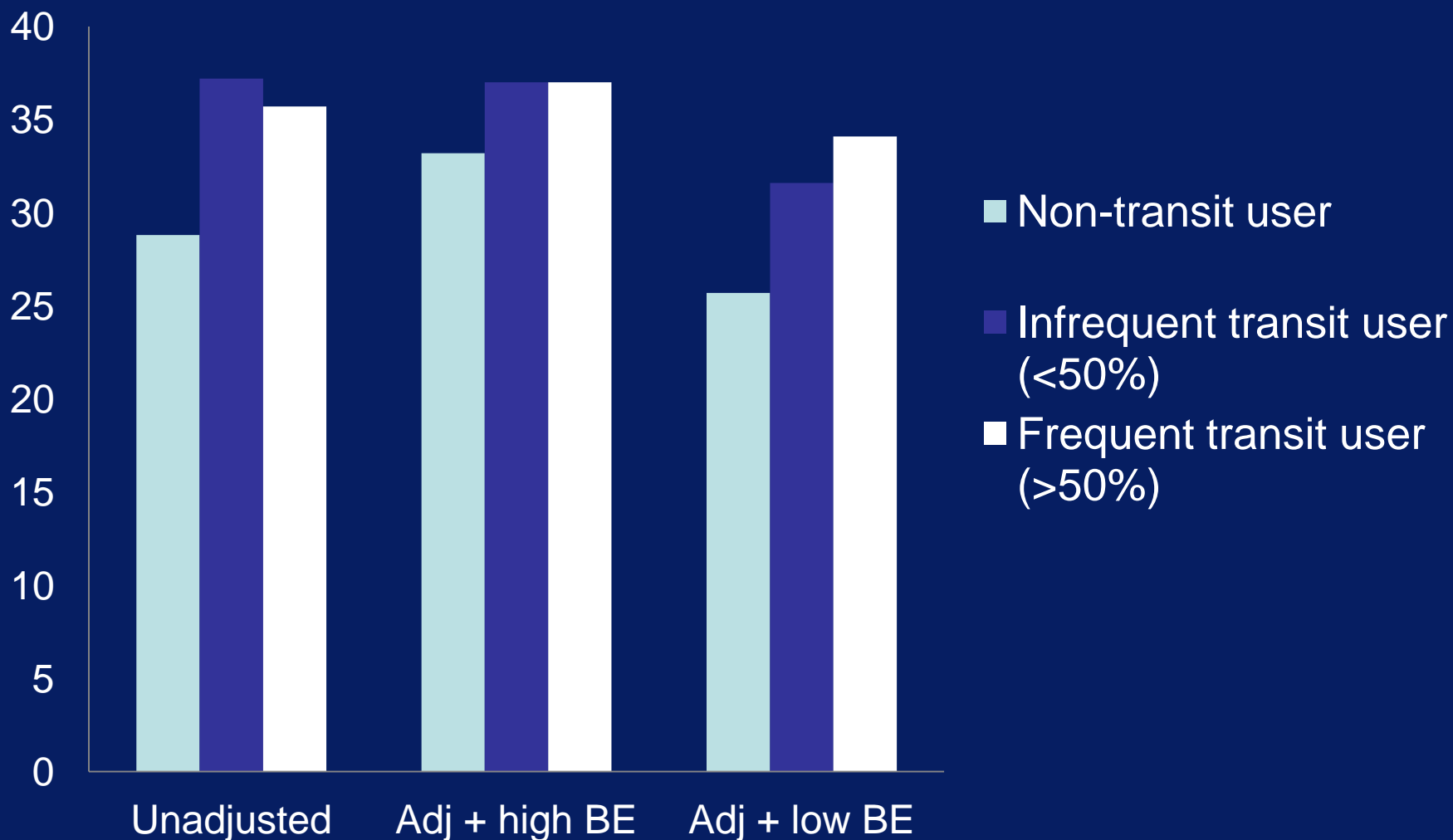
FIGURE 1—Total daily walking trip times to and from transit: United States, 2009 National Household Travel Survey.

Median = 21 minutes walking

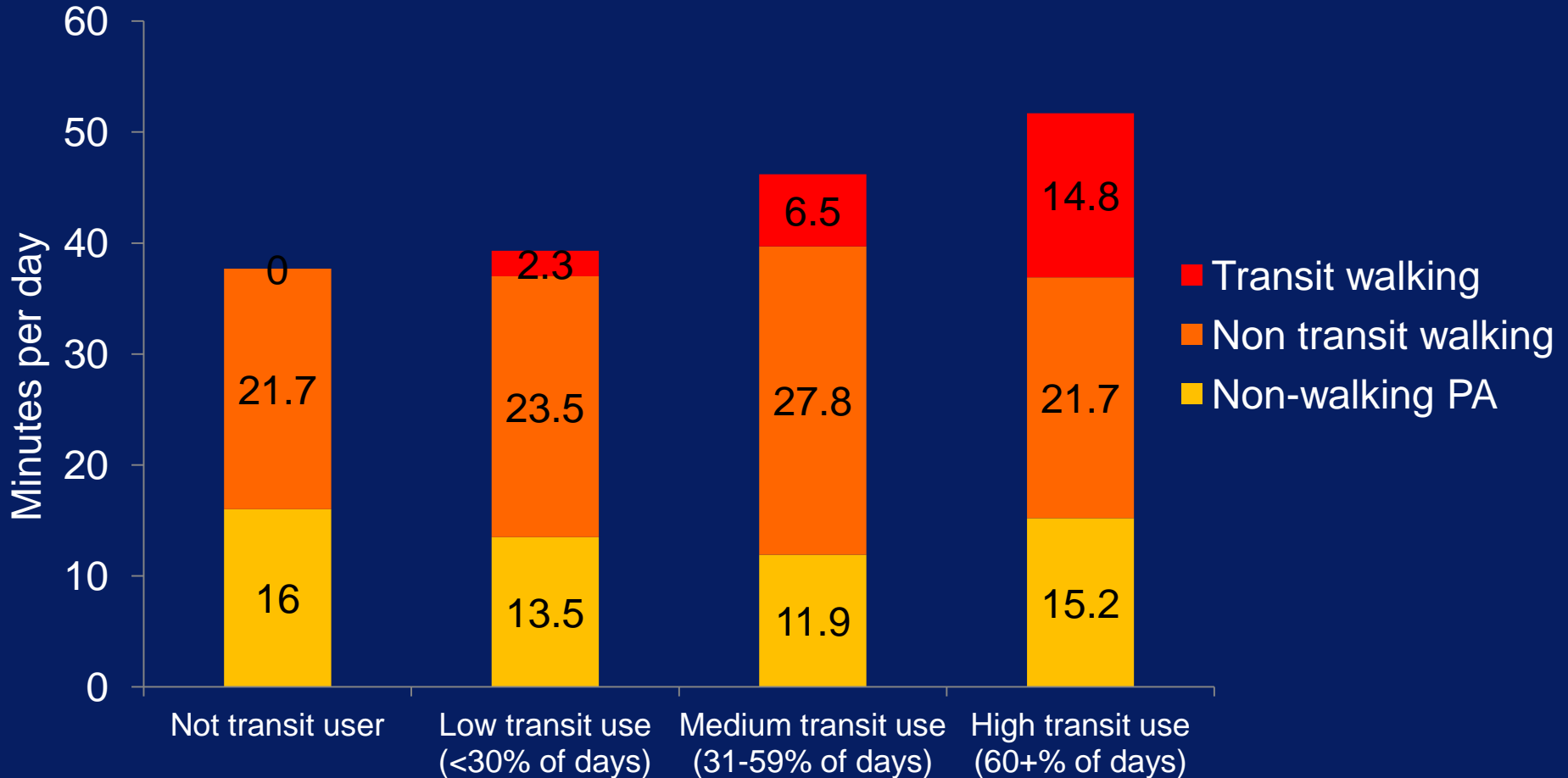
# Different Design Options

- Research design options (cross-sectional)
  - Compare transit users versus non-users
    - In overall physical activity
    - In transit-specific physical activity
    - In person-day level examining both overall and specific transit-specific
- Threats to conclusions
  - Self-selection bias
    - Third variable confounding
  - Substitution
    - Being active through public transportation may substitute for other physical activity
      - Measuring both global and transit-specific physical activity

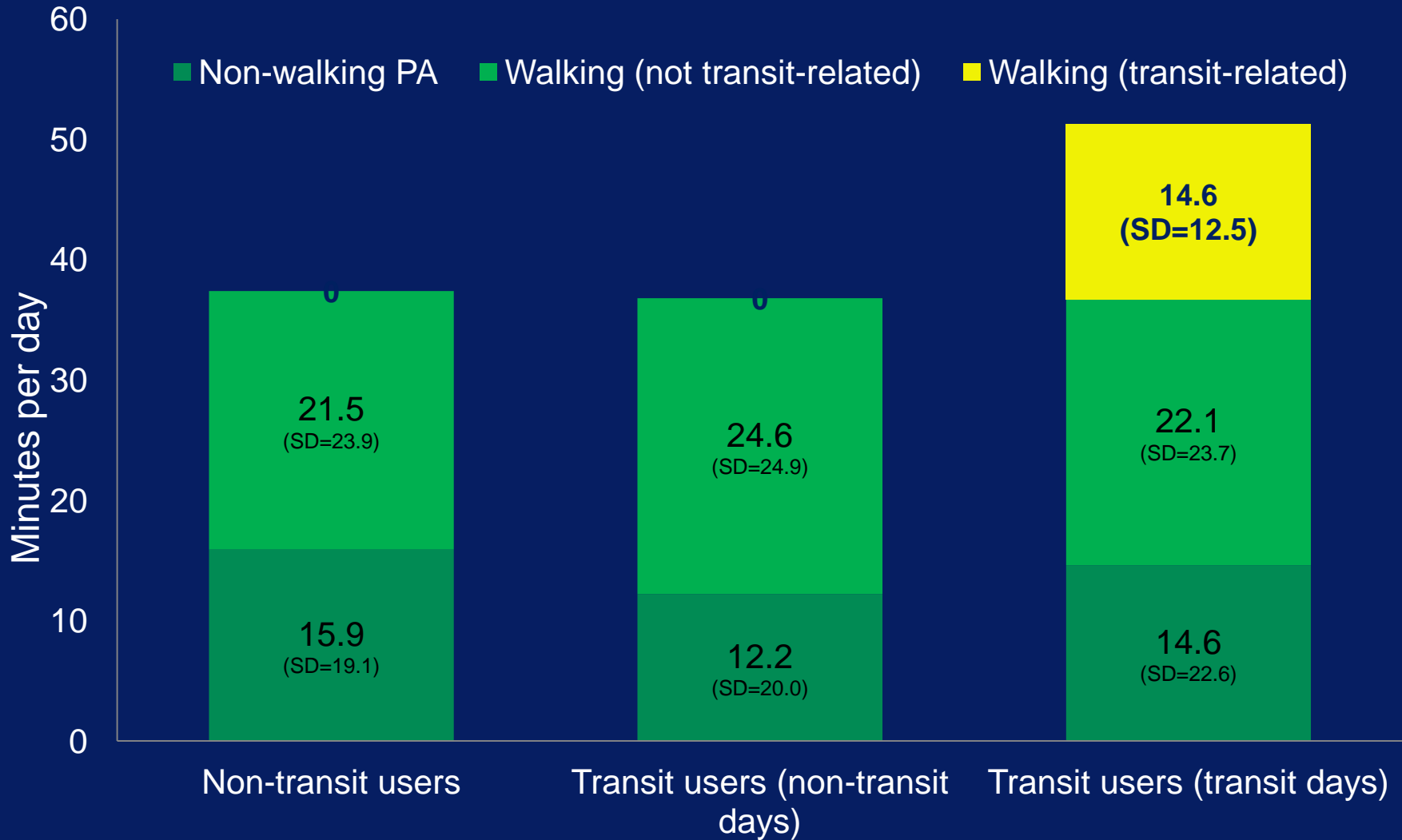
# Differences in Daily PA minutes by Transit Usage



# Transit Frequency and Type of Walking/PA



# Baseline Transit-Related Physical Activity





# 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

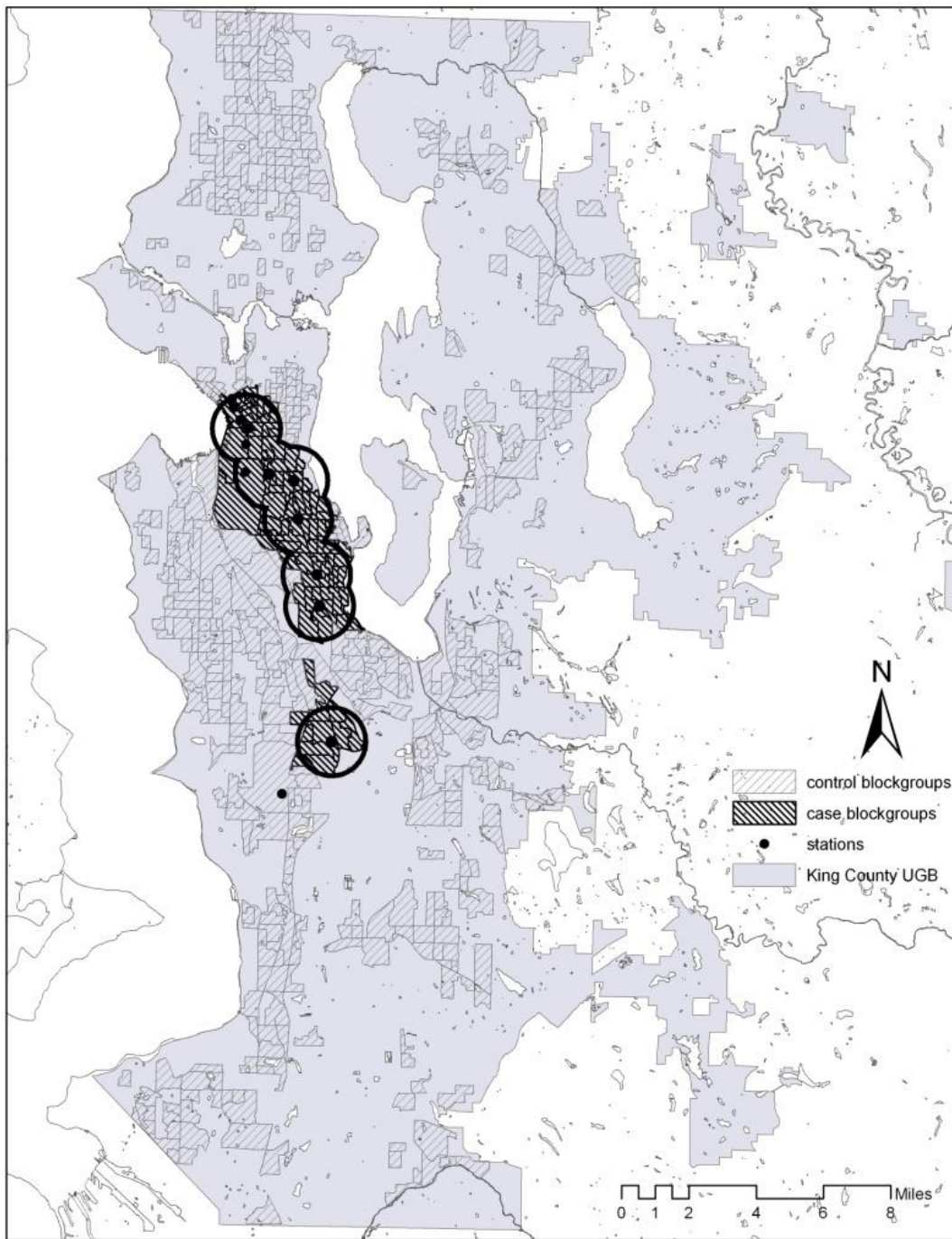
# Travel Assessment and Community - TRAC Project

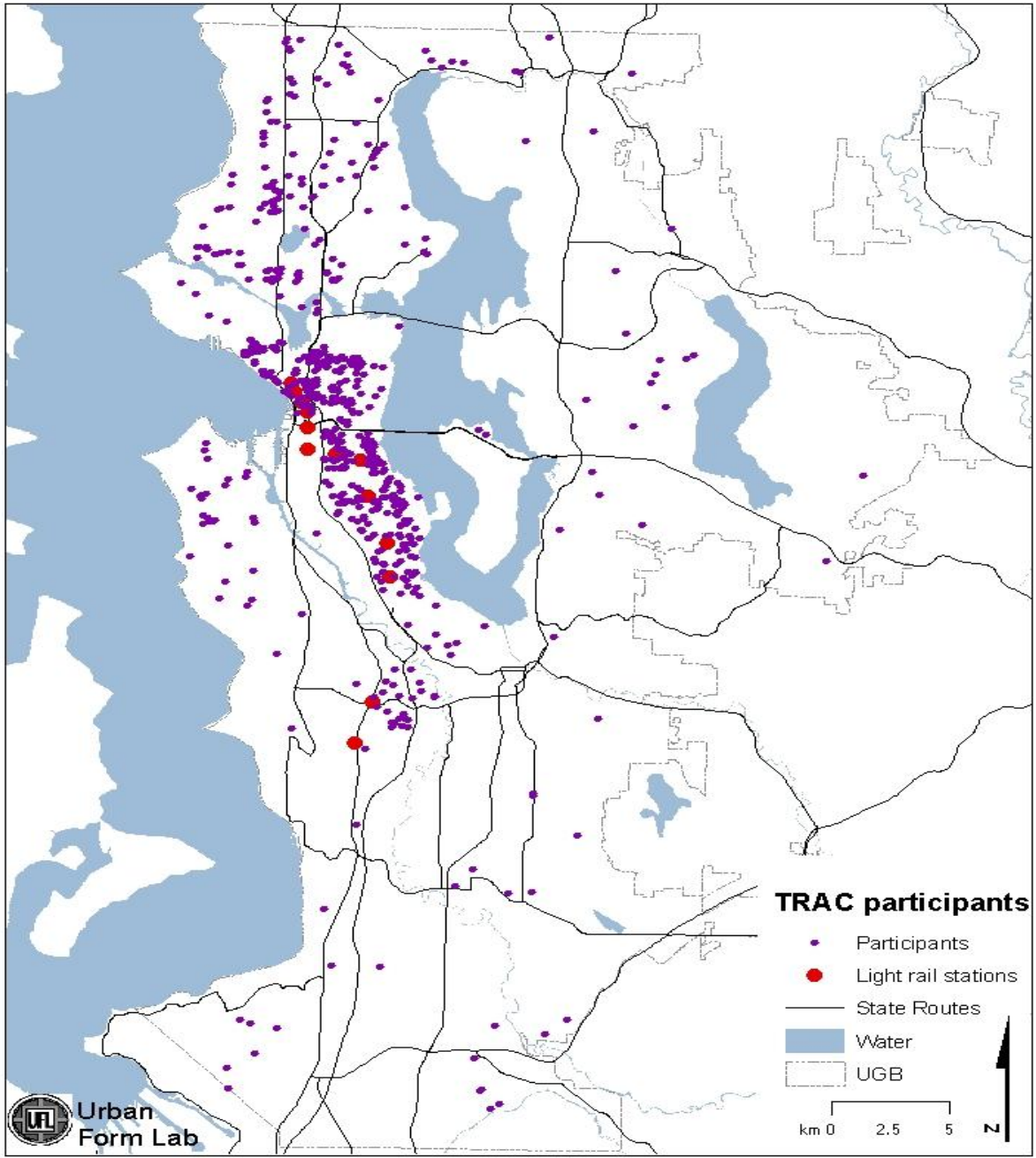
- A natural experiment in which an environment changed (light rail line opening)
  - Addresses some concern about residential self-selection confounding
  - Relative to a demographically and built environment matched sample
  - Examine behavior change in response to environmental change (temporality)
- Use the best possible set of methods to assess physical activity and context
- Multiple similar assessments
  - Baseline (during the 1 year prior to LRT opening)
  - Post 1 (1-2 years after LRT opened)
  - Post 2 (3-4 years after LRT opened)



# TRAC Recruitment

- Group-matched cohort design
  - ‘Cases’ – adults living < 1 mile from (future) LRT station
  - ‘Controls’ – adults in county living >1 mile from (future) LRT station
- Additional eligibility
  - $\geq 18$  years old
  - Able to walk outside home
  - English-speaking or willing to speak through interpreter
  - Living at this residence for > 1 year (and residence built > 3 years ago) and no current intentions to move
  - Contacted via public record information (address/phone)





# TRAC Baseline Demographics, Physical Activity, and Transit By Condition

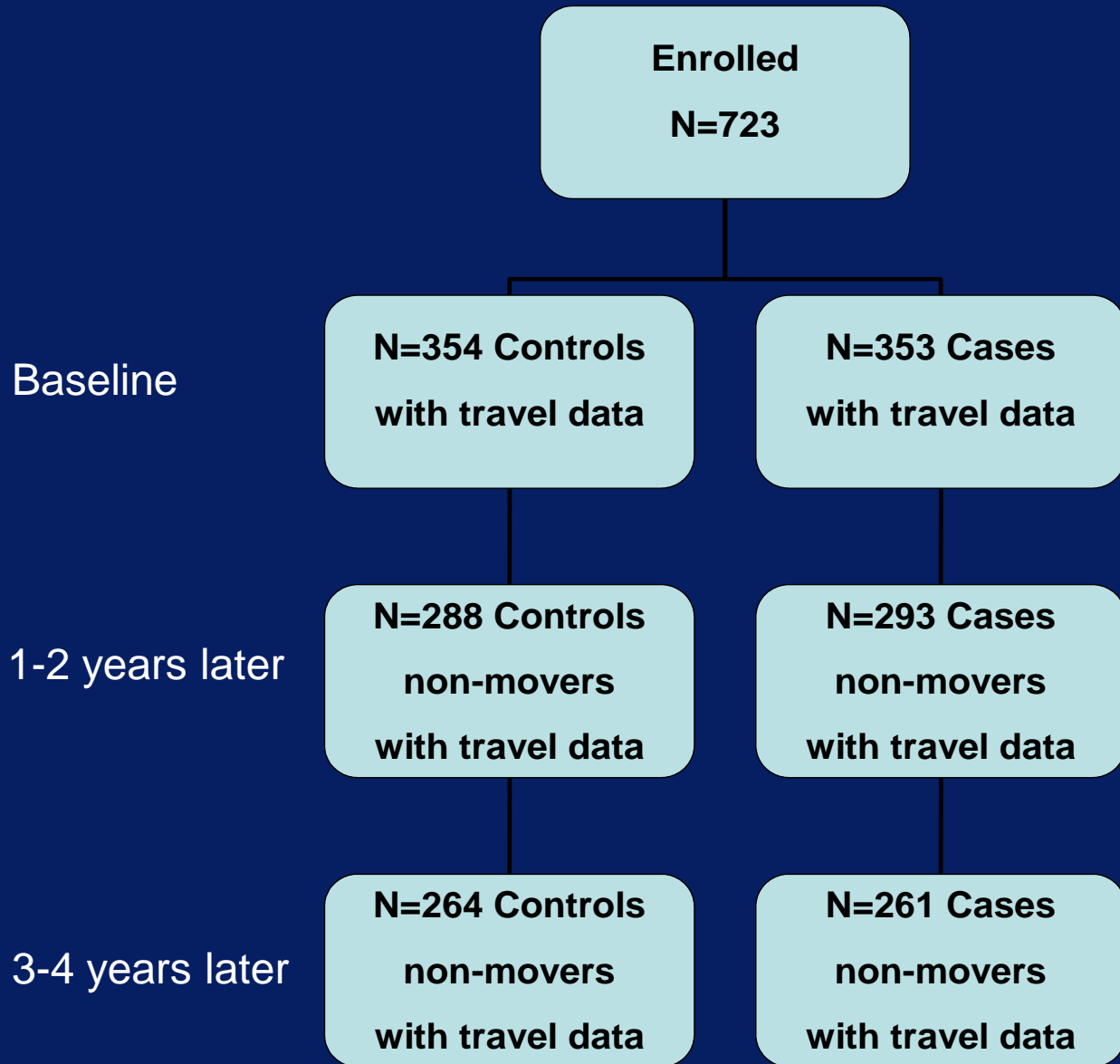
	Control (n=354)	Case (n=353)
Age	51 (13)	52 (13)
Male (%)	37%	40%
Household income (median)	60-69K	60-69K
Race/ethnicity (% non-Hispanic white)*	87%	76%
Employed (%)	68%	63%
Single person household (%)	39%	42%
Daily physical activity minutes (1000+ cpm, continuous)	83 (39)	83 (37)
Daily MVPA minutes (1952+ cpm, continuous)	41 (27)	41 (25)
Daily walking minutes (in bouts)	25.7 (24.9)	30.4 (35.1)
Daily transit-related walking minutes (in bouts)	2.9 (7)	3.0 (7.8)
Transit use (trips)	2.8 (5.2)	2.8 (5.6)
- No trips	61%	57%
- 1-5 trips	21%	25%
- 6+ trips	18%	18%

# TRAC 'participant neighborhood' summary

- Participant's neighborhood defined as area within a ½-mile radius of residence, containing 539 acres; about a 10-minute walk
- Land use
  - 6.3 dwelling units per acre (range: 1 – 30)
  - 5.3 jobs per acre (range: 0 – 272)
  - 16 acres of parkland (range: 0 – 220)
- Food & beverage destinations
  - 1 supermarket (range: 0 – 5)
  - 3 traditional restaurants (range: 0 – 120)
  - 3 fast-food restaurants (range: 0 – 26)
  - 4 coffee shops (range: 0 – 92)
- Transportation
  - 16 miles of streets, excluding freeways (range: 5.4 – 23)
  - 176 intersections (range: 47 – 342)
  - 0 miles of off-street trails (0 – 1.5 miles)



# TRAC Participant Flow By Condition

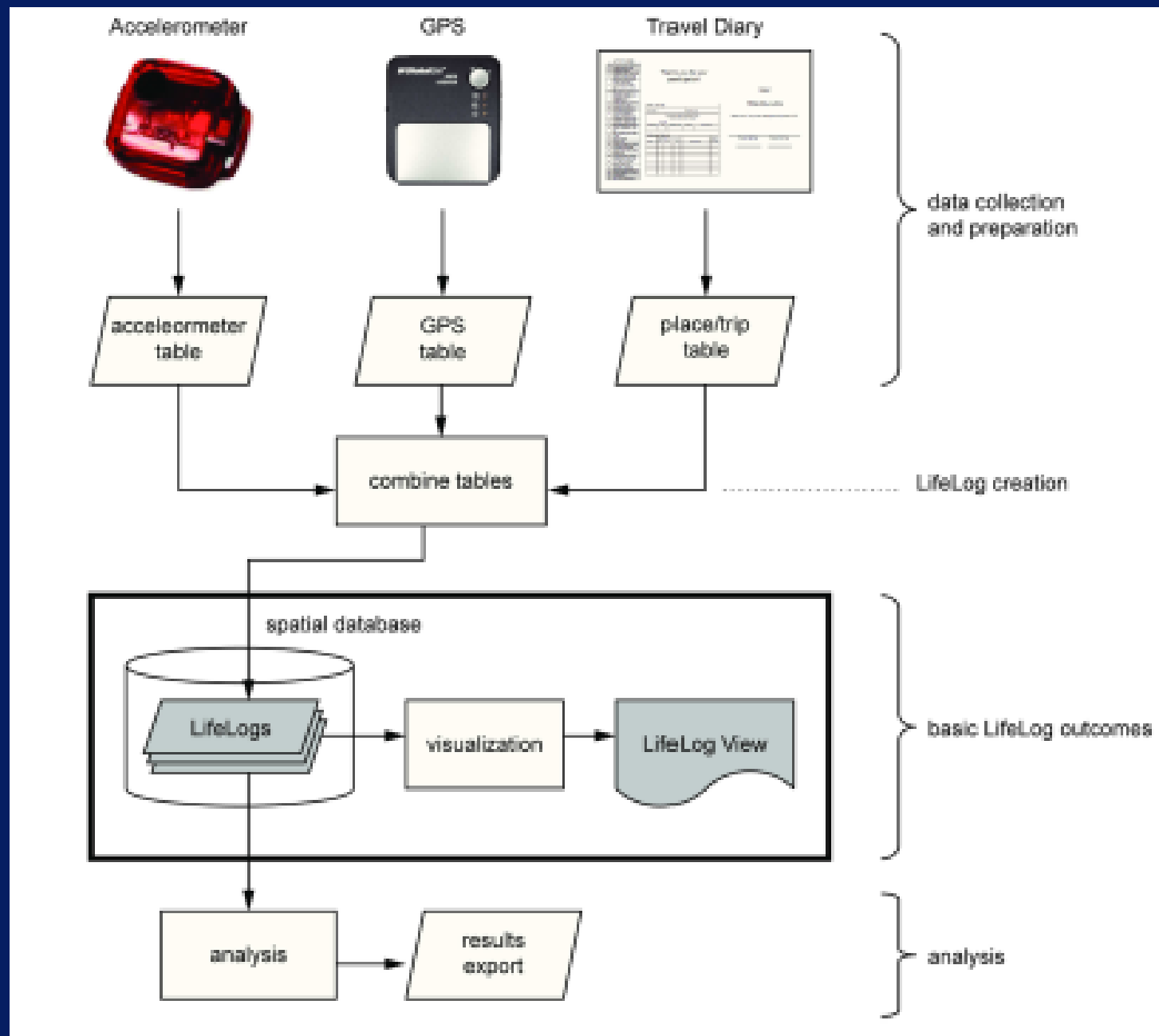


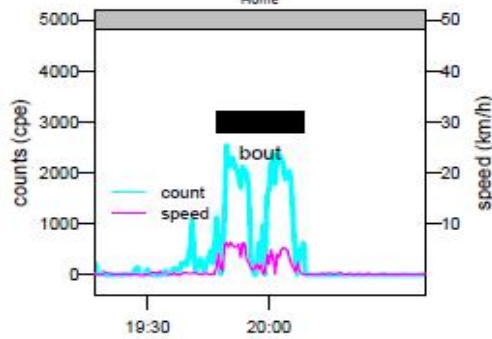
# Sampling, Recruitment, Retention: Lessons Learned

- Engage built environment experts to ‘match’ as best as possible
- If possible, find alternatives to marketing/public records information to augment recruiting
  - That retains random sampling
  - Considering your research question
- Incentivize (creatively)!
- Double or triple anticipated recruitment time line (start early)

# TRAC Methods

- Three time points (baseline, near post, far post)
- Individual participant tracked by month/season, not duration since last assessed
- Demographic/attitudinal/psychosocial survey
- Device-based and trip report integration (for 7 days) to measure physical activity
  - Accelerometer
  - Portable GPS
  - Travel log (place-based)

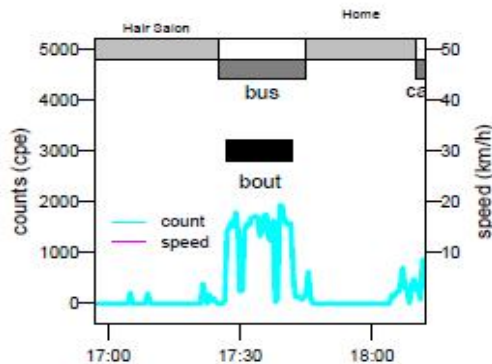
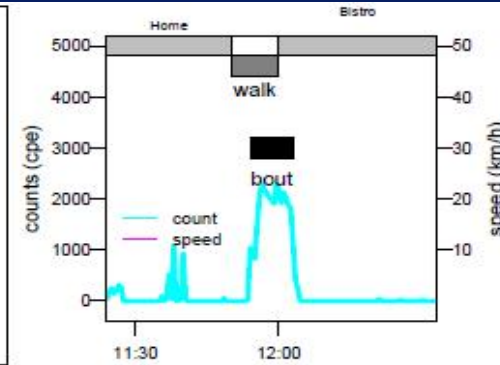




A: Walk1-GPS



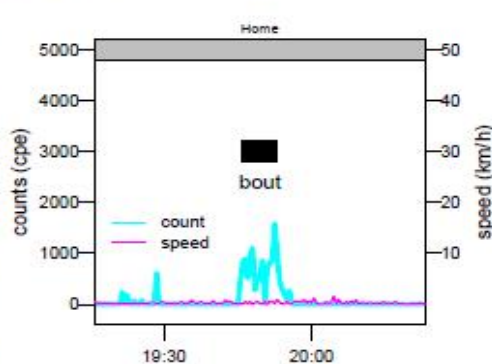
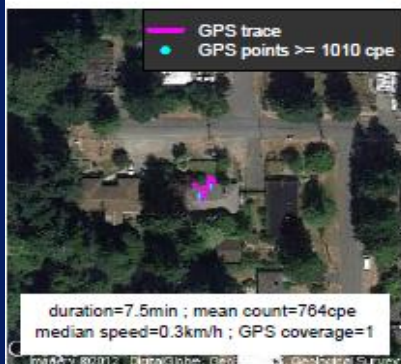
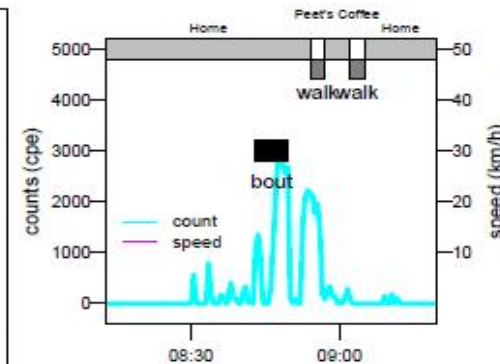
B: Walk2-Diary



C: Walk3-Diary



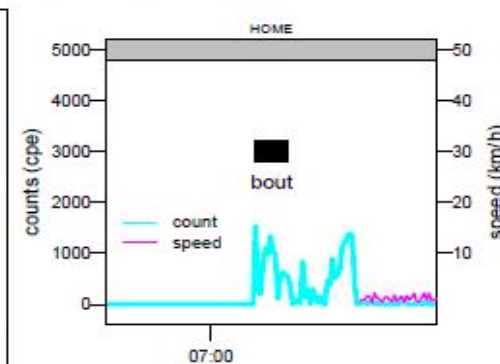
D: Walk4-Diary



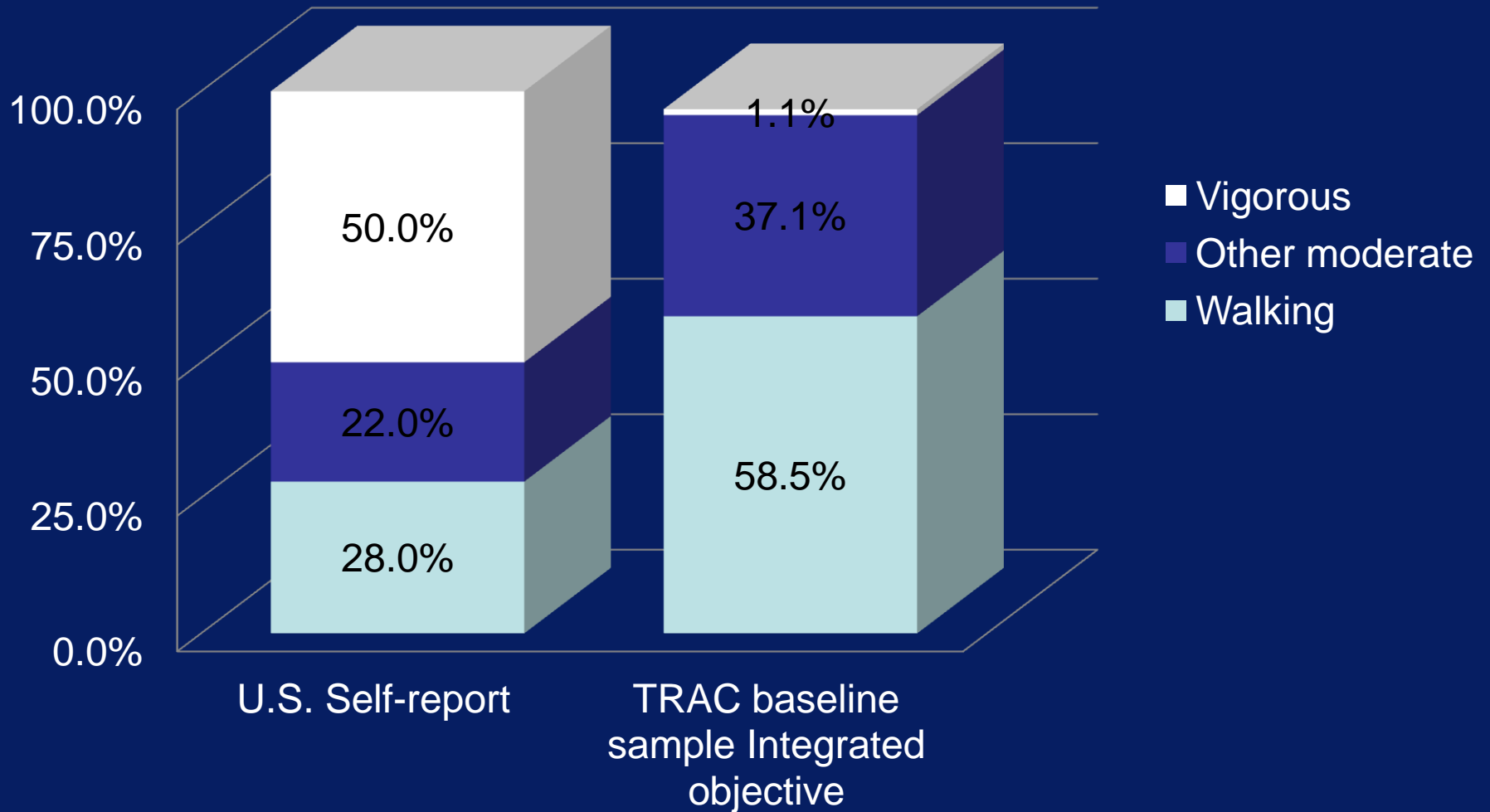
E: NonWalk2-GPS

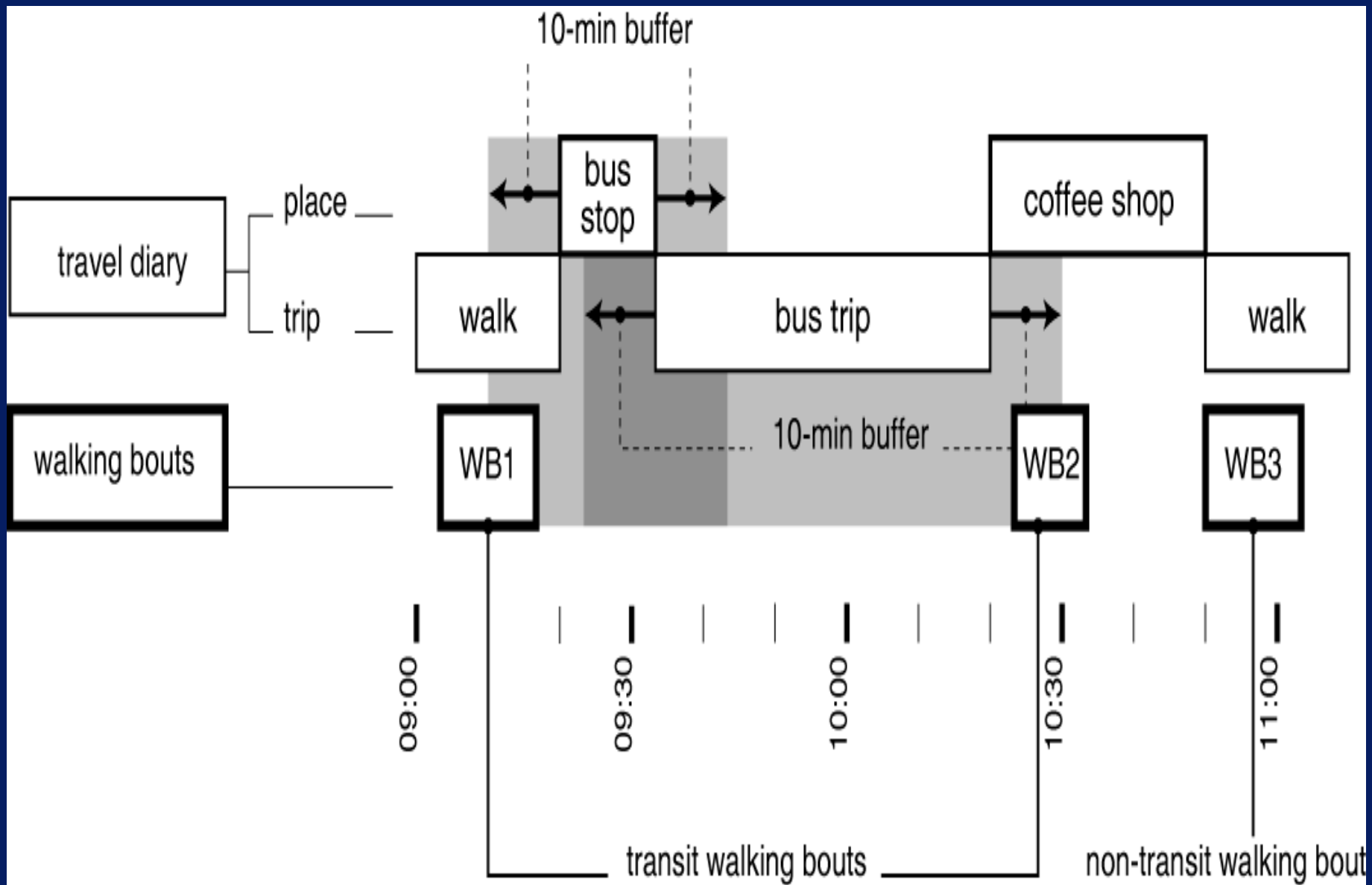


F: NonWalk3-Diary



# Comparison of Self-Report and Integrated Objective





# Measures: Lessons Learned

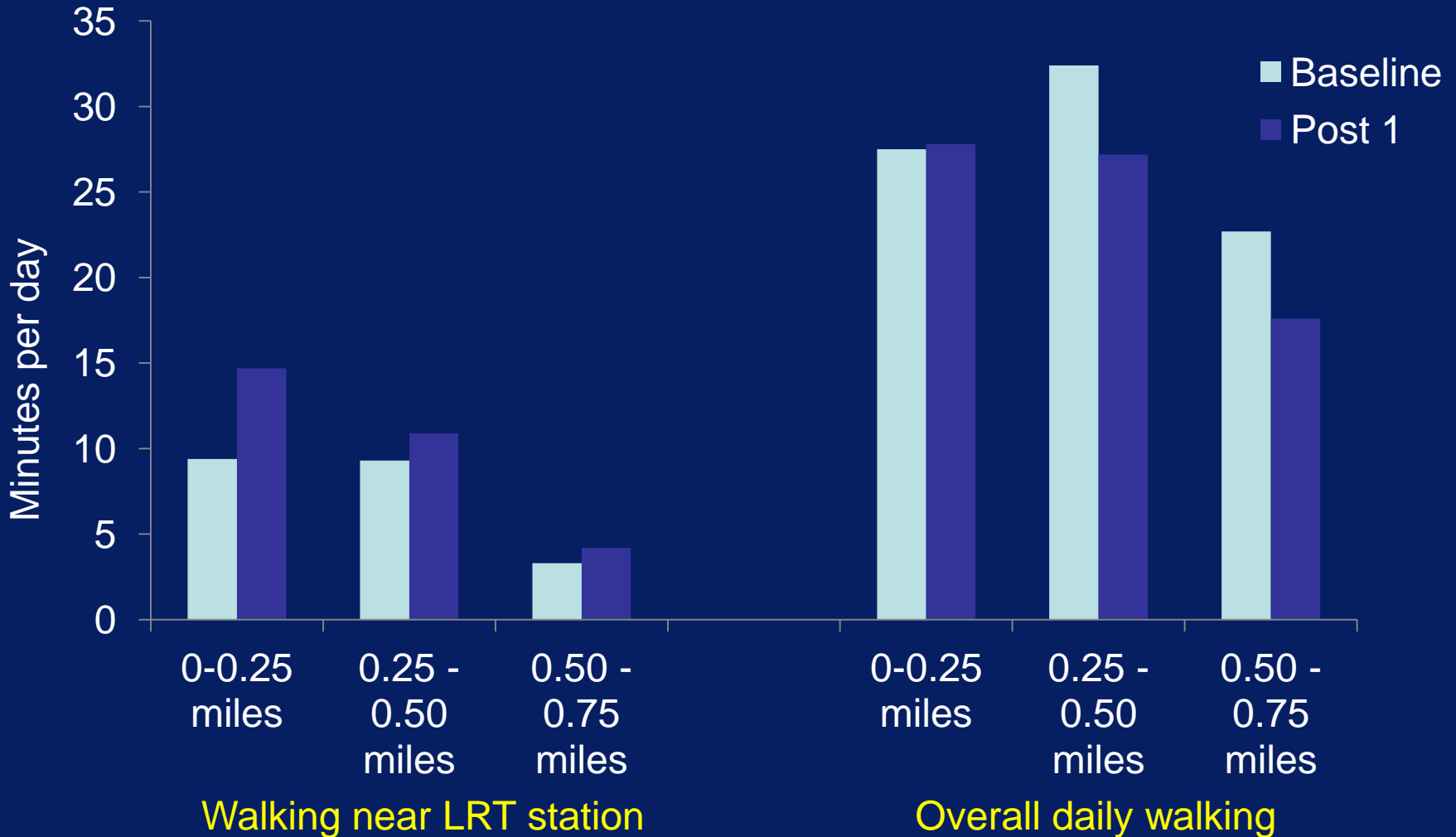
- Cross-measure integration was helpful in obtaining better precision and more information (type, context, etc)
- Carefully examine data even beyond descriptive analysis
  - Know limitations your devices
  - On-going vigilance from staff
- Need a better way to distinguish utilitarian versus recreational walking



# Other Considerations

- Transit users versus non-users
  - Switch to light rail transit versus not switching
  - Examine impacts on movers into ‘intervention’ area
- Changes in built environment or other aspects of transportation system

# Further Analyses: Reconsider 'Caseness'?



# Acknowledgments

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# Citations

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