

## **Design and Methods of Natural Experiments in Transit & Physical Activity**

**Webinar: December 10, 2015**

**Brian Saelens, PhD, Professor, School of Medicine, University of Washington**  
**Barbara Brown, PhD, Professor, Family and Consumer Studies, University of Utah**

### **Questions and Answers**

- **What was the time frame between before and after on the complete streetscape intervention?**

Time 1 data collection was between March and December of 2012 and time 2 data collection was between May and November of 2013.

- **How have these studies addressed differences in baseline built environment characteristics between intervention and comparison residences? Often these studies don't have power to test intervention interactions with built environment characteristics (pop density, other amenities).**

Saelens adds: Part of our initial attempt to match our cases versus controls at baseline was to select census block groups that were similar demographically and in terms of built environment and baseline transit service between the cases versus controls. Thus this was frequency matching at the census block group level from which we recruited eligible participants. This resulted in mostly similar samples we ultimately ended up with in our cases versus controls (although there were some demographic differences that were hard to overcome given that the light rail corridor was selected by the transit agency to be more low income and more ethnically/racially diverse) our study (Saelens). More information can be found out about our sampling and recruitment in Dr. Moudon's report cited in our slides.

Brown adds: Our adjacent controls often shared census boundaries with our Near group, making groups similar. In addition, we will have detailed walkability audit information on all blocks within our study boundaries. This will allow us to determine if physical characteristics relate to choices to walk to the complete street. Look for future work from Calvin Tribby and Harvey Miller for this aspect of the study. The advantage of their strategy is that the assessment will be route-specific, which should be more relevant to walking choices than area wide measures such as census tract density, for example. Instead of controlling for these differences across Near/Far we will utilize the walkability features to predict walking.

- **How would you go about defining the distances for near versus far in a natural experiment? Would it be determined on a case-by-case basis depending on the characteristics of the area? To what extent do you think this difficulty of defining control versus experimental groups impact upon the outcome?**

Saelens adds: This is an excellent question with which we struggled. We proposed and implemented the 1 mile distance from future light rail stations as the cut-off for our cases because many transportation objectives seek to increase active transportation for trips < 1 mile and there is evidence that people are willing to walk farther to access light rail transit than bus transit which is typically <1/2 mile or even <1/4 mile. It behooves us to do some targeted post-hoc analysis to examine whether and which distances are potentially most important/impactful, because it significantly impacts our outcomes and can inform future evaluations.

Brown adds: I agree this is a challenge for the field to address. And it is under researched. The pictures in my presentation show how much the complete street was improved, so it should be a more attractive destination now. But studies of distances to transit stops, bike lanes, and walking paths rarely characterize the qualities of the path from home to the improved facilities or how distance is related to the attractiveness of the destination or the route to get there. My review demonstrates how varied the distances are, suggesting we have many unidentified variables yet to understand. My advice to future researchers would be to make sure that there are sufficient very close participants, given that distance is an important variable but the distance decay line may be steeper than you think. I am curious to know whether explorations of different distances would impact outcomes across a number of studies. I hope researchers begin to report this so that the field can learn what relates to distance walked across settings. In my study the 800M and 1000m distances yielded the same results for non-transit walking. But for transit walking only the <800M distance, not the <1000M distance, showed an effect for Near.

- **For TRAC study, was crow-fly distance or network distance utilized to select case/control participants?**

Our case/control block groups were determined by crow-fly distance, but we will examine differences between case/control definitions based on different distances and whether these distances are calculated based on crow-fly or the street network.

- **For MAPS study, regarding the near/far designation and the correlation/"slam-dunk" question: has anyone studied nearness of origin AND destination? E.g., I live near a nice bike trail but my work is not accessible by trail.**

No, I have not heard of studies that examine the pros and cons of distances of common non-home destinations from bike trails. I think many bike trails share the problem of

light rail trails that they often are built on old freight rail pathways, which assure that few current destinations of interest are nearby. Development around these active travel interventions will take time, just as it took time to develop around freeways.

- **Our group knows from anecdotal evidence that many people hesitate to walk, take transit or exercise in public spaces if they have concerns about restroom availability. Have you considered the role of toilet availability in physical activity? Did restroom visits show up in your GPS data? Has anyone considered this?**

Saelens adds: We did not include this in our light rail study and know that most of the stations for this initial segment of light rail in Seattle/King County do not include restrooms. We did not have public restroom information in our built environment data to examine this as a potential matching variable either, although have seen other investigative teams that have these data (e.g., especially for parks) and are examining their impact.

Brown adds: This is an interesting question. I hope you do some research on it and let me know what you find. We did not have restrooms at the stops to study. I know that in past work on another new line that sometimes participants would request restrooms if asked on surveys what could enhance their transit experience.

- **If we have a community intervention coming up, how and who should we contact that might be interested in the research?**

Saelens adds: We always start with the lead(s) for that community intervention, whether this is local government, transit agencies, or other organizations.

Brown adds: I was in touch with the city transportation officials, Utah Transit Agency, Wasatch Front Regional Council, and the local community councils and leaders. They all had valuable advice.

- **How are local city planners using the data findings in Utah?**

Brown adds: So far I have had simple conversations where I have the impression that the data add to the perspective of what can be accomplished with complete street policies. I look forward to more of this interaction as we continue to analyze our data.

- **Is there any related research on rural transit systems?**

Saelens adds: I am not aware of any natural experiments around physical activity or active living and transit systems in rural settings.

Brown adds: Given that density is one of the key requirements for efficient transit, I'm not sure that there will be much rural transit service to study. I believe that dial-a-ride services are being discussed locally, which would reduce any transit-related walking.

- **Do you usually go through all calibration steps before each data collection using GPS devices?**

Saelens adds: We do some intermittent quality control checks for our accelerometer and GPS devices, but do not routinely go through external calibration/validation checks for our GPS devices each time they are deployed.

Brown adds: Same here. We also had a procedure so that the participants could see maps of their brisk walks. When the calibration was off (as in the daylight savings change we did not update in time on all field laptops) the problems are immediately apparent.

- **On a broader level, how well do you think the field is progressing in terms of conducting more rigorous natural experiments? Do you think there is a discrepancy between the quality of the evidence and current policies in place in relation to implementing transits for the purposes of improving physical activity?**

Saelens adds: I think there has certainly been an increase in the rigorous of measurement of physical activity, its context, and transportation over the past few years that has improved the quality of the natural experiments we are conducting in this area. The use of carefully selected and sampled 'control' populations has also increased the design rigor, as does the shift from cross-sectional analyses examining built environment/transportation infrastructure and physical activity. I (Saelens) think that some recommendations for active living policies are a bit ahead of more conclusive evidence about what changes might increase active living and/or the recommendations lack specificity that could be filled in with better evidence.

Brown adds: Good question. I agree with Brian that the use of pre- post tests with quasi- control groups is going to improve our ability to draw conclusions. The use of objective measures provide more confidence in measures and allow for more tests of comparability across studies. I think a challenge has been that people who create transit policy are different than the people who create health policy. Another challenge is that there are so few studies that involve rigorous assessments of active travel interventions.

At the same time, I have not heard any studies suggest that transit use reduces physical activity. While we may not have a critical mass of studies that recommend X amount of transit to achieve Y amount of physical activity, we have even broader considerations to weigh. In science, we tend to compare costs and benefits of doing something. The financial cost of rail transit is high, the costs of walking trails and bike paths are relatively minor. Yet the benefits of any of these interventions go beyond physical activity. Active transportation can provide greater choices of access, less expensive access, and less pollution. As an environmental psychologist, I am always interested in seeing solutions that have health, environmental, and social equity benefits. Solutions that make cities into interesting, convenient, and more sustainable destinations that do not require carbon-based fuels are important.

- **Once the case/control (near/far) thresholds are established, let's say 1km, what is the recommended number of further break ups by distance (e.g. 250m, 500m, 750m) to examine the results/findings? The TRAC Study showed 3, what did Barbara's study do? What are best practices for further narrowing case/control participants by distance?**

Brown adds: We examined 200m increments, which corresponded to the difference between two common distance recommendations (1/2 mile vs. 1km), but I'm not sure this constitutes a best practice. I would certainly recommend plotting your data by distance to see what the local pattern appears to be.