Predicting Changes in Walking/Biking Rates

PROCESS

1. **Identify what question you're trying to answer.**
   (e.g., "What is the magnitude of the impact that [X intervention] has on biking and/or walking rates?")

2. **Go through the following steps (steps 3 and 4) to generate best guess of magnitude of intervention's impact on walking and/or biking rates in project time frame.**
3. **Scan the tables and identify what measures are relevant to your intervention.** Use Tables 1 and 2 for this step. Select metrics and measure baseline conditions in your project area for each of these. Note that there are other factors (e.g., age, crime rate) that may impact estimate of magnitude, so hold off on this until you've completed steps 4 and 5. *Those measures highlighted in blue are most strongly recommended*.

Relative Magnitude of Impact Key

Relative Change	Estimated % Change
Minor	0.1-4%
Small	5-10%
Medium	11-29%
Large	30% and above

+ = increase

- = decrease

Strength of evidence	Description
Suggestive only	Information based on a single correlation. Interpret as suggestion only. Results would likely not be replicable.
Weak	Only a few cross-sectional data to support link. Can only be interpreted as an association/correlation with current evidence base.
Medium	At least one or more meta-analyses or other review have attempted to quantify, group, and evaluate the findings of several studies looking at the same thing. Studies analysis is based on may still only be cross-sectional, so no clear causal link yet.
Strong	Studies supporting link have some element of tracking a change over time. Cohort studies or RCTS.

Table 1. Walking

Type of Intervention	Measure	Metrics	Relative Change	Strength of Evidence
Design	Intersection/Street Density	Intersection Density Block size Sidewalk coverage	Large, +	Medium. Meta-analysis based primarily on many single-point in time studies.
	% 4-way intersections	% 4-way intersections	Small, -	
Diversity	Distance to a store	Distance to nearest grocery Distance to nearest store Distance to commercial center Distance to closest commercial use	Medium, +	Medium. Meta-analysis based primarily on many single-point in time studies.
	Jobs-housing balance	Jobs-housing imbalance (defined below) Non-retail jobs-housing balance	Medium, +	
	Land-use mix	Entropy Index	Medium, +	
Destination Accessibility	Jobs within one mile	Jobs within one mile	Medium, +	Medium. Meta-analysis based primarily on many single-point in time studies.
	Network connectivity	% connected intersections	Large, +	Weak. Based on single studies that are *suggestive only.* Not meta-analysis results. SUGGESTIVE ONLY, COULD BE HIGHLY VARIABLE
		Path directness	Small-Medium, +	
		% Cul de sacs	None	
		Street connectivity	Small, +	
Distance to Transit	Distance to nearest transit stop	Distance to nearest bus stop Distance to nearest transit stop	Medium, +	Medium. Meta-analysis based primarily on many single-point in time studies.
Density	Household/population density	Residential density Population density Household density	Small, +	Medium, but as strong as it gets. Based on Ewing & Cervero Meta-Analysis from 2010.

Type of Intervention	Measure	Metrics	Relative Change	Strength of Evidence
	Commercial density	Commercial floor area ratio	?	Not clear.

Table 2. Biking

Type of Intervention	Measure	Metrics	Relative Change	Strength of Evidence
Destination Accessibility	Network Connectivity	% connected intersections Path directness % Cul de sacs Street connectivity	Not quantified. May be more important for bikers than walkers according to research.	Weak. Correlations.
Density	Household/population density	Residential density Population density Household density	Seems positive, but not quantified	Weak, Based on correlations/evidence at a single point in time.
Design (?)	Traffic features	Car volume Bicycle boulevards Home zones/"woonerfs" Speed humps Curb extensions Pedestrian crossways # of stop signs and signals	Per 1 mile of high car volume road, 1% drop in cyclists. Regardless of bike lanes.	Weak, Based on correlations/evidence at a single point in time. Suggestive only.
	Bike infrastructure	Painted Bike Lanes Sharrows Cycle tracks Bike Parking Bike boxes	Doesn't seem to be quantified.	Weak, Based on correlations/evidence at a single point in time.
	Road Quality	Pavement quality	Doesn't seem to be quantified.	Weak, Based on correlations/evidence at a single point in time.

4. **Establish your current context for the following characteristics in the project area.** Determine demographic and contextual conditions. Table 3 suggests what kinds of impacts each of these factors may have. These variables may mediate the relationship between your intervention and what impact it might have. For example, if your project area has a rapidly aging population which over-represents the elderly, they may take less advantage of any changes that are implemented due to physical or other restrictions.

Table 3. Mediating Variables to Consider

Type	Factor
Demographic	*Population age distribution* • Older than average may suggest that intervention would have less impact than otherwise • Same may be true of significantly younger than average (i.e. large youth population) • More teenagers and adults aged roughly 15-60 may suggest intervention could have more impact
Demographic	*Income* • Lower than average income may impact magnitude of less expensive activities (e.g. walking or free bikes)
Demographic	*Education and Race* • The higher the educational attainment of the population, the more they may be able to take advantage of new opportunities that require a sense of self-efficacy (early adopters tend to be more educated). *The same is true for race*
Transportation	*Vehicle Ownership* • Higher vehicle ownership may suggest smaller intervention impact • Low vehicle ownership may suggest larger impact
Transportation	*Mode to work* • The greater the existing walking and biking demand is, the more the intervention might have an impact
Crime	*Rates of Property Crime and Violent Crime* • Perceived crime is the best measure here, but actual crime could serve as a proxy. The greater the rates of crime above a certain amount, the less the intervention might be effective.

5. **Synthesize identified relevant elements of steps 3 – 5 and develop your best estimate of the magnitude by which walking and/or biking might increase for *each* of your interventions.** Make sure that this estimate answers the question you set aside in Step 1. No multi-variable change estimates exist, so we would suggest that you estimate what the RANGE of change might be. (i.e., 20-40% predicted increase in walking, rather than 25% increase).