Transit use, physical activity, and body mass index changes: objective measures associated with complete street light rail construction

Active Living Research, 2/23/2015, San Diego, CA

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Forthcoming, American Journal of Public Health
Salt Lake City historically had lots of active transportation & healthy weight.

- Undated, Main St. Salt Lake City
Might the current “Complete Streets” movement provide better PA support?

- Complete Streets reconceptualize roads as habitats for pedestrians & cyclists—not just cars

3 For America 2009
Complete Streets policies increasingly popular

Policy supports adopted by

- 30 states
- 665 regional or local jurisdictions
- Implementation is still a work-in-progress
- Evaluation for health benefits is rare
TRAX green line light rail extension: airport to downtown

- We studied 5 residential stops
- And adults within 2km of those stops
Before & after “Complete Street” intervention

Before (2012)
- No TRAX light rail
- No bike lane
- Narrow sidewalk
- 3 lanes, each direction
- No pedestrian lighting
- Overhead power lines

After (2013)
- TRAX light rail
- Bike lane
- Wide sidewalk
- 2 lanes, each direction
- Landscaping
- Pedestrian lights
- No overhead power lines
- One connection to Front Runner commuter rail
Method: In-home recruitment & data collection, 2012 & 2013

- 2 home visits each year
- Typically 1-week apart
- Height, weight, surveys at home
- Instructed to wear devices
Our sample (537 w GPS data both years)

- 51% female, 25% Hispanic
- Lived in home 7.5 years
  - But 25% only 1 year
  - 57% in single family detached housing
  - 47% rent their dwelling
- 68% employed
- 24% up to high school completed;
  - 37% college grads
- $30-40,000 median household income
Weight status of the sample

- BMI = (Pounds /Inches² * 703) or Kg/meters²

<table>
<thead>
<tr>
<th>Weight category</th>
<th>BMI measure</th>
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<tbody>
<tr>
<td>Obese</td>
<td>≥30</td>
</tr>
<tr>
<td>Overweight</td>
<td>25-29.9</td>
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<tr>
<td>Healthy weight</td>
<td>18.5-24.9</td>
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<tr>
<td>Underweight</td>
<td>≤ 18.5</td>
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(N=537)
Travel patterns measured by GPS data loggers & accelerometers

Worn together for about a week each time

Wearable GPS
GlobalSat DG-100

Activity Monitor
Actigraph GT3X+
End of the week data upload at home reveals the natural ecology of healthy activity bouts

- The resident sees this 3-min bout
- To help with recall
- This example = 0.1 mile or .16 km
GeoStats used GPS traces and speed to define Complete Street transit-related trips

- A “N. Temple trip” = one that intersected an area 40 meters above or below North Temple
- And involves TRAX, bus, or Front Runner ride
- Includes active transit somewhere along the whole trip, not just Complete Street section
### 4 key groups contrasted based on any Complete St. transit use (bus, TRAX light rail, or Ft Runner rail)

<table>
<thead>
<tr>
<th></th>
<th>Never (n=393)</th>
<th>Continuing (n=51)</th>
<th>Former (n=41)</th>
<th>New (n= 52)</th>
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</thead>
<tbody>
<tr>
<td>Transit-related corridor trips:</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>in 2012?</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
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<tr>
<td>in 2013?</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
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<tr>
<td>Expected activity change (2013 PA – 2012 PA):</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>None</td>
<td>None</td>
<td>None</td>
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All analyses control for age, female, Hispanic, college graduate, married, self-reported health, days & temperature differences between measures.
Transit ridership groups & activity change (2013-2012
accelerometer counts/min.)

Accelerometer counts per minute (all wear time)

**p<.01 Never = control group
Transit ridership groups & MVPA change (2013-2012 MVPA of ≥2020 accelerometer counts/min.)

Moderate-to-vigorous minutes per 10 hours of wear

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<th>Former</th>
<th>New</th>
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<tr>
<td>1.35</td>
<td>-2.65</td>
<td>-7.18</td>
<td>4.02</td>
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* *p < .05, **p < .01 Never = control group
Transit ridership groups & sedentary activity change (2013-2012 Sedentary PA of < 100 accelerometer counts/min.)

* $p < .05$, **$p < .01$  Never = control group
BMI changes echo PA changes for transit rider groups (2013-2012)

BMI Change (2013 Minus 2012)

- **Never**: 0.19
- **Continuing**: 0.53
- **Former**: 0.92
- **New**: -0.29

**p<.01 Never = control group**
Active transportation is “stealth exercise”

- Health/exercise benefits = by-products of getting where you want to go (Brown & Werner, 2008)
- Community design can foster stealth exercise
Complete Street proponents advocate for:

- Public health
  - Physical activity, obesity prevention, but also cleaner air & water
- Transportation alternatives
  - Youth & elder mobility; social equity
- Downtowns
  - Pro-transit & Transit-oriented development
- Compact development over sprawl
  - Open space preservation; fewer taxes for roads & sprawl; energy efficient housing & infrastructure
Advantages of complete street interventions

- Broad support across interest group lines
- Wide reach
- Embedded in policy & environmental changes
- Thus long lasting...
...and more appealing
Then...  Now....
Thank you!

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Graduate students: Wyatt Jensen, Calvin Tribby
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