Active Living: Using Research to Inform Policy and Practice

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http://sallis.ucsd.edu

Outline

• Why physical activity?
• What is evidence about the role of environments and policies in active living?
• Examples of effective PSE strategies
• How to improve our translation of research to policy and practice
Deaths (thousands) attributable to individual risk factors in both sexes

Danaei G et al, PLoS Medicine, 2009
How Did We Become Inactive?

- Sleep
- Leisure
- Occupation
- Transportation
- Household

www.activelivingresearch.org
We have invested $Billions to make active transport difficult or impossible
Active Transportation by Youth has Decreased Mode for Trips to School – National Personal Transportation Survey

Accelerometer-based MVPA for Adolescents. From Hallal, Lancet, 2012

Time Spent in MVPA
adjusted for age, sex

<table>
<thead>
<tr>
<th>Country</th>
<th>MVPA minutes (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>72.48 (71.62, 73.34)</td>
</tr>
<tr>
<td>Belgium</td>
<td>50.58 (48.52, 52.64)</td>
</tr>
<tr>
<td>Brazil</td>
<td>47.41 (44.81, 50.01)</td>
</tr>
<tr>
<td>Denmark</td>
<td>66.00 (64.80, 67.20)</td>
</tr>
<tr>
<td>Estonia</td>
<td>74.86 (71.84, 77.89)</td>
</tr>
<tr>
<td>Norway</td>
<td>83.57 (79.51, 87.63)</td>
</tr>
<tr>
<td>Portugal</td>
<td>63.28 (61.23, 65.32)</td>
</tr>
<tr>
<td>Switzerland</td>
<td>78.96 (77.56, 80.37)</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>63.84 (63.40, 64.28)</td>
</tr>
<tr>
<td>United States</td>
<td>45.94 (45.54, 46.34)</td>
</tr>
<tr>
<td>Overall (I-squared = 99.9%, p = 0.000)</td>
<td>64.65 (56.50, 72.81)</td>
</tr>
</tbody>
</table>

www.activelivingresearch.org
Obesity is strongly related to walking, cycling, and transit use!

Credit: John Pucher
Elements of An Active Living Community

Community Design Destinations

Transportation System

School & Worksite

Home

Park & Rec
Public Health Needs to Partner

Setting for PA

• Neighborhood

• Transportation facilities (sidewalks)

• Recreation facilities

• Schools & workplaces

Expertise for Policy, Practice

• Planners

• Transport engineers & planners

• Park & rec, landscape architects

• Educators, architects
The Neighborhood Quality of Life (NQLS) Study: The Link Between Neighborhood Design and Physical Activity 2001-2005

James Sallis, Ph.D.
Brian Saelens, Ph.D.
Lawrence Frank, Ph.D.
And team
Accelerometer-based MVPA Min/day in Walkability-by-Income Quadrants

Walkability: $p = .0002$
Income: $p = .36$
Walkability X Income: $p = .57$

* Adjusted for neighborhood clustering, gender, age, education, ethnicity, # motor vehicles/adult in household, site, marital status, number of people in household, and length of time at current address.
Estimated Public Health Impact of Walkability

- 50 minutes per week = 2+ miles per week
- 2 miles per week = 100 miles per year
- 100 miles per year = 10,000 kcal per year
- 10,000 kcal per year = 2.9 pounds/1.3 kg
- More than the average adult weight gain per year in the U.S.
Percent Overweight or Obese (BMI >25) in Walkability-by-Income Quadrants

Walkability: \( p = .007 \)
Income: \( p = .081 \)
Walkability X Income: \( p = .26 \)

* Adjusted for neighborhood clustering, gender, age, education, ethnicity, # motor vehicles/adult in household, site, marital status, number of people in household, and length of time at current address.
Accelerometer-based MVPA Min/day in Walkability-by-Income Quadrants

Walkability: $F=13.74; p = .000$
Income: $F=2.59; p = .108$
Walkability X Income: $F=.001; p = .981$

* Adjusted for gender and age
Outside Activities (except gardening) (min/wk)

(Adjusted for Time, Region, Demographics)

Walkability: $p < 0.008$

Income: $p = 0.04$

Body Mass Index (BMI)

(Amjusted for Time, Region, Demographics)

Walkability: $p = .02$
Income: $p < .03$

% Obese by Neighborhood Type - Children

<table>
<thead>
<tr>
<th>Neighbourhood Type</th>
<th>Low PA, Low N</th>
<th>Low PA, High N</th>
<th>High PA, Low N</th>
<th>High PA, High N</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI in 85th percentile</td>
<td>34.4%</td>
<td>31.6%</td>
<td>28.7%</td>
<td>27.3%</td>
</tr>
<tr>
<td>BMI in 95th percentile</td>
<td>18.8%</td>
<td>15.3%</td>
<td>14.4%</td>
<td>11.7%</td>
</tr>
</tbody>
</table>
We can learn from international studies.
Associations Between Individual Environmental Characteristics and HEPA/Minimal Activity Among Respondents who Live in Cities with Population $\geq 30,000$

Odds Ratio

HEPA/Minimal Activity

Single Family Houses
Shops Near Home
Transit Stop Near Home
Sidewalks Present
Facilities to Bicycle
Low Cost Rec Facilities
Unsafe to Walk due to Crime

'Agree' with Environmental Characteristic
('Disagree' is referent)
Dose Response between Number of Environmental Characteristics and HEPA/Minimal Activity (Pooled City Sample)

Odds Ratio
HEPA/Minimally Active

Total Number of Environmental Characteristics (Zero is referent)

Sallis. Am J Prev Med. 06/09
- Encourage environment and policy research on physical activity worldwide
- Develop & encourage use of common measures and methods
- Support investigators to obtain internal funding
- Coordinate international studies
  - IPEN Adult, funded by NCI
  - IPEN Adolescent, funded by NHLBI
- Communicate findings to decision makers
Belgium, Denmark, Czech Republic, UK, Spain

12 IPEN Adult Countries
IPEN Adult: GIS Walkability Index
9 SDs
Results: Environmental Attributes + MVPA Min/Week

<table>
<thead>
<tr>
<th>GIS-based Environmental Variable</th>
<th>Single variable model</th>
<th>Final adjusted model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net residential density 1km</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Intersection density 1km</td>
<td>*</td>
<td>NS</td>
</tr>
<tr>
<td>Mixed land use 1km (retail &amp; civic)</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Public transit density 1km</td>
<td>**</td>
<td>*</td>
</tr>
<tr>
<td>Number of parks 0.5km</td>
<td>**</td>
<td>*</td>
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</table>
Associations of environmental variables based on 1 km buffers with accelerometry-based estimates of daily minutes of moderate-to-vigorous physical activity
Comparing MVPA by Lowest & Highest Cities on Environmental Variables

• Adults living in the most activity-friendly cities did 68-89 more minutes of MVPA per week compared to those in the least activity-friendly cities

• Living in the most activity-friendly environments could help the average resident achieve 32-59% of the 150 minute/week physical activity guidelines
Design of streetscapes matters
What is the role of streetscape design?

MAPS Mini

- 15-item MAPS-Mini was designed for practitioners and advocates
  - Reduced from 120 items

- Items were selected based on
  - Correlations with physical activity
  - Guidelines and recommendations
  - Modifiability

- Evaluated for validity in 3677 children, teens, adults, older adults
  - 3 regions
### How do MAPS-Mini scores relate to active transportation? ADJUSTED

<table>
<thead>
<tr>
<th>MAPS Mini Score</th>
<th>Children</th>
<th>Adolescents</th>
<th>Adults</th>
<th>Seniors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Segments</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
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<tr>
<td>Public Parks</td>
<td></td>
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<tr>
<td>Transit Stops</td>
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<tr>
<td>Street Lights</td>
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<td></td>
</tr>
<tr>
<td>Benches</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Building Maintenance</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Absence of Graffiti</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sidewalk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffer</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Tree, Awning Coverage</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Absence of Trip Hazards</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Marked Crosswalk</td>
<td></td>
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<tr>
<td>Curb Cuts</td>
<td></td>
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<tr>
<td>Crossing Signal</td>
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<tr>
<td><strong>GRAND SCORE</strong></td>
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<tr>
<td><strong>GRAND SCORE (for Active Transport)</strong></td>
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</tbody>
</table>
Dose-response of MAPS-Mini total scores and active transport frequency for 4 age groups.
A national study of US adolescents (N=20,745)* found a greater number of physical activity facilities is directly related to physical activity and inversely related to risk of overweight.

*using Add Health data

Gordon-Larsen et al, Pediatrics, 2006
http://www.pediatrics.org/cgi/content/full/117/2/417
People are Most Active on Tracks and Walking Paths

Average Number of Park Users

Sedentary
Walking, Moderate & Vigorous

Track, Sidewalk, Gymnasium, Multi-purpose field, Playground, Outdoor Basketball, Lawn, Baseball, Senior Center

Cohen. RAND
Multistate Evaluation of Safe Routes to School Programs

Orion Stewart, MUP; Anne Vernez Moudon, Dr Es Sc; Charlotte Claybrooke, MS

American Journal of Health Promotion

January/February 2014, Vol. 28, No. 3 Supplement  S89
% of SRTS Projects, By Type

% of projects

- Ped bridge
- Bicycle lane
- Shared use path
- Traffic calming
- Bicycle rack
- ADA improvement
- Signage
- Crosswalk
- Sidewalk

Moving Forward: WASH DOT.
http://www.wsdot.wa.gov/research/reports/fullreports/743.3.pdf
Walking & Cycling to School Pre & Post SRTS Projects in 5 States

Moving Forward: WASH DOT.
http://www.wsdot.wa.gov/research/reports/fullreports/743.3.pdf
Can we increase bicycling? According to controlled studies, single cycling interventions don’t work.

Interventions to promote cycling: systematic review

Lin Yang, PhD student; Shannon Sahlqvist, career development fellow; Alison McMinn, career development fellow; Simon J Griffin, assistant director; David Ogilvie, clinical investigator scientist.
Case studies of multi-level, multi-component, multi-year interventions suggest a different conclusion

Increase in Bike Share of Trips in Cities Around the World

Increase in Bike Share of Trips in Cities Around the World

Policy Recommendations

• Zoning/planning laws that require or favor mixed-use, high density development
• Change transportation goals
  – High quality pedestrian and bicycle facilities
• Count pedestrians and bicyclists
• More investment in active transport
• Parks in every neighborhood
• Parks designed to promote activity in all ages
• Invest first in lower-income neighborhoods
Conclusions

• Active cities are designed with walkable neighborhoods, inviting streetscapes, proximal and well-designed parks, safe places to bicycle, and good access to public transit
• The more activity-friendly the city, the more physical activity
• The more activity-friendly the city, the more co-benefits, including economic
• Please advocate for a more active America, but how?
Research is not easy to put into practice
What info do policy makers & advocates need?

• Evidence relevant to CURRENT policy debates
• Evidence of what works
• Evidence relevant to local communities & populations at highest risk
• Evidence communicated in accessible ways
• Follow the money: how much does it cost & what is ROI?
### Co-Benefits of Designing Activity-Friendly Environments

<table>
<thead>
<tr>
<th></th>
<th>Physical Health</th>
<th>Mental Health</th>
<th>Social Benefits</th>
<th>Environmental Sustainability</th>
<th>Safety / Injury Prevention</th>
<th>Economic Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Open spaces / Parks / Trails</strong></td>
<td>57.5+ / 3.5(0)</td>
<td>93+</td>
<td>42.5+ / 4(0)</td>
<td>20+ / 4(0)</td>
<td>23+ / 4(0)</td>
<td>19+ / 4(0)</td>
</tr>
<tr>
<td><strong>Urban Design</strong></td>
<td>105+ / 54(0)</td>
<td>31+ / 4(0)</td>
<td>80.5+ / 29(0)</td>
<td>265.5+ / 45.5(0)</td>
<td>13.5(0)</td>
<td>69+ / 10.5(0)</td>
</tr>
<tr>
<td><strong>Transport Systems</strong></td>
<td>7+ / 3.5-</td>
<td>3+ / 3.5(0)</td>
<td>23+</td>
<td>70+ / 21(0)</td>
<td>67+ / 14(0)</td>
<td>56+ / 3.5(0)</td>
</tr>
<tr>
<td><strong>Schools</strong></td>
<td>19.5+ / 3.5(0)</td>
<td>21+</td>
<td>11+</td>
<td>21.5+</td>
<td>4+ / 3-</td>
<td>15+</td>
</tr>
<tr>
<td><strong>Workplaces / Buildings</strong></td>
<td>55+ / 3.5(0)</td>
<td>18.5+ / 4(0)</td>
<td>20.5+</td>
<td></td>
<td></td>
<td>48+ / 3.5(0)</td>
</tr>
</tbody>
</table>

Designed to Move: Active Cities

Blueprint for city leaders to create an active city

- Comprehensive summary of the evidence base on co-benefits
- Proven interventions
- Recommendations, checklists, practical steps/ideas, sample metrics
- Talking points for city leaders
- Case studies of ‘bright spots’

- www.designedtomove.org/resources
ALR: Communicating Results to Non-Researchers

• Website: about 12,000 visits per month
  – Research briefs are widely downloaded
  – MOVE blog
• Webinar series: www.dialogue4health.org
• ALR electronic Newsletter to list of 5000+
• Facebook, Twitter, Youtube
• Partnerships, presentations
Good feedback from infographics

THE ROLE OF Parks and Recreation IN PROMOTING PHYSICAL ACTIVITY

RACIAL DISPARITIES

70% & 81%

of African-American neighborhoods of Hispanic neighborhoods
lack recreation facilities, compared to 38% of white neighborhoods.

PROPERTY VALUES

Homes near parks can sell for up to $2,262 more than homes without parks nearby.

TRAILS

A study in Nebraska found that for every $1 spent on trails, there was almost $3 in savings in direct medical costs.

OPEN SPACE

Youths in neighborhoods with 7 recreational facilities were 26% more likely to be active 5 times per week than those in areas without facilities.

Research Translation Grant: Active Transport to School: Keshia Pollack

• Audiences
  – School principals
  – City elected officials
  – City agency directors
  – School and City police
  – Community members

• Messages
  – Routes to school have physical hazards and violence
  – Feasible solutions are Walking School Buses, streetscape improvements

• Tactics
  – Package findings for key audiences.
  – Briefing with City Council.
  – Meeting with Schools and City Police.
  – Write Op Ed
Lessons We Are Learning

• It is difficult to communicate research. Simplify results. Collaborate with communication professional/journalist
• Select researchers with interest & skill in communication. We consulted quarterly to provide frequent input.
• Some investigators are uncomfortable in translation role
• Create permanent products in multiple media
• Promote via traditional & new media
• Partnerships with key organizations, not just promotion
• Difficult to evaluate