Proximity of Parks and Schools Is Associated with Physical Activity in Adolescent Girls

An Ancillary Study to The Trial of Activity in Adolescent Girls (TAAG)
Funded by NHLBI, Grant R01HL71244; Office of Minority Health
Background and Methods

• TAAG is a school-based, national randomized controlled intervention trial whose goal is to increase PA among adolescent girls.

• 6th grade girls recruited from 36 schools in 6 cities across the US. (n= 1,603)

• Wore accelerometers for 1 week.

• Geocoded their address and studied their neighborhoods and the relationship of neighborhood features to PA, as measured by the accelerometer.
Methods

To understand how different neighborhoods might be associated with PA, we analyzed the data hierarchically with girl as the center of her own neighborhood.

1) Sites
2) Schools
   % free lunch (by school)
3) Girls
   Controlled for:
   Neighborhood SES,
   Neighborhood % African American
   Neighborhood % Hispanic
   Girl’s race/ethnicity
Neighborhood Size

We looked at neighborhoods using:
- Census block group
- Census tract
- Traffic analysis zone (TAZ)
- ¼ mile circular radius (girl’s home as centroid)
- ½ mile
- 1 mile;
- ¼ mile along street network
- ½ mile
- 1 mile

Results are based upon ½ mile circular radius
Overlay of TAAG Neighborhood Definitions
Minneapolis, MN

Columbia, SC
Mean Miles From School Along Street Network

Baltimore
Columbia
Minneapolis
New Orleans
San Diego
Tucson

Mean distance from school
Range
% Girls living within 0.5 and 1 mile of school

- Baltimore
- Columbia
- Minneapolis
- New Orleans
- San Diego
- Tucson

Percent

0 5 10 15 20 25

1/2 mile 1 mile
Outcome: MET-Weighted MVPA

(moderate to vigorous physical activity)

- Differentiates slow from brisk walking (1500 cut point)
- Weights the intensity of exercise

(2 + 0.0017*accelerometer counts/30 seconds)

- Counted blocks of time after 3 pm Monday-Friday and all day Saturday and Sunday (Non school hours)
- Use minutes of MET-weighted MVPA per week.
### Greater Distance from School Related to Lower Physical Activity

<table>
<thead>
<tr>
<th>Distance To School</th>
<th>Difference in MET-Weighted MVPA</th>
<th>95% C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1/2 mile reference</td>
<td>-45 minutes/week</td>
<td>(-117, 38)</td>
</tr>
<tr>
<td>½-5 miles</td>
<td>-96 minutes/wk</td>
<td>(-170, -6)**</td>
</tr>
<tr>
<td>&gt; 5 miles</td>
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</table>
Potential Mechanism

• More time commuting, less free time.

• The few students who live close probably do walk to school.
Types of Parks Visited
(definition from Mertes & Hall, 1996, NRPA)

97 Mini parks
234 Neighborhood parks
139 Community parks
24 Large urban parks
25 Sports complexes
136 Natural resource areas
52 Special use facilities
707 Total

+710 Schools/ schoolyards
Average number of parks near girls’ homes

Number of parks

Baltimore  S. Carolina  Minneapolis  New Orleans  San Diego  Tucson

1/2 mile radius
1 mile radius

6/2/04  23
Total Parks Associated with MET-Weighted MVPA

<table>
<thead>
<tr>
<th>Radius</th>
<th>Coefficient</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mile radius</td>
<td>1.68**</td>
<td>10.2 min</td>
</tr>
<tr>
<td>0.5 mile radius</td>
<td>3.13**</td>
<td>18.8 min</td>
</tr>
<tr>
<td>0.25 mile radius</td>
<td>3.24**</td>
<td>19.5 min</td>
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Proximity to More Parks Associated with MET-weighted MVPA

![Bar chart showing the relationship between the number of parks and MET-weighted MVPA minutes. The chart indicates that proximity to more parks is associated with an increase in MET-weighted MVPA.]

- 1 park: Estimate
- 2 parks: +57 min
- 3 parks: +57 min
- 4 to 5 parks: +111 min
- >5 parks: +111 min
**Neighborhood Parks Contribute More to PA**

Compared to other parks:

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Parks</td>
<td>3.46</td>
<td>20.8 minutes</td>
</tr>
<tr>
<td>Neighborhood Park</td>
<td>6.38**</td>
<td>37.8 minutes</td>
</tr>
</tbody>
</table>
Neighborhood Parks (5-10 acres) & MET-Weighted MVPA

Extra minutes of MET-Weighted MVPA

0 1 2 3

+214 min

estimate
We visited all parks (n=707) within a 1 mile radius of girls homes and documented the existence of a variety of facilities, including

- playgrounds, (play equipment for Children< 10 yrs)
- basketball courts,
- tracks,
- fields,
- and other features.
Playgrounds

% of girls who have a playground within 0.5 miles of their home
% of girls who have a basketball court in a park within ½ mile of their home
% of girls who have a multi-purpose field within ½ mile of their home
Parks and facilities

- Parks with only basketball: 8 (2%)
- Parks with only fields: 28 (6%)
- Parks with only playgrounds: 59 (12%)
- Parks with none of above 3 facilities: 133 (26%)
- Parks with 2 or more of above: 277 (55%)
Effect Sizes for Parks With Specific Facilities

Extra minutes of MET-Weighted MVPA

- Playgrounds: +27.4
  - Basketball: +30.1
  - Fields: +28.7

6/2/04
Validating findings: 3D PAR

During the last 3 days of wearing the CSA monitor, girls completed a 3-D PAR, reporting when and where they engaged in various activities.
What Kind of Physical Activity?

Girls' Recorded Activities

- Any PA: 90%
- Basketball: 9%
- Play: 6%
- Field Games: 8%

Percentage of Girls
All Physical Activity

- Home: 55%
- Community: 18%
- School: 8%
- Public: 7%
- Other: 12%
Basketball

Home 74%
School 2%
Community 11%
Public 9%
Other 4%
Playing with Younger Children

Home 76%
School 1%
Community 12%
Public 4%
Other 7%

School 1%
Field Games

- Home 42%
- School 8%
- Community 35%
- Public 4%
- Other 11%
More Work to be Done…

1. Only a small portion of girls are active in community settings.

2. Community settings can explain a small portion of total MET-weighted MVPA.

3. Still need to connect individual girls who are active to community settings. – Appears that it could explain the observed variation.
   Are parks a venue for girls’ physical activity? Or, or do they help make PA more normative?
Summary

- Greater distance from school associated with less MVPA
- Greater density of parks associated with more MVPA
- Park relationship appears to be specific to neighborhood playgrounds
- Park facilities (basketball, fields, playgrounds) appear important to MVPA
Limitations

• Cannot rule out selection bias—Active families might choose to live near parks and schools.

• Only one age and gender group

• We don’t have consistent findings across all geographies—some associations at one level, are absent at others.
Prevention Paradox

“A preventive measure that brings large benefits to the community offers little to each participating individual.”

- Geoffrey Rose

Effect sizes of parks on PA are relatively small, but potentially influence everyone in the neighborhood.
Conclusion

• Proximity to school and proximity to neighborhood parks are associated with physical activity in middle school-aged girls

• This study provides support for specific community/neighborhood structural features as an intervention to increase physical activity and improve health