Assessing influence of peer interaction on physical activity among youth by measuring peer proximity with mobile technology.

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Buijs, L.  
Smit, S.  
Buijzen, M.  

ISPAH 2016, Bangkok
Are youngsters more active when they are together?
• Promoting a healthy lifestyle for children and adolescents.

• Focus on physical activity → Social network intervention
Wearable lab
Smartphone

- Communication with Fitbit and server
Smartphone

- Assessment of social network
  - Friendship nominations
Smartphone

- Questionnaires (e.g. Daily food intake)
Smartphone

- Social platform
- Pictures (e.g. media exposure or food)
- Objective measure of social network
  - We termed this *the beacon network*
Beacon network
Beacon network
my movez

VOOR EEN GEZONDE LEVENSTIJD BIJ KINDEREN

Maastricht Universiteit
Beacon network
Nominated Beacon network
Are youngsters more active together vs. alone?
The big differences

- Automatic detected peer presence
  - 297533 observations
  - Max classmates = 85
- Self nominated peer presence
  - 12787 observations
  - Max classmates = 29

<table>
<thead>
<tr>
<th>Beacon network</th>
<th>detected</th>
<th>undetected</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Nominated beacon network</td>
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<tr>
<td>detected</td>
<td>10695</td>
<td>2092</td>
<td>80.44%</td>
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<tr>
<td>undetected</td>
<td>286838</td>
<td>0</td>
<td>3.73%</td>
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<tr>
<td>Total</td>
<td>3.73%</td>
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</table>
The sample

- N=994 (467 boys, 534 girls)
- Mean age = 11.51 (SD = 1.35)

- N= 235 (82 boys, 153 girls)
- Mean age = 11.90 (SD = 1.10)

>80% participation per classroom

At least:
- Fitbit data
- Friendship nominations
The sample

Average steps boys vs. girls

Steps per minute

Boy

Sex

Girl
The sample

Average steps per minute per age category

<table>
<thead>
<tr>
<th>Age</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
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<tbody>
<tr>
<td>Steps per minute</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
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## The sample

<table>
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<th>Estimate (SD)</th>
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<tr>
<td>Age</td>
<td>-1.46 (.16)</td>
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Three research questions

1 Are youngsters more active when they are together?
   - social facilitation

2 When together, does group size reduce physical activity?
   - impression management

3 When together, what is the influence of friends vs non-friends?
Question 1

- Are youngsters more active when they are together compared to when they are alone?
- Compare PA at timeslots when youngsters are together vs. alone
The sample

Average steps per minute per time category

- preschool
- break1
- break2
- postschool
- home
Nominated Beacon data

Average steps alone vs. together

Steps per minute

Setting

Alone

Together
Based on self nominations, youngsters who are together are more active.
Question 2

• Are youngsters less active when group size increases?
• Compare PA and the number of classmates around

Number of classmates → Steps per minute
Beacon data
Distribution of Beacon data
Beacon data
Distribution of Beacon data
Beacon data

<table>
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<th></th>
<th>Estimate (SD)</th>
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<tbody>
<tr>
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<tr>
<td>Gender</td>
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<tr>
<td>Age</td>
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Mean number of classmates = 13.16
Nominated Beacon data
Distribution of nominated Beacon data
Nominated Beacon data
### Nominated Beacon data

<table>
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<tbody>
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<tr>
<td>Age</td>
<td>-.18 (.72)</td>
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<td>.80</td>
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</table>

Mean number of classmates = 10.98
Question 3

- And does it matter whether the peers are friends or not?

Number of classmates

Number of friends

Steps per minute
<table>
<thead>
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<th>Estimate (SD)</th>
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<th>p</th>
</tr>
</thead>
<tbody>
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<td><strong>Number of classmates</strong></td>
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<td>.001</td>
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<tr>
<td><strong>Gender (0=boy,1=girl)</strong></td>
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<tr>
<td><strong>Age</strong></td>
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<tr>
<td><strong>Number of friends</strong></td>
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<td>.82</td>
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<td><em><em>#classmates</em> #friends</em>*</td>
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<td>.44</td>
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## Nominated Beacon data

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<td>.02 (.13)</td>
<td>1.16</td>
<td>.25</td>
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<tr>
<td>Gender (0=boy,1=girl)</td>
<td>-4.26 (1.71)</td>
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<tr>
<td>Age</td>
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<tr>
<td>Number of friends</td>
<td>.92 (.52)</td>
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<td>#classmates* #friends</td>
<td>-.04 (.02)</td>
<td>-1.55</td>
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</table>
Conclusions and discussion

• Based on self nomination, youngsters are more active when they are together vs. alone.

• The more classmates are detected, the more active youngsters are. Indication of more crowded places/places that you are more active?

• No effect of the number of friends who are close.

• The automatic detection of classmates heavily overestimates the classmates which they spend time with.

• The influence of the time categories

• Missing participants because of low participation in the class.

• Cycling data
Contact information

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Smartphone

- Cycling activities (not in this data yet)