Social network intervention to promote physical activity in youth

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Communication and Media

BSI Day 2017, Berg en Dal
Promoting a healthy lifestyle for children and adolescents.

Focus on physical activity
Social network intervention:
MyMovez Wearable lab
Fitbit Flex

Monthly Totals:
- 281,194 steps
- 0 floors
- 210.10 km
- 87,807 calories

Totals:
- 13,914 steps
- 0 floors
- 10.37 km
- 2,995 calories
Smartphone

- Communication with Fitbit and server
Smartphone

- Communication with Fitbit and server
- Assessment of social network
  - Friendship nominations
Smartphone

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- Assessment of social network
  - Friendship nominations
- Questionnaires (e.g. Daily food intake)
Smartphone

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- Assessment of social network
  - Friendship nominations
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- Social platform (Social Buzz)
Smartphone

- Communication with Fitbit and server
- Assessment of social network
  - Friendship nominations
- Questionnaires (e.g. Daily food intake)
- Social platform (Social Buzz)
- Pictures (experience sampling)
Smartphone

- Communication with Fitbit and server
- Assessment of social network
  - Friendship nominations
- Questionnaires (e.g. Daily food intake)
- Social platform (social Buzz)
- Pictures (e.g. media exposure or food)
- GPS coordinates (cycling)
Smartphone

- Communication with Fitbit and server
- Assessment of social network
  - Friendship nominations
- Questionnaires (e.g. Daily food intake)
- Social platform (social Buzz)
- Pictures (e.g. media exposure or food)
- GPS coordinates (cycling)
- Objective measure of social network
  - We termed this *the beacon network*
Beacon network
Beacon network
Beacon network
Study 1: Together is more active?
Steps per minute

Beacon network

Alone

Together
Study 1: Together more active?

- Boys: 20
- Girls: 40

Steps per minute

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Sex
Study 1: Together more active?

Steps per minute

Age

Behavourial Science Institute

Radboud University
Study 1

• Youngsters are more active when they are together with classmates, but what about friends?

• And are the youngsters more active because they are together, or are they together because they are active?

Study 2

• Social network approach

• Understand how similarity in physical activity among friends occurs
Similarity in physical activity

Selection

Influence
### Selection

Do youngsters select friends based on physical activity levels?

<table>
<thead>
<tr>
<th>Youngster</th>
<th>T1 Activity</th>
<th>T2 Activity</th>
<th>T3 Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youngster A</td>
<td>Active</td>
<td>Active</td>
<td>Active</td>
</tr>
<tr>
<td>Youngster B</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Youngster C</td>
<td>Active</td>
<td>Active</td>
<td>Active</td>
</tr>
</tbody>
</table>
Influence

Do youngsters select friends based on physical activity levels?

Do youngsters influence the amount of physical activity of friends?

<table>
<thead>
<tr>
<th></th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youngster A</td>
<td>Active</td>
<td>Active</td>
<td>Active</td>
</tr>
<tr>
<td>Youngster B</td>
<td>Moderate</td>
<td>Active</td>
<td>Active</td>
</tr>
<tr>
<td>Youngster C</td>
<td>Moderate</td>
<td>Inactive</td>
<td>Inactive</td>
</tr>
</tbody>
</table>

friends
non-friends
Girls
Boys
active
inactive
Social network of a class over time

Wave 1

Wave 2

Wave 3
Social network of a class over time

Wave 1

Wave 2

Wave 3
Social network of a class over time
### Network effects

<table>
<thead>
<tr>
<th></th>
<th>SE</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>outdegree (density)</td>
<td>-1.6205</td>
<td>-4.4470</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>reciprocity</td>
<td>0.9664</td>
<td>8.6906</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>transitive triplets</td>
<td>0.1900</td>
<td>10.1604</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>3-cycles</td>
<td>-0.0670</td>
<td>-2.0120</td>
<td>.044</td>
</tr>
<tr>
<td>indegree - popularity (sqrt)</td>
<td>-0.2351</td>
<td>-2.5307</td>
<td>.011</td>
</tr>
<tr>
<td>outdegree - activity (sqrt)</td>
<td>0.3655</td>
<td>3.0585</td>
<td>.002</td>
</tr>
<tr>
<td>out-out degree^(1/2) assortativity</td>
<td>-0.1169</td>
<td>-2.6874</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Alter</td>
<td>-0.0112</td>
<td>.2409</td>
<td>.809</td>
</tr>
<tr>
<td>Ego</td>
<td>-0.1303</td>
<td>2.8891</td>
<td>.004</td>
</tr>
<tr>
<td>Similarity</td>
<td>0.7313</td>
<td>2.0261</td>
<td>.042</td>
</tr>
<tr>
<td>Same sex</td>
<td>0.7365</td>
<td>7.6400</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

### Behavior effects

<table>
<thead>
<tr>
<th></th>
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<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear shape</td>
<td>0.1634</td>
<td>2.1903</td>
<td>.029</td>
</tr>
<tr>
<td>Quadratic shape</td>
<td>-0.0424</td>
<td>-.6263</td>
<td>.53</td>
</tr>
<tr>
<td>Total similarity</td>
<td>0.0302</td>
<td>.2240</td>
<td>.82</td>
</tr>
<tr>
<td>Effect from sex</td>
<td>-0.2420</td>
<td>1.7398</td>
<td>.08</td>
</tr>
</tbody>
</table>
### Network effects
- Similarity: [Selection effect!] 0.7313 (0.3519) 2.0261 .042

### Behavior effects
- Total similarity: [Influence effect!] 0.0302 (0.1348) .2240 .82
Study 2

• There is similarity within friends
• Without intervention, friends do not influence the physical activity of friends

Study 3

• Pilot study: mobile social network intervention
• Based on the intervention by Crystal, but mobile
Pilot study

- One secondary school
  - 5 intervention classes
  - 6 control classes

- Baseline (Nov 2016)
  - assess network and determine PI’s

- Intervention (Dec 2016)
  - Approach and train PI’s at day 1

- 28 influencers: 15% per class (gender matched)
Pilot study

• Who to choose as a peer influencer?
  - Centrality
    – Indegree
    – Betweenness
    – Closeness

• How to persuade and train the peer influencers
Pretest to match the language of the target audience: Captains

Provide information and fun facts to the peer influencers
Train the peer influencer how (s)he can influence the physical activity of friends

Ask for their personal strategies and preferences

[Self determination]
Create commitment by asking whether they accept the role of team captain
Take home message

- When youngsters are together with classmates, they are more physically active than when they are alone.

- There is similarity in physical activity of friends, caused by selection effects.

- We still have a lot of work to do!
Contact information

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