

# “Hidden” social networks in behaviour change interventions

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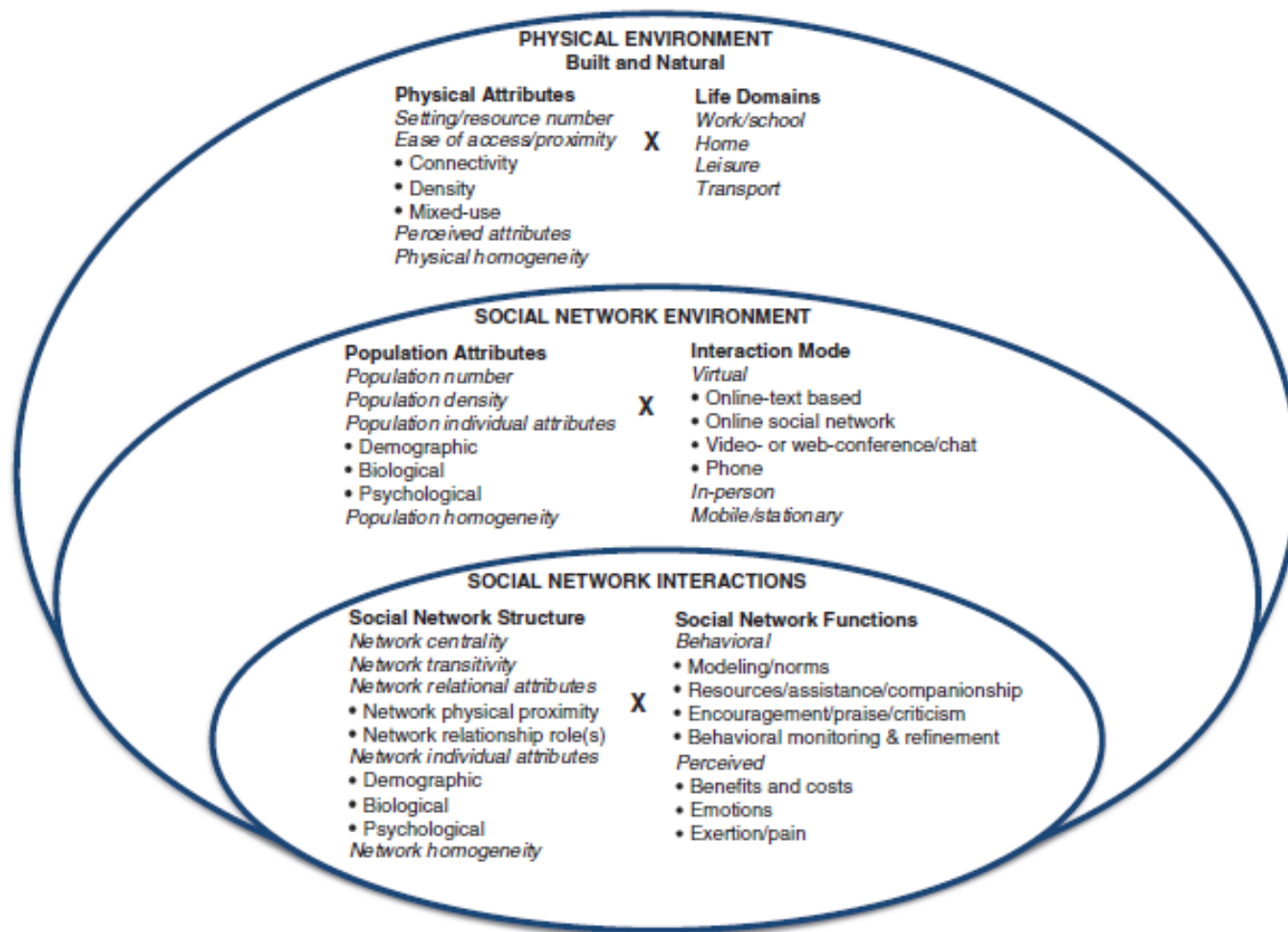
Queen’s University Belfast, Northern Ireland

# Social Networks

- Social structure – social “actors” – ties between them
- Everyone is embedded within a social network (friends, family, work colleagues).
- Influence our health and behavioural choices.
- Purported modifiable mediator of physical activity behaviour change
  - social regulation of behaviour by others in the network
  - exchange of social support
  - social influence (altering behaviour to that of our friends)
  - social selection (friends with those who are similar to us)

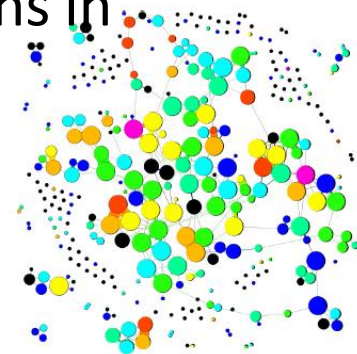


# Social Networks for Activity Promotion (SNAP) Model



# “Hidden” Social Networks

- Complex interventions – unintentional and unobserved consequences
- Many interventions do not account for the interaction among individuals....
- ...and how such interactions may affect intervention outcome
- So-called “hidden” networks
  - overlooked
  - unobserved
  - under-utilised in behaviour change interventions
- Need to capture such social networks and interactions in behaviour change interventions



# Aim



**"I'm the least popular girl in school.  
I only have 735 Facebook friends!"**

1. Investigate evidence of social networks within intervention;
2. And, if evident, what are the characteristics and evolution of the network structure over time

# The PAL Scheme

The Physical Activity Loyalty Card Scheme



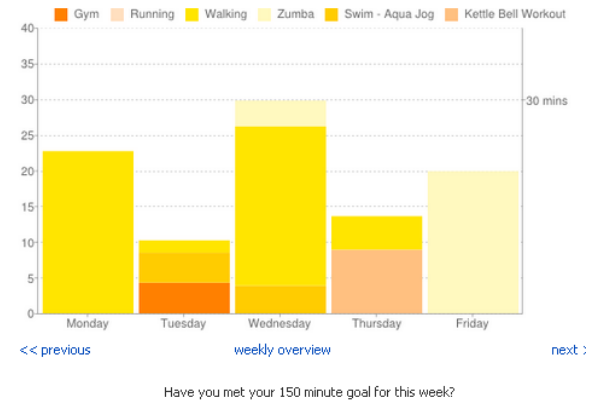
## RFID Tagging



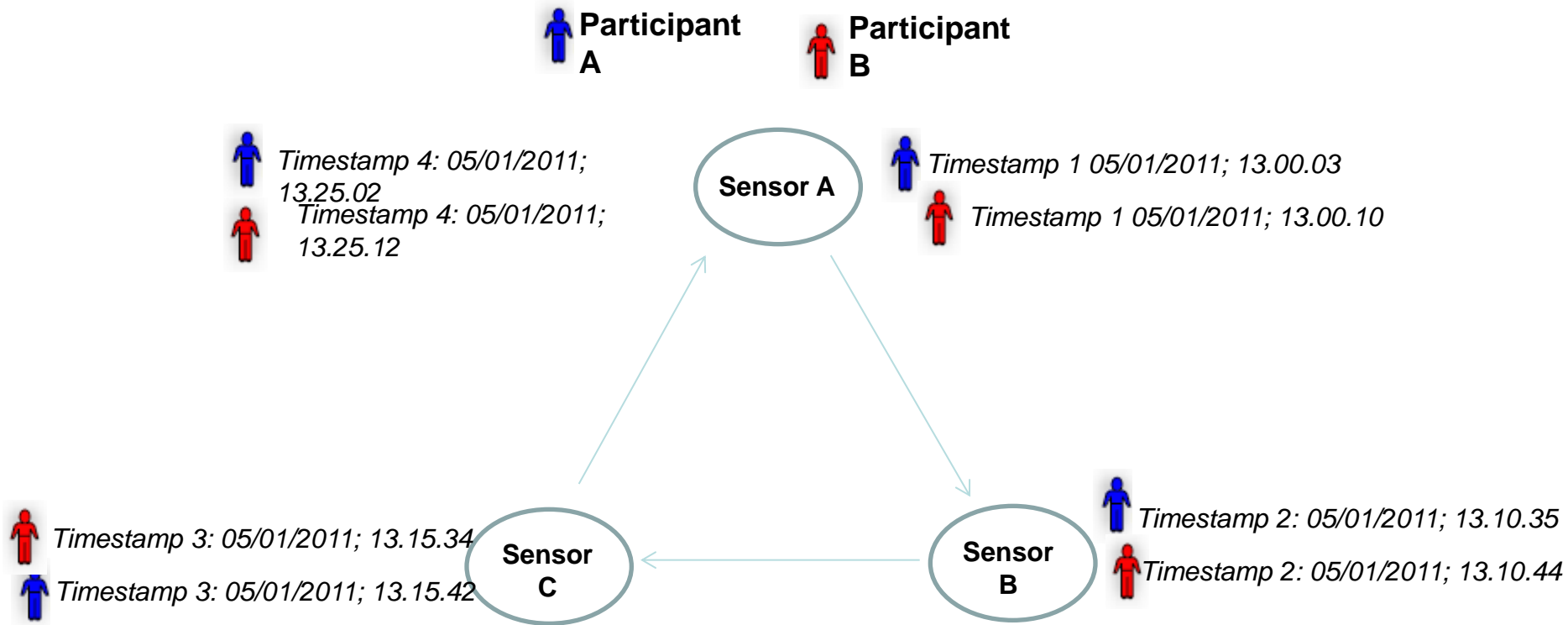
## Study website



## Physical Activity



# Capturing Social Networks



**Social interactions inferred by card scans:**

- (1) on the same day**
- (2) at the same sensor (at least 3 or more co-occurrences)**
- (3) timestamps within 10 seconds**



# Methodology



## Recruitment:

- N=406 recruited
- 12-week intervention
- Baseline, week 12 and 6 months
- Amount of activity (subj+obj)
- Health and wellbeing
- Self-efficacy
- Work absenteeism

## Analyses:

### Network parameters:

- Network density
- Degree centrality
- Triadic census
- Number of social ties
- Strength of social ties
- Stability of social ties

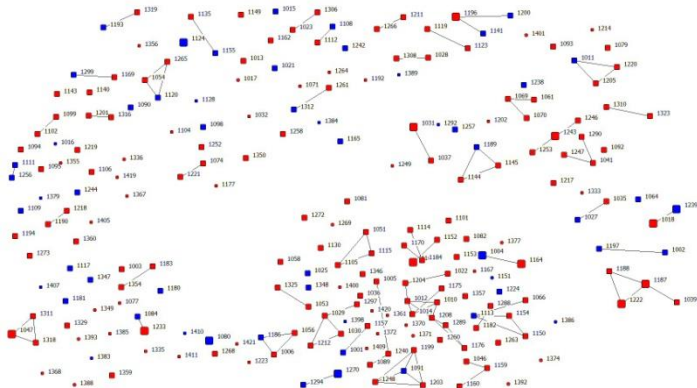
## Randomly allocated to:

- **Incentive Group:** participants monitored their PA levels, collected 'points' and earned rewards;
- **No Incentive Group:** participants used their PAL card to monitor PA levels (no points, no rewards).





# Dynamic nature of social networks

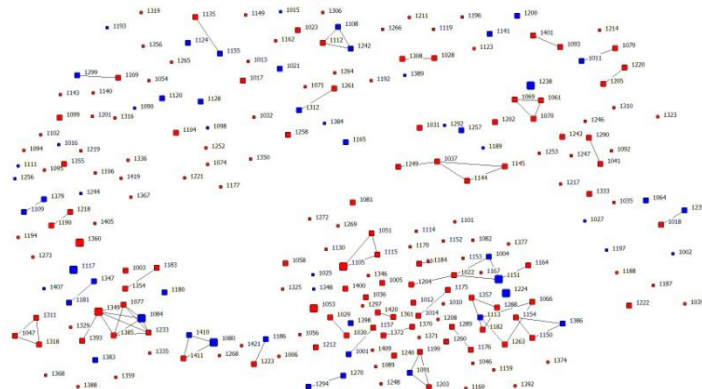
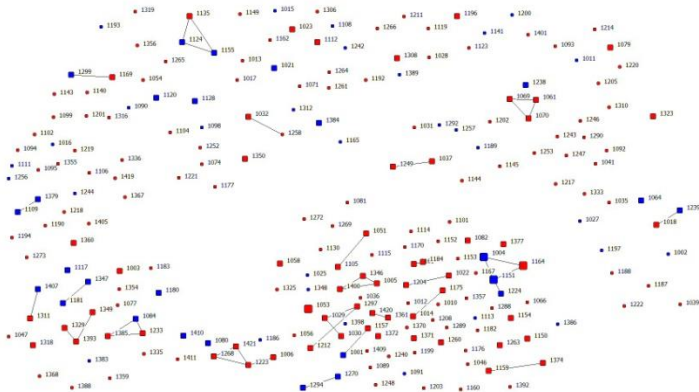


## Week 1

- n=176 social ties
- Strength of social ties = 1050
- Mean strength of social ties = 6.0
- Jaccard Index = 8%

## Week 6:

- n=138 social ties
- Strength of social ties = 1016
- Mean strength of social ties = 7.4
- Jaccard Index = 28%



## Week 12:

- n=80 social ties
- Strength of social ties = 562
- Mean strength of social ties = 7.0
- Jaccard Index = 36%

# Take Home Messages

- Evidence of “hidden” social networks
- Evidence that these networks are dynamic and change over short timeframes
- Evidence that they influence behaviour
- Must be measured and accounted for in interventions and subsequent analyses
- Identification of assumed pathways of change
- Impact of analyses in real-time to influence intervention

Undertake development work and pilot testing necessary to adequately design, implement and evaluate social network enabled interventions

## 1. Theory

- Systematic Review
- Behaviour Change Techniques and Social Network Functions
- ***Social network analysis***

## 2. Modelling

- ***Agent-based modelling***
- Stakeholders and users
- Optimal design

## 3. Pilot Testing

- Workplace setting
- Mixed methods

# Acknowledgements

Thanks for listening

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## “Hidden” Social Networks in Behavior Change Interventions

Ruth F. Hunter, PhD, Helen McAneney, PhD, Michael Davis, PhD, Mark A. Tully, PhD, Thomas W. Valente, PhD, and Frank Kee, MD

We investigated whether “hidden” (or unobserved) social networks were evident in a 2011 physical activity behavior change intervention in Belfast, Northern Ireland. Results showed evidence of unobserved social networks in the intervention and illustrated how the network evolved over short periods and affected behavior. Behavior change interventions should account for the interaction among participants (i.e., social networks) and how such interactions affect intervention outcome. (*Am J Public Health*. Published online ahead of print January 20, 2015: e1–e4. doi: 10.2105/AJPH.2014.302399)