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The Importance of Social Networks in explaining Childhood Obesity

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Project Aims

- Understanding the concept of social networks / peer acceptance
- How far can this go in explaining the prevalence of childhood obesity?
- What insights can the modelling results give us?

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Survey results: How many friends?

- Obese children appear to have slightly fewer friends than not obese children although this is not materially different

Type of friends	Not obese	Obese
Best friends	4	3
Good friends, not best	9	8
Friends I've met	12	11
Acquaintances	21	20

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Survey results: Classmates

- Question: Classmates
  - How would you describe your classmates?

    Weigh lot more, little more, same, little less, lot less
  - Answer – almost all, most, half, some, hardly any
- Issue: Responses not cross consistent – children over-categorise
- Answer: Results show obese children are more likely to respond that classmates are also obese
  - Obese children – 50% of classmates obese
  - Not-obese children – 17% of classmates obese

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Survey results: Siblings

- Question: Siblings
  - How would you describe your brothers and sisters?

    Weigh lot more, little more, same, little less, lot less

    Question asked for older, younger, brother and sister
- Issue: Quantity of responses low
- Issue: Type of response biased
- Answer: Results show that obese children are more likely to respond that siblings are also obese:
  - Obese children – 24% of siblings obese
  - Not-obese children – 10% of siblings obese

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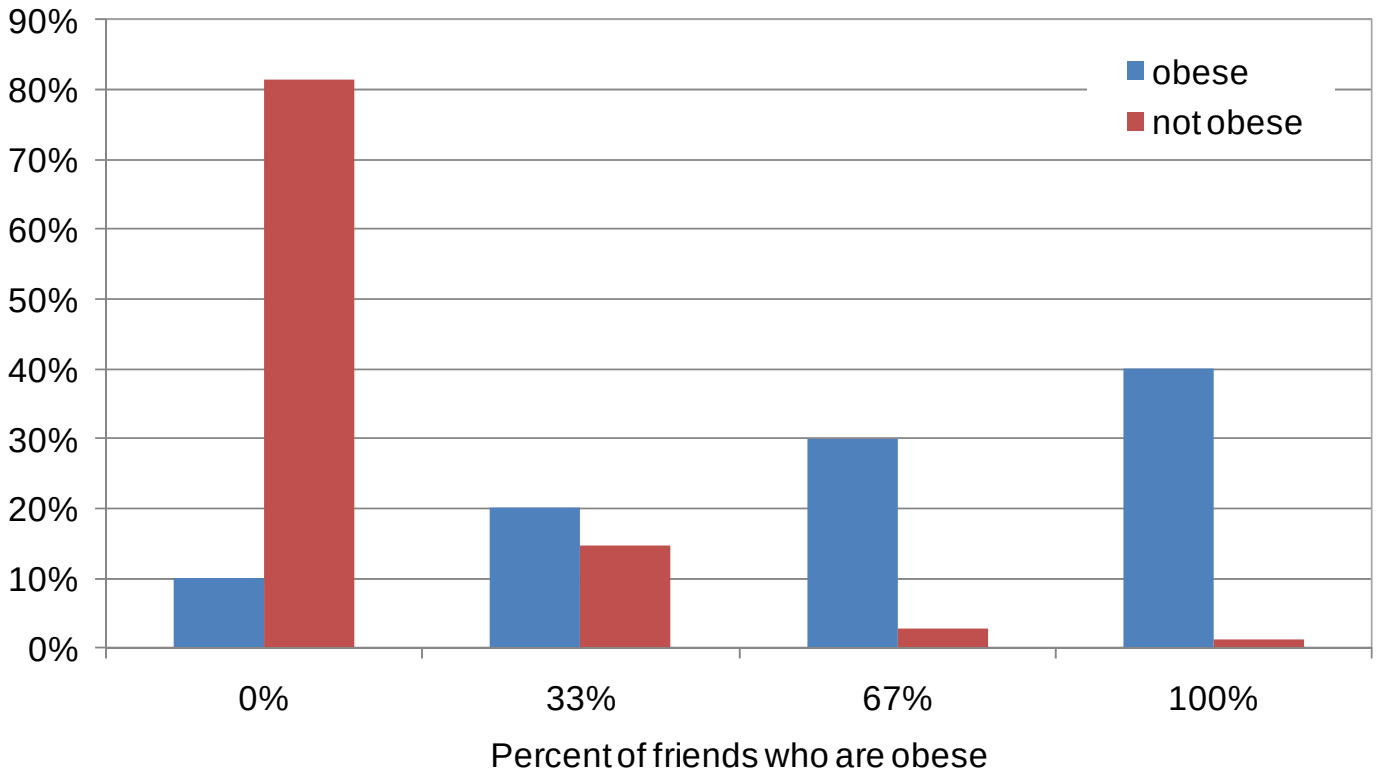
Survey results: Friends

- Question: Friends
  - For each of your three best friends, how would you describe them?

    Weigh lot more, little more, same, little less, lot less



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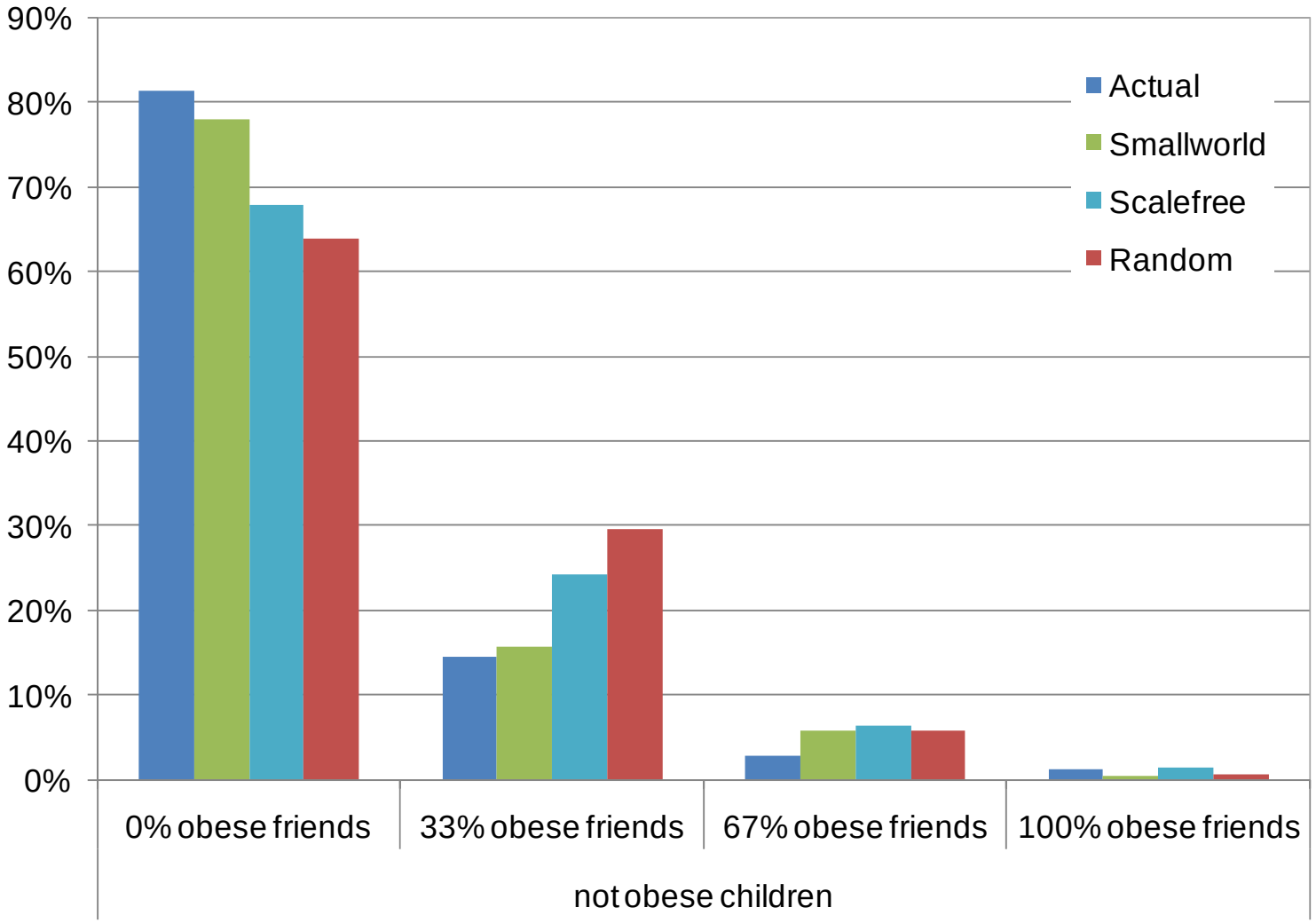
Network Results: Not obese children

- Smallworld network explains not obese children very well



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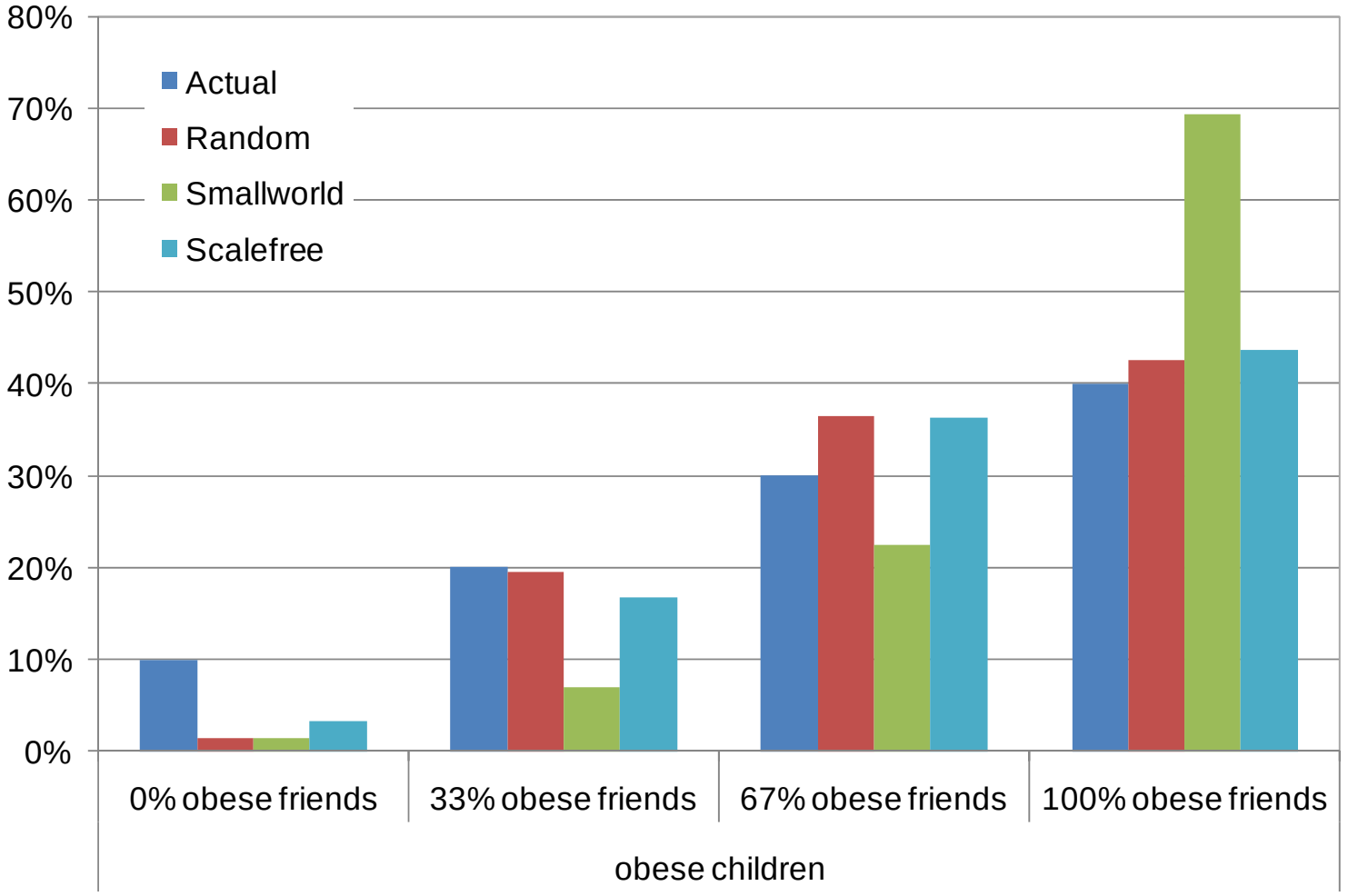
Network Results: Obese children

- Random network explains obese children better
- All struggle to match the level of interaction across children



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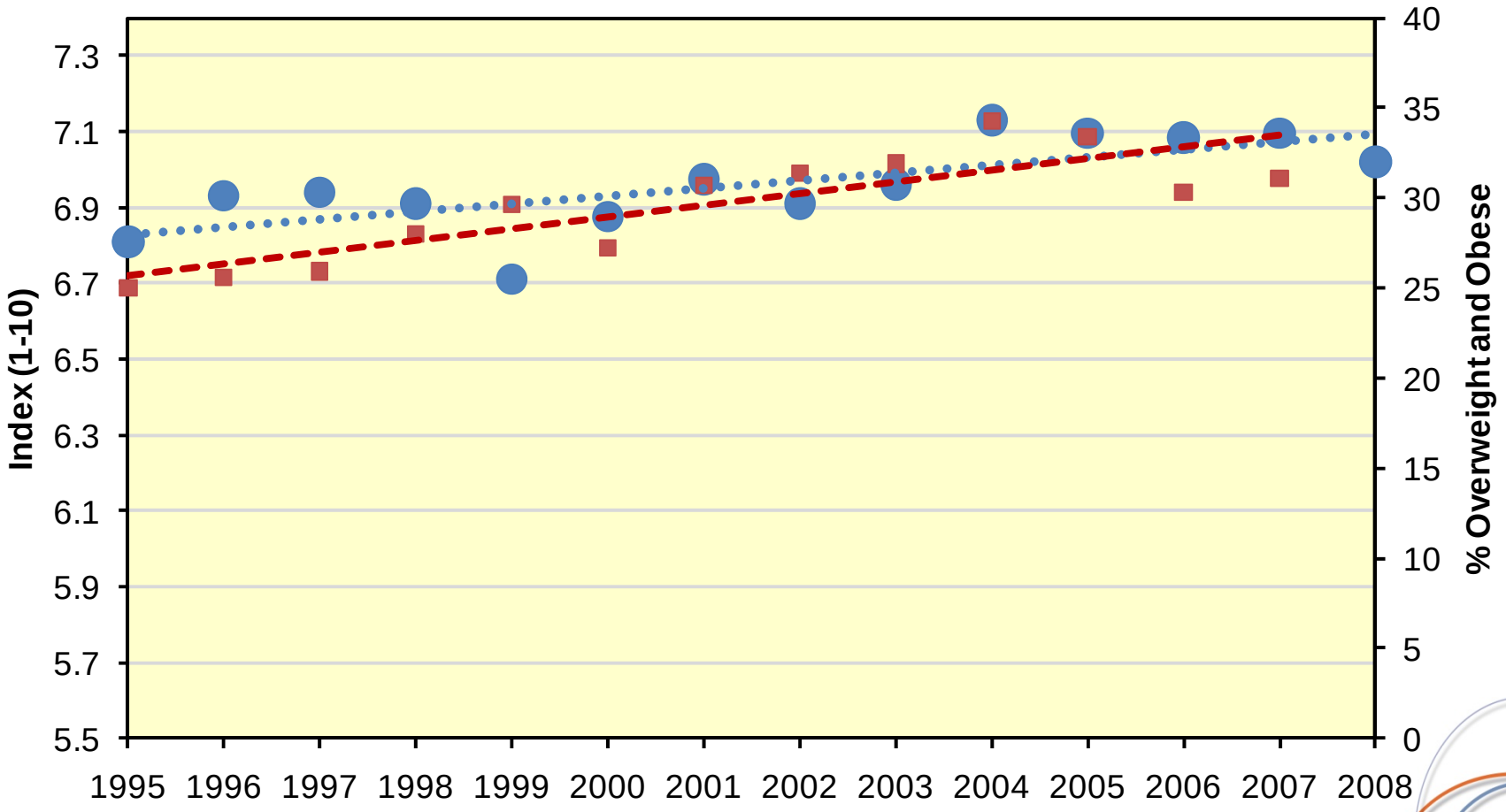
Other factors: Happiness

- Can other factors explain child obesity?



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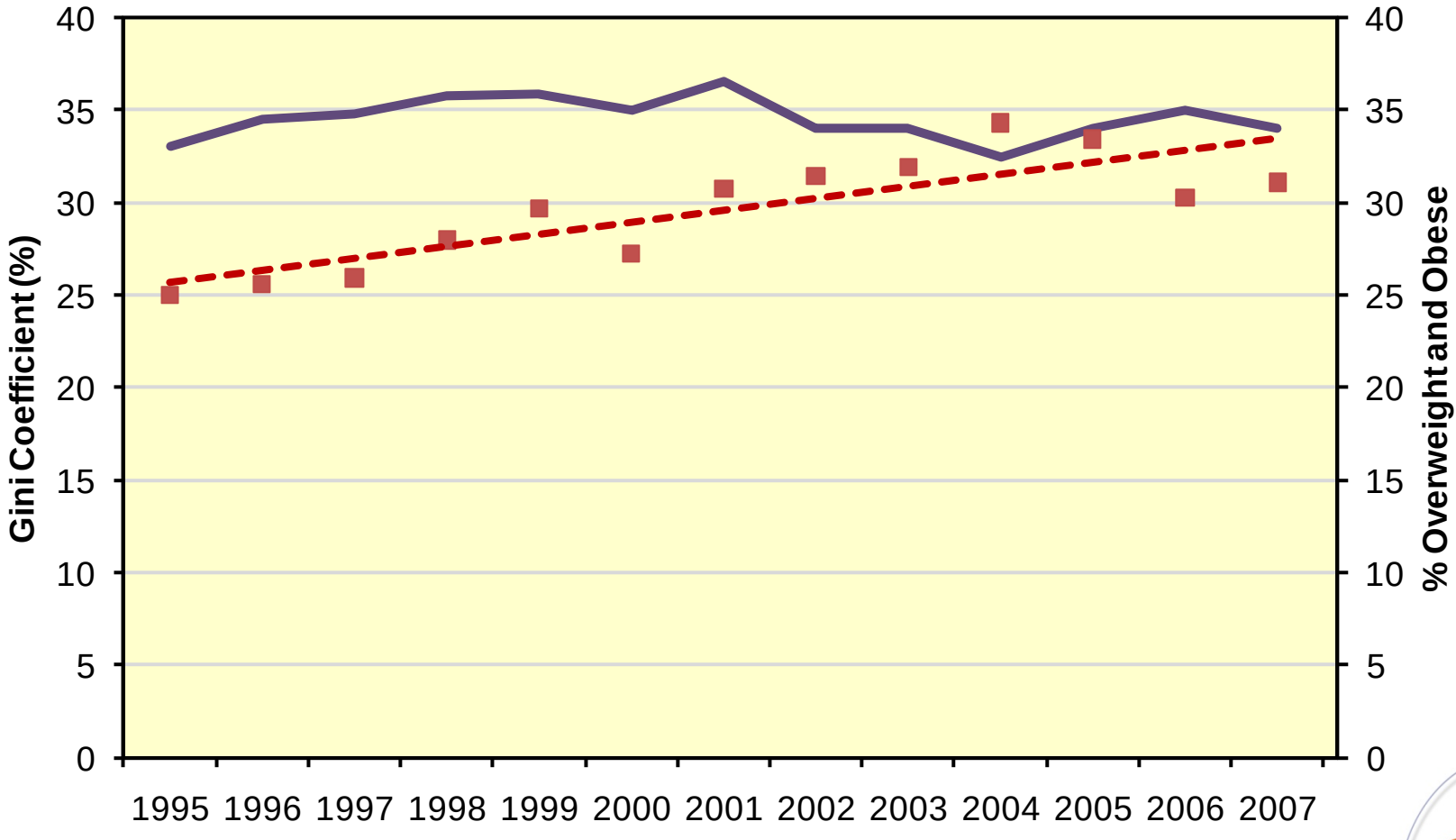
Other factors: Inequality



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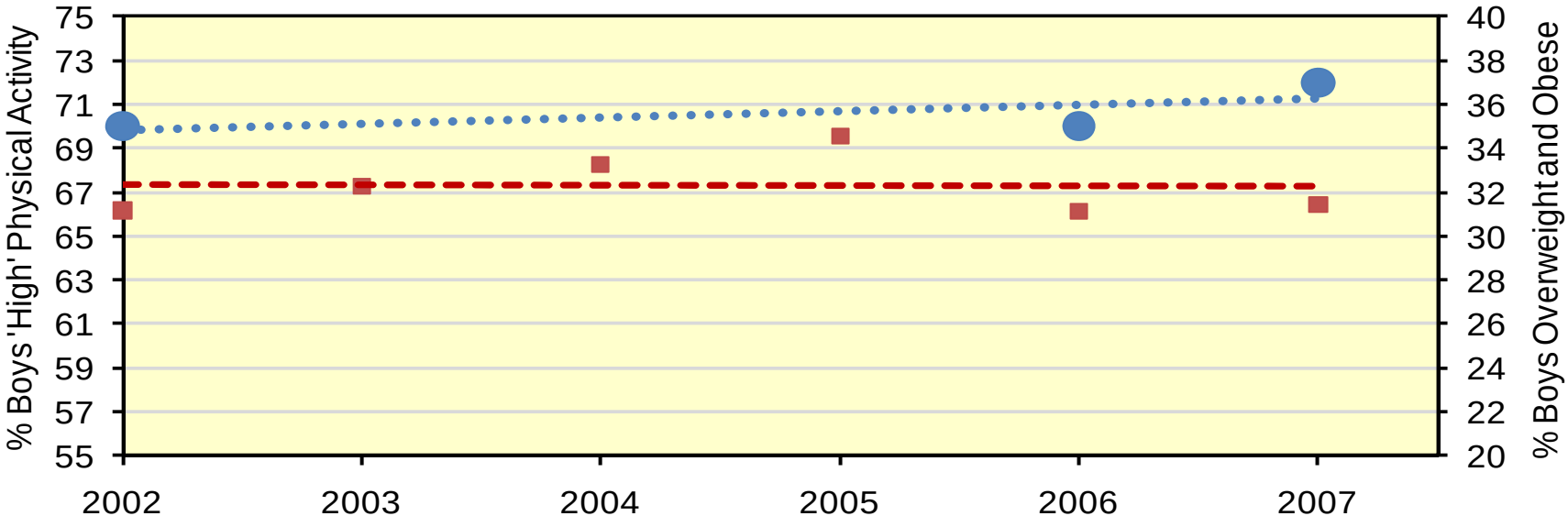
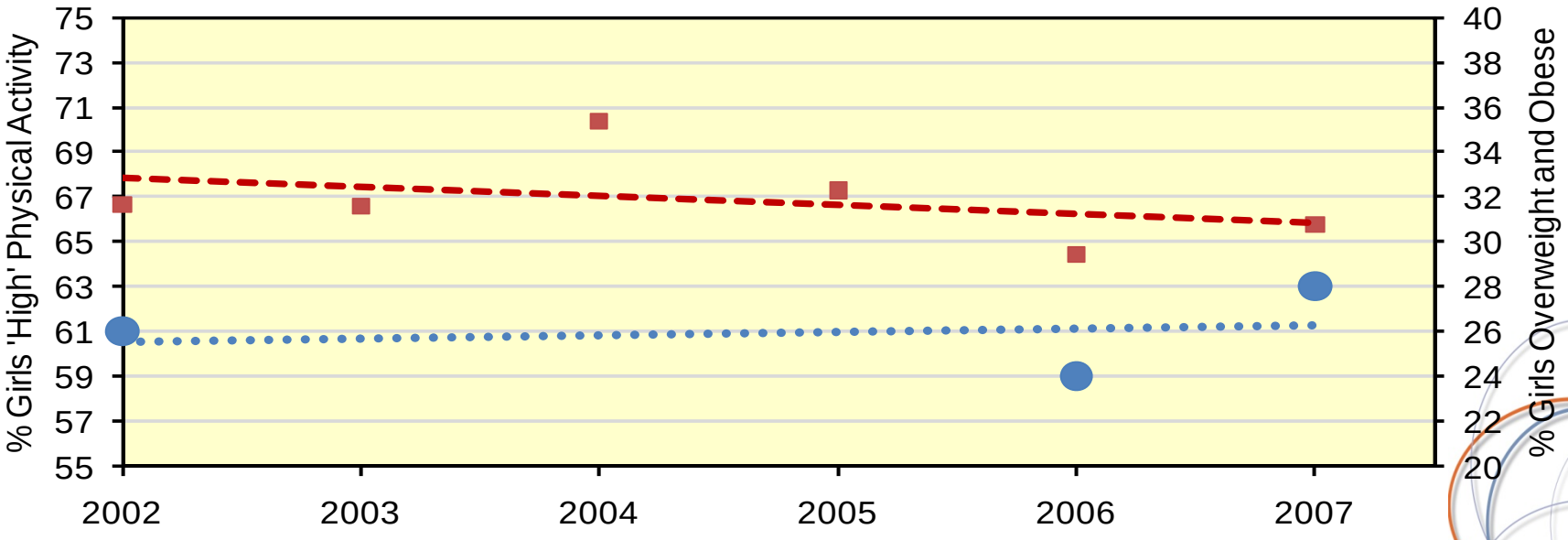
Other factors: Physical Activity





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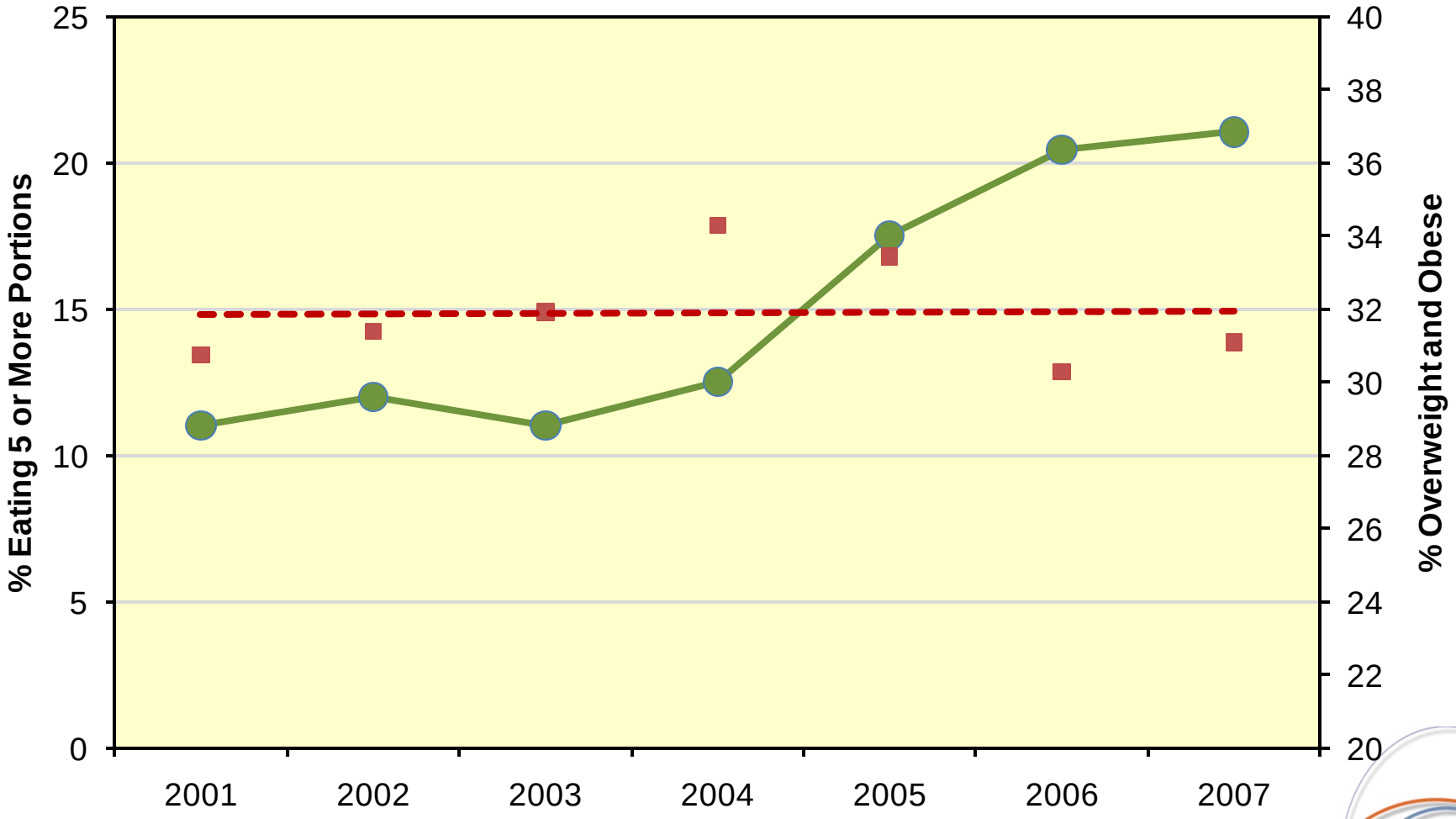
Other factors: Healthy Eating



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Model Insights

- Peer acceptance is better at explaining child obesity than all other factors considered
- Non obese children have tightly structured overlapping friends of friends networks
- Obese have less structure to friendship networks, less segregation between obese and not obese than expected
- Tight structure of non obese is holding the obese in place. Implies encouraging them to promote the benefits could be an effective way of drawing in the obese

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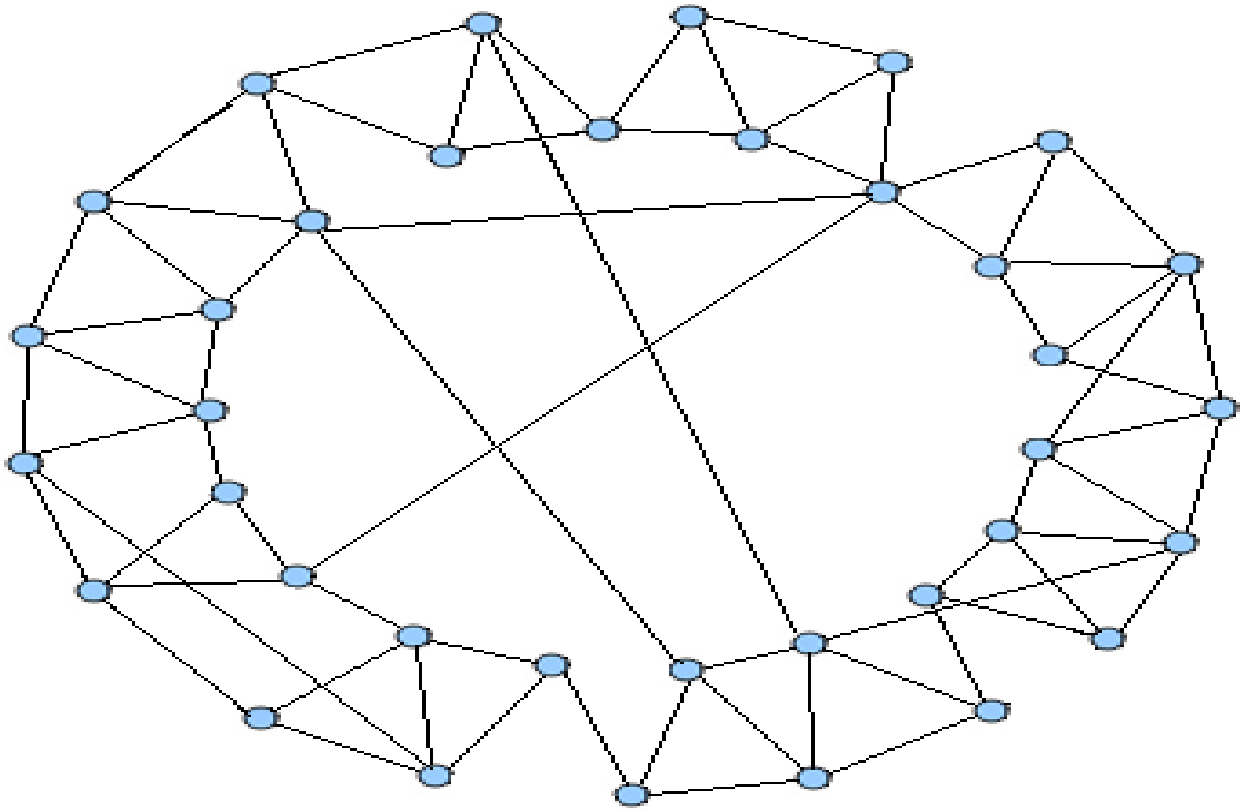
Network Analysis – how it works

- Agents can be in one of two states 0 or 1 – obese or not obese
- Initially all agents are in state 0
- A small number are chosen at random to be in state 1
- Can this spread through the network to match the observed proportion (18.8%) of obese children?
- Each agent has a peer acceptance threshold which describes their likelihood to switch from state 0 to 1
- Each agent switches from 0 to 1 if the proportion of agents it is connected to in that state is above this
- Solve model N times, observe distribution of outcomes
- Do the results match the observed survey results?

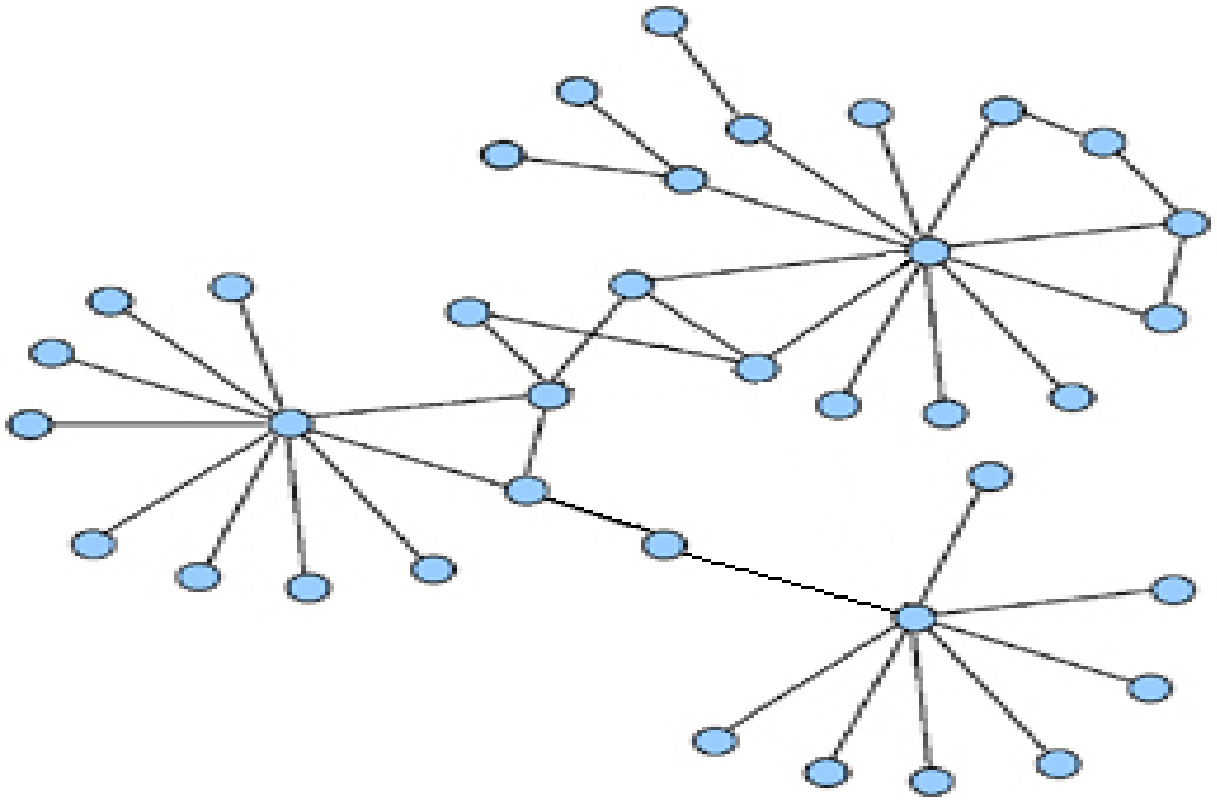
Types of Network: Smallworld

- People are connected by short chains of acquaintances
- A proportion is rewired to introduce long distance links
- Most social influence networks are smallworld



Types of Network: Scalefree

- Popular people with lots of links combined with people with very few social contacts
- Examples of a scalefree networks are academic citations



Types of Network: Random

- Connections made at random with no formal structure