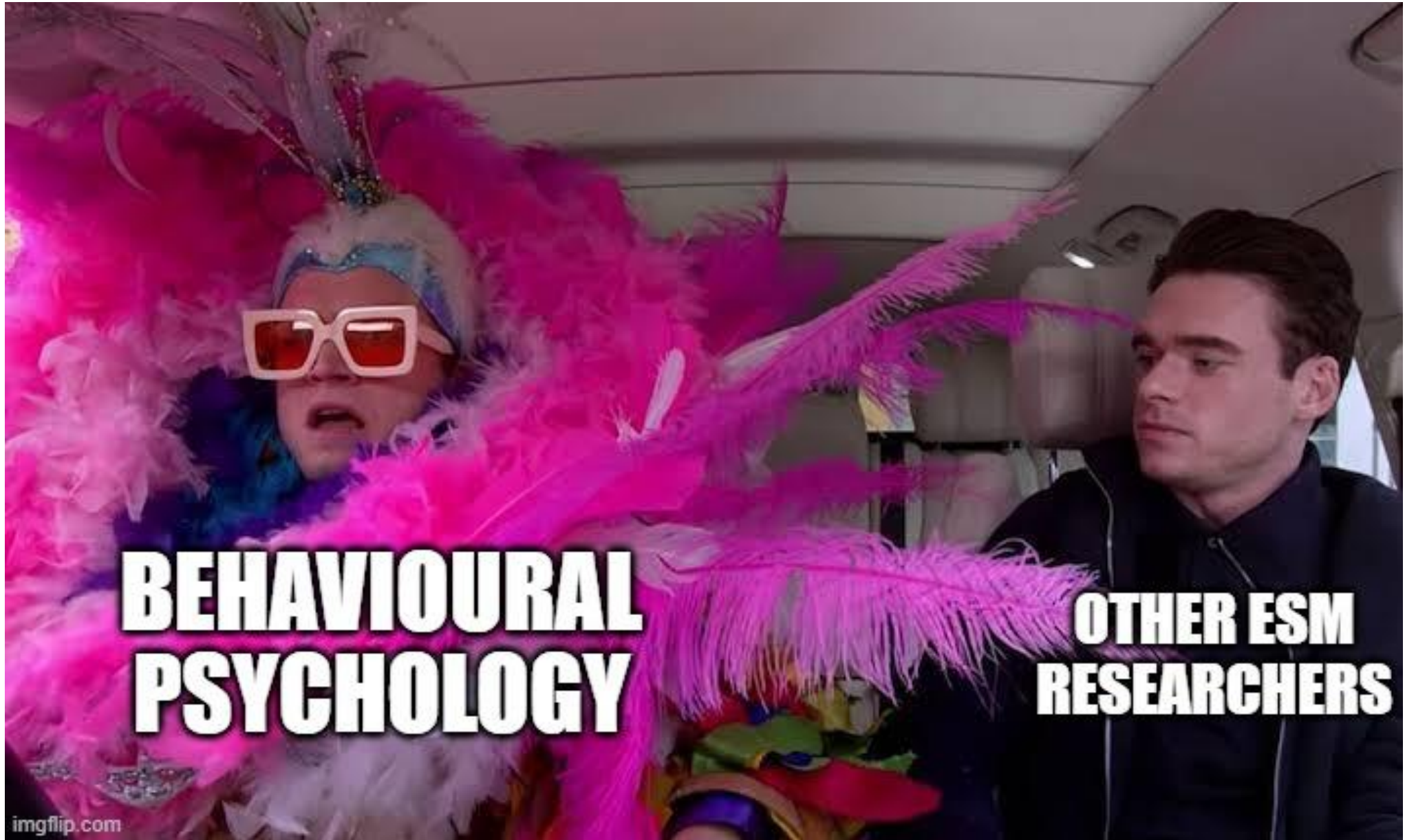


# **Human behaviour in energy system models - perspectives from a behavioural psychologist**

Lars Even Egner (NTNU/ IFE)

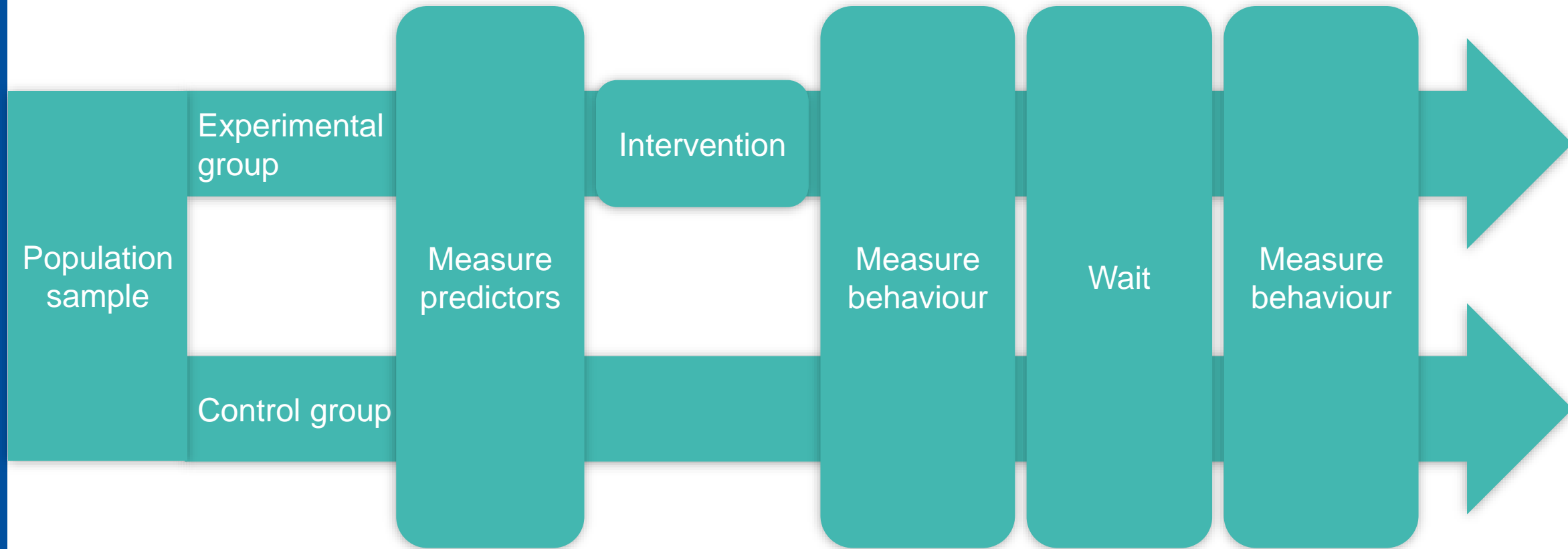


# What I will talk about

- Methodological difficulties of predicting meaningful consumer energy behaviour.
  - Energy retrofiting
  - Home PV system
  - EV charging patterns
- How to incorporate behaviour in ESM's regardless.
- How not to do it.

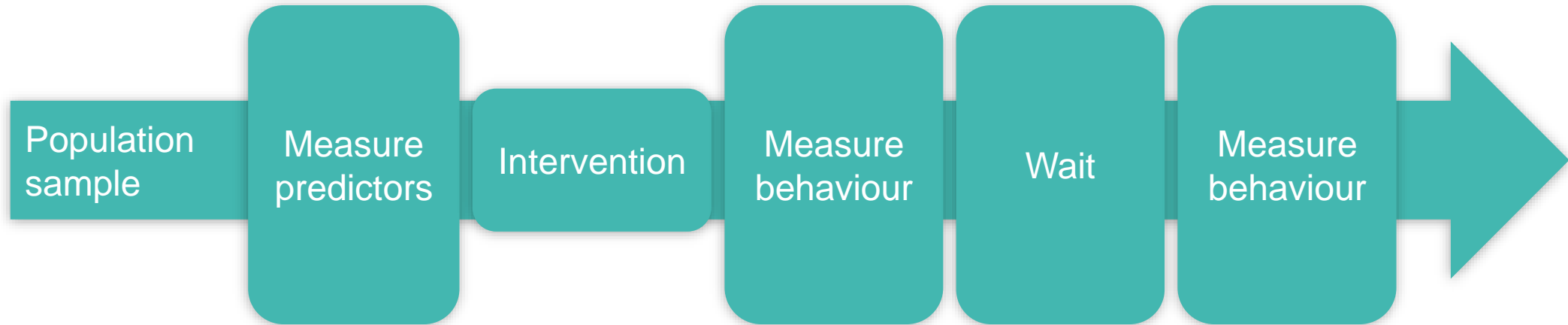


# Ideal behavioural psychology situation



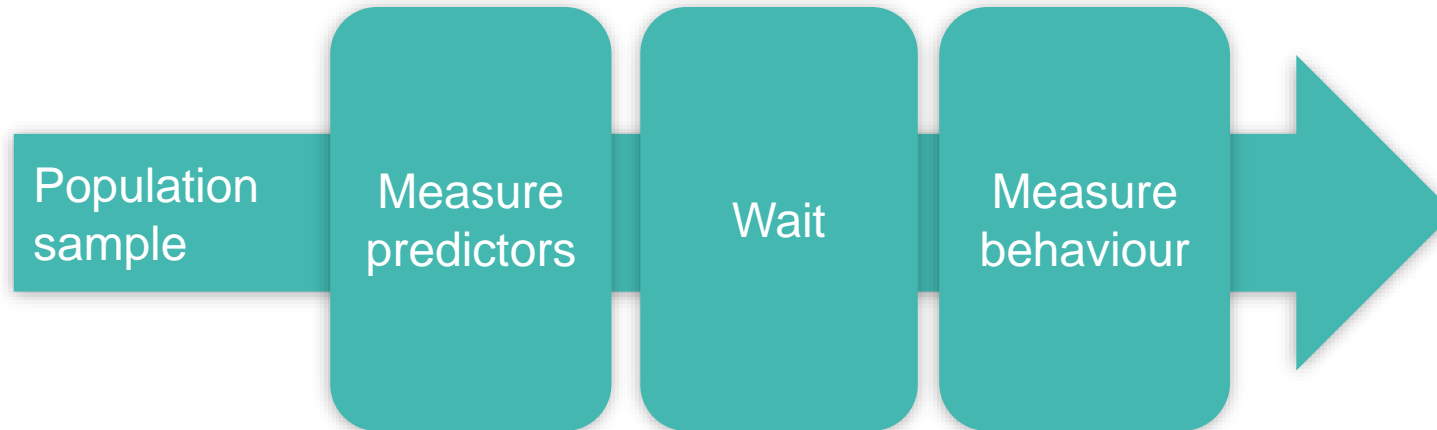
But does the municipality want to roll out a policy for half its population?

# Sub-optimal behavioural psychology situation



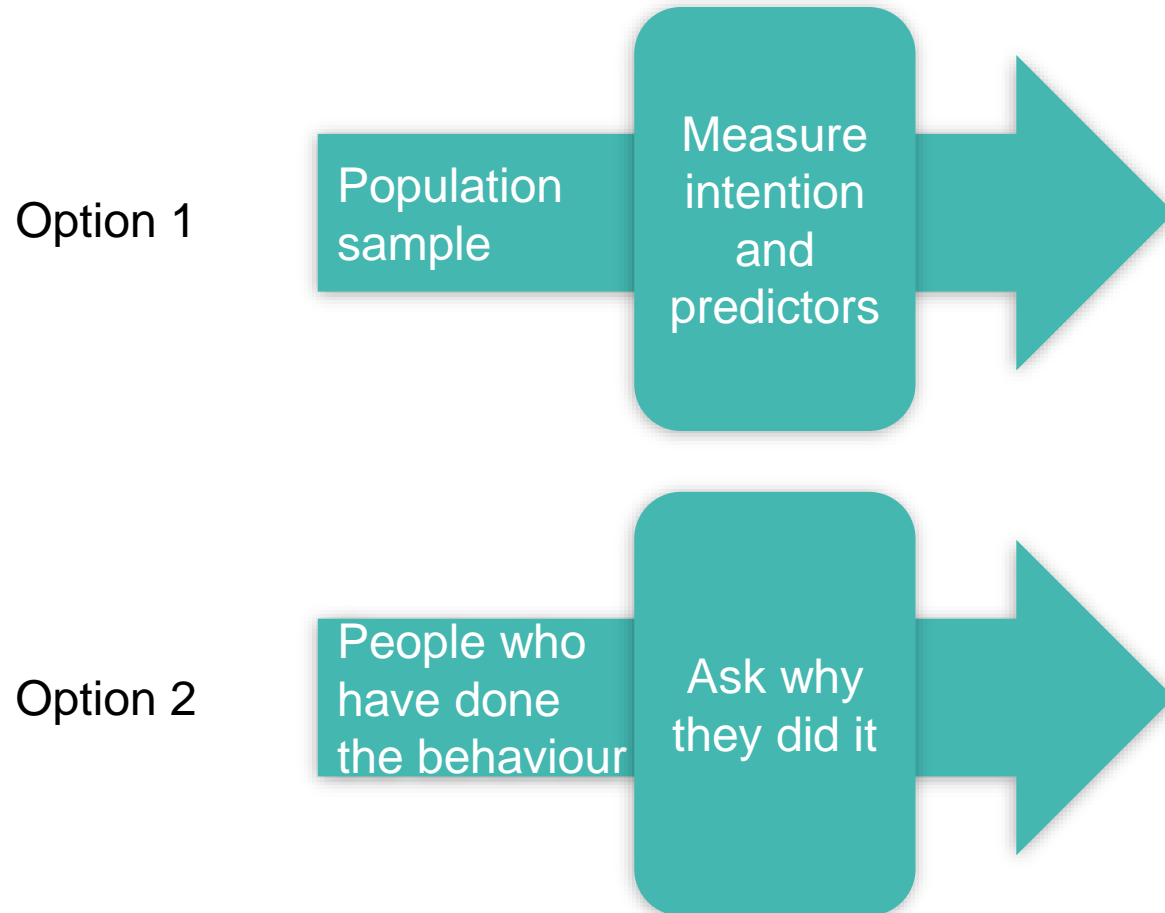
But do you really have funding to roll out any meaningful intervention for thousands of people?

# Sub-optimal behavioural psychology situation



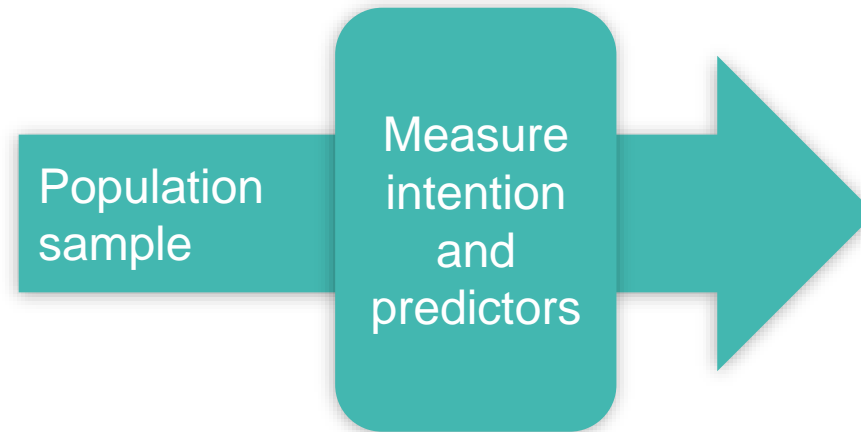
Lower frequency behaviour requires larger samples. 1% rate, 50 cases, means  $N=5000$ .  
Are you gonna make 5000 people answer a follow up survey?

# The situation in most energy behaviours



# The problem with option 1

- Relies mostly on intention, which explain generally explain 28% of the variance of behaviour ( $R^2$ ).
- We don't really know the real number for energy behaviour.





# The problem with option 2

- Assume people know why they did something.
- Choice-supportive misremembering.
  - Previous behaviour/ choices are recalled as more obvious, rational, and generally “good”.



# The problem with option 2

- The only certain predictor will be demographical variables measured in this group, e.g. age/sex/location/family situation.
  - Unfortunately these variables are pretty bad predictors compared to other factors.

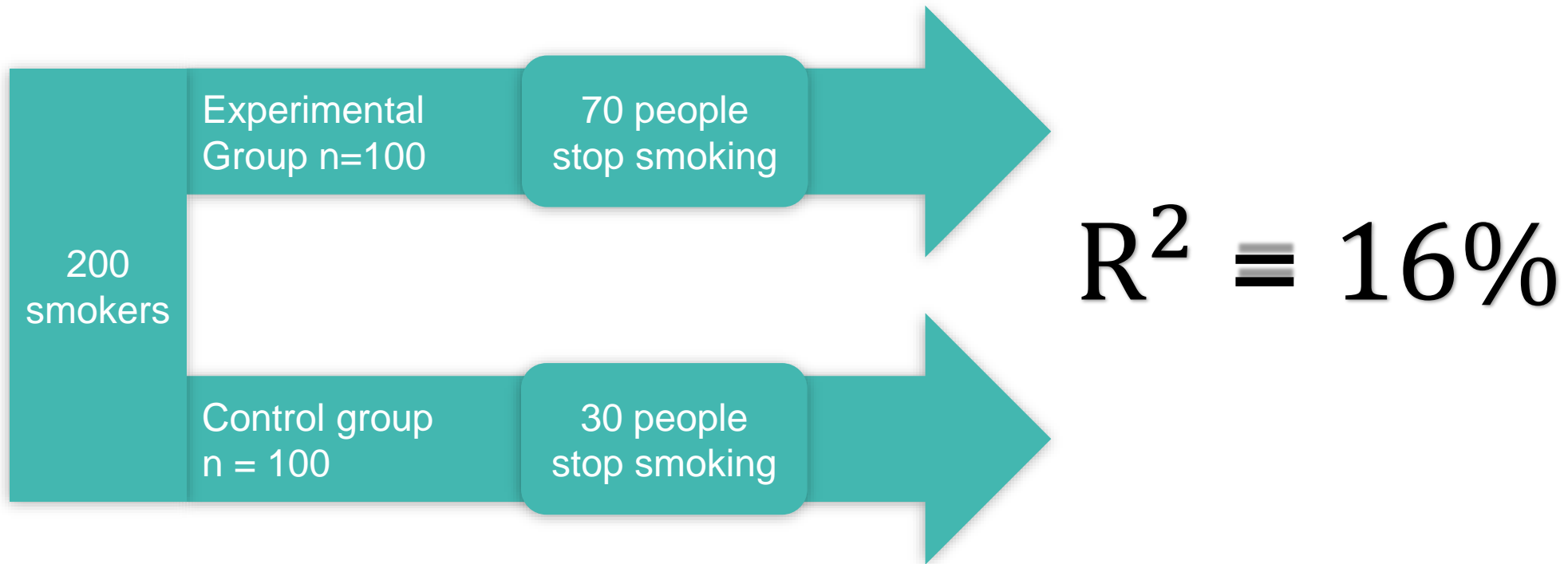


# What we currently have

- One method that at best predicts  $R^2=28\%$  of the behaviour.
- One method that measures stuff that rarely predict anything.

# What does $R^2 = 28\%$ even mean?

- More than you probably believe



“High  $R^2$  is a privilege reserved for the theoretical sciences”  
 – My favorite biologist

# How to incorporate behavioural science?

Apply general behavioural theories developed and tested for other behaviours

Theory of planned behaviour;  
Diffusion of innovation;  
Bounded rationality utility maximization;  
HUMAT (ABM only)

Rely on predictors (of intention) for the specific behaviour

Correlation matrixes;  
Regression tables;  
Complete models  
(Can be difficult to convert)

Include behavioural scientists

Ask them to generate a plausible behavioural systems  
  
Don't expect anywhere near perfect prediction

# How not to do it

- Homebrew your own behavioural theory based on some interviews and what “makes sense”.
  - You wouldn’t trust an energy system made by me.
- Assume everyone in the model is an omnipotent economist whose sole purpose in life is to die as rich as possible
  - At least include some bonded rationality
- Read about one behavioral theory from the 70’s and base the entire model on that

# In short

- Behaviour psychology is difficult to do in meaningful energy behaviour.
- Perfectly predicting behaviour isn't a thing
- Base the models behaviour on (1) existing theory (2) existing intention prediction and/or (3) behavioural researchers you include in the project.