

Gold standard of evidence: Randomized Control Trial 101

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What is the health effect of exercising?

Independent variable:

Dependent variable:

What is the health effect of exercising?

Independent variable: whether someone exercises or not

Dependent variable:

What is the health effect of exercising?

Independent variable: whether someone exercises or not

How much time per week does someone spend exercising?

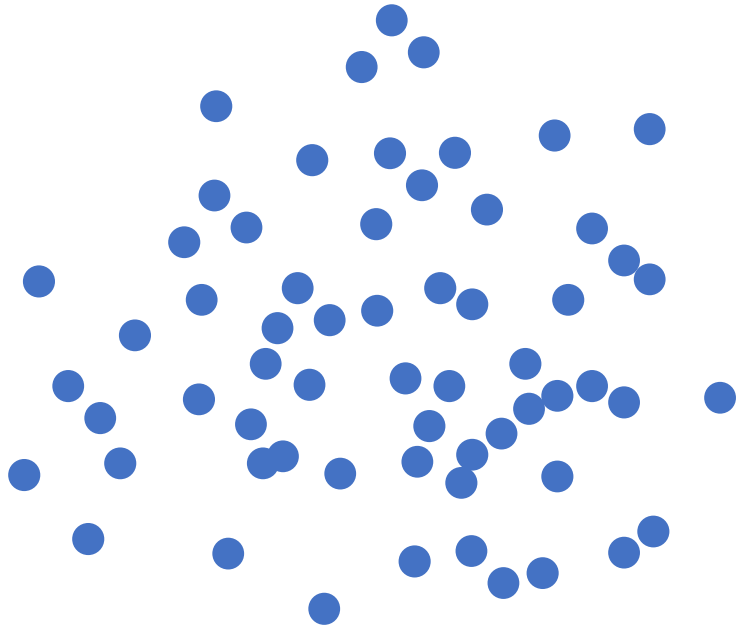
Dependent variable: cholesterol levels

Blood pressure? Resting heart rate? Mobility?

Many ways to define
the independent and dependent
variables!

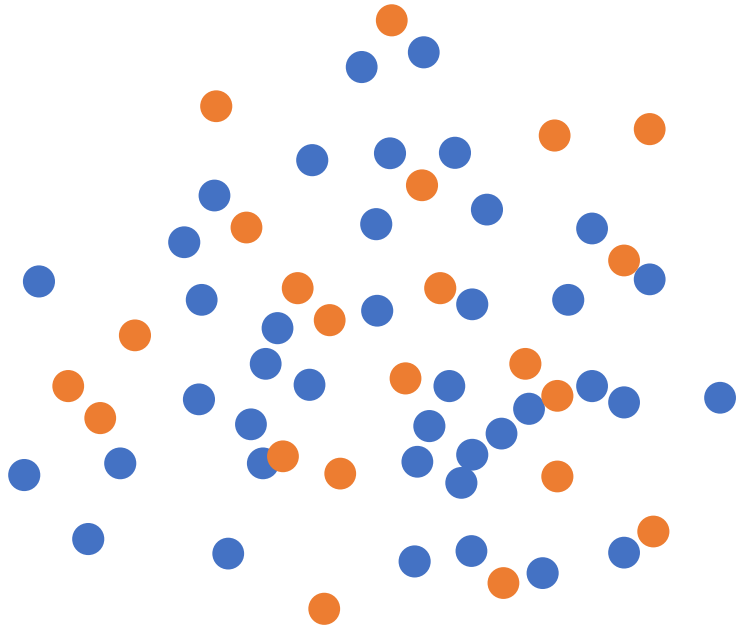
What is the health effect of exercising?

Gather data



What is the health effect of exercising?

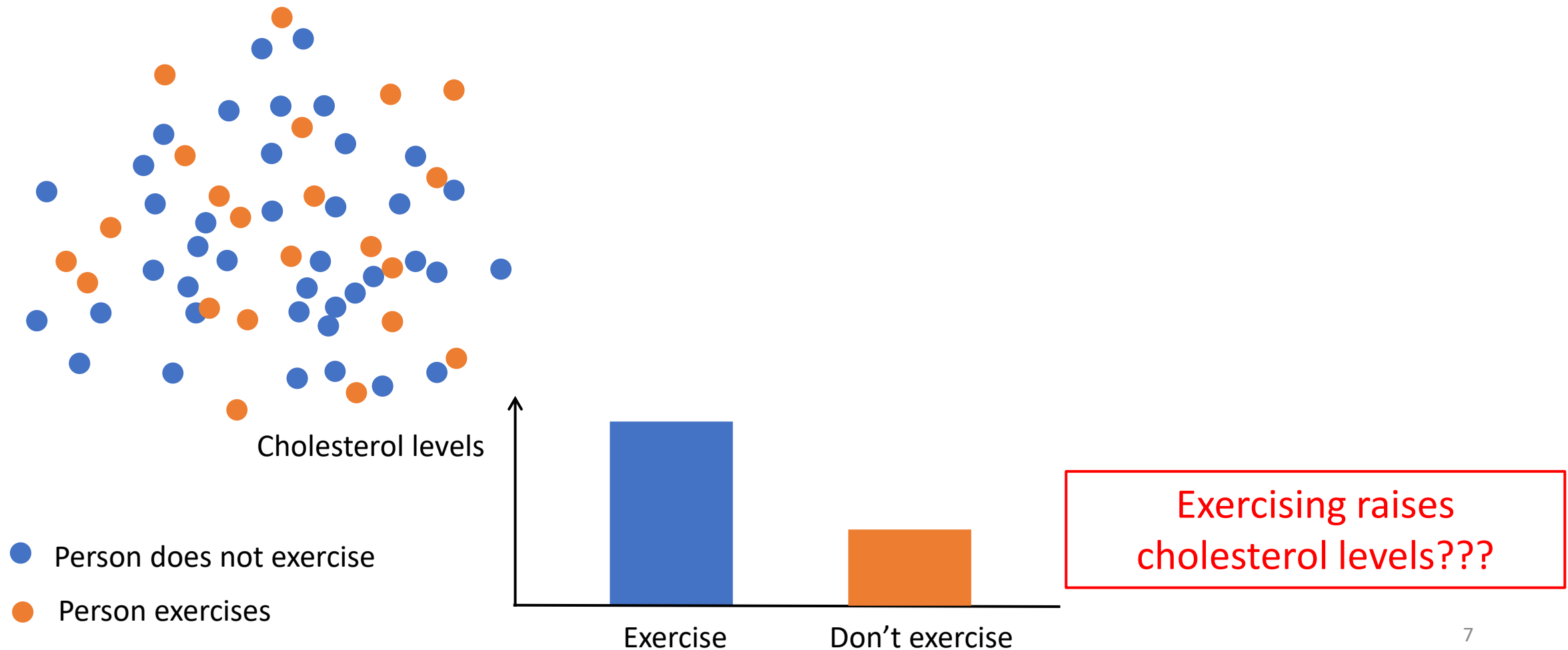
Ask whether someone exercises



● Person does not exercise

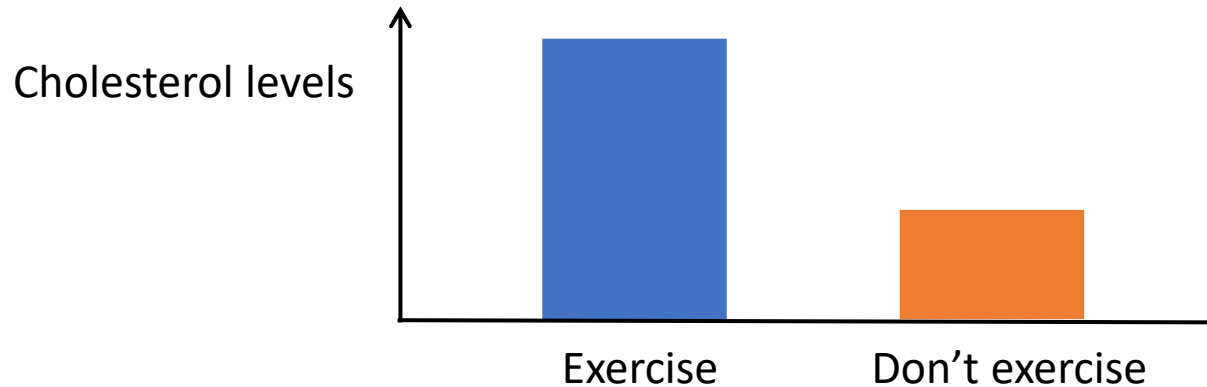
● Person exercises

What is the health effect of exercising?



Bias: systematic error in sampling or testing


Exercising raises
cholesterol levels???



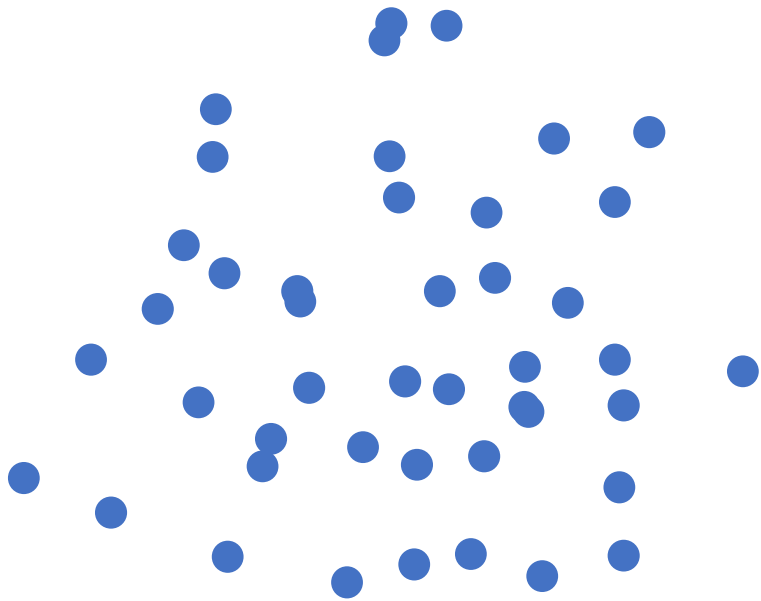
A potential bias

Individuals who are
unhealthy or have health
issues may be more
motivated to exercise

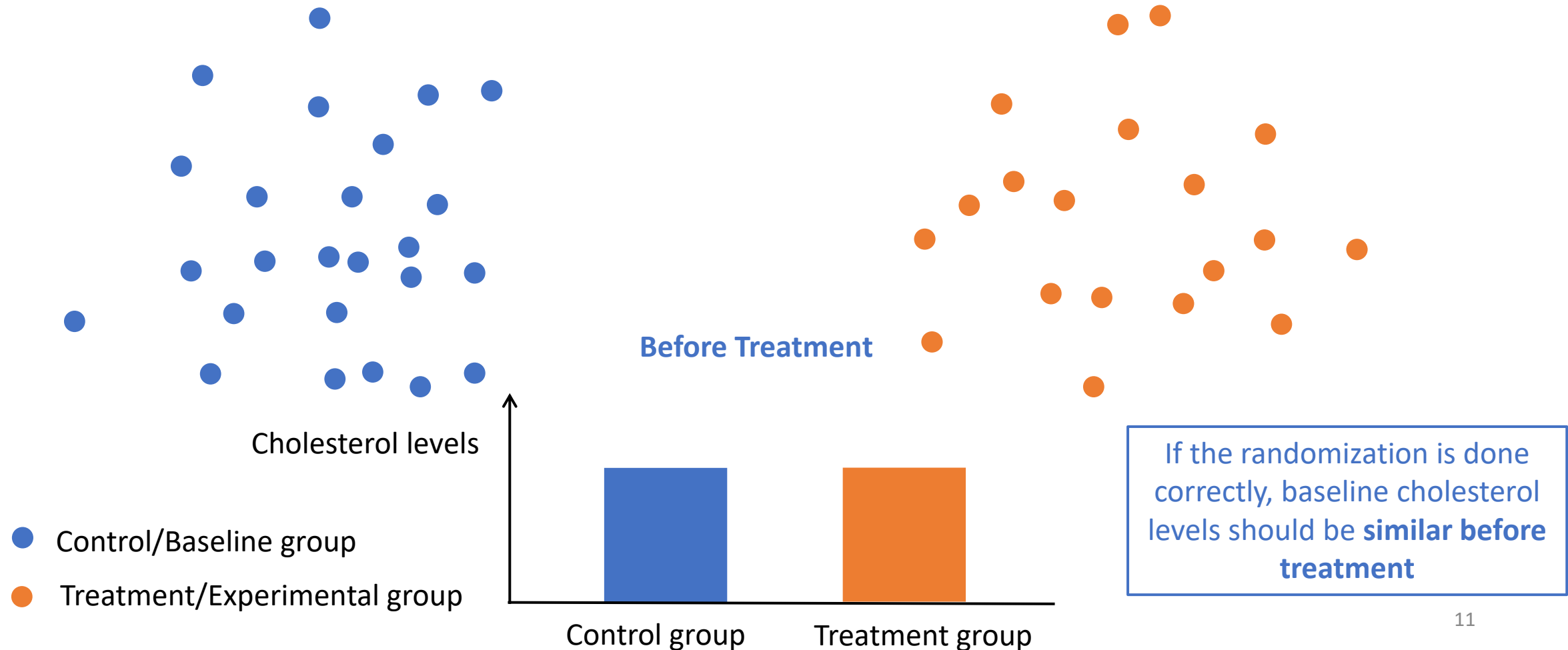
Solution: Fair Experiment

- How would you design a fair experiment?
 - **Treatment:** Daily cardio exercises for 30 mins
 - **Control:** Light stretching exercises for 30 mins
-  Why might we want to provide the control group with light stretching exercises?

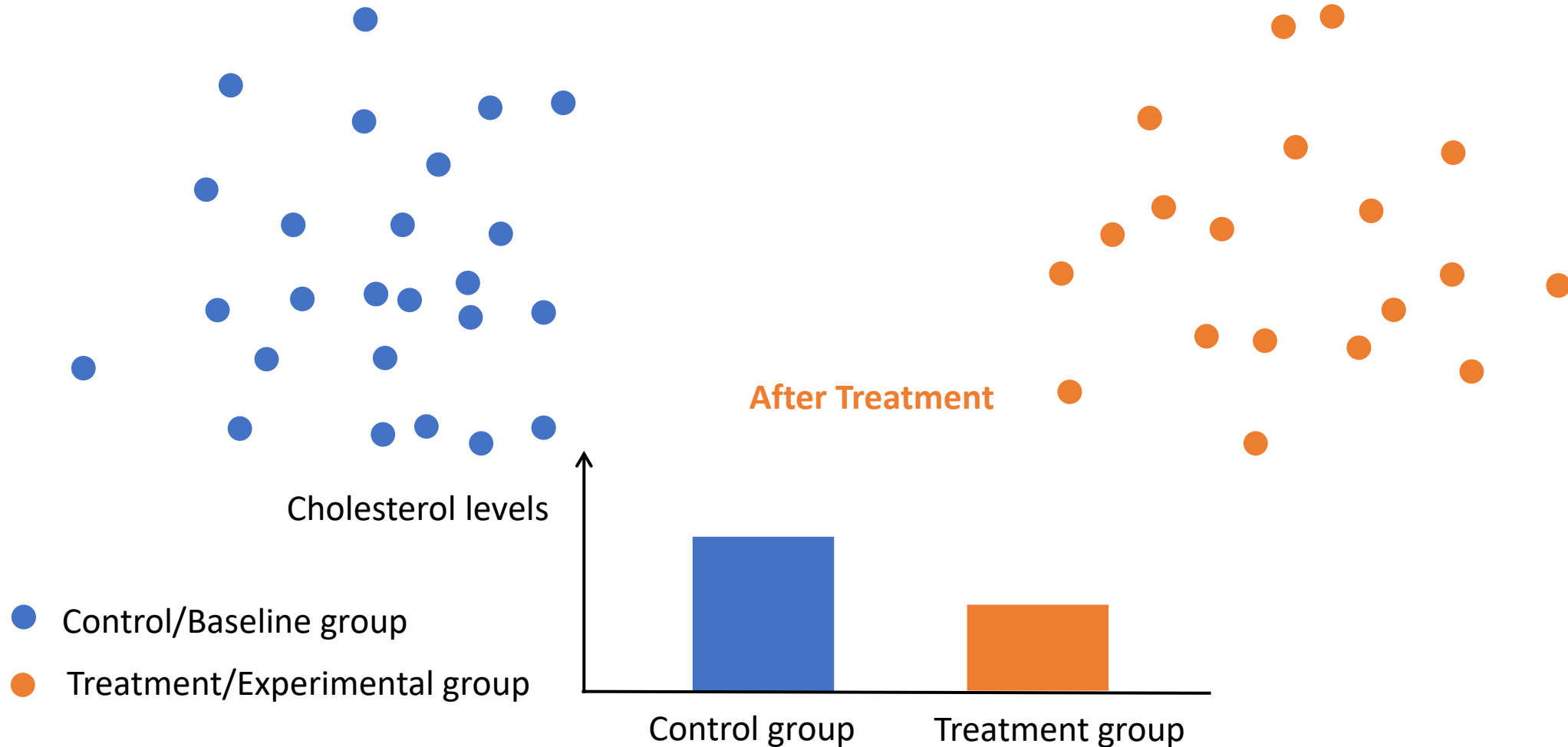
Randomized Control Trial



Randomized Control Trial



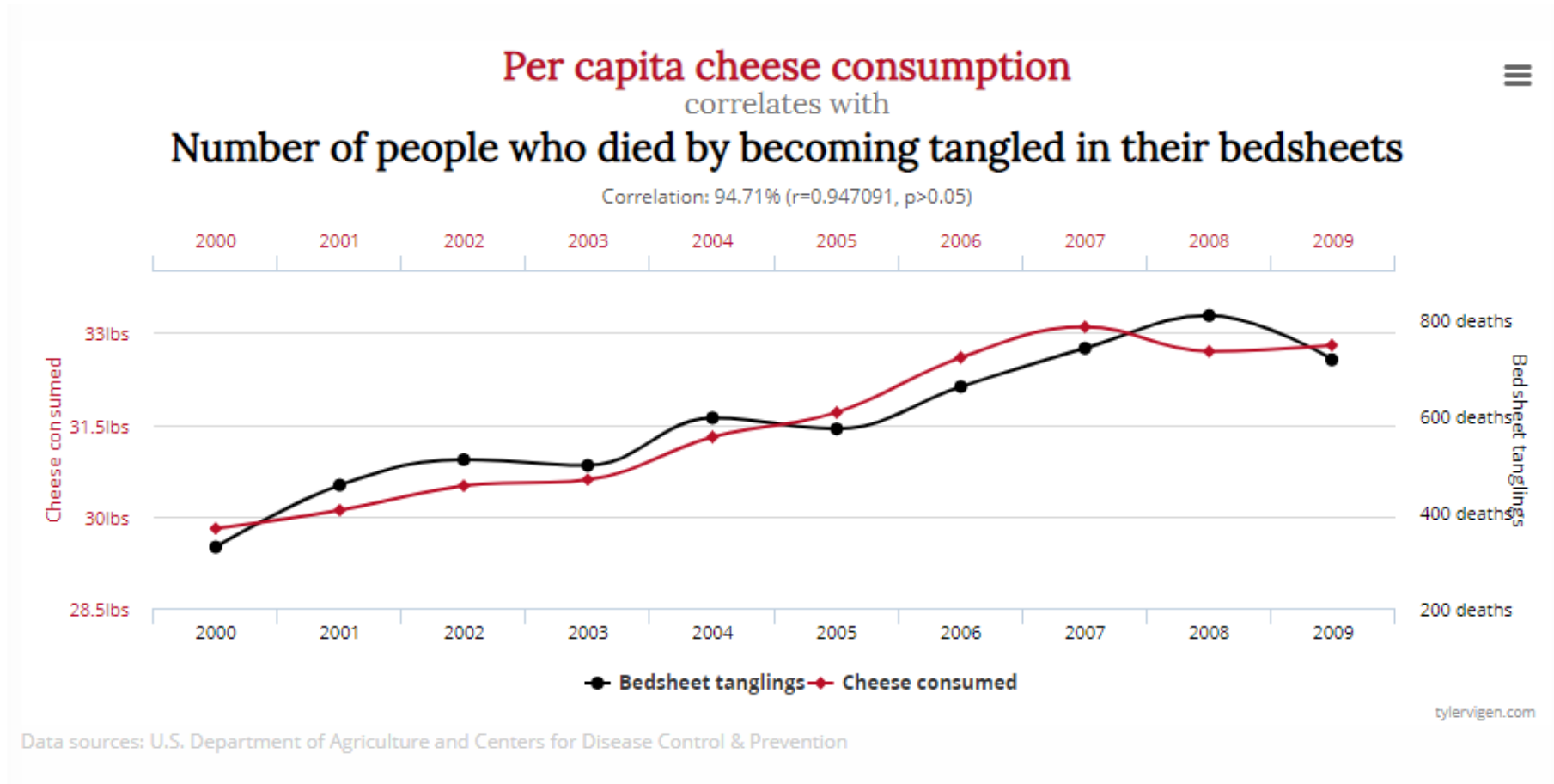
Treatment Effect: Daily Exercise



Takeaways

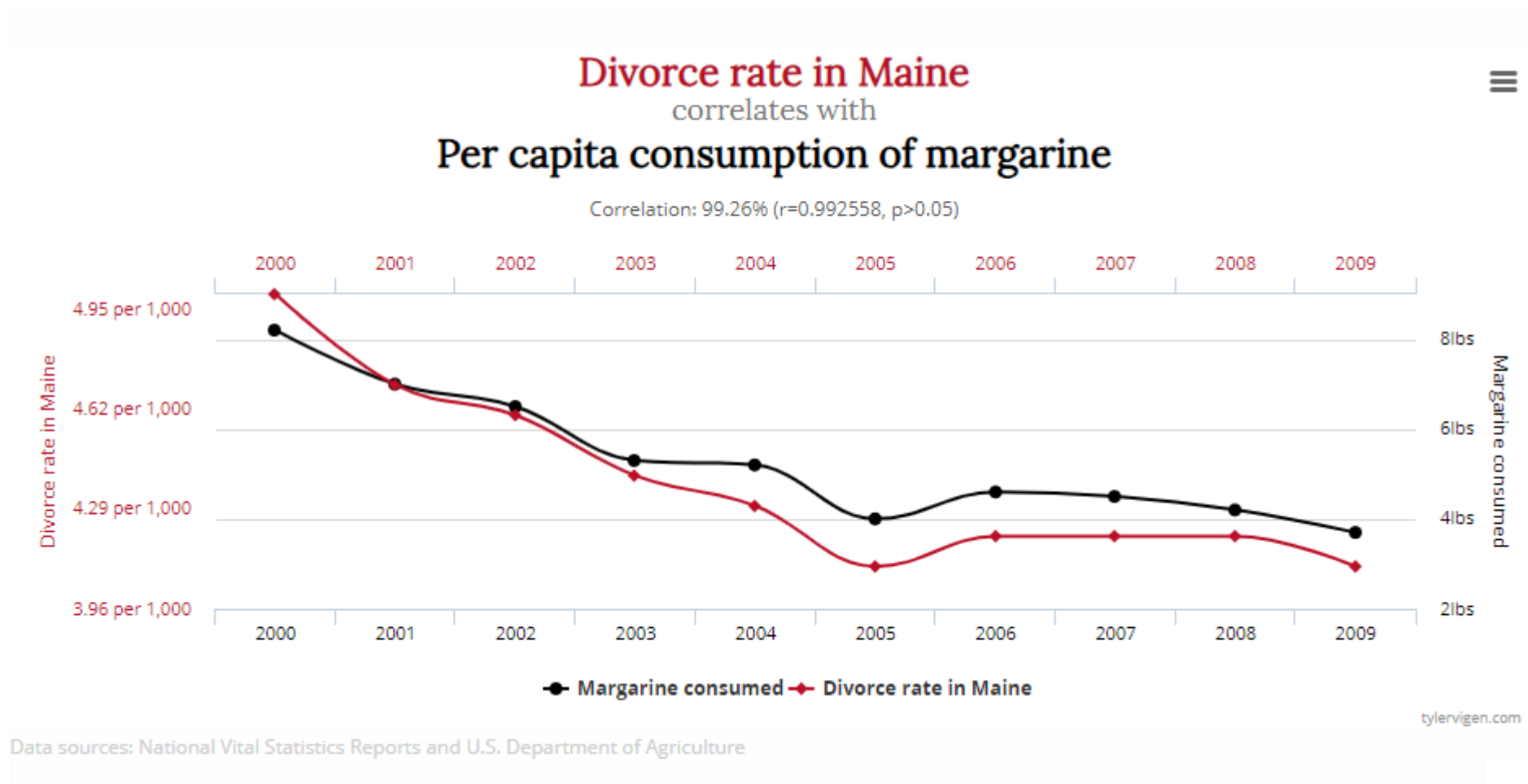
- Bias could produce misleading and counterintuitive findings
- Randomization at the start of the study ensures group comparability, allowing for a fair comparison
- Defining the independent and dependent variables are at the heart of study design
- Many considerations (e.g., ethical concerns, cognitive biases, and others) come into play when determining what the treatment and control groups receive

Spurious correlation



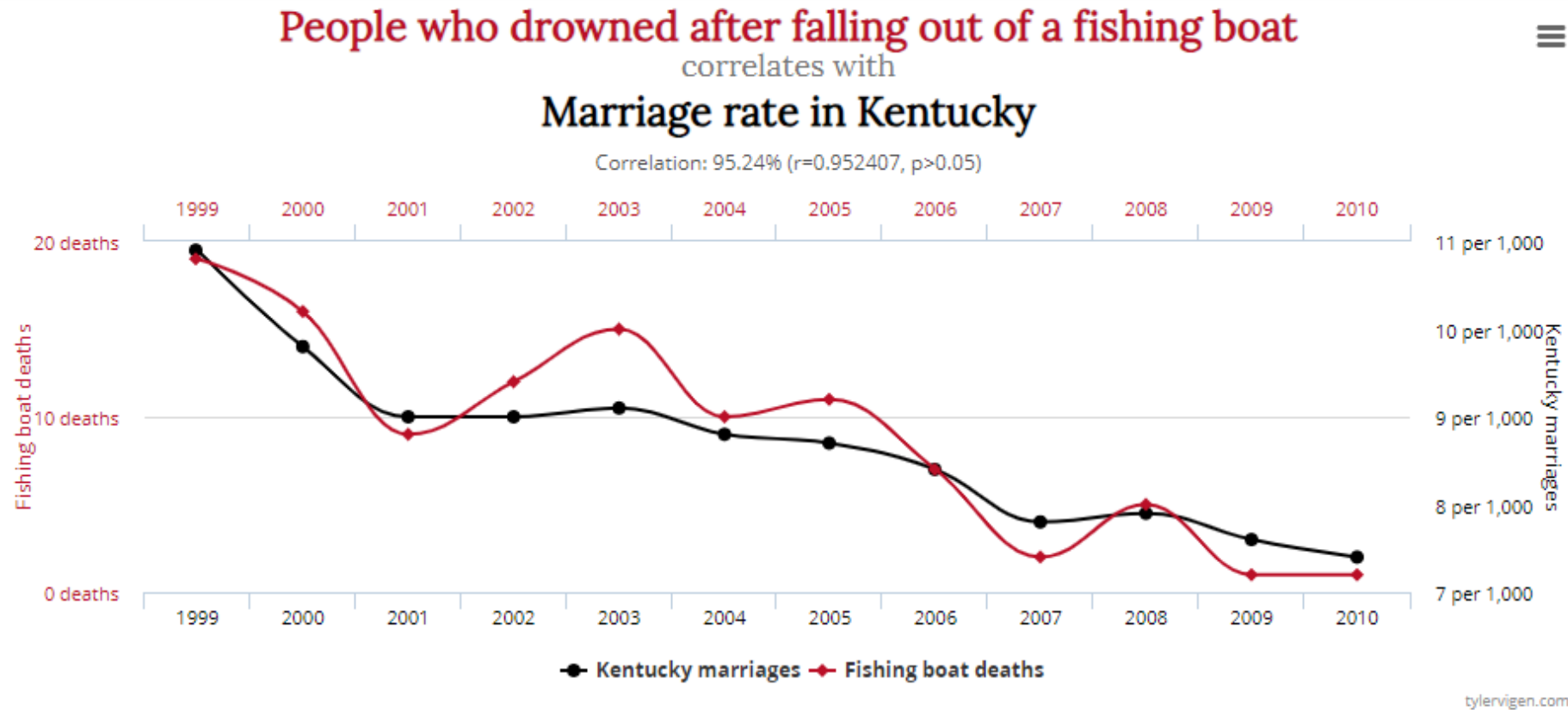
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Spurious correlation



Data sources: Centers for Disease Control & Prevention and National Vital Statistics Reports

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