What can it mean if X is correlated (associated) with Y in a sample?

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Maybe

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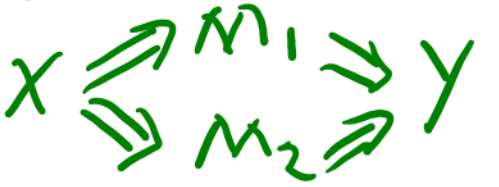
Maybe

a) Directly $X \Rightarrow Y$

b) Through mediating factor(s)



What can it mean if X is correlated (associated) with Y in a sample?

1) $X \Rightarrow Y$ i.e. $\Delta\uparrow X \Rightarrow \uparrow E(Y)$

2) $Y \Rightarrow X$

Maybe

a) Directly $X \Rightarrow Y$

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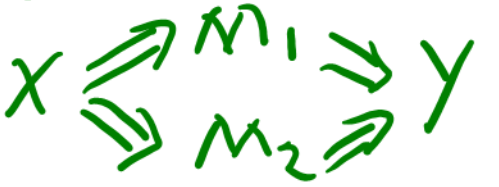

What can it mean if X is correlated (associated) with Y in a sample?

1) $X \Rightarrow Y$ i.e. $\Delta\uparrow X \Rightarrow \uparrow E(Y)$

2) $Y \Rightarrow X$

3) Z

Maybe

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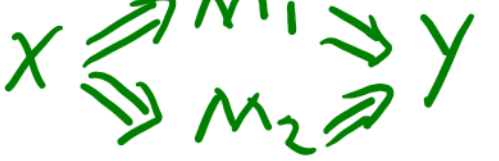
b) Through mediating factor(s)



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Maybe

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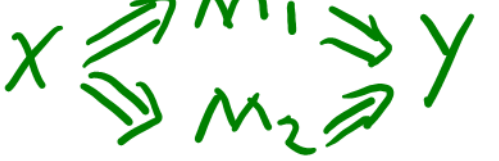

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1) $X \Rightarrow Y$ i.e. $\Delta\uparrow X \Rightarrow \uparrow E(Y)$

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3) $Z \Rightarrow X$, $Z \Rightarrow Y$

Maybe

a) Directly $X \Rightarrow Y$

b) Through mediating factor(s)

$X \Rightarrow M_1 \Rightarrow Y$

$X \Rightarrow M_2 \Rightarrow Y$

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1) $X \Rightarrow Y$ i.e. $\Delta\uparrow X \Rightarrow \uparrow E(Y)$

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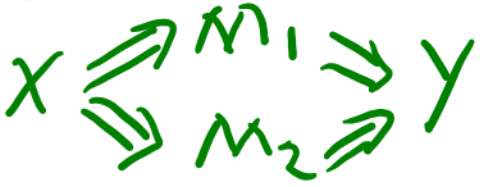


2) $Y \Rightarrow X$

3) 


Confounding factor(s)

a) Z known + measurable

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a) Z known + measurable

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c) Z unknown

d) There are clusters in which Z is constant

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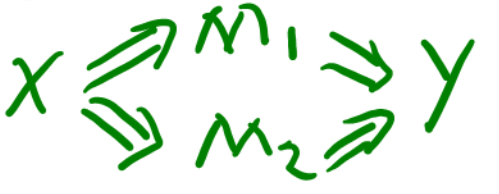


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4) Chance

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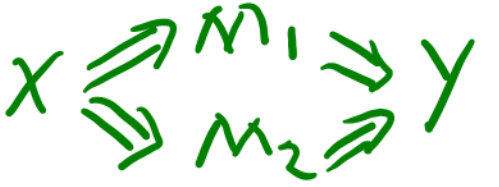


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4) Chance

5) Selection

What can it mean if X is correlated (associated) with Y in a sample?

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2) $Y \Rightarrow X$

3) $Z \Rightarrow X$, $Z \Rightarrow Y$ — Confounding factor(s)

a) Z known + measurable

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- To conclude that $X \Rightarrow Y$ we need to be willing to reject the other possibilities.

What can it mean if X is correlated (associated) with Y in a sample?

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- To conclude that $X \Rightarrow Y$ we need to be willing to reject the other possibilities.
- Ordinary statistical analysis only helps with #4 via p-value.

SCS 2017: Longitudinal and Nested Data

Day 1 – Part 1

# The Fundamental 2 x 2 Table of Statistics

*– or when Statistics seem to lie they are usually just answering a different question*

SCS 2017: Longitudinal and Nested Data

Day 1 – Part 2

# Statistical Reasoning with Ellipses:

## The Data Ellipse

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Day 1 – Part 3

# Statistical Reasoning with Ellipses:

## The Beta Ellipse

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Day 1 – Part 4

# Getting Started with R and R Studio

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Day 1 – Part 1

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