

# Lecture 17: Measurement and Descriptives

Wednesday, October 25, 2023

Your Teaching Fellows:

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Lectures: MWF 12:00 PM – 1:00 PM (003); 1:00 PM – 2:00 PM (004); 2:00 PM – 3:00 PM (010)

Office hours: Tuesdays 2:00 PM – 4:00 PM

## Reminder:

- Lab 3 = Friday
- Extra data collection day Oct 30<sup>th</sup>, 5-6:30 pm (SWNG 121) – Minimum 3 members from a group need to be there
- Review session: November 3<sup>rd</sup>, 4-5:30 on Canvas Zoom

# Reliability and Validity

- Reliability
  - Test re-test reliability
  - Inter-rater reliability
  - Internal consistency reliability
- Construct validity
  - Face validity
  - Content validity
  - Predictive validity
  - Concurrent validity
  - Convergent validity
  - Discriminant validity

## Reliability and Validity

Fear of Being Single Scale (Spielmann et al., 2013)

1. It scares me to think that there might not be anyone out there for me
2. I feel it is close to being too late for me to find the love of my life
3. I feel anxious when I think about being single forever
4. I need to find a partner before I'm too old to have and raise children
5. If I end up alone in life, I will probably feel like there is something wrong with me
6. As I get older, it will get harder and harder to find someone

# Reliability

- Test re-test reliability
- Inter-rater reliability
- Internal consistency reliability

Class  $\alpha = 0.81$   
Original  $\alpha = 0.83$

$\alpha \geq 0.9$	Excellent
$0.7 \leq \alpha < 0.9$	Good
$0.6 \leq \alpha < 0.7$	Acceptable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha \leq 0.5$	Unacceptable

## Construct validity

# Construct Validity

Does content of measure reflect the meaning of the construct?

How does this measure relate to other measures and behaviours?

Face validity

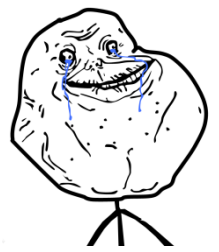
Content validity

Predictive validity

Concurrent validity

Convergent validity

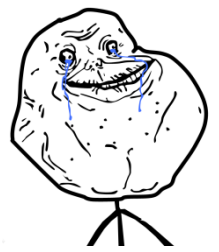
Discriminant validity



## Reliability and Validity

Fear of Being Single Scale (Spielmann et al., 2013)

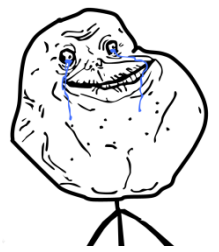
1. It scares me to think that there might not be anyone out there for me
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## Construct validity

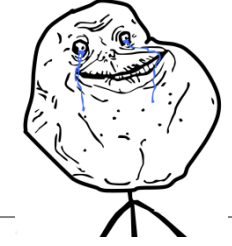
- Predictive validity
  - Predicts future, conceptually related behaviours
- Concurrent validity
  - Associated with conceptually related behaviours that is measured at the same time
- Convergent validity
  - Related to scores on measures of similar constructs
- Discriminant validity
  - Not related to scores on measures of unrelated constructs



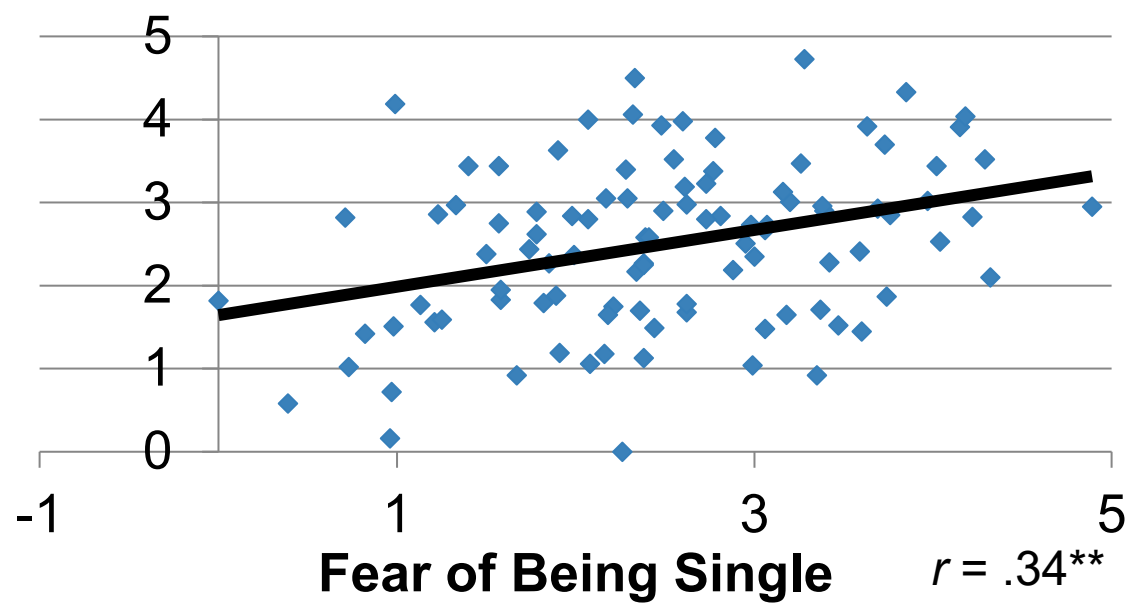


# Construct Validity

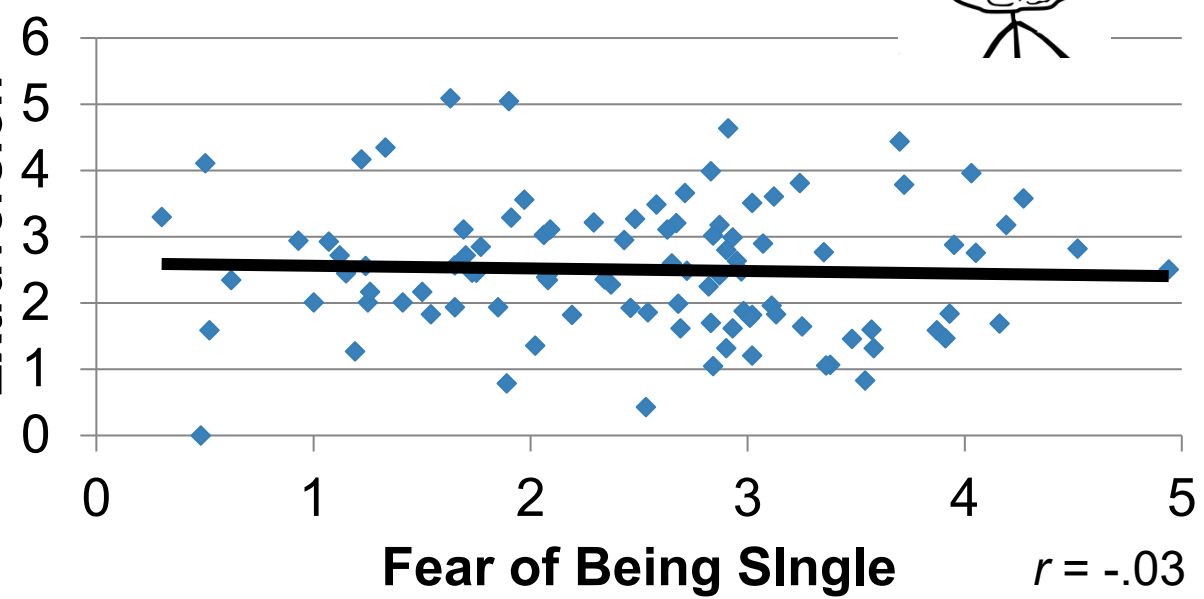
- Study 1:
  - Participants also responded to:
    - Rejection sensitivity
    - Hurt feeling proneness
    - Breakup initiation 3 months later
    - Extraversion
- Study 2:
  - Participants were at a speed dating event
    - Target selectiveness



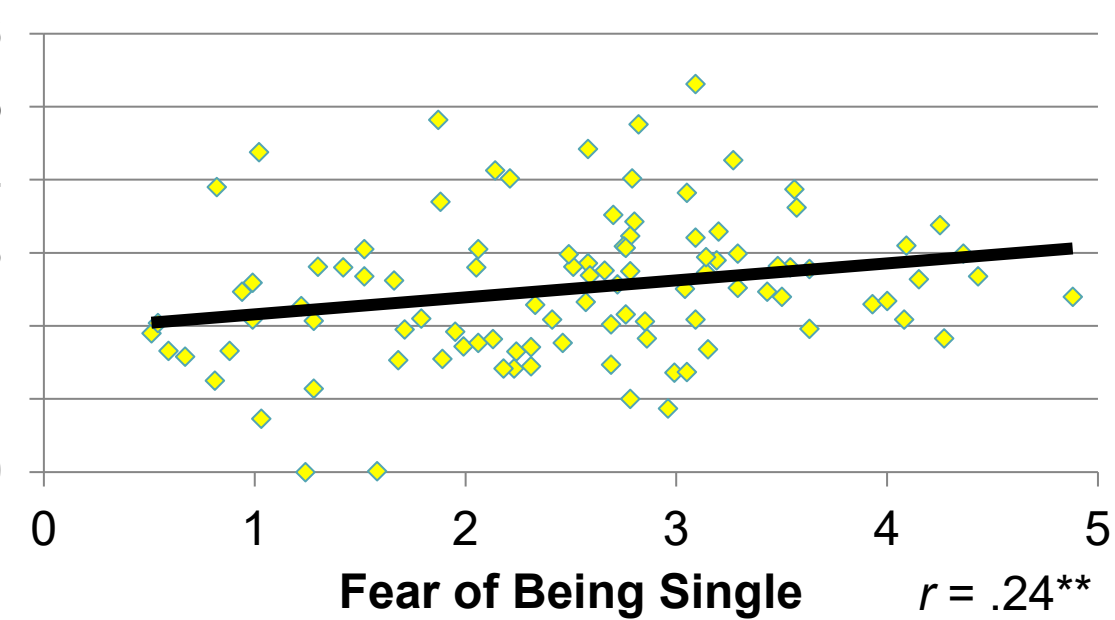
Rejection  
sensitivity



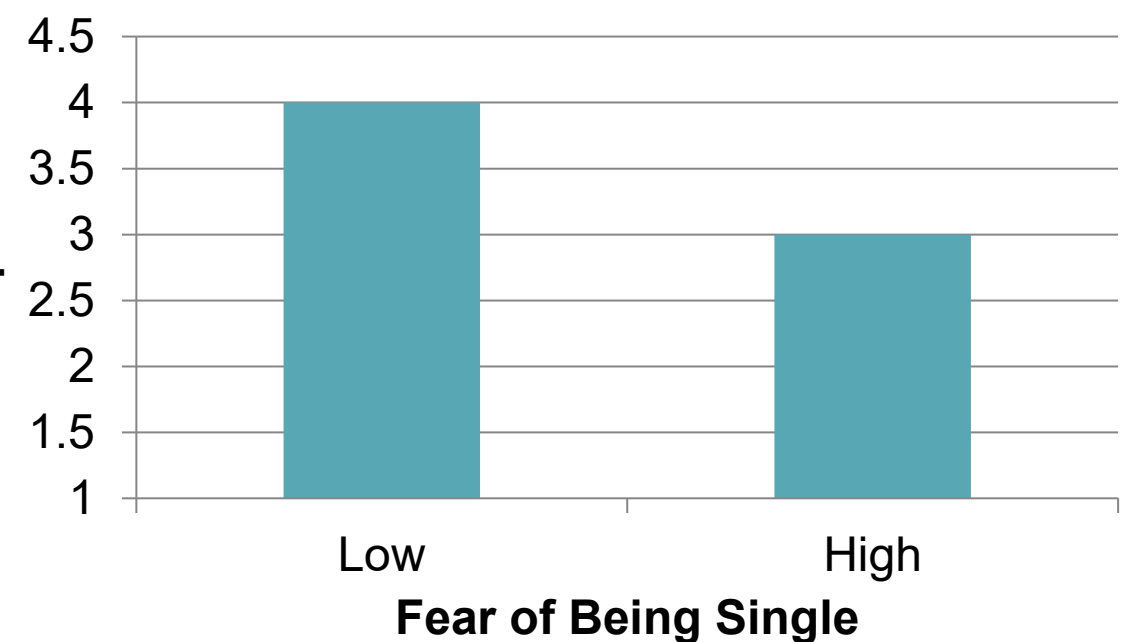
Extraversion



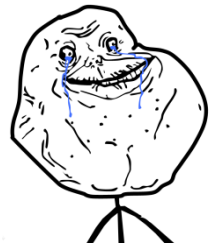
Hurt Feelings  
Proneness



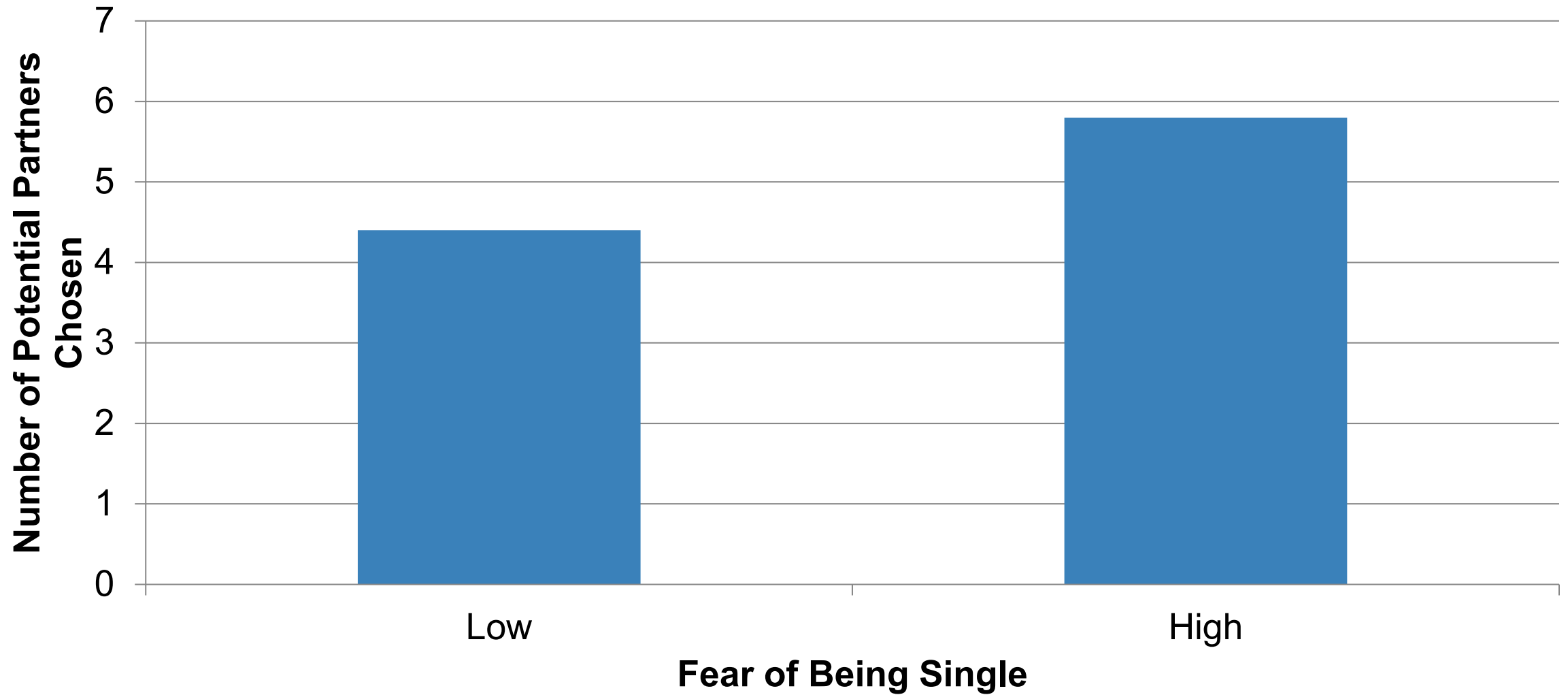
Breakup initiator



# Construct validity



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## Construct validity

- Over 2 studies, high Fear of Being Single is...
  - Positively correlated to Rejection Sensitivity
  - Positively correlated to Hurt Feelings Proneness
  - Less likely to initiate a breakup 3 months later
  - Uncorrelated to Extraversion
  - Less selective in choosing potential dating partner

	Example
<b>Predictive Validity</b>	
<b>Convergent Validity</b>	
<b>Concurrent Validity</b>	
<b>Discriminant Validity</b>	

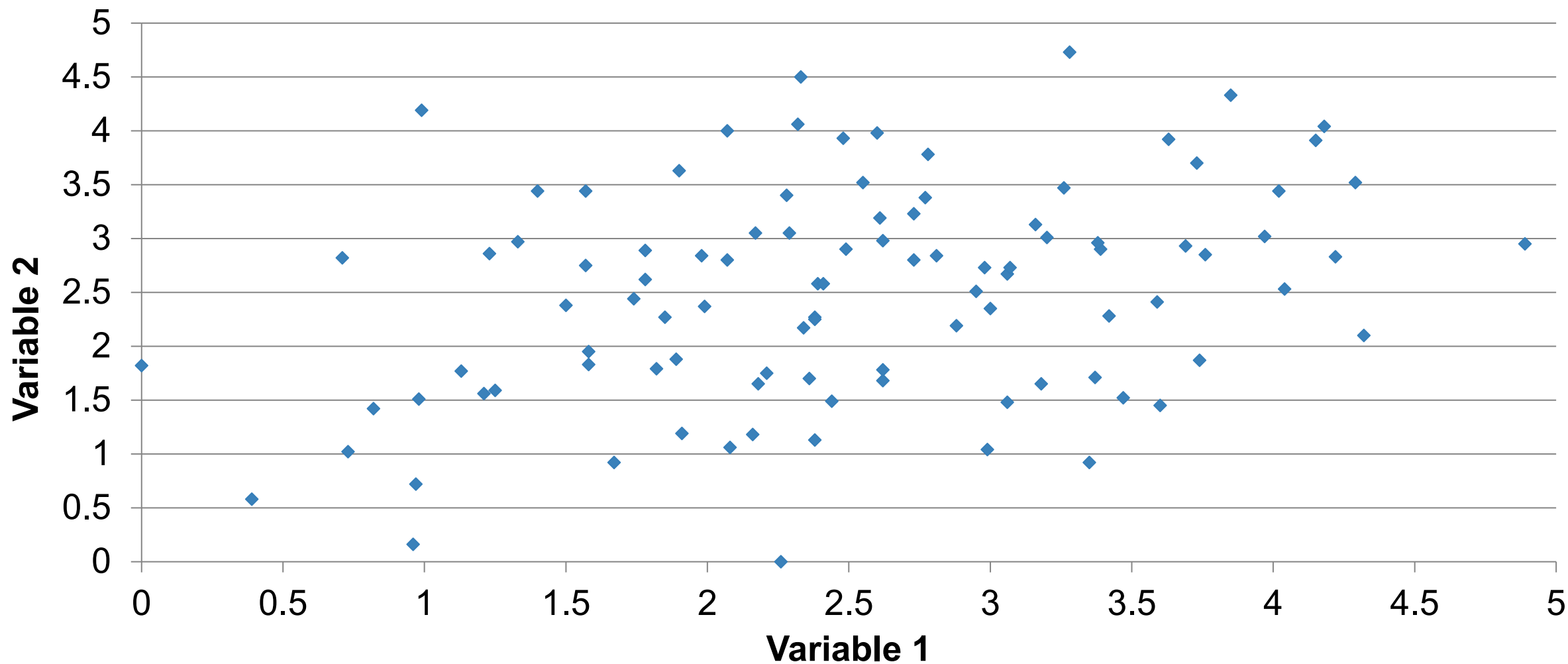
# FINALLY – STATS!



## Learning objectives

- By the end of this class, you'll be able to
  - Describe why we use descriptive statistics.
  - Calculate and interpret a mean, median, and mode
  - Explain how the mean is affected by outliers, and how sample size influences how much it's affected
  - Interpret the standard deviation
  - Describe why variance is calculated
  - Interpret a squared correlation coefficient
  - Compare and contrast regression and correlation

# Purpose of Descriptive Statistics



## Purpose of Descriptive Statistics

- Summarizes mass of data points
  - Understanding and interpretation
  - Visual displays, appropriate calculations
- In experiments can calculate within each cell
  - Means, standard deviations...
- In correlation designs
  - For each variable, calculate mean, standard deviations, etc
  - Correlation coefficient is a descriptive statistic



## Measures of Central Tendency

- Most important task: What is representative? What is in the *middle* of the data?
- **Median** = score that divides group in half
  - 50% of the scores above, 50% below
- **Mode** = most frequently occurring score
  - Sometimes no mode; sometimes more than one
- **Mean** = arithmetic average
  - What we use!
  - Uses information from every score

## Measures of Central Tendency

- Calculate mean:
  - Add up all scores in each group and divide by the number of scores in each group
- Median:
  - Put scores in order
  - Count number of scores
    - If odd #: identify the middlemost score.
    - If even#: identify two middle scores, take average of them
- Mode:
  - Put scores in order, or create a frequency distribution.
  - Identify the score that occurs most frequently

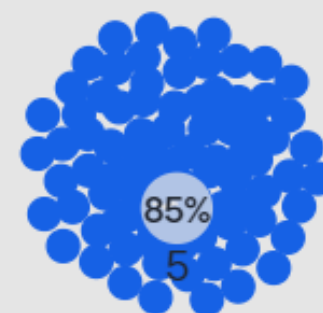
# Sample dataset: 2, 7, 8, 4, 9, 1, 5, 4 -- What is the mean

0%  
9



1%

▶ Start Menti



2%

4



# Sample dataset: 2, 7, 8, 4, 9, 1, 5, 4 -- What is the median?

0  
9

1

▶ Start Menti

4

5

97

4.5

7

4

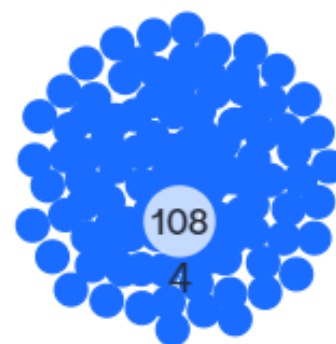
# Sample dataset: 2, 7, 8, 4, 9, 1, 5, 4 -- What is the mode?

0  
9

0  
8

0  
5

0  
4.5

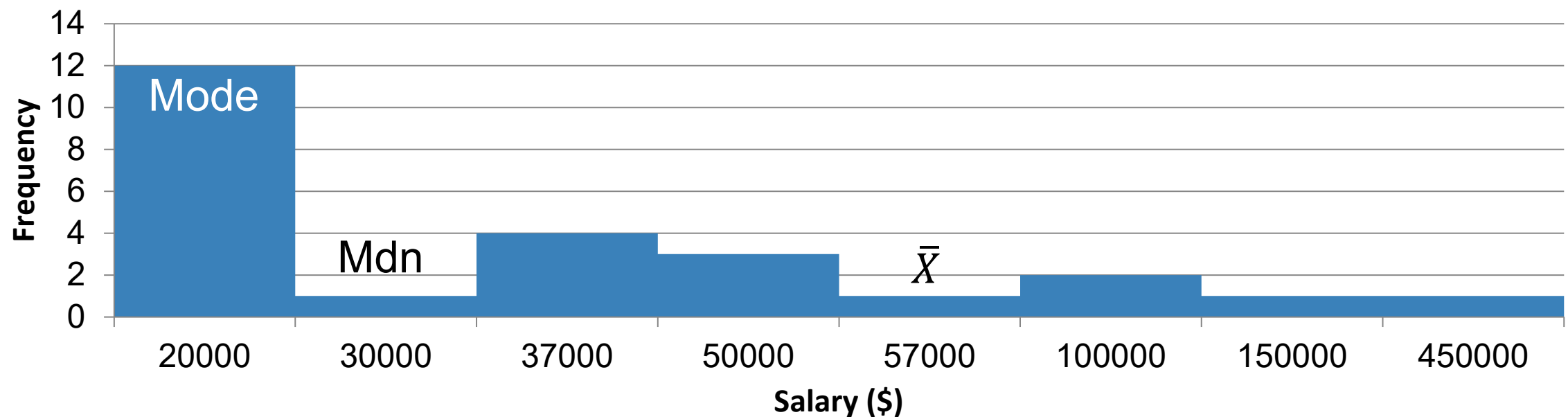


## Mode

- Whenever you have outliers, making the mean inaccurate (not reflective of the actual sample)
  - And a mode is readily observable

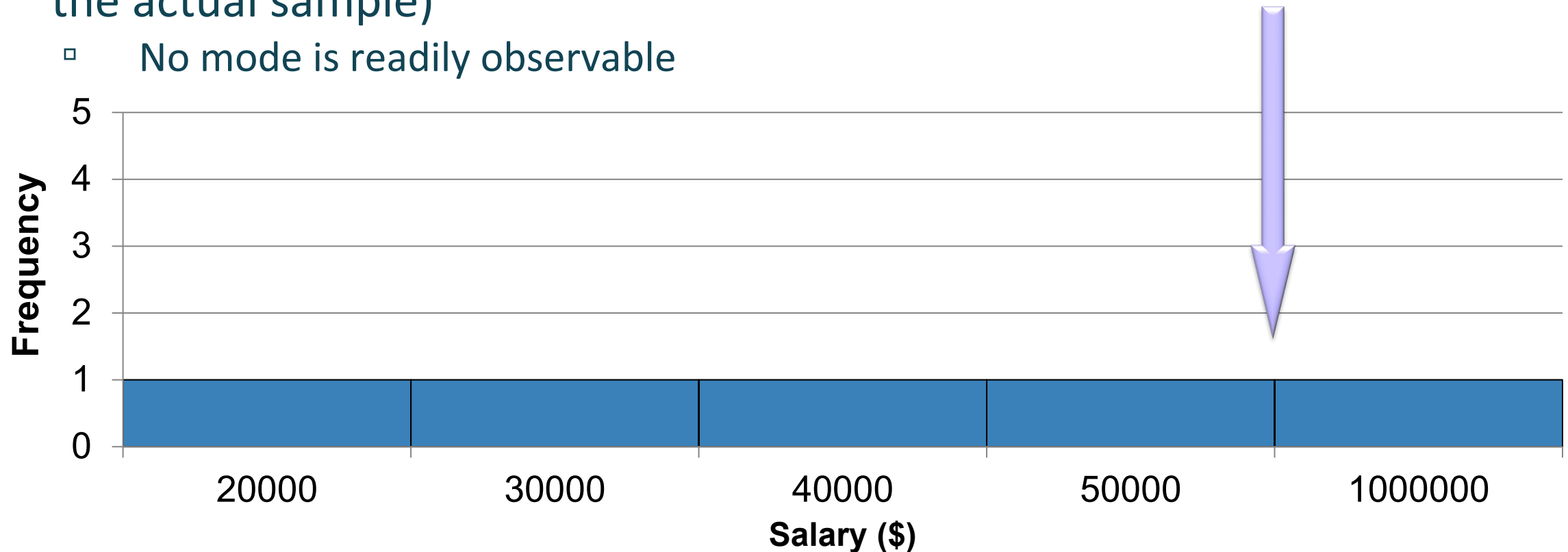
$n = 25$

**Employee Salary Distribution**



## Median

- Whenever you have outliers, making the mean inaccurate (not reflective of the actual sample)
  - No mode is readily observable



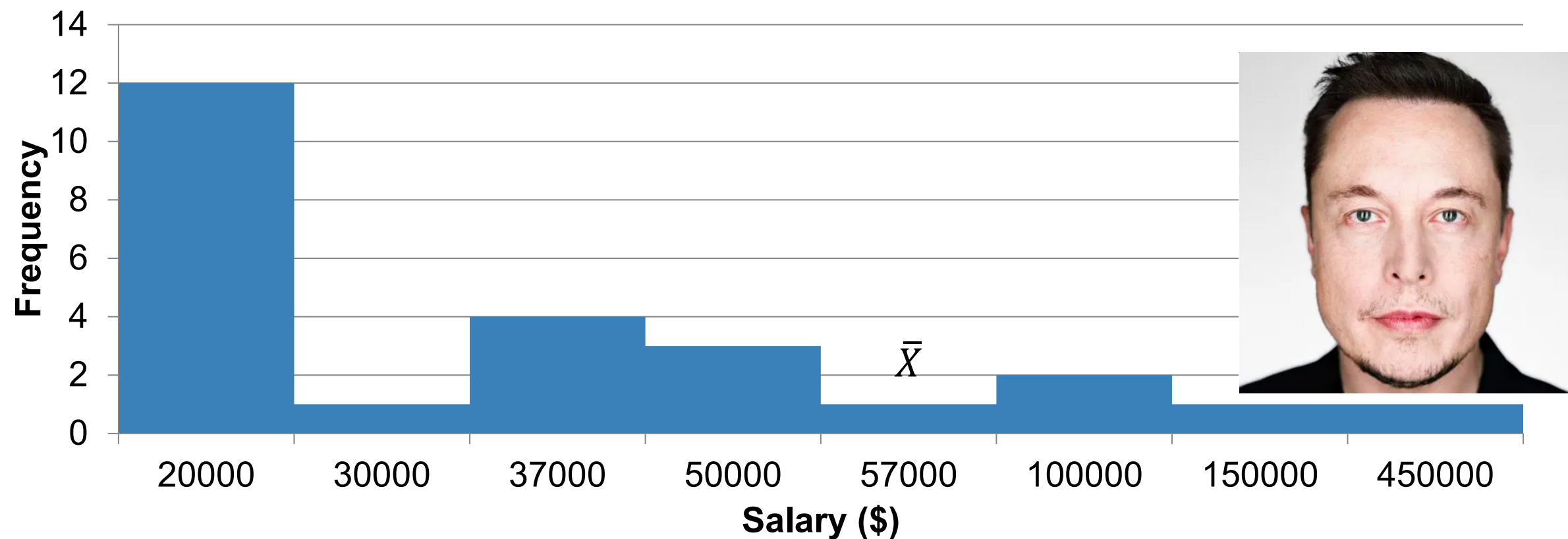
## Mean

- Most frequently-used measure of central tendency ( $\bar{X}$ )
- Con:
  - Affected by outliers (i.e., extreme scores)
- Pros:
  - With increasing sample size, each extreme score has less effect on the mean
  - Maximises use of datapoints
  - Has mathematical properties that allow us to do analyses




## Mean, Sample size, Outliers

Employee Salary Distribution



# Mean, Sample size, Outliers

	Sample Size			
	25 	24 (drop the \$450K)	240 (10x everyone minus \$450K)	241 (10 x everyone plus 1 at \$450K)
Mean	57 000	40 625	40 625	42 170
Median	30 000	25 000	25 000	30 000
Mode	20 000	20 000	20 000	20 000

*The moral of the story: Check for outliers if you only have a small sample, but try to get a large sample as first step.*