

PSC 202

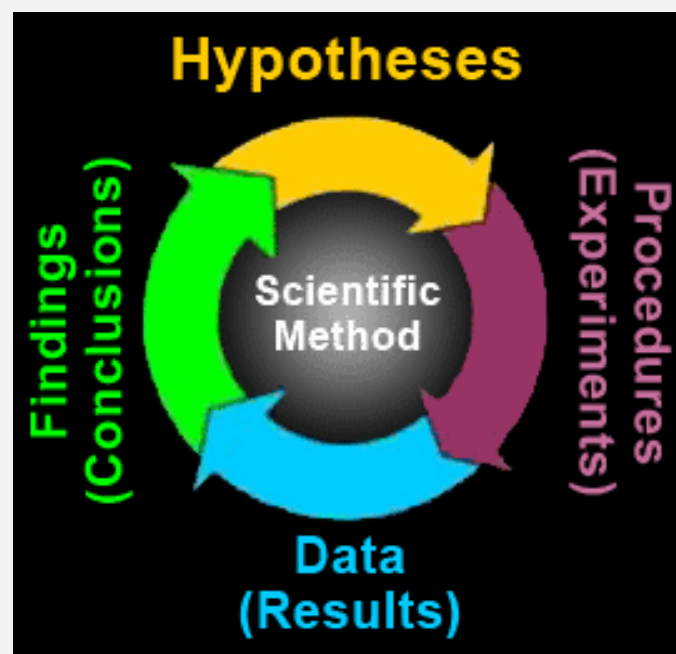
SYRACUSE UNIVERSITY

INTRODUCTION TO POLITICAL ANALYSIS

**BIVARIATE HYPOTHESIS TESTING
PART 1**

WHERE WE ARE

- Formulate research question
- Propose explanation/theory, hypotheses
- Data collection process
- Use data to evaluate hypotheses
- Reassess explanation



HURDLES TO CAUSALITY

- Is there a credible causal mechanism that connects X to Y ?
- Can we rule out the possibility that Y could cause X ?
- Is there covariation between X and Y ?
- Have we controlled for all confounding variables (Z) that might make the association between X and Y spurious?

LARGE N AND SMALL N

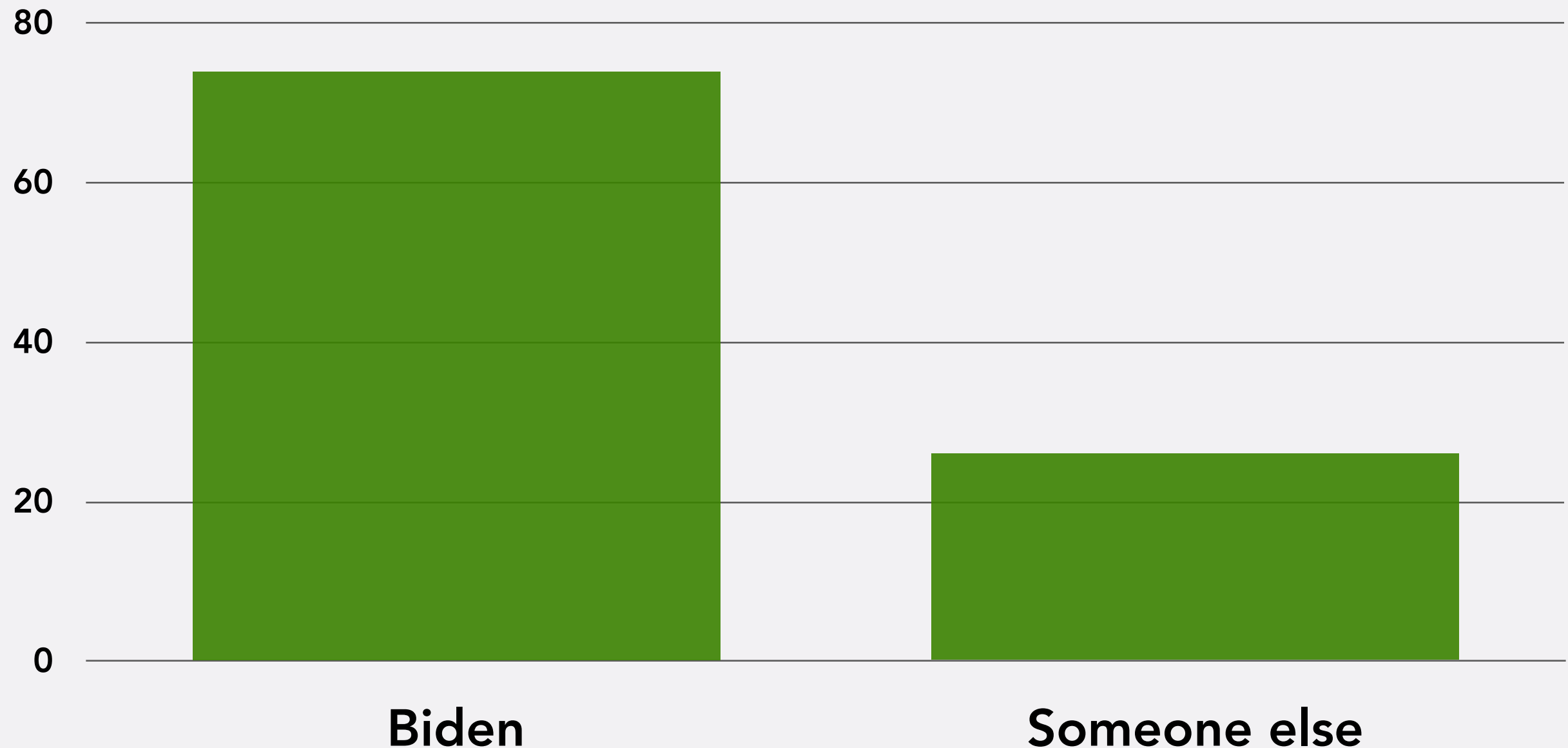
- **Qualitative studies (small n)**
- **Quantitative studies (large n)**

HURDLE 3

- Is there a credible causal mechanism that connects X to Y ?
- Can we rule out the possibility that Y could cause X ?
- Is there covariation between X and Y ?
- Have we controlled for all confounding variables (Z) that might make the association between X and Y spurious?

SURVEY

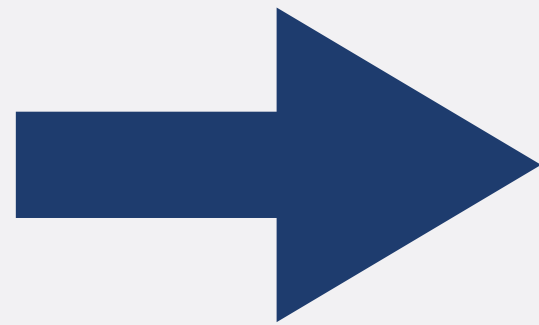
- Do you plan to vote for Joe Biden in 2024, or someone else?



- Excluding students who said "Don't know", "I am not eligible to vote", "I do not plan to vote"

BIVARIATE RELATIONSHIP

?

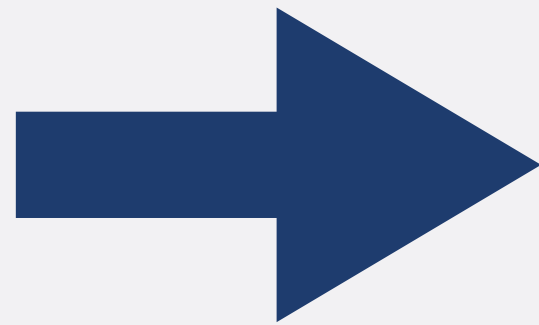


Vote for J. Biden

- **What explains why some of you plan to vote for Biden while others don't?**

BIVARIATE RELATIONSHIP

Gender



Vote for J. Biden

- If gender has an effect on vote intention, what would we expect to see?
- How could we show it?

BIVARIATE RELATIONSHIP

- **Male**
 - **Biden: 16**
 - **Someone else: 8**
- **Female**
 - **Biden: 43**
 - **Someone else: 13**

CROSS-TABULATIONS

Gender

2024 Vote Intention

Male

Female

Biden

16

43

Someone Else

8

13

Gender		Male	Female
2024 Vote Intention	Biden	16	43
	Someone Else	8	13

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		
	Male	Female	Total
Biden	16	43	59
Someone Else	8	13	21
Total	24	56	80

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		
	Male	Female	Total
Biden	16	43	59
Someone Else	8	13	21
Total	24	56	80

Total number

Biden voters

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		
	Male	Female	Total
Biden	16	43	59
Someone Else	8	13	21
Total	24	56	80

Total number
Men

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		
	Male	Female	Total
Biden	16	43	59
Someone Else	8	13	21
Total	24	56	80

Total number

CROSS-TABULATIONS

Gender

2024 Vote Intention

Gender			
	Male	Female	Total
Biden	16	43	59
Someone Else	8	13	21
Total	24	56	80

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Male	Female	Total
Biden	% (16)		
Someone Else	% (8)		
Total	% (24)		

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		
	Male	Female	Total
Biden	66.7% (16)		
Someone Else	33.3% (8)		
Total	100% (24)		

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		
	Male	Female	Total
Biden	66.7% (16)	% (43)	
Someone Else	33.3% (8)	% (13)	
Total	100% (24)	% (56)	

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		
	Male	Female	Total
Biden	66.7% (16)	76.8% (43)	
Someone Else	33.3% (8)	23.2% (13)	
Total	100% (24)	100% (56)	

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		
	Male	Female	Total
Biden	66.7% (16)	76.8% (43)	% (59)
Someone Else	33.3% (8)	23.2% (13)	% (21)
Total	100% (24)	100% (56)	% (80)

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		
	Male	Female	Total
Biden	66.7% (16)	76.8% (43)	73.8% (59)
Someone Else	33.3% (8)	23.2% (13)	26.2% (21)
Total	100% (24)	100% (56)	100% (80)

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		
	Male	Female	Total
	% male Biden voters		
Biden	66.7% (16)	76.8% (43)	73.8% (59)
Someone Else	33.3% (8)	23.2% (13)	26.2% (21)
Total	100% (24)	100% (56)	100% (80)

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		Total
	Male	Female	
Biden	66.7% (16)	76.8% (43)	73.8% (59)
Someone Else	33.3% (8)	23.2% (13)	26.2% (21)
Total	100% (24)	100% (56)	100% (80)

% female Biden voters

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		
	Male	Female	Total
Biden	66.7% (16)	76.8% (43)	73.8% (59)
Someone Else	33.3% (8)	23.2% (13)	26.2% (21)
Total	100% (24)	100% (56)	100% (80)

Total % Biden voters

TEMPLATE

Independent Variable

Dependent Variable

	Independent Variable		
	IV Value 1	IV Value 2	Total
D V Value 1	% In Column (# Cases)	% In Column (# Cases)	% Of Total (# In Row)
D V Value 2	% In Column (# Cases)	% In Column (# Cases)	% Of Total (# In Row)
Total	100% (# In Column)	100% (# In Column)	100% (# Total)

CROSS-TABULATIONS

Gender

2024 Vote Intention

	Gender		
	Male	Female	Total
Biden	66.7% (16)	76.8% (43)	73.8% (59)
Someone Else	33.3% (8)	23.2% (13)	26.2% (21)
Total	100% (24)	100% (56)	100% (80)

COVARIATION

- **Covariation between gender and vote intention: Share of women who plan to vote for Biden is larger than share of men who plan to**

TERMINOLOGY

- **Zero-order relationship: relationship between two variables, without controlling for any other factors**
 - **Women are 10.1 percentage points more likely to plan to vote for Biden than men (76.8% vs. 66.7%)**

EXERCISE

- **"Are you a member of a fraternity or sorority?"**
- **Men**
 - **Yes: 6**
 - **No: 23**
- **Women**
 - **Yes: 26**
 - **No: 32**
- **What is the zero-order relationship between gender and being in a fraternity/sorority?**

CROSS-TABULATIONS

Gender

Sorority/Fraternity

	Gender		
	Male	Female	Total
Member	21% (6)	45% (26)	37% (32)
Not A Member	79% (23)	55% (32)	63% (55)
Total	100% (29)	100% (58)	100% (87)

- Zero-order relationship: Women are 24 percentage points more likely to be members of Greek life than men

BIVARIATE RELATIONSHIPS

		Independent Variable	
		Nominal/Ordinal	Interval
Dependent Variable	Nominal/Ordinal	Cross-Tabulation	?
	Interval	?	?

BIVARIATE RELATIONSHIPS

Independent Variable

Dependent Variable

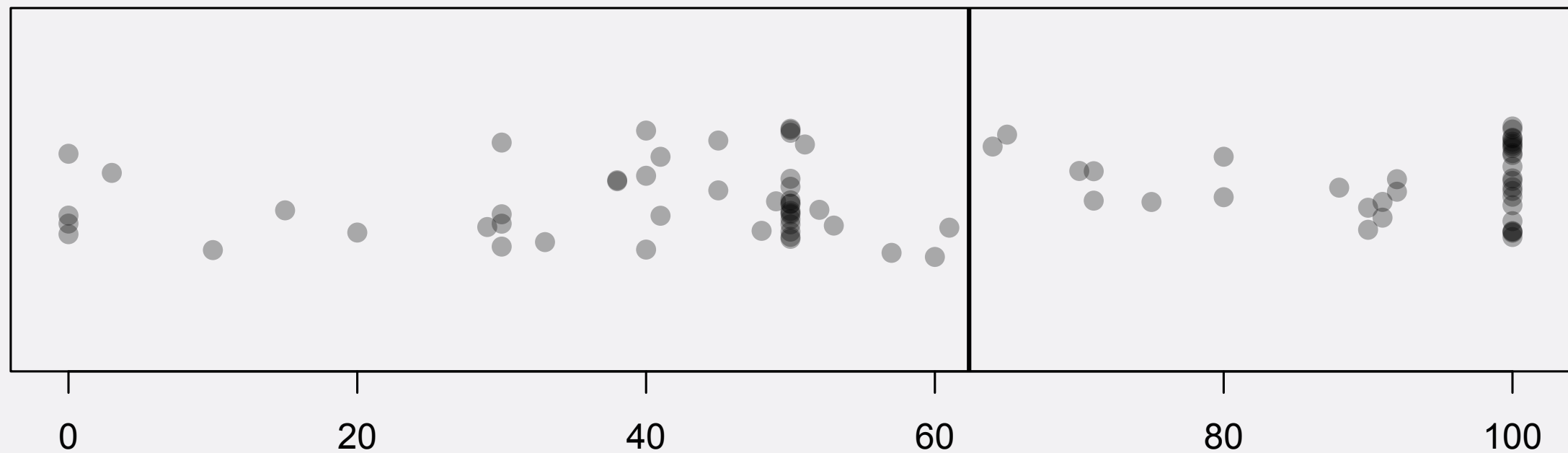
		Independent Variable	
		Nominal/Ordinal	Interval
Dependent Variable	Nominal/Ordinal	Cross-Tabulation	Not In This Class...
	Interval	?	?

BIVARIATE RELATIONSHIPS

		Independent Variable	
		Nominal/Ordinal	Interval
Dependent Variable	Nominal/Ordinal	Cross-Tabulation	Not In This Class...
	Interval	?	?

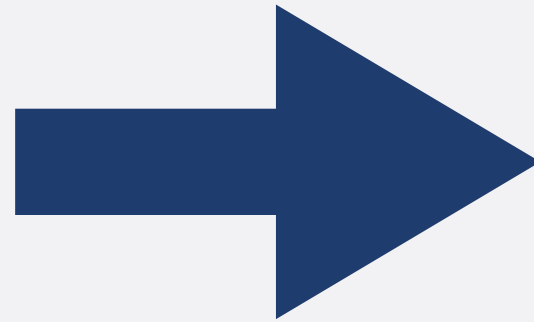
SURVEY

- **Feelings towards Taylor Swift**



BIVARIATE RELATIONSHIP

?

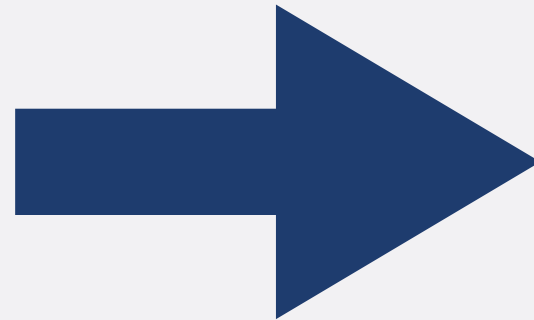


**Feelings towards
Taylor Swift**

- **What explains variation in feelings towards Taylor Swift?**

BIVARIATE RELATIONSHIP

Gender



**Feelings towards
Taylor Swift**

- **If gender has an effect on feelings towards Taylor Swift, what would we expect to see?**
- **How could we show it?**

TAYLOR SWIFT

	Mean Thermometer Score	Frequency
Female	62.8	58
Male	51.6	30
Total	62.4	88

ZERO-ORDER RELATIONSHIP

	Mean Thermometer Score	Frequency
Female	62.8	58
Male	51.6	30
Total	62.4	88

ZERO-ORDER RELATIONSHIP

- **There is covariation between gender and feelings towards Taylor Swift**
 - **Women's feelings towards her are on average 11.2 points higher than men's**

MEAN COMPARISON TABLE

Average of DV		Frequency
IV Value 1	Mean of DV for IV Value 1	# Cases IV Value 1
IV Value 2	Mean of DV for IV Value 2	# Cases IV Value 2
Total	Mean of DV overall	# Cases overall

- DV: Dependent variable; IV: Independent variable

SUPREME COURT

	Mean Thermometer Score	Frequency
Female	34.5	58
Male	34.4	30
Total	34.5	88

ZERO-ORDER RELATIONSHIP

- There is *no* covariation between gender and feelings towards Supreme Court
 - Women's feelings towards the court are on average the same as those of men

BIVARIATE RELATIONSHIPS

Independent Variable

Dependent Variable

		Independent Variable	
		Nominal/Ordinal	Interval
Dependent Variable	Nominal/Ordinal	Cross-Tabulation	Not In This Class...
	Interval	Mean Comparison	?

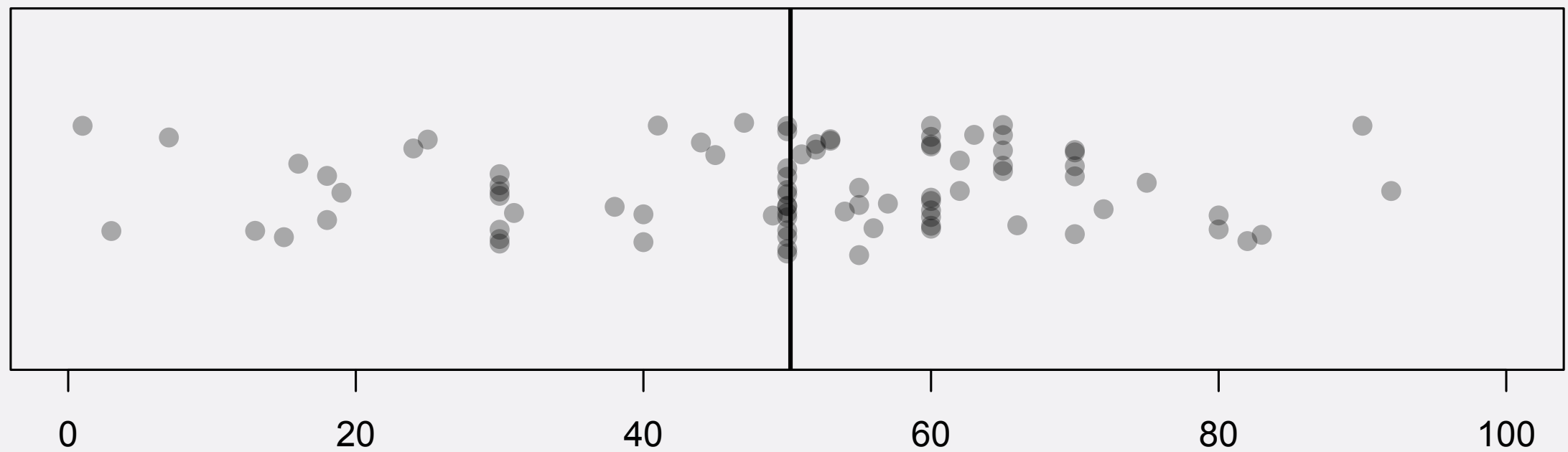
BIVARIATE RELATIONSHIPS

Independent Variable

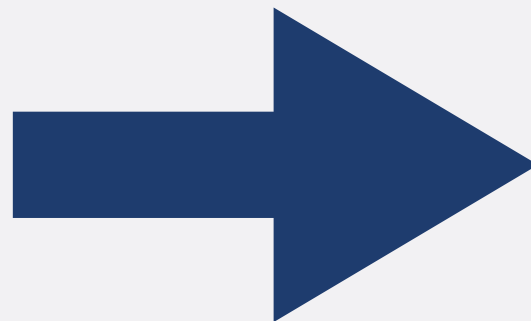
Dependent Variable

		Independent Variable	
		Nominal/Ordinal	Interval
Dependent Variable	Nominal/Ordinal	Cross-Tabulation	Not In This Class...
	Interval	Mean Comparison	?

BIVARIATE RELATIONSHIP

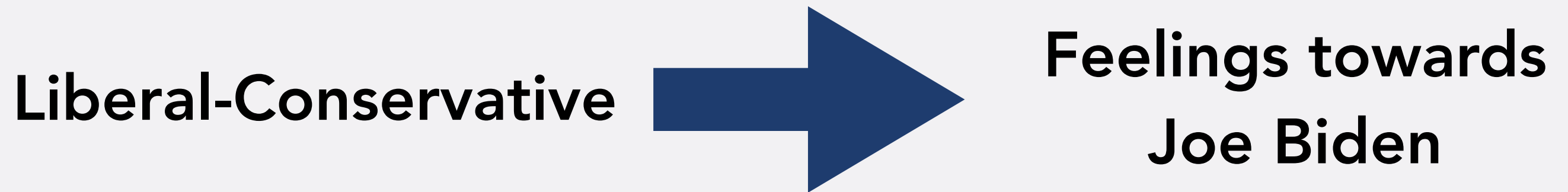


?



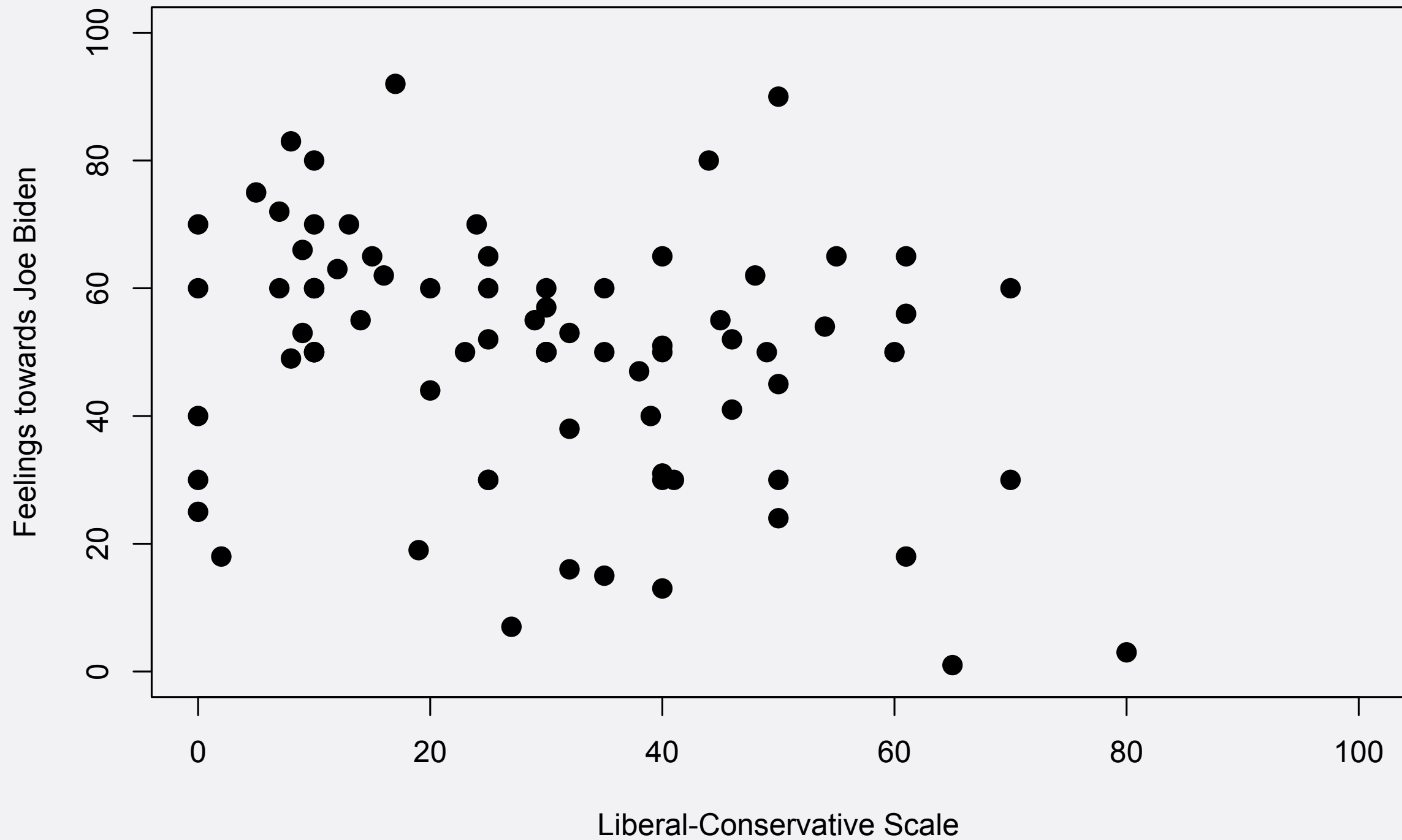
**Feelings towards
Joe Biden**

BIVARIATE RELATIONSHIP

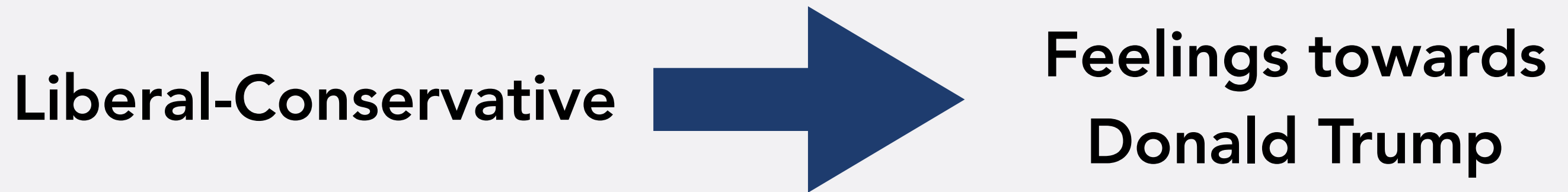


- DV: Feelings towards Joe Biden (0-100)
- IV: Liberal-Conservative (0-100)

JOE BIDEN

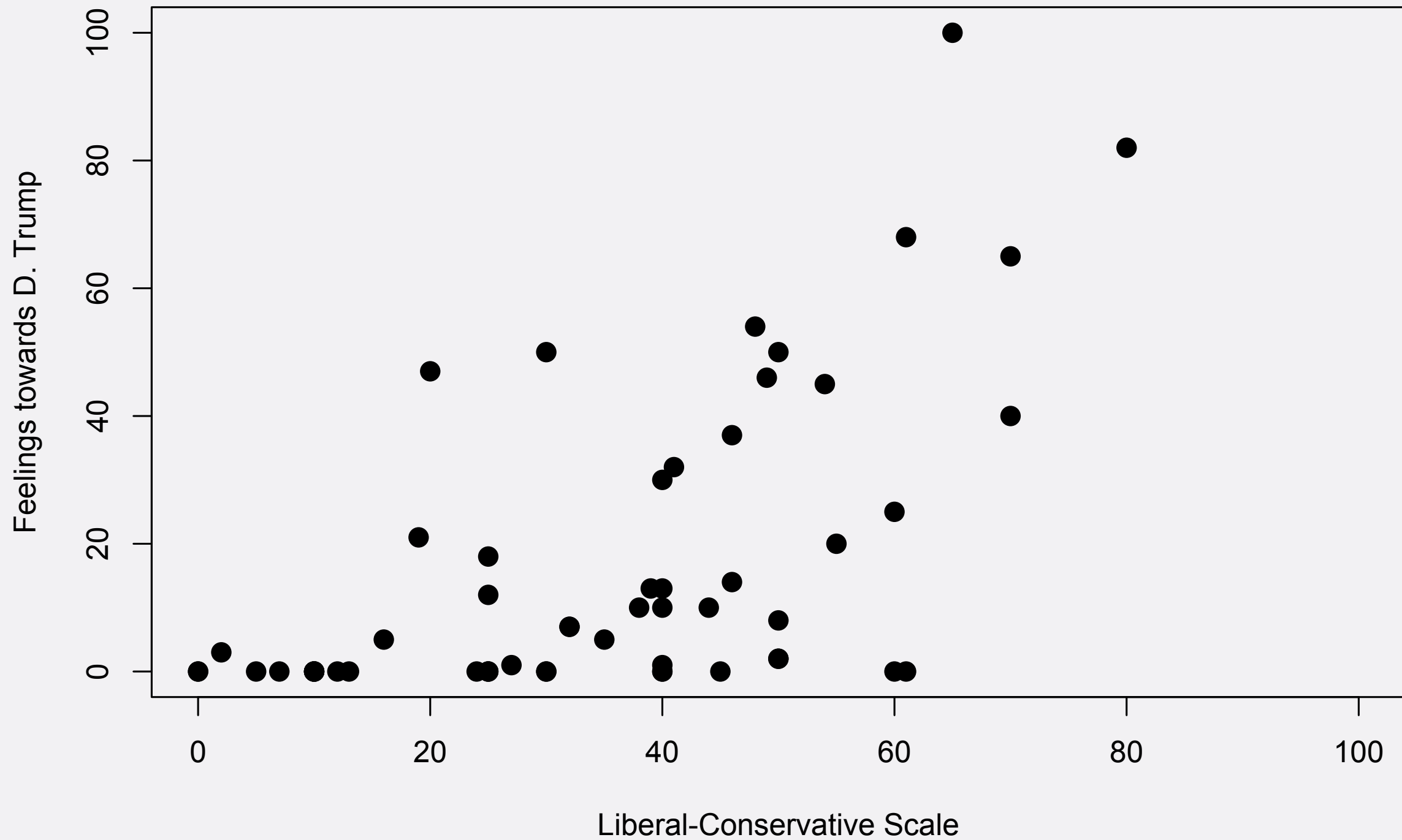


BIVARIATE RELATIONSHIP

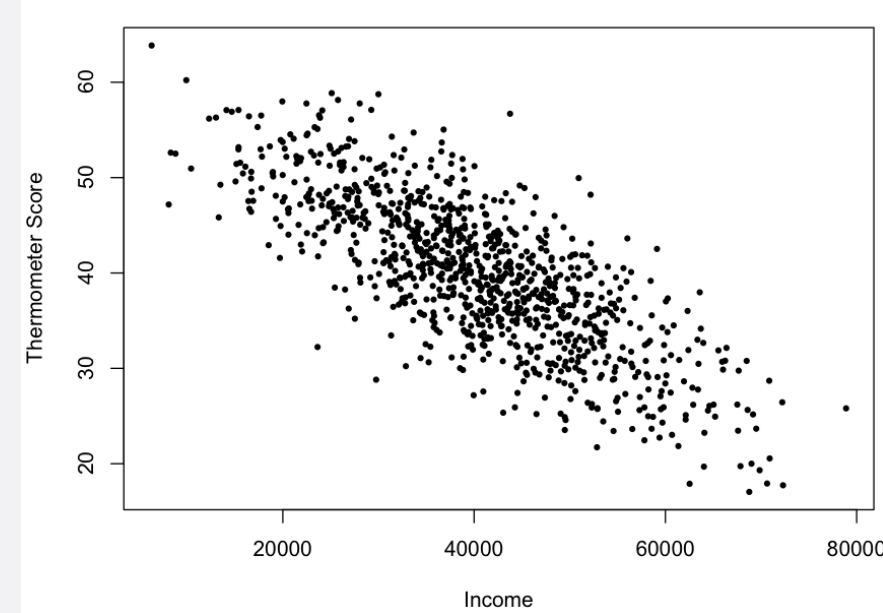
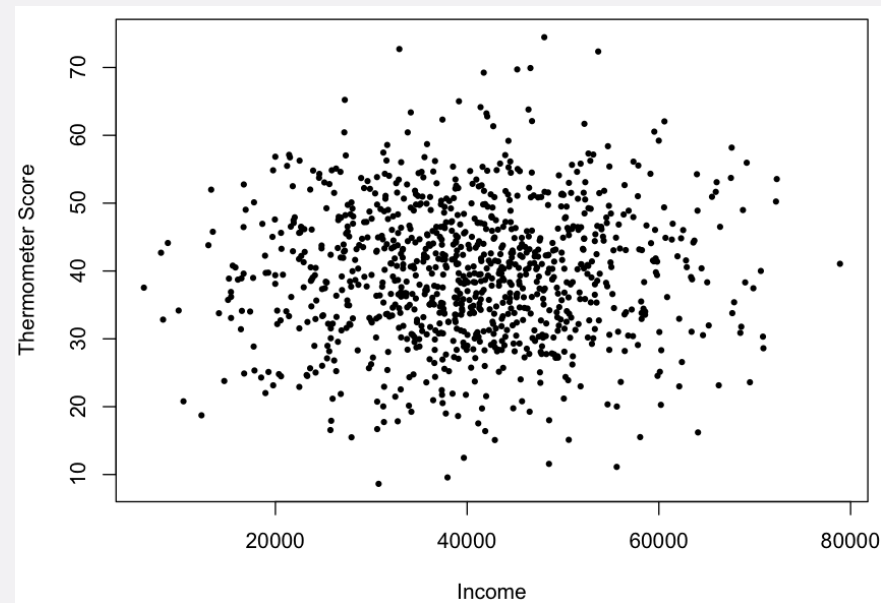
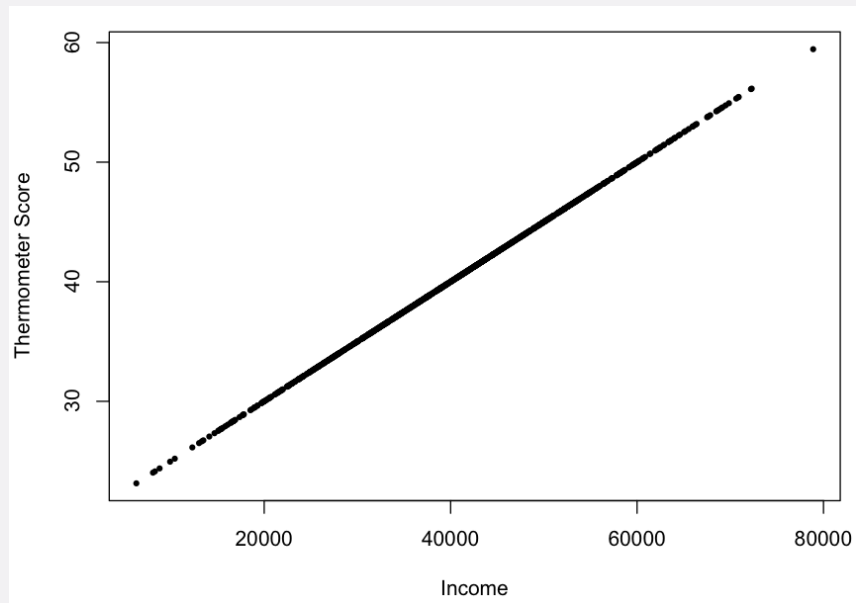
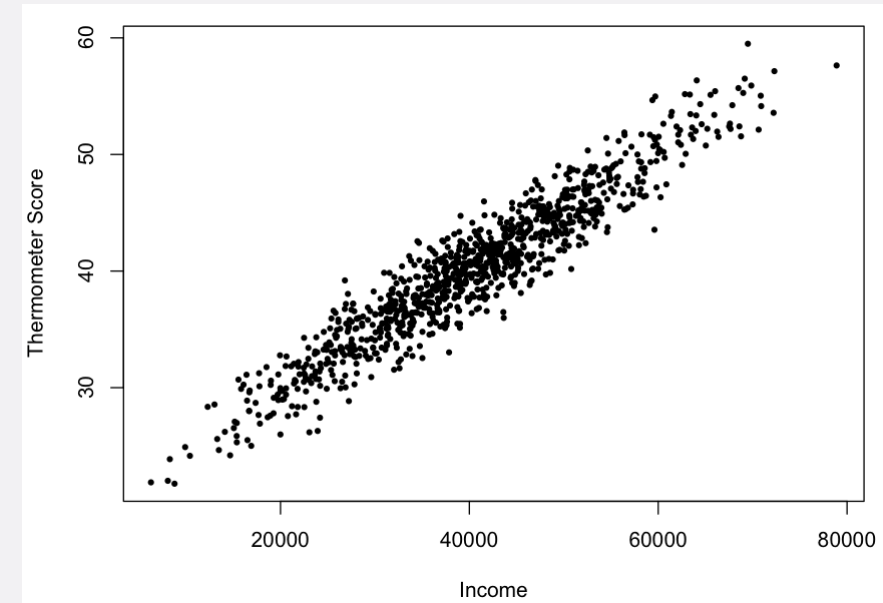
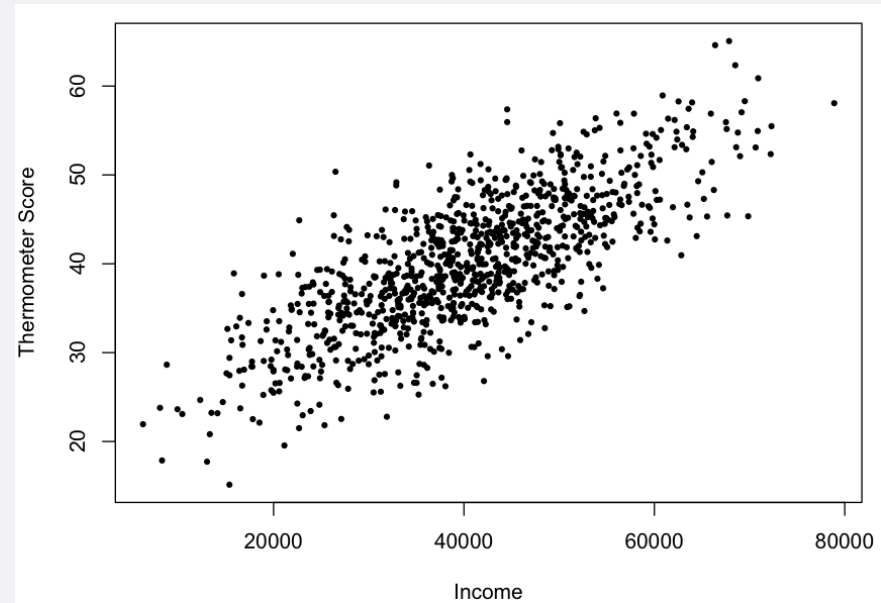
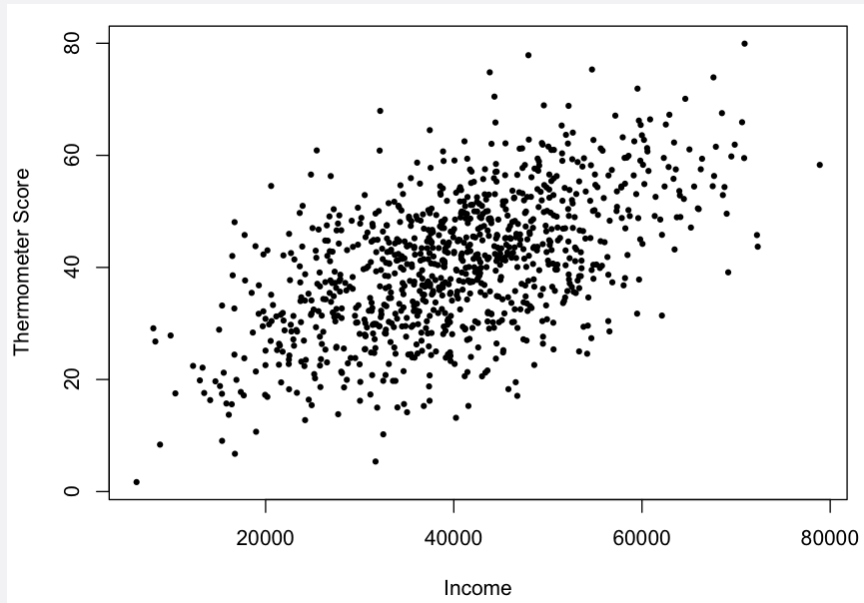


- DV: Feelings towards Donald Trump (0-100)
- IV: Liberal-Conservative (0-100)

DONALD TRUMP



SCATTERPLOTS



SCATTERPLOT

- **Some relations are positive, some negative, others show no relation**
- **Some are more positive than others**
- **We want to make statements that are more precise than "Some are more positive than others"**

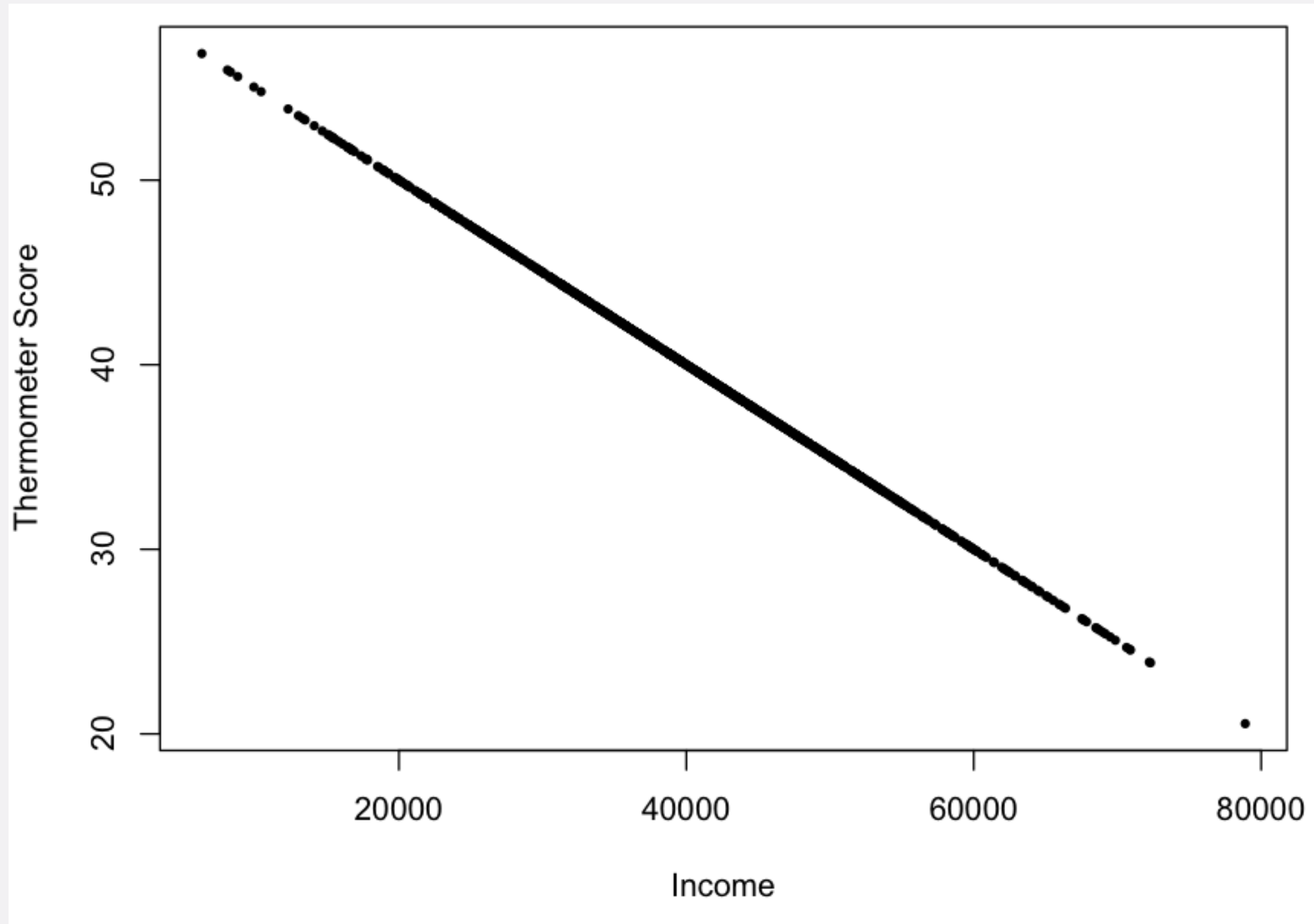
CORRELATION

- Systematic way to measure the *direction* and *linearity* of the relationship between two variables
- Pearson correlation r
- Ranges between -1 and +1

PEARSON'S R

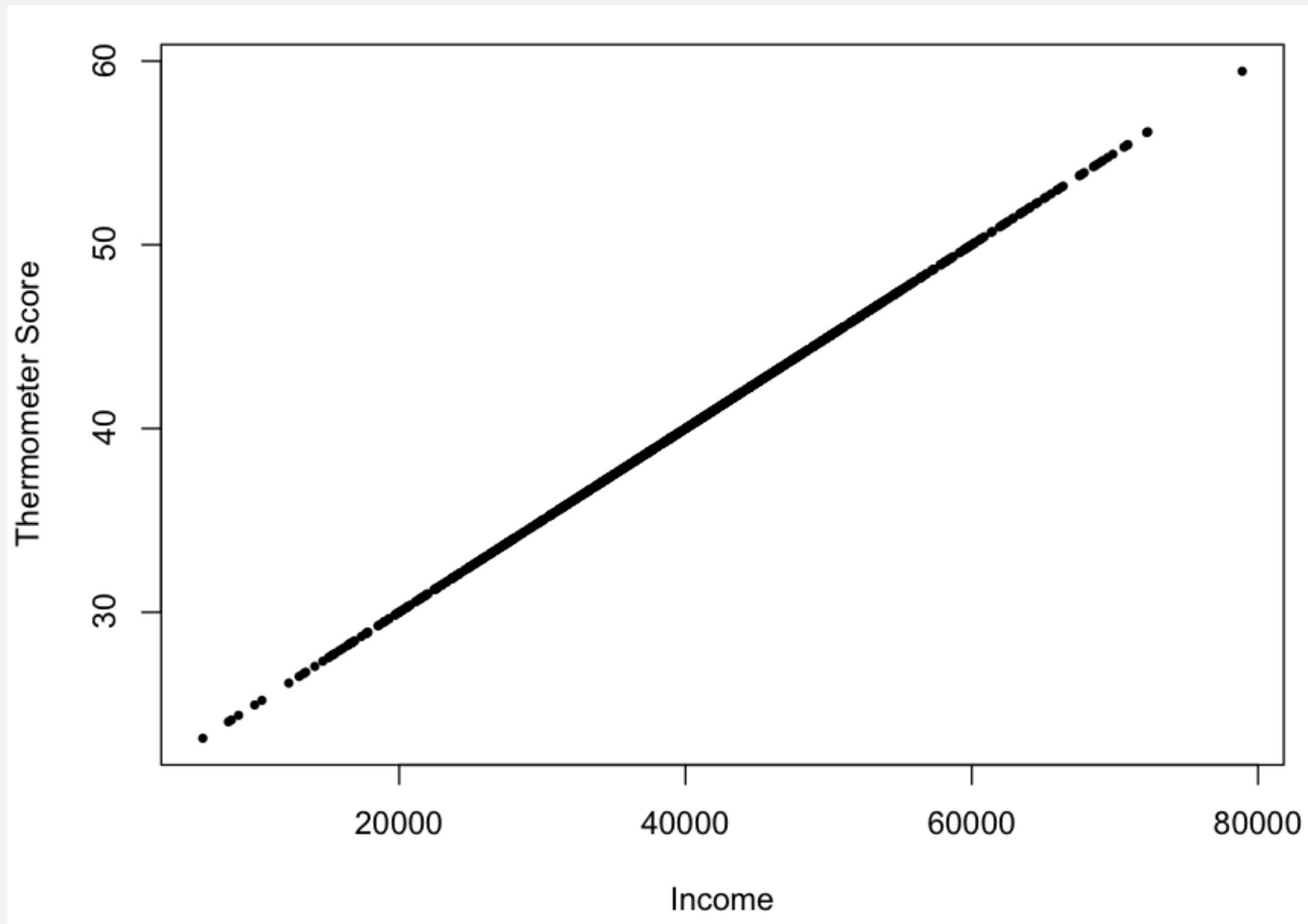
- If the coefficient is 0, no bivariate relationship exists
 - A positive coefficient means that a positive relationship exists
 - A negative coefficient means that a negative relationship exists
- Correlation of -1 or +1 means that relation between X and Y is perfectly linear

CORRELATION



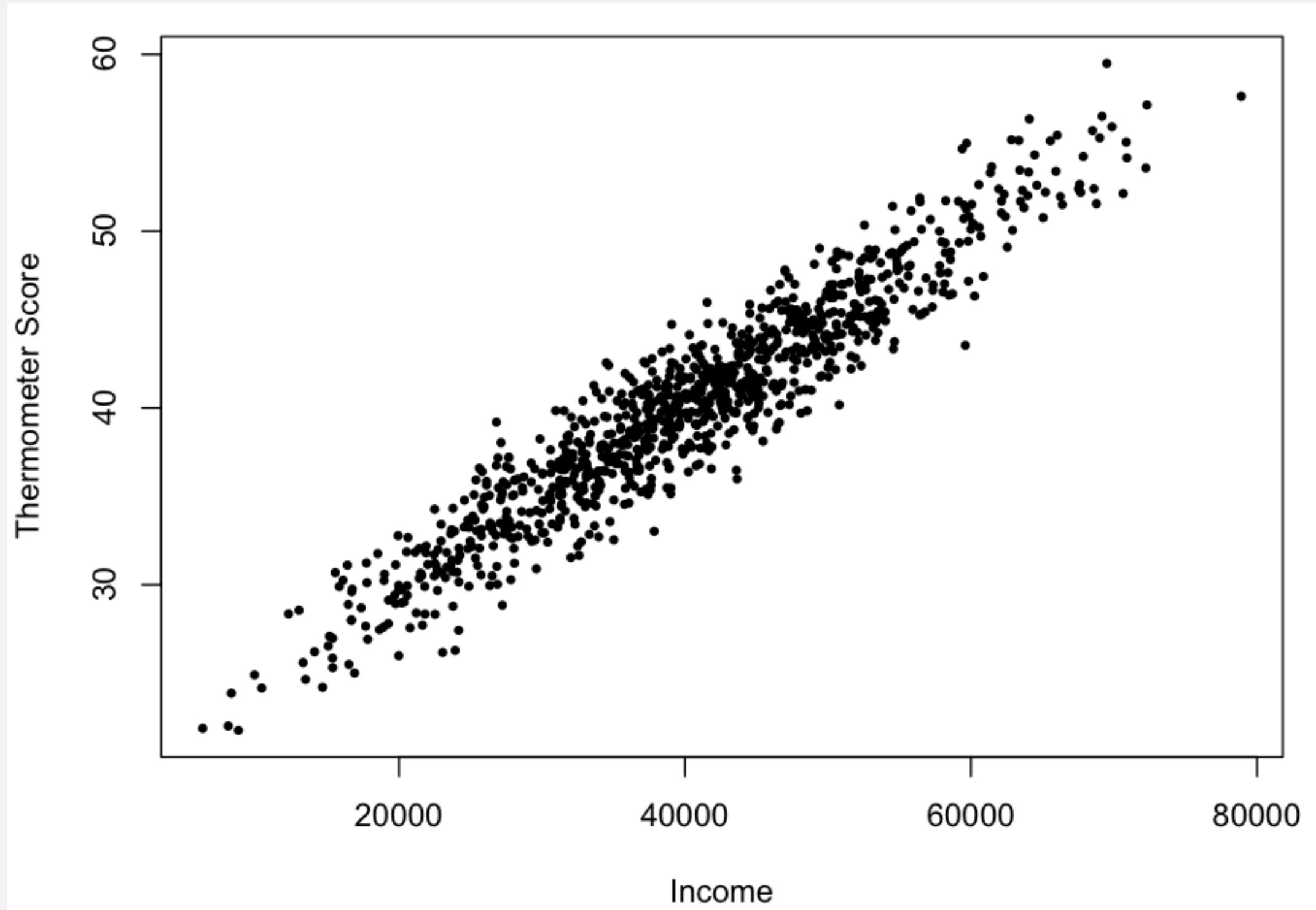
$r = -1$

CORRELATION



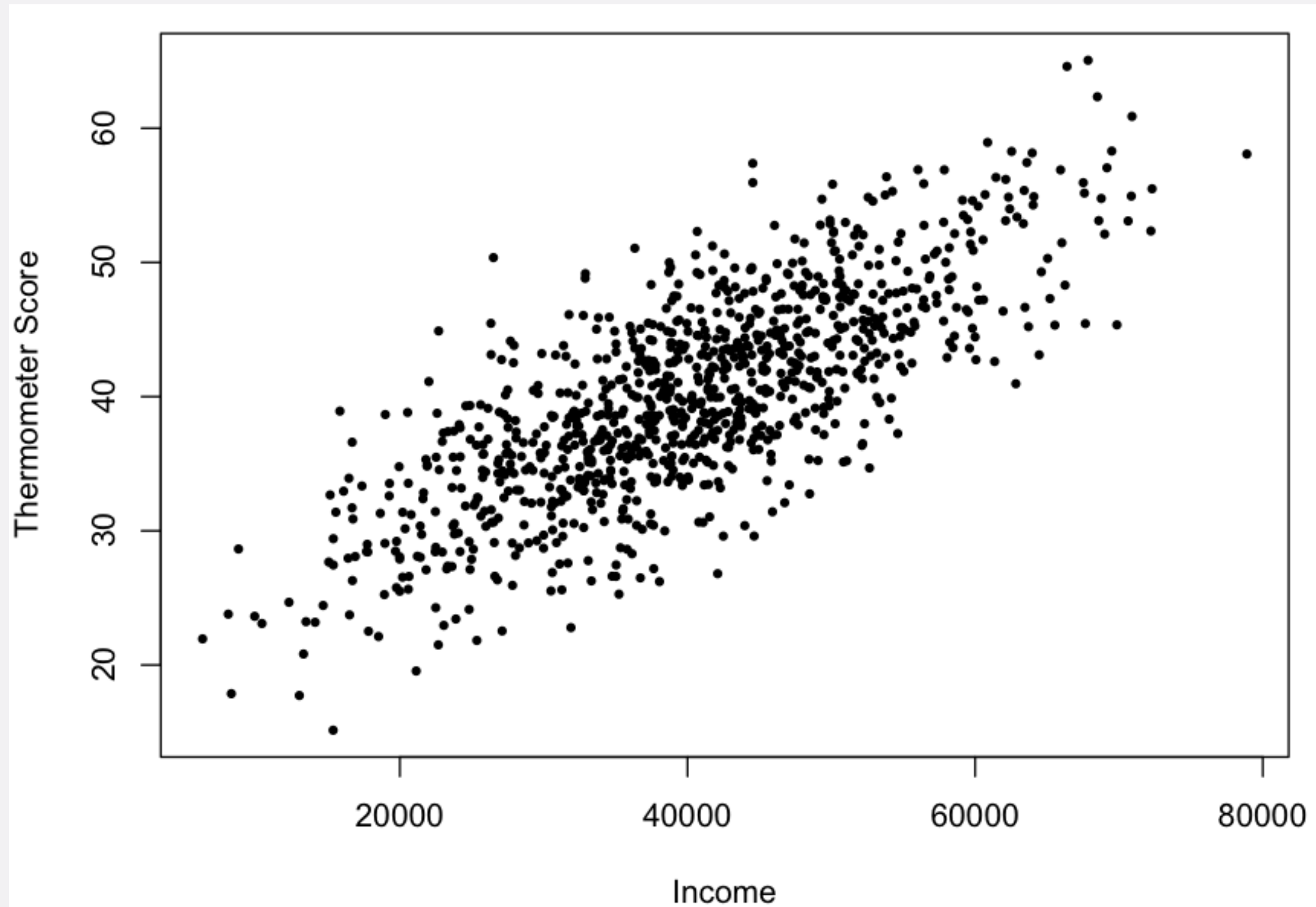
$r=1$

CORRELATION



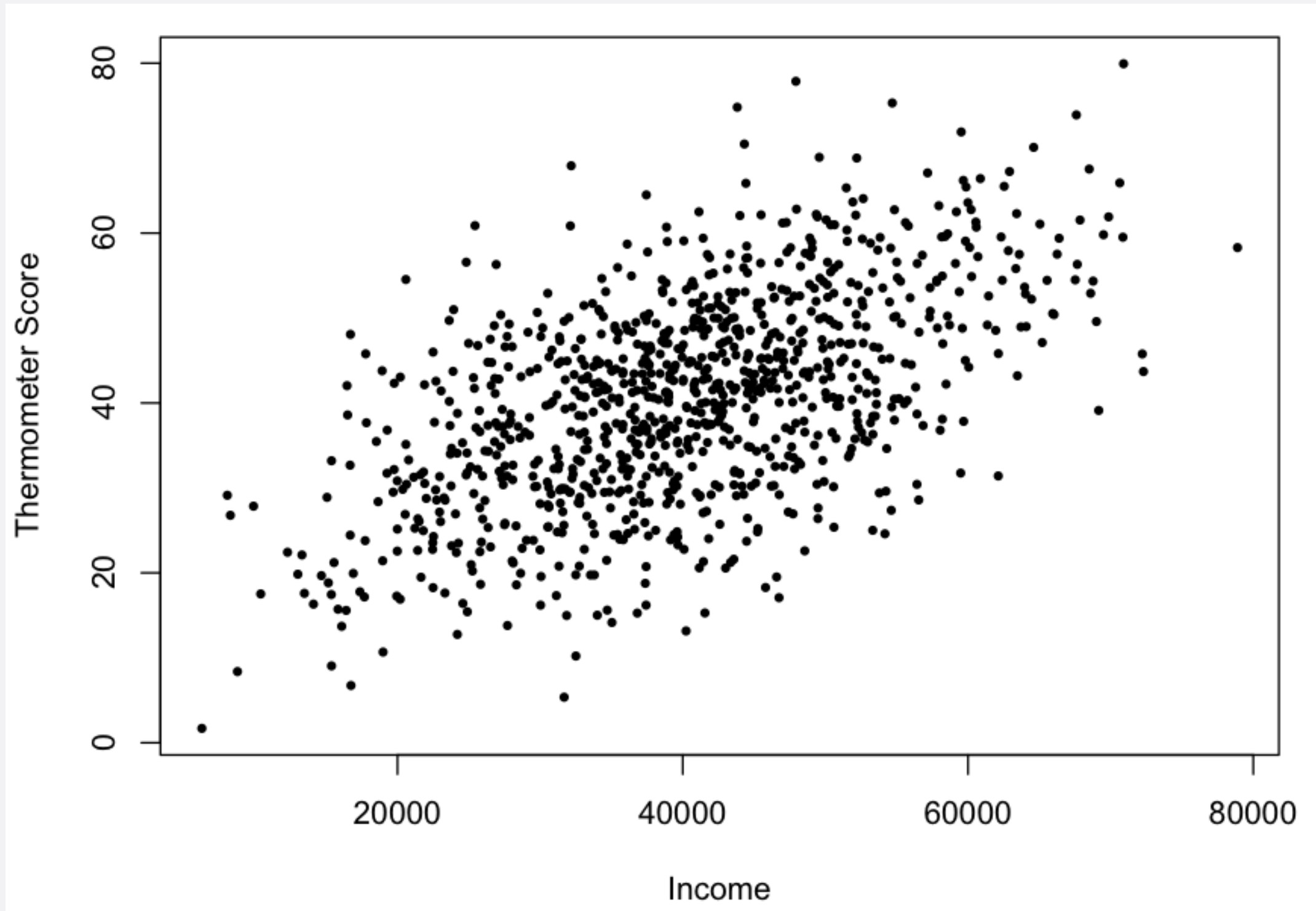
$r=0.95$

CORRELATION



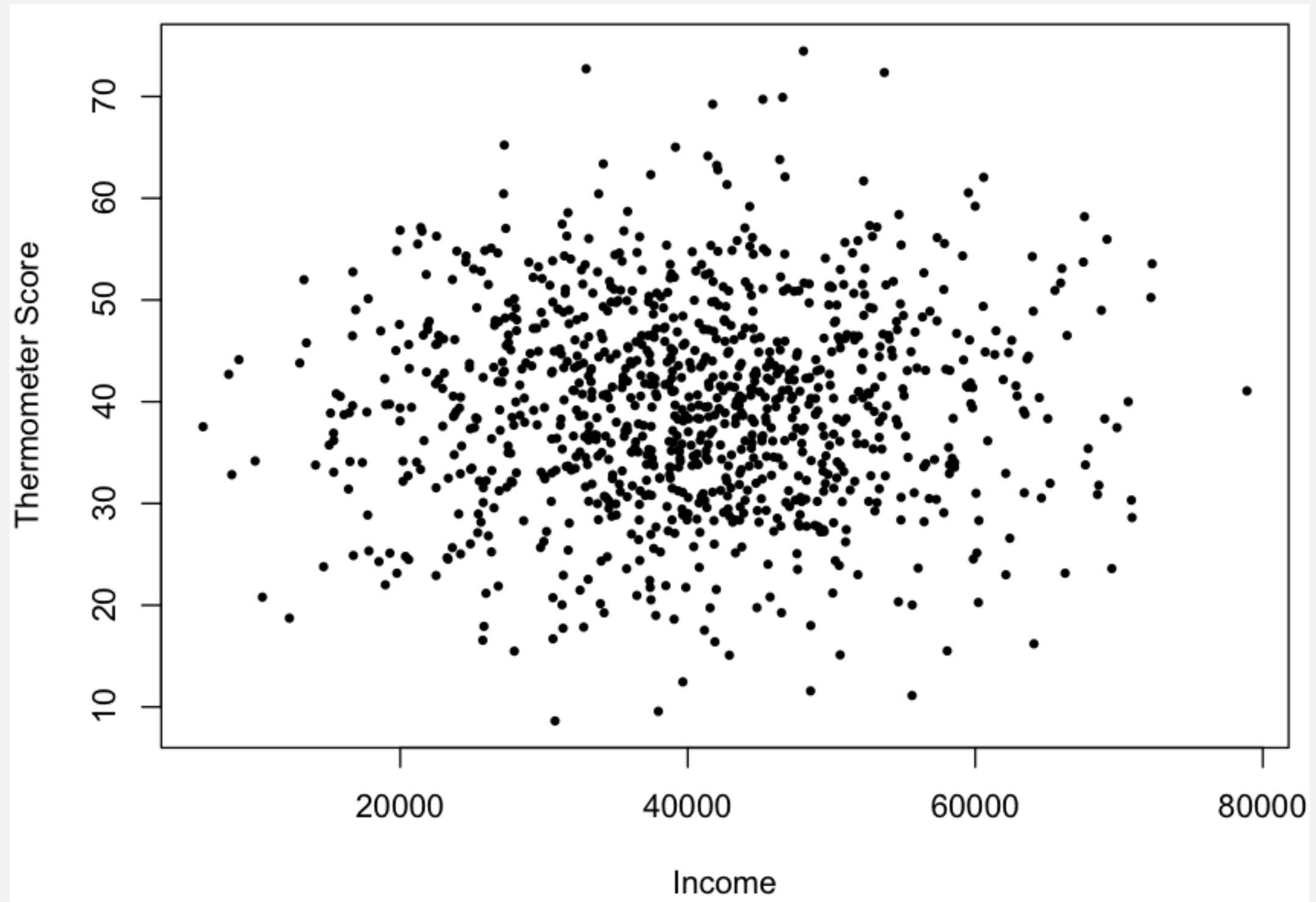
$r=0.77$

CORRELATION



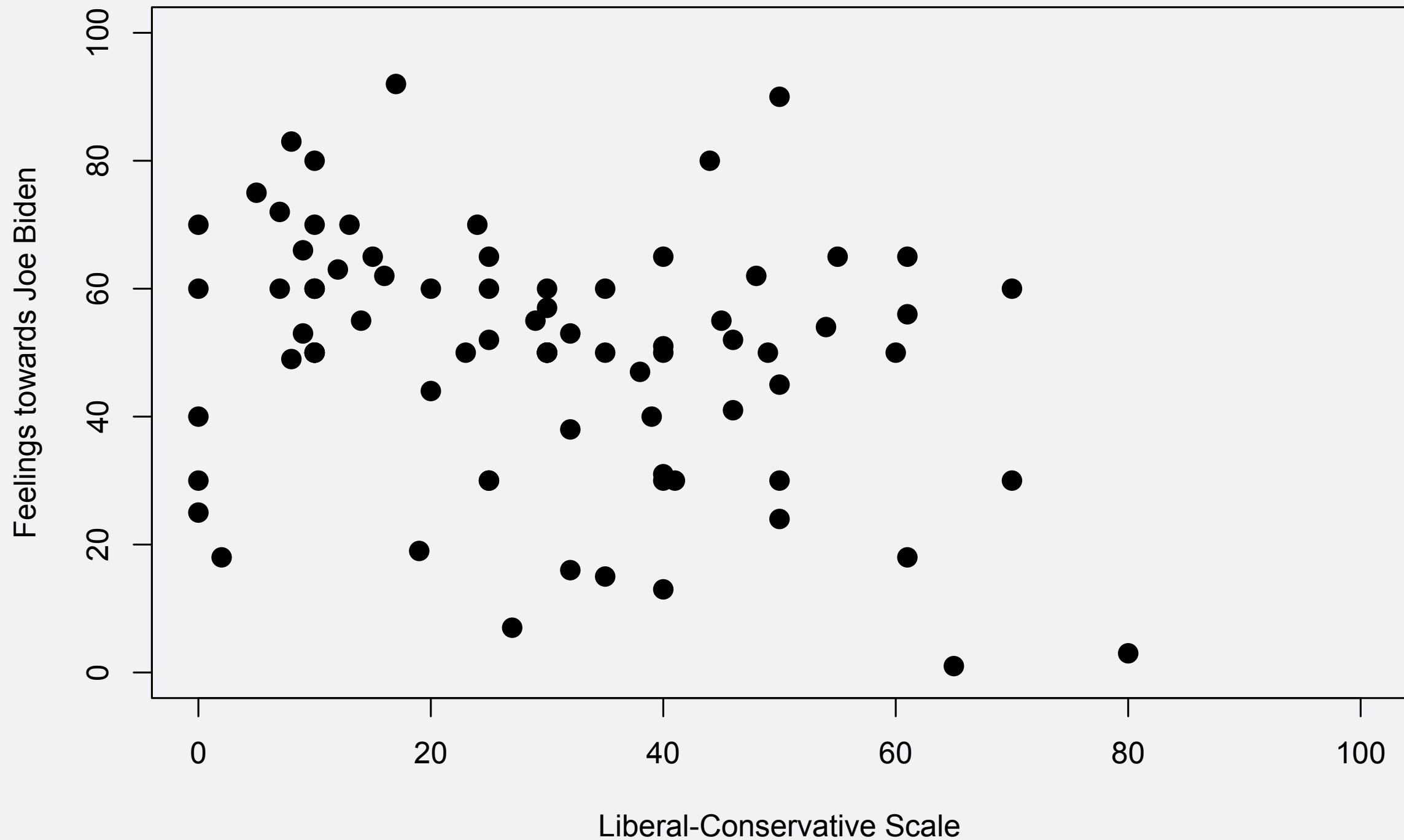
$r=0.53$

CORRELATION



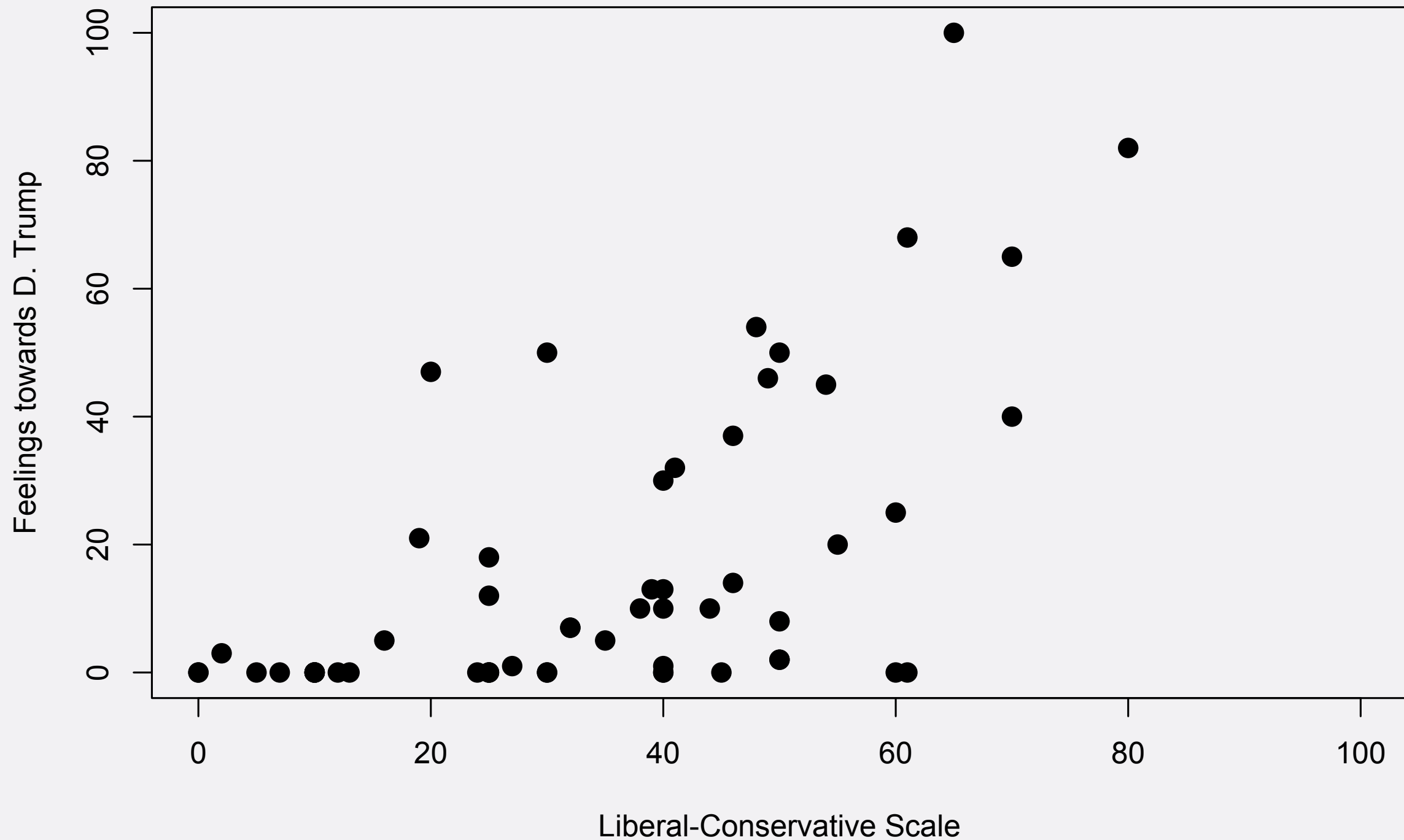
$r=0$

JOE BIDEN



$r = -0.29$

DONALD TRUMP



$r=0.61$