

Physical Activity and BMI: Linear Regression

Description:

This data set, "Physical activity and BMI", provides participants' Body Mass Index and average daily number of steps.

Variables:

- SUBJECT** - Participant's ID.
- PA** - Physical activity indicated by average daily number of steps (in thousands).
- BMI** - Body Mass Index

This example JASP file demonstrates the use of linear regression. Specifically, we will investigate whether and to what extent the average daily number of steps relates to BMI.

Reference:

Moore, D. S., McCabe, G. P., and Craig, B. A. (2012). *Introduction to the Practice of Statistics* (7th ed.). New York: Freeman.

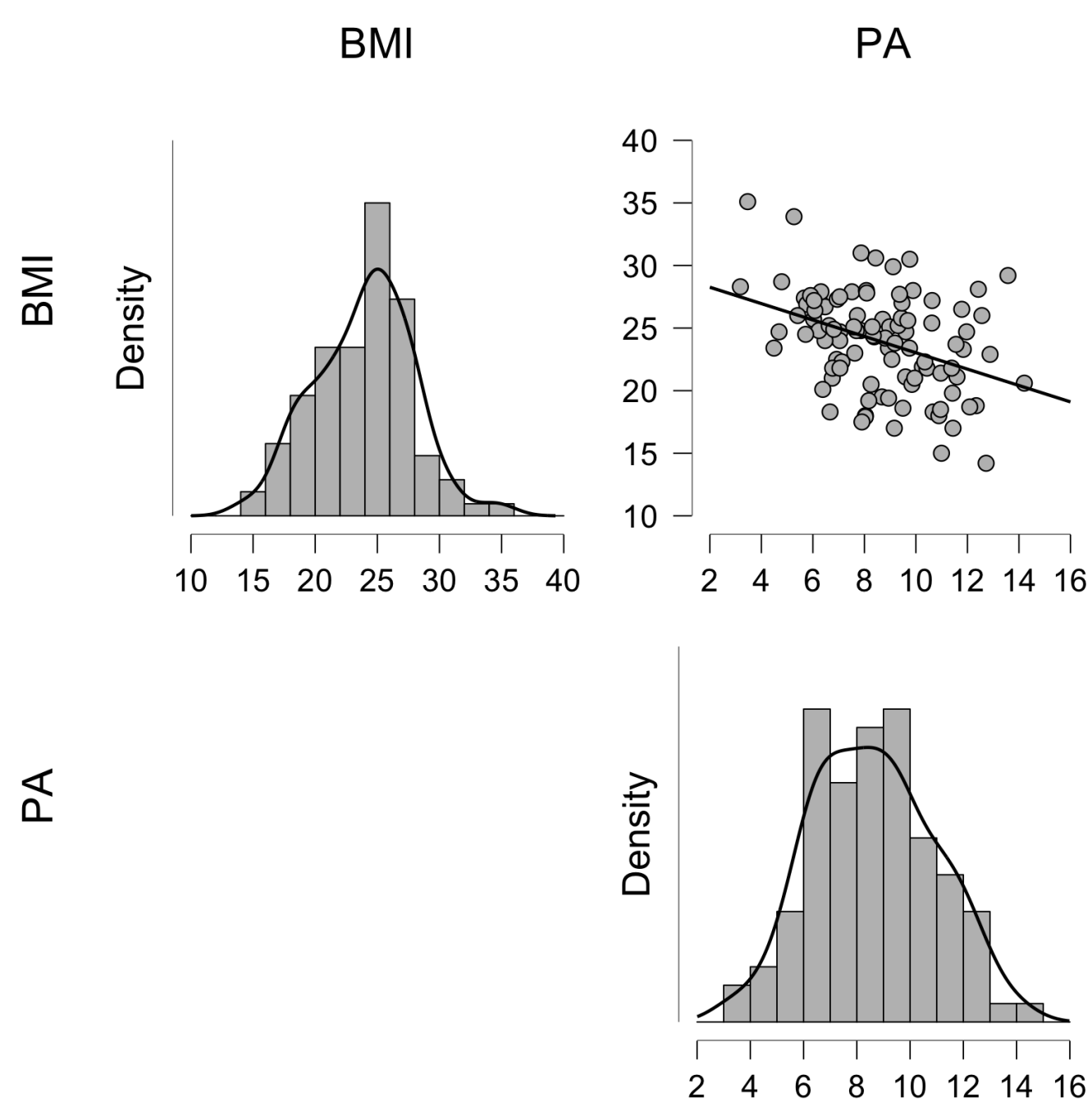
Mestek, M. L., Plaisance, E., and Grandjean, P. (2008). The relationship between pedometer-determined and self-reported physical activity and body composition variables in college-aged men and women. *Journal of American College Health*, 57: 39–44.

Descriptive Statistics

The data feature 100 participants with recordings of their physical activity (PA) and Body Mass Index (BMI).

| Descriptive Statistics | | |
|------------------------|--------|--------|
| | BMI | PA |
| Valid | 100 | 100 |
| Missing | 0 | 0 |
| Mean | 23.939 | 8.614 |
| Std. Deviation | 3.941 | 2.320 |
| Minimum | 14.200 | 3.186 |
| Maximum | 35.100 | 14.209 |

Correlation plot



The bi-variate scatterplot shows a negative relationship between the PA and BMI.

Linear Regression

| Model Summary | | | | |
|---------------|-------|----------------|-------------------------|-------|
| Model | R | R ² | Adjusted R ² | RMSE |
| 1 | 0.385 | 0.149 | 0.140 | 3.655 |

Physical activity explains about 15% of the variance in BMI.

| ANOVA | | | | | | |
|-------|------------|----------------|----|-------------|--------|--------|
| Model | | Sum of Squares | df | Mean Square | F | p |
| 1 | Regression | 228.377 | 1 | 228.377 | 17.096 | < .001 |
| | Residual | 1309.101 | 98 | 13.358 | | |
| | Total | 1537.478 | 99 | | | |

The linear regression model is significantly better than the null model.

| Coefficients | | | | | | |
|--------------|-------------|----------------|----------------|--------------|--------|--------|
| Model | | Unstandardized | Standard Error | Standardized | t | p |
| 1 | (Intercept) | 29.578 | 1.412 | | 20.948 | < .001 |
| | PA | -0.655 | 0.158 | -0.385 | -4.135 | < .001 |

The coefficients table shows that the model can be expressed as $BMI = 29.578 - 0.665 \cdot PA$.

On average, a thousand more steps per day relates to a decrease of BMI of about 0.665.

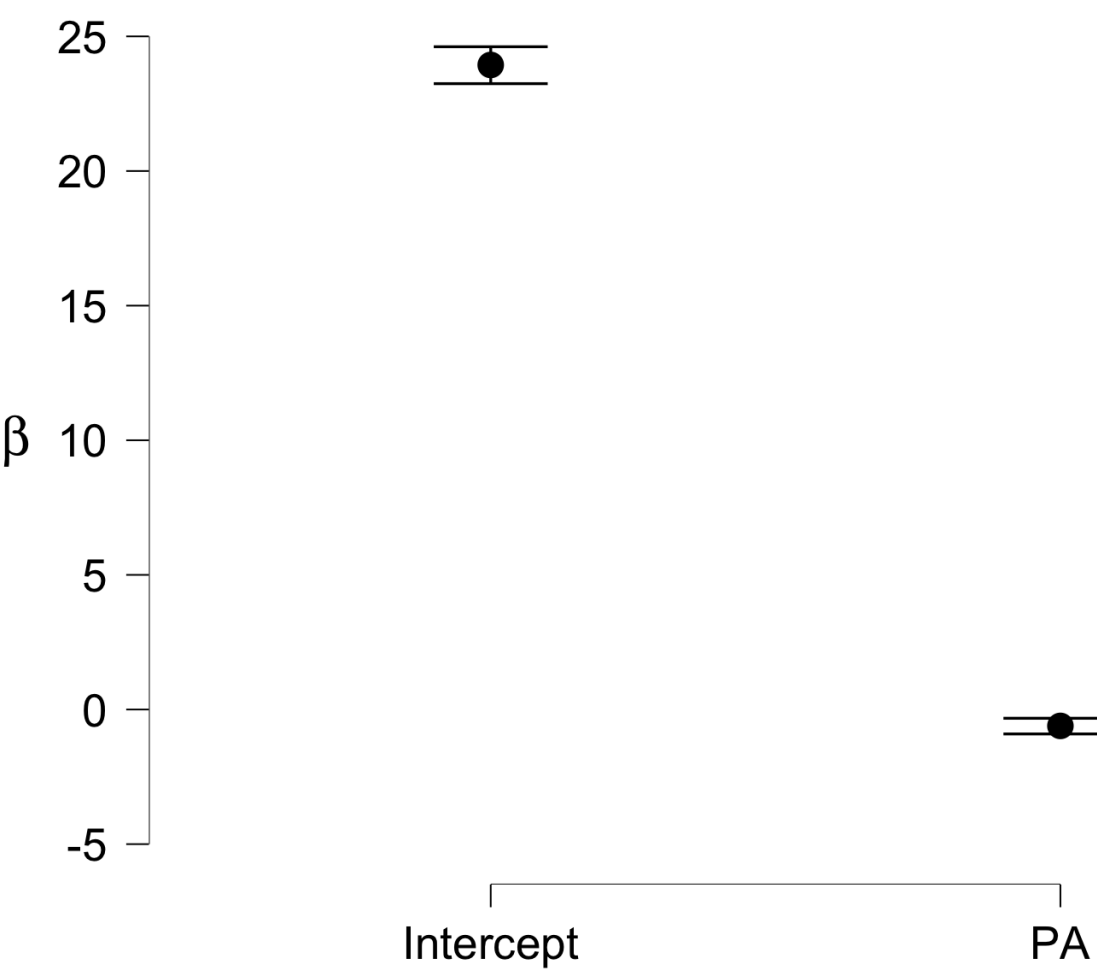
Bayesian Linear Regression

| Model Comparison | | | | | |
|------------------|-------|-----------|-----------------|------------------|----------------|
| Models | P(M) | P(M data) | BF _M | BF ₁₀ | R ² |
| Null model | 0.500 | 0.004 | 0.004 | 1.000 | 0.000 |
| PA | 0.500 | 0.996 | 284.327 | 284.327 | 0.149 |

Posterior Summary

| Posterior Summaries of Coefficients | | | | | | | |
|-------------------------------------|--------|-------|--------|-------------|-------------------------|-----------------------|--------|
| Coefficient | Mean | SD | P(inc) | P(inc data) | BF _{inclusion} | 95% Credible Interval | |
| | | | | | | Lower | Upper |
| Intercept | 23.939 | 0.366 | 1.000 | 1.000 | 1.000 | 23.244 | 24.615 |
| PA | -0.609 | 0.157 | 0.500 | 0.996 | 284.327 | -0.908 | -0.326 |

Posterior Coefficients with 95% Credible Interval



Inferential Plots

