Interpretation of Regression Coefficients

1. Simple Regression with One Quantitative Predictor

Literal Interpretation
\[ b_0 : \text{intercept} = \text{The predicted mean of Y (the DV) when X equals 0.00} \]
\[ b_1 : \text{slope of X} = \text{The predicted change in Y for a one unit increase in X} \]

General Interpretation (one normally used in APA-styled reports)
When reporting results of regression researchers tend to provide a general, not literal, interpretation of regression coefficients, and often the intercept is not of interest (unless one of the IV is categorical, which is discussed below), so focus is upon the slope estimates.

\[ b_1 : \text{slope of X} = \text{Shows relationship between X and Y; if positive this indicates that as X increases Y also tends to increase, if negative, suggests that as X increases Y tends to decline} \]

Example 1

DV = Salary
IV = Age
\[ b_0 = 1500.00 \]
\[ b_1 = 750.00 \]

Literal Interpretation
\[ b_0 : \text{Someone with age} = 0 \text{ is predicted to have a salary of} \$1,500; \text{or, The predicted salary for someone 0 years of age is} \$1500 \]
\[ b_1 : \text{For each additional year of age, salary is expected to increase} \$750 \]

General Interpretation
\[ b_1 : \text{As one advances in age, salary should also increase; or, the greater one’s age, the greater one’s salary} \]

Example 2

DV = Mathematics test scores
IV = minutes studied daily
\[ b_0 = 50.00 \]
\[ b_1 = 0.10 \]

Literal Interpretation
\[ b_0 : \text{Students who don’t study daily are expected to score} 50 \text{ on the mathematics test} \]
\[ b_1 : \text{For each additional minute studied daily, test scores are expected to increase} 0.10 \text{ points.} \]

(Note that 10 minutes of daily study is expected to produce an increase in test scores of 0.10×10 = 1 point, so 20 minutes would result in 0.10×20 = 2 points, 30 minutes in 0.10×30 = 3 points, etc.)

General Interpretation
\[ b_1 : \text{The more one studies daily, the greater will be one’s test scores in mathematics} \]
Example 3

DV = Mathematics test scores
IV = hours spent watching TV weekly
b₀ = 75.00
b₁ = -1.30

Literal Interpretation
b₀ : Students who watch 0 hours of TV weekly are expected to score 75 on the mathematics test
b₁ : For each additional hour of TV watched weekly, mathematics test scores are expected to decline by -1.30 points.

(Note that for 3 hours of TV watching is predicted to reduce test scores by -1.3×3 = -3.9 points, 4 hours of TV watching weekly is predicted to result in a -1.30×4 = -5.2 points, and so on.)

General Interpretation
b₁ : The more time one dedicates to watching TV, the lower will be one’s test scores.

2. Regression with Multiple Quantitative Predictors

Literal Interpretation
b₀ : intercept = The predicted mean of Y (the DV) when all Xs equal 0.00
b₁ : slope of X₁ = The predicted change in Y for a one unit increase in X₁ controlling for X₂
b₂ : slope of X₂ = The predicted change in Y for a one unit increase in X₂ controlling for X₁

General Interpretation (APA styled)
Authors tend to report a general interpretation similar to those offered above without specifically mentioning holding constant, or controlling, the other predictors in the regression equation. Normally partial effect interpretation (holding constant the other predictors) is implied or ignored. To mimic this, I’ll include the partial effect component of the general interpretation in parentheses which means one may opt to include or exclude the partial effect wording.

b₁ : slope of X = Shows relationship between X and Y; if positive this indicates that as X₁ increases Y also tends to increase (controlling for X₂), if negative, suggests that as X₁ increases Y tends to decline (controlling for X₂).

Example 1

DV = Salary
IV = Age
IV = Job Commitment (1=low, 5=high)
b₀ = 1500.00
b₁ = 750.00
b₂ = 9632.00

Literal Interpretation
b₀ : Someone with age = 0 and job commitment = 0 is predicted to have a salary of $1,500; or, The predicted salary for someone 0 years of age and with 0 rating on job commitment is $1500
b₁ : For each additional year of age, salary is expected to increase $750 controlling for level of job commitment
b₂ : For each point increase in job commitment, salary is expected to increase $9,632 holding constant age
**General Interpretation**

*b*$_{\text{age}}$ : The greater one’s age, the greater one’s salary (holding constant job commitment levels)

*b*$_{\text{job}}$ : (After taking into consideration one’s age,) as job commitment increases, so too does salary

**Example 2**

DV = Mathematics test scores  
IV = minutes studied daily  
IV = Motivation to learn mathematics (1=low, 10 = high)  
*b*$_{0}$ = 50.00  
*b*$_{\text{minutes}}$ = 0.10  
*b*$_{\text{motivation}}$ = 3.45

**Literal Interpretation**

*b*$_{0}$ : Students who don’t study daily and have motivation of 0 are expected to score 50 on the mathematics test

*b*$_{\text{minutes}}$ : For each additional minute studied daily, test scores are expected to increase 0.10 points controlling for, or holding constant, motivation to learn mathematics.

*b*$_{\text{motivation}}$ : For each point increase in motivation to learn mathematics, test scores are expected to increase by 3.45 points controlling for the number of minutes studied daily.

**General Interpretation**

*b*$_{\text{minutes}}$ : The more one studies daily, the greater will be one’s test scores in mathematics (after taking into account one’s motivation to learn mathematics)

*b*$_{\text{motivation}}$ : The greater one’s motivation to learn mathematics, the greater will be one’s mathematics test scores (controlling for minutes studied daily)

**Example 3**

DV = Mathematics test scores  
IV = hours spent watching TV weekly  
IV = prior test score mathematics  
*b*$_{0}$ = 43.00  
*b*$_{\text{TV}}$ = -1.30  
*b*$_{\text{prior math}}$ = 0.46

**Literal Interpretation**

*b*$_{0}$ : Students who watch 0 hours of TV weekly and have prior mathematics test score of 0 are expected to score 43 on the mathematics test

*b*$_{\text{TV}}$ : For each additional hour of TV watched weekly, mathematics test scores are expected to decline by 1.30 points controlling for one’s prior mathematics test scores.

*b*$_{\text{prior math}}$ : For each additional point scored on a prior mathematics test, mathematics test scores are expected to increase 0.46 points holding constant number of hours watching TV.

**General Interpretation**

*b*$_{\text{TV}}$ : The more time one dedicates to watching TV, the lower will be one’s test scores in mathematics (controlling for one’s prior achievement in mathematics).

*b*$_{\text{prior math}}$ : The better one performs on a previous mathematics test, the better one is likely to perform on the current mathematics test (controlling for number of house watching TV).

3. **Qualitative Predictors – to be added**