Interpretation of Regression Coefficients

1. Simple Regression with One Quantitative Predictor

Literal Interpretation
b_0 : intercept = The predicted mean of Y (the DV) when X equals 0.00
b_1 : slope of X = 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 : slope of X = 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 : Someone with age = 0 is predicted to have a salary of $1,500; or, The predicted salary for someone 0 years of age is $1500
b_1 : For each additional year of age, salary is expected to increase $750

General Interpretation
b_1 : 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 : Students who don't study daily are expected to score 50 on the mathematics test
b_1 : For each additional minute studied daily, test scores are expected to increase 0.10 points.

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

General Interpretation
b_1 : 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
$b_0 = 75.00$
$b_1 = -1.30$

Literal Interpretation
b_0 : Students who watch 0 hours of TV weekly are expected to score 75 on the mathematics test
b_1 : 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
b_1 : The more time one dedicates to watching TV, the lower will be one's test scores.

2. Regression with Multiple Quantitative Predictors

Literal Interpretation
b_0 : intercept = The predicted mean of Y (the DV) when all Xs equal 0.00
b_1 : slope of X_1 = The predicted change in Y for a one unit increase in X_1 controlling for X_2
b_2 : slope of X_2 = The predicted change in Y for a one unit increase in X_2 controlling for X_1

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.

b_1 : slope of X = Shows relationship between X and Y; if positive this indicates that as X_1 increases Y also tends to increase (controlling for X_2), if negative, suggests that as X_1 increases Y tends to decline (controlling for X_2).

Example 1

DV = Salary
IV = Age
IV = Job Commitment (1=low, 5=high)
$b_0 = 1500.00$
$b_{age} = 750.00$
$b_{job} = 9632.00$

Literal Interpretation
b_0 : 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
b_{age} : For each additional year of age, salary is expected to increase $750 controlling for level of job commitment
b_{job} : For each point increase in job commitment, salary is expected to increase $9,632 holding constant age

General Interpretation
b_{age} : The greater one's age, the greater one's salary (holding constant job commitment levels)
b_{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)
$b_0 = 50.00$
$b_{minutes} = 0.10$
$b_{motivation} = 3.45$

Literal Interpretation
b_0 : Students who don't study daily and have motivation of 0 are expected to score 50 on the mathematics test
$b_{minutes}$: For each additional minute studied daily, test scores are expected to increase 0.10 points controlling for, or holding constant, motivation to learn mathematics.
$b_{motivation}$: 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
$b_{minutes}$: 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)
$b_{motivation}$: 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
$b_0 = 43.00$
$b_{TV} = -1.30$
$b_{prior\ math} = 0.46$

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