

Table web Regression under different missing value mechanisms, with different approaches to handling missing values (see Fig 7.1). The root of the mean squared error (sqrt(MSE)) was highlighted in bold for the strategy with the best result in estimating the coefficients b1 and b2.

	MCAR b±SE; sqrt(MSE)	Adj R ²	x1 MAR on x2 b±SE; sqrt(MSE)	Adj R ²	x1 MAR on y b±SE; sqrt(MSE)	Adj R ²	x1 MNAR b±SE; sqrt(MSE)	Adj R ²
x1 independent of x2								
Original data, no missings (n=500)		67%		67%		67%		67%
b1	1.00±0.045; 0.044		1.00±0.045; 0.044		1.00±0.045; 0.044		1.00±0.045; 0.044	
b2	1.00±0.045; 0.044		1.00±0.045; 0.044		1.00±0.045; 0.044		1.00±0.045; 0.044	
Complete case analysis (n=250)		67%		61%		55%		62%
b1	1.00±0.064; 0.064		1.00±0.064; 0.063		0.83±0.062; 0.185		1.00±0.081; 0.080	
b2	1.00±0.064; 0.064		1.00±0.081; 0.080		0.83±0.063; 0.184		1.00±0.063; 0.061	
Conditional mean with X (n=500)		50%		50%		43%		44%
b1	1.00±0.078; 0.064		1.00±0.078; 0.063		0.83±0.090; 0.185		1.00±0.106; 0.080	
b2	1.00±0.055; 0.064		1.00±0.055; 0.080		1.12±0.060; 0.139		1.00±0.058; 0.064	
SI with X+Y (n=500)		67%		67%		67%		62%
b1	1.00±0.045; 0.063		1.00±0.045; 0.061		1.01±0.045; 0.060		1.14±0.059; 0.162	
b2	1.00±0.045; 0.064		1.00±0.045; 0.079		1.00±0.045; 0.069		1.00±0.048; 0.064	
mice with X+Y (n=500)		67%		66%		67%		62%
b1	1.00±0.054; 0.057		1.00±0.054; 0.056		1.00±0.054; 0.056		1.13±0.071; 0.152	
b2	1.00±0.056; 0.056		1.00±0.068; 0.068		1.00±0.060; 0.061		1.00±0.058; 0.059	
x1 correlated with x2								
Original data, no missings (n=500)		77%		77%		77%		77%
b1	1.00±0.063; 0.064		1.00±0.063; 0.064		1.00±0.063; 0.064		1.00±0.063; 0.064	
b2	1.00±0.063; 0.064		1.00±0.063; 0.064		1.00±0.063; 0.064		1.00±0.063; 0.064	
Complete case analysis (n=250)		77%		70%		66%		69%
b1	1.00±0.090; 0.088		1.00±0.090; 0.090		0.86±0.086; 0.169		1.00±0.103; 0.105	
b2	1.00±0.090; 0.088		1.00±0.103; 0.102		0.84±0.086; 0.181		1.00±0.090; 0.090	
Conditional mean with X (n=500)		72%		72%		70%		70%
b1	1.00±0.101; 0.088		1.00±0.101; 0.090		0.85±0.108; 0.169		1.00±0.118; 0.105	
b2	1.00±0.087; 0.085		1.00±0.087; 0.092		1.21±0.082; 0-221		1.17±0.082; 0.191	
SI with X+Y (n=500)		78%		78%		78%		76%
b1	1.01±0.064; 0.088		1.01±0.063; 0.089		1.01±0.063; 0.094		1.06±0.074; 0.127	
b2	0.99±0.063; 0.087		1.00±0.063; 0.096		0.99±0.063; 0.106		1.09±0.063; 0.130	
mice with X+Y (n=500)		77%		77%		78%		76%
b1	1.00±0.079; 0.080		1.00±0.078; 0.081		1.00±0.079; 0.086		1.06±0.093; 0.113	
b2	1.00±0.077; 0.079		1.00±0.082; 0.083		1.00±0.085; 0.094		1.09±0.081; 0.125	

Results are means over 1000 repetitions of estimating b_1 and b_2 in a linear regression model. Samples with 500 subjects were generated from the model: $y = b_1 * x_1 + b_2 * x_2 + \text{error}$, where $x_1 \sim N(0,1)$, $x_2 \sim N(0,1)$ for x_1 independent of x_2 , and $x_1 = 0.707 * x_1 + N(0, .707)$ for x_1 correlated with x_2 ; $\text{error} \sim N(0,1)$, and $b_1 = b_2 = 1$.

Original data: $n=500$ without missings

Complete case analysis, on average $n=250$: subjects with missing values in x_1 were excluded.

Conditional mean with X: missing values in x_1 were imputed with predicted values from the linear regression model $x_1 \sim x_2$.

SI with X+Y: single imputation of missing values in x_1 with random draws from the predicted distribution from the linear regression model $x_1 \sim x_2 + y$.

mice with X+Y: multiple imputation of missing values in x_1 with random draws from the predicted distribution from the linear regression model $x_1 \sim x_2 + y$ (repeated 5 times, predictive mean matching).