

Meta-Regression: Age × Study Design

Q1. Write the fitted model equation for each study design.

Non-RCT: $\hat{y} = 0.2271 - 0.0134 \text{ Age}_c$

RCT: $\hat{y} = 0.1148 - 0.0142 \text{ Age}_c$ [0.2271 – 0.1123; –0.0134 – 0.0008]

Interpretation: Effect size decreases with age in both designs. RCTs start lower (0.1148 vs 0.2271) but the slopes are almost the same.

Q2. Interpret the model coefficients.

Term	Estimate	p-value	Meaning
β_0	0.2271	< .0001	Non-RCT effect at mean age
β_1	–0.0134	0.0045	Age slope in Non-RCT
β_2	–0.1123	0.0332	RCT – Non-RCT difference at mean age
β_3	–0.0008	0.8960	Difference in age slopes (RCT vs Non-RCT)

Interpretation: β_0 , β_1 and β_2 are significant; β_3 is not.

Q3. Is there a significant interaction between age and study design?

$H_0: \beta_3 = 0$; $z = -0.131$, $p = 0.896 > 0.05 \rightarrow H_0$ not rejected.

Interpretation: The age–effect relationship does not differ between RCT and Non-RCT studies (slopes are parallel).

Q4. Do the moderators jointly explain heterogeneity? (Omnibus test)

$Q_M(df = 3) = 32.78$, $p < .0001 \rightarrow H_0$ rejected.

Interpretation: Age and design together significantly explain differences in effect sizes.

Q5. Is there residual heterogeneity after adding the moderators?

$\tau^2 = 0$, $I^2 = 0\%$, $Q_E(df = 8) = 0.3843$, $p = 1.000$.

Interpretation: No unexplained heterogeneity remains; the model fits well.

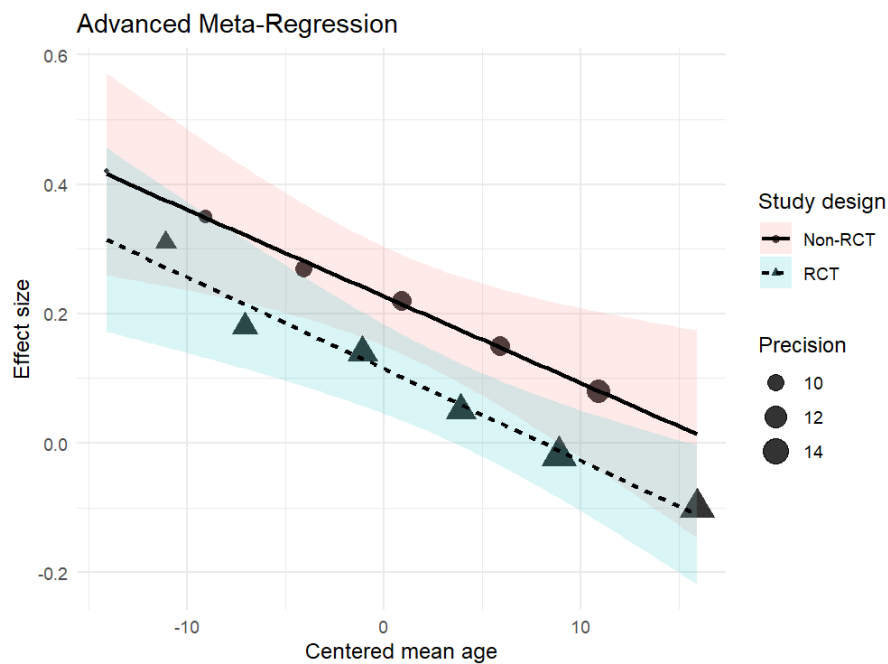
Q6. Calculate R^2 .

$\tau^2_0 = 0.0151$ (intercept-only model), $\tau^2_m = 0$

$R^2 = (0.0151 - 0)/0.0151 \times 100 = 100\%$

Interpretation: Age and study design explain all of the between-study heterogeneity.

Q7. Interpret the meta-regression plot.



Interpretation: Both lines decline with age and are nearly parallel, so there is no interaction. The RCT line lies below the Non-RCT line, showing smaller RCT effects.

Q8. Write the overall conclusion.

Effect size decreases significantly with age ($\beta_1 = -0.0134$, $p = 0.0045$). RCTs show smaller effects than Non-RCTs ($\beta_2 = -0.1123$, $p = 0.033$). The age effect does not differ by design (β_3 $p = 0.896$).