S3 Procedure for calculating, converting and combining the effect sizes

Conversion from bivariate *r* to *z*:

$$z = 0.5 \cdot \ln\left(\frac{1+r}{1-r}\right)$$

Calculation variance of z V_z:

$$v_z = \frac{1}{n-3}$$

Calculation of standard error SE_z:

$$SE_z = \sqrt{v_z}$$

Conversion from *z* to *r*:

$$r = \frac{e^{2z}-1}{e^{2z}+1}$$

If there are 2 groups: From arithmetic mean comparison to bivariate *r*

(1) Calculation of Hedges' *g*:

$$g = \frac{M_1 - M_2}{SD_{pooled}}$$

using the pooled and weighted standard deviation (according to Cohen):

$$SD_{pooled} = \sqrt{\frac{(n_1-1)SD_1^2 + (n_2-1)SD_2^2}{n_1+n_2-2}}$$

(2) Conversion to bivariate *r*:

$$r_{pb} = \frac{M_1 - M_2}{SD_{pooled}}\sqrt{\frac{n_1 n_2}{n(n-1)}} = g \cdot \sqrt{\frac{n_1 n_2}{n(n-1)}}$$

If there are two comparison/control groups: From multiple arithmetic mean comparisons to bivariate *r*

(1) Combine arithmetic means of multiple groups (here: multiple control groups)

$$M_{merged} = \frac{(M_1 \cdot n_1) + (M_2 \cdot n_2)}{(n_1 + n_2)}$$

(2) Combine standard deviation of multiple groups (here: multiple control groups)

$$SD_{merged} = \frac{(SD_1 \cdot n_1) + (SD_2 \cdot n_2)}{(n_1 + n_2)}$$

(3) Calculation of Hedges' *g*:

$$g = \frac{M_{merged} - M_3}{SD_{pooled}}$$

using the pooled and weighted standard deviation (according to Cohen):

$$SD_{pooled} = \sqrt{\frac{(n_{merged}-1)SD_{merged}^2 + (n_3-1)SD_3^2}{n_{merged}+n_3-2}}$$

(4) Conversion to bivariate *r*:

$$r_{pb} = \frac{M_{merged} - M_3}{SD_{pooled}} \sqrt{\frac{n_{merged} n_3}{n(n-1)}} = g \cdot \sqrt{\frac{n_{merged} n_3}{n(n-1)}}$$

If there are 3 and more groups in ascending order (A, B, C, D, E): From multiple arithmetic mean comparisons to bivariate *r*

All pairwise comparisons
- 3 groups (i.e. ABC): 3 comparisons AB, BC, AC.
- 4 groups (i.e. ABCD): 6 comparisons AB, AC, AD, BC, BD, CD.
- 5 groups (i.e. ABCDE): 10 comparisons AB, AC, AD, AE, BC, BD, BE, CD, CE, DE.

(1) For each comparison:

$$r_{pb} = \frac{M_1 - M_2}{SD_{pooled}} \sqrt{\frac{n_1 n_2}{n(n-1)}} = g \cdot \sqrt{\frac{n_1 n_2}{n(n-1)}}$$

With $SD_{pooled} = \sqrt{\frac{(n_1-1)SD_1^2+(n_2-1)SD_2^2}{n_1+n_2-2}}$

(2) *z*-transformation of each individual *r*:

$$z = 0.5 \cdot \ln\left(\frac{1+r}{1-r}\right)$$

(3) Averaging of all *z* scores:

$$z_{merged} = \frac{z_1, z_2, \ldots z_5}{1, 2, \ldots, 5}$$

(4) Conversion to merged bivariate *r*:

$$r_{merged} = \frac{e^{2z} - 1}{e^{2z} + 1}$$

From frequencies (A, B, C, D) to bivariate *r*
- If 2 groups (i.e. AB): one 2 x 2 Contingency Table
- If 3 groups (i.e. ABC): two 2 x 2 Contingency Tables AB and BC
- If 4 groups (i.e. ABCD): three 2 x 2 Contingency Tables AB, BC and CD

(1) Calculation of the Odds Ratio (for each 2 x 2 Contingency Table):

$$OR = \left(\frac{A}{A+B}\right) \Big/ \left(\frac{C}{C+D}\right)$$

With

	Outcome yes	Outcome no
Predictor yes	A	B
Predictor no	C	D

(2) Calculation of Cohen's *d* (for each 2 x 2 Contingency Table):

$$d = \frac{\ln(OR)\sqrt{3}}{\pi}$$

(3) Calculation of bivariate *r* (for each 2 x 2 Contingency Table):

$$r = \frac{d}{\sqrt{d^2 + a}}$$

With $a = \frac{(n_1+n_2)^2}{n_1 \cdot n_2}$

(4) *z*-transformation of each individual bivariate *r*:

$$z = 0.5 \cdot \ln\left(\frac{1+r}{1-r}\right)$$

(5) Averaging of all *z* scores:

$$z_{merged} = \frac{z_1, z_2, \ldots z_5}{1, 2, \ldots, 5}$$

(6) Conversion to merged bivariate *r*:

$$r_{merged} = \frac{e^{2z} - 1}{e^{2z} + 1}$$

Combine multiple bivariate correlations to r_{merged}

(1) *z*-transformation of each individual bivariate *r*:

$$z = 0.5 \cdot \ln\left(\frac{1+r}{1-r}\right)$$

(2) Averaging of all *z* scores:

$$z_{merged} = \frac{z_1, z_2, \ldots z_5}{1, 2, \ldots, 5}$$

(3) Conversion to merged bivariate *r*:

$$r_{merged} = \frac{e^{2z} - 1}{e^{2z} + 1}$$