

## Project: Unreliable heterogeneity

**Table 1**

**Variance in reliability leads to positive bias in heterogeneity estimates**

Meta-Analysis	$\rho_{xy}$	Observed Effect Sizes			SD(ES)
		Study 1	Study 2	Study 3	
		$\sqrt{R_{xx'}} \times \sqrt{R_{yy'}} = .6$	$\sqrt{R_{xx'}} \times \sqrt{R_{yy'}} = .7$	$\sqrt{R_{xx'}} \times \sqrt{R_{yy'}} = .8$	
I	0.0	0.00	0.00	0.00	0.00
II	0.3	0.18	0.21	0.24	0.03
III	0.5	0.30	0.35	0.40	0.05

*Note:* Reproduced from Olsson Collentine et al. (2020). The values under Study 1, 2 and 3 are observed effect sizes for that study given its measurement reliability  $\sqrt{R_{xx'}} \times \sqrt{R_{yy'}}$  and the true effect size  $\rho_{xy}$  when within-study sample size is infinite. SD (ES) is the standard deviation of the observed effect sizes for meta-analysis I, II and III, equivalent to heterogeneity given infinite within-study sample sizes. Code to reproduce table: [LINK](#)

**Table 2 (version 1)**

**Imperfect reliability leads to negative bias in heterogeneity estimates**

$\sqrt{R_{xx'}} \times \sqrt{R_{yy'}}$	Observed Effect Sizes			SD(ES)
	Study 1	Study 2	Study 3	
1	0.1	0.15	0.2	0.05
0.8	0.08	0.12	0.16	0.04
0.6	0.06	0.09	0.12	0.03

*Note:* The values under Study 1, 2 and 3 are observed effect sizes for that study given the measurement reliability  $\sqrt{R_{xx'}} \times \sqrt{R_{yy'}}$  and the true effect size of that study (first row) when within-study sample size is infinite. SD (ES) is the standard deviation of the observed effect sizes, equivalent to heterogeneity given infinite within-study sample sizes. Code to reproduce table: [LINK](#)

**Table 2 (version 2)****Imperfect reliability leads to negative bias in heterogeneity estimates**

	Observed Effect Sizes			SD(ES)
	Study 1	Study 2	Study 3	
$\sqrt{R_{xx'}} \times \sqrt{R_{yy'}} = 1$	0.1	0.15	0.2	0.05
$\sqrt{R_{xx'}} \times \sqrt{R_{yy'}} = 0.8$	0.08	0.12	0.16	0.04
$\sqrt{R_{xx'}} \times \sqrt{R_{yy'}} = 0.6$	0.06	0.09	0.12	0.03

*Note:*

The values under Study 1, 2 and 3 are observed effect sizes for that study given the measurement reliability  $\sqrt{R_{xx'}} \times \sqrt{R_{yy'}}$  and the true effect size of that study (first row) when within-study sample size is infinite. SD (ES) is the standard deviation of the observed effect sizes, equivalent to heterogeneity given infinite within-study sample sizes. Code to reproduce table: [LINK](#)