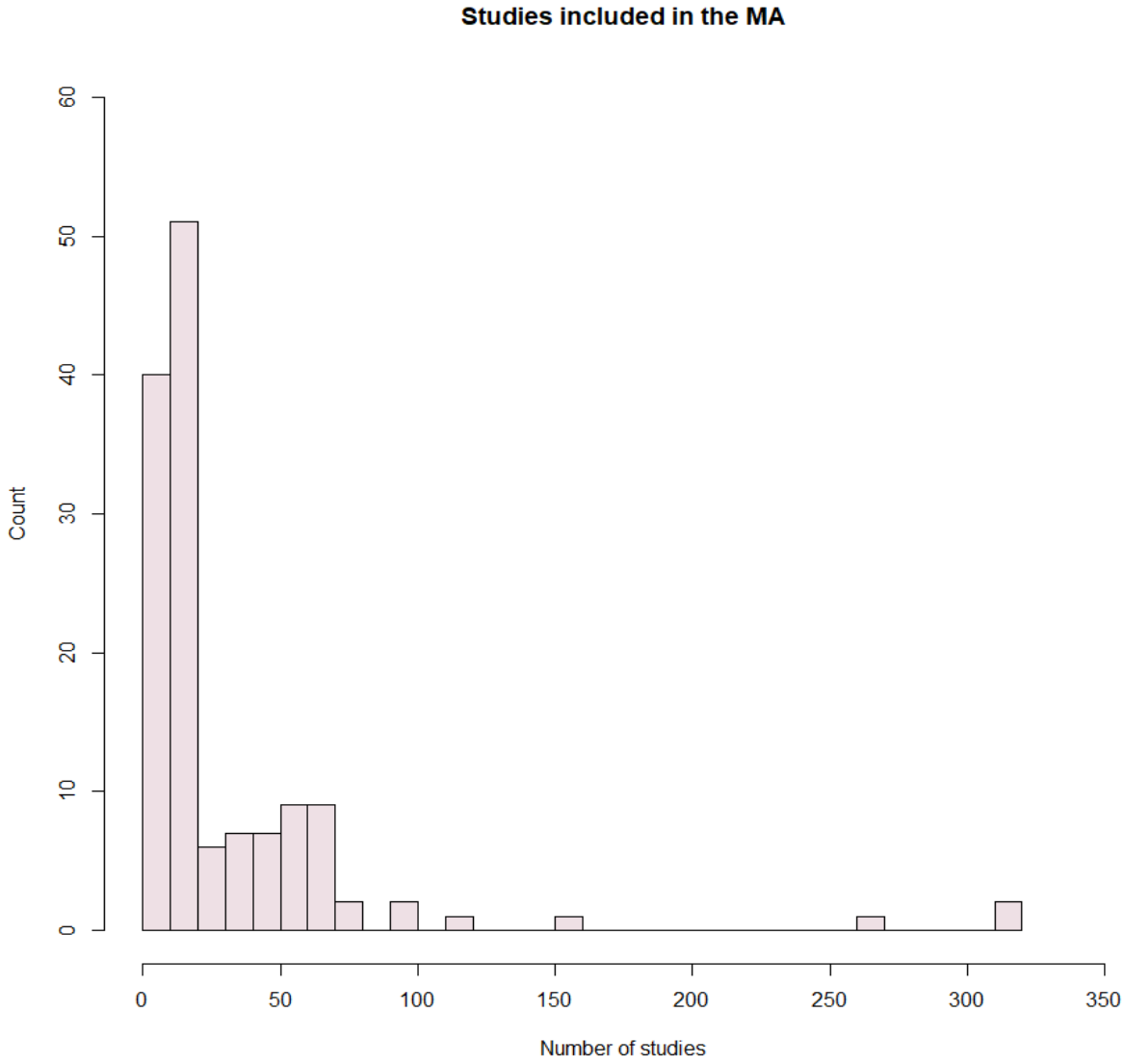
Supplementary file: Additional Figures, Tables, and Analyses

Supplementary Figures

Figure S1.

Distribution of the number of studies for the 138 RG datasets.



Supplementary Tables

Table S1.

Mathematical formulation of the three statistical models proposed in RG meta-analysis.

	Mathematical model	Parameter to estimate
Fixed-effect model	$\hat{\theta}_i = \theta + e_i$	θ
Varying-coefficient model	$\hat{\theta}_i = \theta_i + e_i$	$k^{-1}\sum_{i=1}^{k}\theta_i$
Random-effects model	$\hat{\theta}_i = \mu_\theta + e_i + \varepsilon_i$	μ_θ

Note: $\hat{\theta}_i$: reliability estimate reported in the i_{th} study. θ: population reliability coefficient common to all individual reliability estimates when assuming an FE model. e_i: sampling error of the i_{th} reliability estimate. μ_θ: pooled parametric reliability coefficient when assuming an RE model. ε_i: error due to sampling of population reliability coefficients.

Table S2.

Statistical methods to calculate an average reliability coefficient.

	Statistical Model				
Transformation method	**OLS**	**FE**	**VC**	**RE/Rei**	**REn**
No transformation	✓	✓	✓[a]	✓	✓
Fisher's Z	✓	✓	-	✓	-
Hakstian and Whalen	✓	✓	-	✓	-
Bonett	✓	✓	-	✓	-

Note: OLS: Ordinary Least Squares (unweighted conventional statistical methods). FE: Fixed-effect model. VC: Varying-Coefficient model. RE: Standard Random-Effects model weighting by the inverse variance. REi: Random-Effects model with the improved method of Hartung and Knapp (2001). REn: Random-effects model weighting by sample size. [a]Note that the average reliability coefficient calculated under the VC model coincides with that of the OLS model for untransformed reliability coefficients.

Table S3.

Methods to construct a confidence interval around the average reliability coefficient.

	Statistical Model					
Transformation method	**OLS**	**FE**	**VC**	**RE**	**REi**	**REn**
No transformation	✓	✓	-	✓	✓	✓
Fisher's Z	✓	✓	-	✓	✓	-
Hakstian and Whalen	✓	✓	-	✓	✓	-
Bonett	✓	✓	✓	✓	✓	-

Note: OLS = Ordinary Least Squares (unweighted conventional statistical methods). FE = Fixed-Effect model. VC = Varying-Coefficient model. RE = standard Random-Effects model weighting by the inverse variance. REi = Random-Effects model with the improved method of Hartung and Knapp (2001). REn: Random-Effects model weighting by sample size.

Table S4.

Descriptive statistics of number of studies included in each meta-analysis, sample sizes, kurtosis and skewness.

		Mean	SD	Min	Q1	Median	Q3	Max	Range
	Number of Studies	31.34	47.37	5	9	14	40	319	314
	Sample Size	209.19	107.03	38	125.25	220	249.38	799	761
Kurtosis	**No Transformation**	3.74	2.53	1.42	2.21	2.95	4.15	18.48	17.06
	Fisher's Z	2.98	1.21	1.52	2.18	2.61	3.44	8.32	6.81
	Hakstian-Whalen's	3.01	1.36	1.49	2.16	2.61	3.26	9.44	7.95
	Bonett's	2.94	1.14	1.53	2.15	2.59	3.34	7.00	5.47
Skewness	**No Transformation**	-.75	.85	-3.47	-1.18	-.71	-.2	1.21	4.69
	Fisher's Z	.01	.73	-1.95	-.42	.07	.48	2.29	4.24
	Hakstian-Whalen's	.2	.73	-1.6	-.29	.14	.63	2.22	3.81
	Bonett's	-.09	.72	-2.3	-.55	-.12	.33	1.84	4.14

Note: SD: Standard Deviation. Min. and Max.: Minimum and Maximum. Q1 and Q3: quartiles 1 and 3.

Table S5.

Post-hoc comparisons between different transformations of the coefficients regarding to skewness

Transformation	Transformation	Mean Difference	*SE*	$p_{Bonferroni}$
No Transformation	**Fisher's Z**	-.756*	.040	< .001
	Hakstian-Whalen	-.948*	.132	< .001
	Bonett	-.664*	.126	< .001
Fisher's Z	**Hakstian-Whalen**	-.192	.124	.74
	Bonett	.092	.123	1
Hakstian-Whalen	**Bonett**	.284*	.014	< .001

SE = Standard Error of the mean difference.

Table S6.

Post-hoc comparisons between different transformations of the coefficients regarding to kurtosis

Transformation	Transformation	Mean Difference	*SE*	$p_{Bonferroni}$
No Transformation	**Fisher's Z**	.769	.144	< .001
	Hakstian-Whalen	.736	.116	< .001
	Bonett	.802	.160	< .001
Fisher's Z	**Hakstian-Whalen**	-.033	.034	1
	Bonett	.033	.020	.548
Hakstian-Whalen	**Bonett**	.066	.050	1

SE = Standard Error of the mean difference.

Table S7.

Descriptive statistics of average alpha coefficients for each τ^2 estimator

τ^2	Transformation	Mean	*SD*	Min	*Q1*	Median	*Q3*	Max	Range
DL	**No Transformation**	.831	.07	.622	.791	.837	.883	.975	.353
	Fisher's Z	.833	.069	.62	.787	.84	.887	.986	.366
	Hakstian-Whalen	.832	.069	.622	.789	.838	.885	.98	.358
	Bonett	.834	.068	.624	.788	.842	.887	.986	.361
REML	**No Transformation**	.828	.069	.616	.791	.832	.877	.975	.359

Fisher's Z	.833	.069	.619	.786	.841	.887	.986	.366
Hakstian-Whalen	.831	.069	.62	.789	.838	.884	.98	.36
Bonett	.834	.068	.624	.789	.842	.887	.986	.361

DL= DerSimonian-Laird estimator. REML= Restricted Maximum-Likelihood estimator. *SD*: Standard Deviation. Min. and Max.: Minimum and Maximum. *Q1* and *Q3*: quartiles 1 and 3.

Table S8.

Results of the repeated measures ANOVA to calculate the average alpha coefficient

	Sum of Squares	*df*	Mean Square	*F*	*p*	η^2
Transformation	.004	3	.001	43.43	< .001	.241
Residual	.011	411	.000			
τ^2 estimator	.000	1	.000	1.11	.294	.008
Residual	.022	137	.000			
Transformation * τ^2 estimator	.000	3	.000	26.29	< .001	.161
Residual	.002	411	.000			

Table S9.

Post-hoc comparisons for the interaction between τ^2 estimator and transformation of the coefficients regarding the average alpha coefficient.

τ^2	Transformation	τ^2	Transformation	Mean Difference	SE	$p_{Bonferroni}$
DL	**No Transformation**	**REML**	**No Transformation**	.003	.001	.037
	Fisher's Z		**Fisher's Z**	.000	.001	1
	Hakstian-Whalen		**Hakstian-Whalen**	.000	.001	1
	Bonett		**Bonett**	.000	.001	1

DL= DerSimonian-Laird estimator. REML= Restricted Maximum-Likelihood estimator. Only those combinations that were of interest for the study have been included in the table.

Table S10.

Descriptive statistics of confidence width for each random-effects model and τ^2 estimator.

τ^2	Model	Transformation	Mean	*SD*	Min	*Q1*	Median	*Q3*	Max	Range
DL	RE	No Transformation	.059	.052	.009	.03	.043	.072	.412	.403
		Fisher's Z	.07	.057	.01	.035	.054	.089	.421	.411
		Hakstian-Whalen	.068	.059	.01	.034	.051	.086	.46	.45
		Bonett	.069	.058	.01	.034	.052	.089	.417	.407
	REi	No Transformation	.079	.071	.011	.035	.059	.099	.543	.532
		Fisher's Z	.084	.077	.012	.037	.058	.107	.589	.578
		Hakstian-Whalen	.082	.075	.012	.036	.06	.104	.573	.561
		Bonett	.084	.08	.012	.037	.058	.107	.637	.625
REML	RE	No Transformation	.069	.055	.011	.032	.054	.083	.387	.376
		Fisher's Z	.071	.056	.011	.037	.054	.089	.412	.401
		Hakstian-Whalen	.07	.055	.011	.035	.054	.087	.402	.39
		Bonett	.071	.057	.012	.037	.052	.088	.422	.411
	REi	No Transformation	.082	.075	.012	.035	.061	.1	.544	.532
		Fisher's Z	.084	.077	.012	.038	.058	.11	.589	.577
		Hakstian-Whalen	.083	.075	.012	.037	.06	.107	.574	.562
		Bonett	.084	.08	.012	.038	.058	.109	.637	.625

DL= DerSimonian-Laird estimator. REML= Restricted Maximum-Likelihood estimator. RE= Random-Effects model. REi: Random-Effects model with the improved method of Hartung and Knapp (2001). *SD*: Standard Deviation. Min. and Max.: Minimum and Maximum. *Q1* and *Q3*: quartiles 1 and 3.

Table S11.

Results of the repeated measures ANOVA to calculate the confidence width.

	Sum of Squares	*df*	Mean Square	*F*	*p*	η^2
Transformation	0.007	3	0.002	5.81	< .001	.041
Residual	0.170	411	0.000			
τ^2	0.032	1	0.032	2.12	.147	.015
Residual	2.072	137	0.015			
Model	0.105	1	0.105	41.39	< .001	.232
Residual	0.348	137	0.003			
Transformation * τ^2	0.000	3	0.002	4.5	.004	.032
Residual	0.160	411	0.000			
Transformation * Model	0.002	3	0.000	2.19	.088	.016
Residual	0.150	411	0.000			
τ^2 * Model	0.003	1	0.003	5.72	.018	.04
Residual	0.062	137	0.000			
Transformation * τ^2 * Model	.001	3	0.000	1.18	.316	.009
Residual	.134	411	0.000			

Table S12.

Post-hoc comparisons for the interaction between τ^2 estimator and the transformation of the coefficients regarding the confidence width.

τ^2	Transformation	τ^2	Transformation	Mean Difference	SE	$p_{Bonferroni}$
DL	**No Transformation**	**REML**	**No Transformation**	-0.013	0.006	1
	Fisher's Z		**Fisher's Z**	-0.007	0.006	1
	Hakstian-Whalen		**Hakstian-Whalen**	-0.007	0.006	1
	Bonett		**Bonett**	-0.004	0.003	1

DL= DerSimonian-Laird estimator. REML= Restricted Maximum-Likelihood estimator. Only those combinations that were of interest for the study have been included in the table.

Table S13.

Post-hoc comparisons for the interaction between τ^2 estimator and the two random effects models regarding the confidence width.

τ^2	Model	Tau	Model	Mean Difference	*SE*	$p_{Bonferroni}$
DL	RE	REML	RE	-.01	.006	.643
	REi		REi	-.005	.005	1

DL= DerSimonian-Laird estimator. REML= Restrictied máximum-likelihood estimator. RE= Standard Random-Effects model weighting by the inverse variance. REi= Random-Effects model with the improved method of Hartung and Knapp (2001). Only those combinations that were of interest for the study have been included in the table.

Table S14.

Post-hoc comparisons between statistical models to calculate average alpha

Model	Model	Mean Difference	*SE*	$P_{Bonferroni}$
FE	**OLS**	.019	.004	< .001
	RE	.015	.004	.003
	REn	.021	.007	.008
OLS	**RE**	-.004	.004	1
	REn	.002	.007	1
RE	**REn**	.007	.007	1

FE: Fixed-Effect model. OLS: Ordinary Least Squares. RE: Random-Effects model. REn: Random-Effects model weighted by sample size. *SE*: Standard Error.

Table S15.

Bonferroni's post hoc comparisons for analytic strategy to calculate average alpha coefficient.

Model	Transformation	Model	Transformation	Mean Difference	*SE*	*t*	$p_{Bonferroni}$
FE	**Bonett**	**FE**	**Hakstian-Whalen**	-.011	.008	-1.277	1
			No Transformation	-.029	.008	-3.48	.04
			Fisher's Z	.001	.008	.148	1
		OLS	**Bonett**	.004	.008	.48	1
		RE	**Bonett**	.003	.008	.393	1
FE	**Hakstian-Whalen**	**FE**	**No Transformation**	-.019	.008	-2.203	1
			Fisher's Z	.012	.008	1.425	1
		OLS	**Bonett**	.015	.008	1.757	1
			Hakstian-Whalen'	.02	.008	2.32	1
		RE	**Hakstian-Whalen**	.016	.008	1.94	1
FE	**No Transformation**	**FE**	**Fisher's Z**	.031	.008	3.628	.023
		OLS	**No Transformation**	.048	.008	5.67	< .001
		RE	**No Transformation**	.036	.008	4.275	.002
		REn	**No Transformation**	.041	.008	4.86	< .001
FE	**Fisher's Z**	**OLS**	**Fisher's Z**	.004	.008	.509	1
		RE	**Fisher's Z**	.003	.008	.395	1
OLS	**Bonett**	**OLS**	**Hakstian-Whalen**	.005	.008	.563	1
			No Transformation	.014	.008	1.71	1
			Fisher's Z	.001	.008	.177	1
		RE	**Bonett**	-.000	.008	-.087	1
OLS	**Hakstian-Whalen**	**OLS**	**No Transformation**	.01	.008	1.147	1
			Fisher's Z	-.003	.008	-.386	1
		RE	**Hakstian-Whalen**	-.003	.008	-.38	1
OLS	**No Transformation**	**OLS**	**Fisher's Z**	-.013	.008	-1.533	1
		RE	**No Transformation**	-.012	.008	-1.395	1
		REn	**No Transformation**	-.007	.008	-.811	1
OLS	**Fisher's Z**	**RE**	**Fisher's Z**	-.000	.008	-.114	1
RE	**No Transformation**	**REn**	**No Transformation**	.005	.008	.585	1

FE: Fixed-Effect Model. OLS: Ordinary Least Squares. RE: Random Effects Model. REn: Random Effects Model weighted by sample size. NT: untransformed reliability coefficients. Z: Fisher's Z transformation. HW: Hakstian and Whalen's transformation. B: Bonett's transformation. *SE*: Standard Error. Only those combinations that were of interest for the study have been included in the table.

Table S16.

Post-hoc comparisons between statistical models to calculate the confidence width of average alpha coefficient

Model	Model	Mean Difference	*SE*	$p_{bonferroni}$
FE	**OLS**	-.070	.004	< .001
	RE	-.051	.004	< .001
	REi	-.067	.004	< .001
	REn	-.047	.006	< .001
	VC	-.009	.006	1
OLS	**RE**	.02	.004	< .001
	REi	.004	.004	1
	REn	.024	.006	< .001
	VC	.061	.006	< .001
RE	**REi**	-.016	.004	< .001
	REn	.004	.006	1
	VC	.041	.006	< .001
REi	**REn**	.197	.006	.007
	VC	.057	.006	< .001
REn	**VC**	.038	.007	< .001

FE: Fixed-Effect Model. OLS: Ordinary Least Squares. RE: Random Effects Model. REi: Random-Effects model with the improved method of Hartung and Knapp (2001). REn: Random-Effects model weighting by sample size. VC: Varying-Coefficient model. SE: Standard Error.

Table S17.

Post-hoc comparisons between the transformation of the coefficients regarding the I^2 index

Transformation	Transformation	Mean Difference	*SE*	$p_{Bonferroni}$
No Transformation	**Fisher's Z**	2.62	.396	< .001
	Hakstian-Whalen	-.868	.163	< .001
	Bonett	-.86	.22	< .001
Fisher's Z	**Hakstian-Whalen**	-3.488	.361	< .001
	Bonett	-3.481	.351	< .001
Hakstian-Whalen	**Bonett**	.008	.07	1

Table S18.

Post-hoc comparisons between transformation of the coefficients regarding prediction intervals width.

Transformation	Transformation	Mean Difference	*SE*	$p_{Bonferroni}$
No Transformation	**Fisher's Z**	-.066	.009	< .001
	Hakstian-Whalen	-.047	.005	< .001
	Bonett	-.091	.013	< .001
Fisher's Z	**Hakstian-Whalen**	.019	.001	.009
	Bonett	-.024	.005	< .001
Hakstian-Whalen	**Bonett**	-.043	.009	< .001