

Electronic Supplementary Material for

Stolwijk, I., Jak, S., Eichelsheim, V., & Hoeve, M. (2022). Dealing With Dependent Effect Sizes in MASEM: A Comparison of Different Approaches Using Empirical Data. *Zeitschrift für Psychologie*. <https://doi.org/10.1027/2151-2604/a000485>

Appendix A: Studies Included in the Meta-Analysis**Table E1**

Characteristics of the Studies Included in the Meta-analysis

Study	Sample	<i>N</i>	<i>M</i> _{age}	% boys	Sample type	# effect sizes
Aaron & Dallaire (2010)	1	857	12.4	52	2	2
	2	670	14.4	52	2	2
Adams (2001)		932	12.5	50	1	3
Allen et al. (2005)		179	13	47	1	2
Baldry & Farrington (2000)		238	12.7	53	1	1
Banyard et al. (2006)		980	14.5	48	1	3
Barberet et al. (2004)	1	1,836	17.5	100	1	1
	2	1,855	17.5	0	1	1
Barnow et al. (2005)		168	14.5	48	1	4
Bean et al. (2006)		202	13.9	54	2	2
Bowman et al. (2007)	1	54	16.5	100	1	3
	2	81	16.4	0	1	3
Brauer (2011)		1,919	11	50	1	4
Brenden et al. (2001)		516	17	100	1	2
Burton et al. (1995)		263	16.4	48	1	5
Byrnes et al. (2011)	1	415	13.3	44	1	1
	2	372	13.9	44	1	1
Caldwell et al. (2006)		95	15.3	100	2	2
Campbell (1987)		64	15.5	0	1	1
Capaldi et al. (2003)	1	49	13.5	100	2	1
	2	49	15.5	100	2	1
Cernkovich et al. (1987)		824	15.3	49	1	7

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Chapple (2003)		926	15.9	49	1	3
Chhangur et al. (2015)	1	308	17.4	47	1	1
	2	308	16.4	47	1	1
	3	308	14.4	47	1	1
	4	308	15.4	47	1	1
	5	308	13.4	47	1	1
Chung & Steinberg (2006)		488	15.5	100	2	3
Conrad (2015)		766	12	50	1	1
Cook (2009)		88	15.3	67	3	1
Coughlin & Vuchinich (1996)		194	17	100	2	3
Crane (2010)		688	14.9	46	1	2
Criss (2002)		412	17	49	1	29
Crosswhite-Gamble (2006)		736	15	50	1	87
Dawes (1976)		619	16	50	2	1
De Kemp et al. (2004)	1	520	12,3	50	1	2
	2	520	12,9	51	1	2
	3	520	13,5	51	1	2
De Vries et al. (2016)		102	15.5	70	2	3
Deutsch et al. (2012)	1	5,973	15.9	50	1	1
	2	2,277	16.1	48	1	1
Dishion et al. (2004)	1	142	9,5	100	2	1
	2	142	23,5	100	2	1
Dishion et al. (1991)		206	10	100	3	2
Dodge et al. (2008)	1	754	6	50	3	2
	2	754	10	50	3	4
Eaton et al. (2009)	1	240	15.2	100	3	2
	2	335	15.2	0	3	2
Edens et al. (2008)		76	15.6	100	2	1
Estevez et al. (2005)		983	13.7	47	1	6
Evans et al. (2012)	1	381	11	0	1	1
	2	323	11	100	1	1
	3	381	13	0	1	1
	4	323	13	100	1	1

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Farrington et al. (2001)		1,395	NA	100	1	2
Farrington et al. (2002)		421	17.8	100	2	1
Farrington et al. (2015)		400	21	100	1	2
Finkenauer et al. (2005)		1,355	12.3	52	1	5
Flannery et al. (1999)	1	608	12.7	100	1	2
	2	562	12.7	0	1	2
Fletcher et al. (2004)	1	2,568	15.9	46	1	5
	2	2,568	16.9	46	1	3
Gainey et al. (1997)		101	11.4	57	2	2
Gault-Sherman (2012)	1	12,505	14.8	50	1	7
	2	12,505	15.8	50	1	13
Giever (1996)		422	15	NA	1	1
Gold et al. (2011)		112	15.6	80	2	1
Gray-Ray & Ray (1990)	1	215	15	100	2	1
	2	78	15	100	2	1
Griffin et al. (2000)		228	11.5	50	1	1
Guimond et al. (2016)	1	163	13.5	48	1	2
	2	163	14.5	48	1	1
Haapasalo (2000)		78	NA	100	2	2
Hair et al. (2008)		4,671	18	51	1	6
Halgunseth et al. (2013)		324	14	50	1	1
Harris et al. (2017)	1	2,775	15	50	1	2
	2	2,867	15	50	1	4
	3	2,706	15	51	1	6
	4	2,150	15	51	1	8
Hay (2001)		197	15.4	52	1	2
Hay (2003)		182	15.4	48	1	3
Haynie (2003)		5,477	15.1	0	1	1
Heaven (1994)	1	136	14	100	1	4
	2	146	14	0	1	4
Heaven et al. (2004)		276	15.3	68	1	4
Henneberger et al. (2013)		364	15.8	68	1	1
Henneberger et al. (2014)		517	14	0	1	1

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Herman et al. (1997)	1	2,850	15.1	49	1	3
	2	2,850	16.1	49	1	3
Herrenkohl et al. (2000)	1	703	18	51	1	1
	2	715	18	51	1	2
	3	720	18	51	1	2
Herrington (2015)		213	94.4	2	1	1
Hill & Atkinson (1988)	1	1,294	16	100	1	8
	2	1,374	16	0	1	8
Hoeve et al. (2011)	1	330	17.2	50	1	4
	2	301	23	44	1	4
Hoeve et al. (2007)	1	506	22.5	100	1	1
	2	394	23	100	1	1
Intravia et al. (2012)		1,675	13.8	50	1	2
Janssen et al. (2016)	1	580	13.9	52	1	2
	2	539	15.9	52	1	2
Johnson (1987)	1	353	15.5	0	1	2
	2	357	15.5	100	1	2
	3	710	15.5	50	1	2
Jones et al. (2000)		50	19.2	58	1	4
Jug (2015)		264	17.2	41	1	4
Juras (2004)		452	12.9	53	1	1
Keijsers et al. (2010)	1	289	14	48	1	4
	2	289	15	48	1	8
Keijsers et al. (2012)		497	13	57	2	2
Kerr et al. (1999)	1	593	14	100	1	2
	2	593	14	0	1	2
Kjellstrand & Eddy (2011)	1	655	10.2	49	2	1
	2	655	13.9	49	2	1
	3	655	15.7	49	2	2
	4	655	NA	NA	2	4
Krohn & Massey (1980)		2,053	15	NA	1	2
Krohn et al. (1992)		947	13.5	74	2	16
Kupanoff (2002)		202	15.8	27	3	8

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Kwon & Wickrama (2014)		407	14.6	46	1	6
Lahlah et al. (2013)		364	16.5	100	2	4
Lahlah et al. (2014)	1	365	15.7	100	2	16
	2	112	16.1	100	2	16
Laible et al. (2016)		987	15	50	1	1
Larzelere & Patterson (1990)		180	13	100	2	4
Loukas et al. (2007)	1	216	12	100	2	2
	2	238	13.4	0	2	2
Luo (2000)		217	14.7	53	1	1
Mak (1994)	1	405	15.6	100	1	2
	2	387	15.6	0	1	2
Manders et al. (2006)		140	14.4	49	1	2
Mann et al. (2015)		470	15.6	52	1	1
Mason (1996)	1	148	13.4	36	1	2
	2	148	14.4	36	1	2
Mathis (2013)		2,722	13.3	52	1	35
McCord (1991)		232	18	100	1	1
Mulvey et al. (2010)		1,119	NA	100	2	4
Murray et al. (2007)		15,117	NA	51	1	1
Nijhof et al. (2009)		577	12.5	80	2	1
O'Connor & Dvorak (2001)	1	141	17.1	100	1	3
	2	261	17.1	0	1	3
Park et al. (2010)		2,522	19	51	1	1
Paschall et al. (2003)	1	2,117	15.6	100	1	3
	2	2,117	16.6	100	1	2
Patouris et al. (2016)		199	16.4	49	1	2
Patterson et al. (1985)		133	15.8	100	1	6
Peterson (2002)	1	1,536	12.1	0	1	1
	2	1,536	12.1	0	1	1
Pettit et al. (2001)		440	51	52	1	6
Prinz et al. (2004)		599	7.9	51	1	2
Rankin & Kern (1994)		1,395	14.4	52	1	8
Ray et al. (2017)		1,216	16.3	100	2	2

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Roberts (2002)		424	20.3	45.	3	2
Samaniego & Gonzalez (1999)		214	13.5	43	1	3
Sampson & Laub (1994)		1,000	14.7	100	3	4
Scholte (1999)		115	21	75	2	3
Simon et al. (2007)	1	673	10.5	46	1	6
	2	673	12.5	46	1	3
Simons et al. (1989)	1	307	15	50	3	3
	2	307	16	50	3	3
Skinner (2000)		109	15	45	1	6
Spano et al. (2009)	1	1,544	15	51	2	4
	2	1,544	16	51	2	4
Stewart et al. (2002)	1	407	13.5	46	1	1
	2	407	15.5	46	1	2
Svensson et al. (2013)		843	14.5	55	1	1
Tilton-Weaver (2014)	1	874	13.7	50	1	4
	2	874	14.7	50	1	9
Torrente & Vazsonyi (2012)		653	17	43	1	4
Unnever et al. (2006)		2,472	12.5	50	1	3
Van der Graaff et al. (2012)	1	323	14.3	49	1	2
	2	323	15.3	49	1	2
Van Voorhis et al. (1988)		152	16.4	53	1	7
Van Vugt et al. (2016)		462	7.46	100	1	3
Vazsonyi & Flannery (1997)	1	743	12.8	50	1	3
	2	278	12,8	52	1	3
Vazsonyi et al. (2008)	1	687	15.7	46	1	8
	2	1,812	16.5	49	1	8
Vazsonyi et al. (2016)	1	239	14	53	1	3
	2	130	14.7	52	1	3
Vega et al. (1993)		1,843	12.5	NA	1	1
Vitaro et al. (2000)		567	13.5	100	1	3
Walker-Barnes & Mason (2001)		300	14.6	55	1	3
Walters (2014)		4,897	9	52	1	1
Weintraub & Gold (1991)		1,300	14.5	50	1	2

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Wells & Rankin (1988)		1,830	16	100	1	6
Werner & Silbereisen (2003)	1	120	14.6	100	1	2
	2	120	15.6	100	1	2
	3	128	14.6	0	1	2
	4	128	15.6	0	1	2
Williams & Steinberg (2011)		1,062	16.4	86	2	4
Wissink et al. (2006)	1	83	14.4	47	1	1
	2	33	14.4	47	1	1
	3	106	14.4	47	1	1
	4	319	14.4	47	1	1
Wolfe & Shoemaker (1999)		127	15.8	78	2	4
Wolff & Crockett (2011)	1	7,748	14.9	50	1	2
	2	7,748	15.9	50	1	2
Worthen (2011)	1	638	15.3	100	1	8
	2	678	15.3	0	1	8
	3	1316	15.3	48	1	8
Wright & Cullen (2001)		1,526	17.5	48	2	13

Note. N = sample size based on the juveniles; M_{age} = mean age of the juveniles when child delinquency was measured; % boys = based on number of male children in the sample; Sample type: 1 = sample of individuals not at-risk for delinquent behaviour, 2 = sample of individuals at-risk for delinquent behaviour, 3 = other (e.g., combined samples of delinquents and non-delinquents); # effect sizes = number of effect sizes (i.e., correlation coefficients) that were included in the current study.

Appendix B: Additional Results**Table E2***Pooled Correlation Matrices for all Variables per Approach of Dealing with Dependency*

	1	2	3	4
Approach: Ignoring Dependency				
1. Parental Crime	–	.008	.012	.022
2. Support	-.051*** [-.067, -.034]	–	.015	.007
3. Behavioural Control	-.055*** [-.078, -.032]	.185*** [.155, .214]	–	.009
4. Child Delinquency	.169*** [.125, .212]	-.157*** [-.171, -.144]	-.162*** [-.180, -.144]	–
Approach: Simple Aggregation				
1. Parental Crime	–	.019	.030	.040
2. Support	-.087*** [-.124, -.050]	–	.050	.016
3. Behavioural Control	-.059* [-.118, -.001]	.365*** [.267, .464]	–	.018
4. Child Delinquency	.224*** [.146, .303]	-.193*** [-.225, -.162]	-.208*** [-.244, -.173]	–
Approach: Weighted Aggregation				
1. Parental Crime	–	.033	.021	.039
2. Support	-.064+ [-.129, .001]	–	.034	.013
3. Behavioural Control	-.071*** [-.112, -.031]	.272*** [.206, .339]	–	.015
4. Child Delinquency	.227*** [.151, .303]	-.169*** [-.193, -.144]	-.186*** [-.216, -.156]	–
Approach: Elimination				
1. Parental Crime	–	.021	.018	.034
2. Support	-.055** [-.095, -.015]	–	.034	.013
3. Behavioural Control	-.074*** [-.109, -.039]	.273*** [.206, .341]	–	.017
4. Child Delinquency	.170*** [.103, .236]	-.180*** [-.206, -.155]	-.191*** [-.224, -.157]	–
WPL-approach				
1. Parental Crime	–	.037	.045	.027
2. Support	-.016 [-.089, .057]	–	.015	.011
3. Behavioural Control	-.028 [-.116, .061]	.150*** [.121, .178]	–	.012

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4. Child Delinquency	.190 ^{***}	-.162 ^{***}	-.163 ^{***}	–
	[.138, .243]	[-.183, -.141]	[-.187, -.140]	

Note. The pooled correlation estimates including their 95% confidence intervals are presented

below the diagonal, the corresponding standard errors are presented above the diagonal.

⁺ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Dealing With Dependent Effect Sizes in MASEM – ESM 1

Table E3

Parameter Estimates of the Partial Mediation Model including their 95% CIs per Approach of Dealing with Dependency

	Ignoring Dependency		Simple Aggregation		Weighted Aggregation		Elimination		WPL-approach	
	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI
Parental Crime – Support	-0.051 ***	[-0.067, -0.034]	-0.087 ***	[-0.124, -0.050]	-0.064 +	[-0.129, 0.001]	-0.055 **	[-0.095, -0.015]	-0.016	[-0.045, 0.013]
Parental Crime – Behavioural Control	-0.055 ***	[-0.078, -0.032]	-0.059 *	[-0.118, -0.001]	-0.071 ***	[-0.112, -0.031]	-0.074 ***	[-0.109, -0.039]	-0.028 *	[-0.049, -0.006]
Parental Crime – Child Delinquency	0.155 ***	[0.111, 0.199]	0.205 ***	[0.125, 0.285]	0.209 ***	[0.132, 0.286]	0.152 ***	[0.085, 0.219]	0.184 ***	[0.158, 0.210]
Support – Child Delinquency	-0.125 ***	[-0.140, -0.110]	-0.120 ***	[-0.163, -0.077]	-0.117 ***	[-0.150, -0.084]	-0.133 ***	[-0.164, -0.102]	-0.138 **	[-0.230, -0.047]
Behavioural Control – Child Delinquency	-0.130 ***	[-0.150, -0.111]	-0.152 ***	[-0.198, -0.107]	-0.139 ***	[-0.175, -0.103]	-0.143 ***	[-0.181, -0.105]	-0.138 ***	[-0.193, -0.082]

Note. β = regression coefficient; CI = confidence interval.

+ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table E4*Residual (co)Variances of the Partial Mediation Model including their 95% CIs per Approach of Dealing with Dependence*

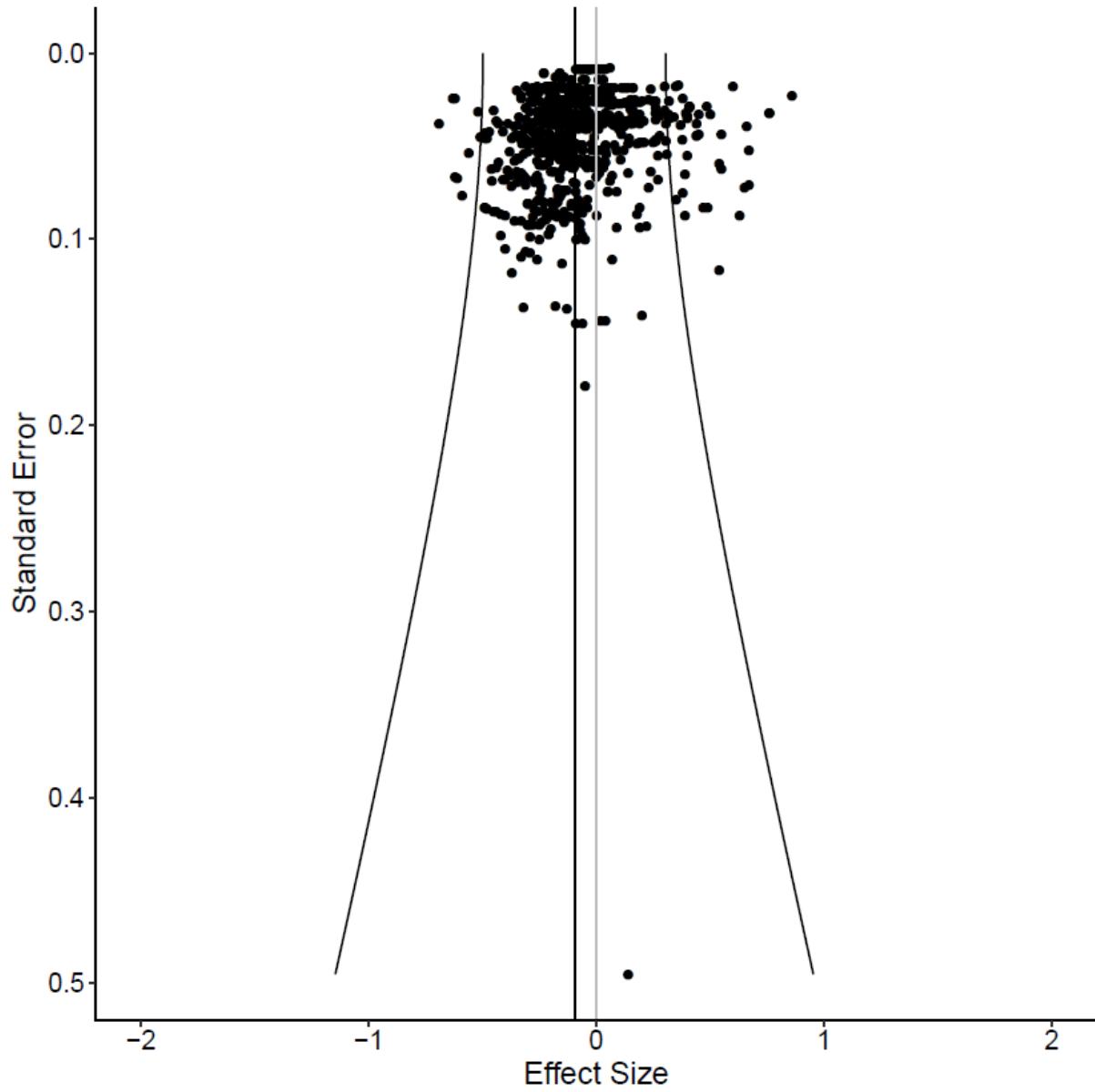
	Ignoring Dependency		Simple Aggregation		Weighted Aggregation		Elimination		WPL-approach	
	Residual Variances									
	ψ	95% CI	ψ	95% CI	ψ	95% CI	ψ	95% CI	ψ	95% CI
Support	1.00	[1.00, 1.00]	.99	[.99, 1.00]	1.00	[.99, 1.00]	1.00	[.99, 1.00]	1.00	[1.00, 1.00]
Behavioural Control	1.00	[.99, 1.00]	1.00	[.99, 1.00]	1.00	[.99, 1.00]	.99	[.99, 1.00]	1.00	[1.00, 1.00]
Child Delinquency	.93	[.92, .95]	.90	[.86, .93]	.91	[.88, .94]	.92	[.90, .95]	.92	[.89, .95]
	Residual Covariances									
Support – Behavioural Control	.18	[.15, .21]	.36	[.26, .46]	.27	[.21, .33]	.27	[.20, .34]	.15	[.08, .22]

Note. ψ = residual (co)variance; CI = confidence interval.

Appendix C: Evaluation of Publication Bias

Figure E1

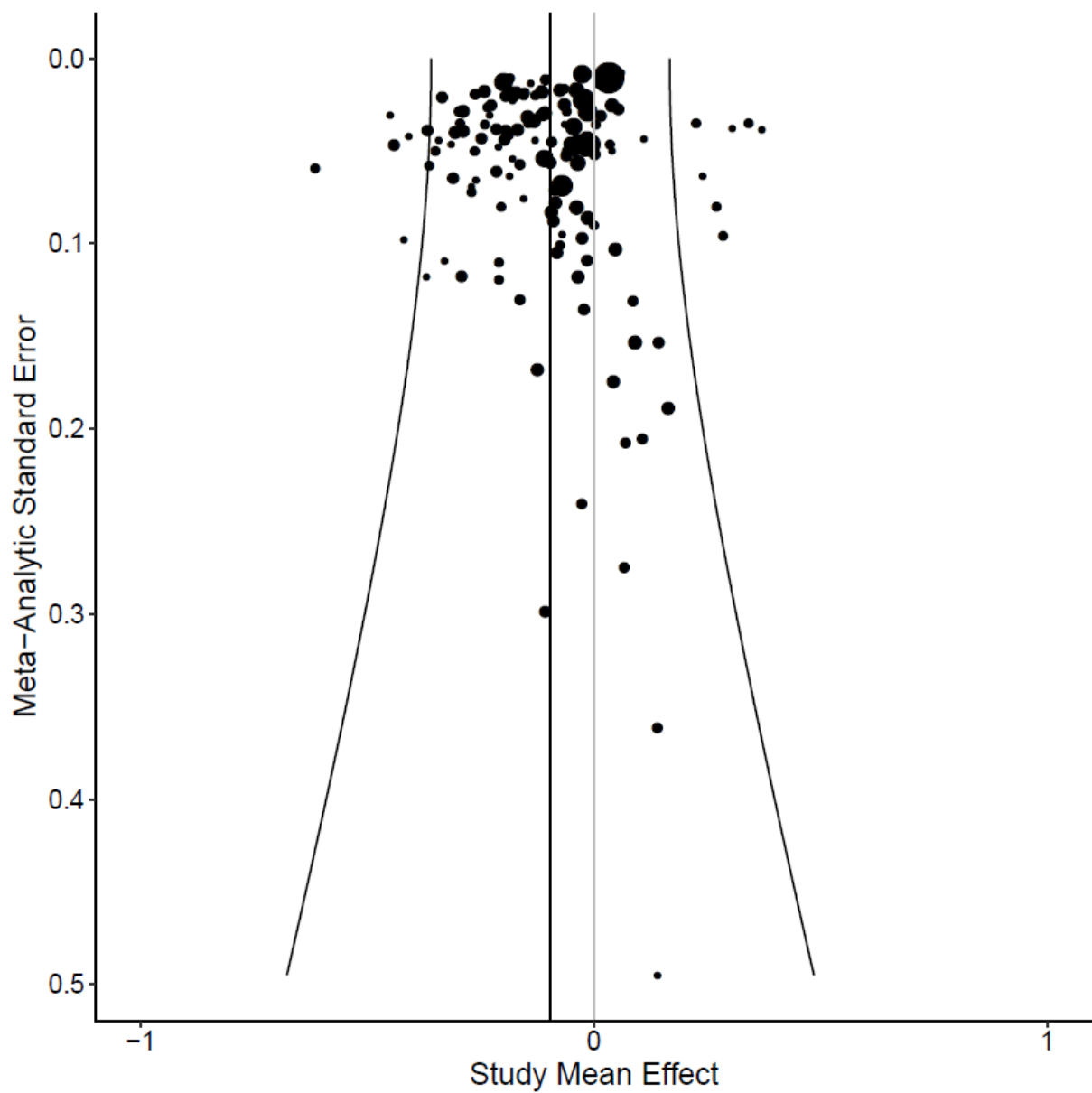
Funnel Plot of All Effect Sizes



Note. Each dot represents one effect size.

Figure E2

Study-Funnel Plot



Note. Each dot represents a study. The size of the dots is proportional to the number of effect sizes reported in the study.

Appendix D: PRISMA Statement

The data was collected by Hoeve et al. (2009), Silva Pinho (2017), and Van den Berg (2018). Four databases were searched, including: PsycINFO, ERIC, Sociological Abstracts, and Criminal Justice Abstracts. The following script was written for PsycINFO and adjusted for the other databases.

#1 parenting

parental involvement/ OR parenting style/ OR parenting skills/ OR transgenerational patterns/ OR (parenting OR child?rearing OR parent* influenc* OR parent* style* OR ((parent* OR mother* OR maternal OR father* OR paternal) ADJ3 (acceptance OR authorita* OR control* OR discipline OR disclosure OR harsh OR knowledge OR monitoring OR neglect OR permissive* OR rejection OR supervision OR support OR warmth)) OR intergeneration* OR second generation* OR transgenerat*).ti,ab,id.

#2 child delinquency

juvenile delinquency/ OR juvenile justice/ OR ((child* OR adolesc* OR youth* OR juvenile) ADJ3 (delinq* OR devian* OR crim* OR offend*)).ti,ab,id.

#3 parental delinquency

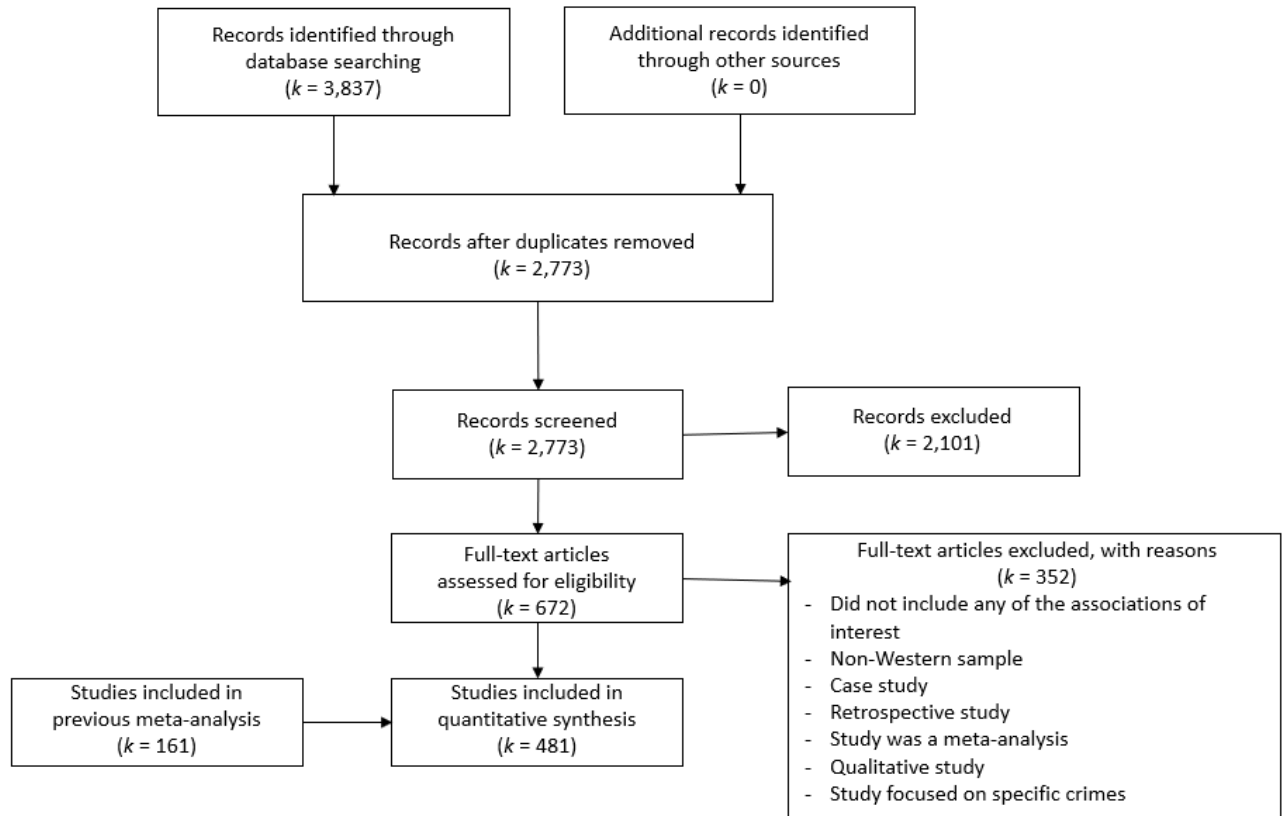
((parent* OR mother* OR maternal OR father* OR paternal) ADJ3 (delinq* OR devian* OR crim* OR offend*)).ti,ab,id.

Combination of search scripts

(1 AND 2) OR (1 AND 3) OR (2 AND 3)

Figure E3

PRISMA flow diagram for the selection of studies for the project ‘The potential mediating role of parenting on the intergenerational continuity of criminal behaviour’.



Note. Derived from “A Comparison of Meta-analytic Structural Equation Modeling and Univariate Meta-analysis: An application in forensic child and youth care services [Unpublished master’s thesis]”, by T. van den Berg, 2019.