Title:
Mixed methods systematic review and multilevel meta-analysis of a teacher classroom management programme: effectiveness and stakeholders' experiences

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Background

Research shows correlations between children's problematic behaviours and reduced academic performance, stressed teacher-child relationships, poorer peer interactions, higher involvement in deviant behaviours, lower school adjustment, and increased chances of dropping out of school (Baker, Clark, Crowl, & Carlson, 2009; McMahon, Wells, & Kotler, 2006). Problematic behaviour is a source of stress for teachers and predictive of teacher burnout (Kokkinos, 2007).

Children use more prosocial behaviours in classrooms with teachers who are trained in positive management strategies compared to those whose teachers are not trained (Girard, Girolametto, Weitzman, & Greenberg, 2011). Developing teachers' positive practices also benefits the mental health of educators, providing a community for those who feel isolated (Gebbie, Ceglowski, Taylor, & Miels, 2012).

The Incredible Years (IY) Teacher Classroom Management (TCM) Programme is one intervention developed to address problematic behaviours via training teachers to use positive and proactive management strategies (Webster-Stratton, 2001). Ultimately, by changing teachers' classroom management strategies, the programme aims to affect children's behaviours.

Research questions and design

This systematic review utilises advanced statistical analyses and cross-synthesises evidence from both quantitative trials and qualitative studies to answer the research question: What is known about the effectiveness of the Incredible Years Teacher Classroom Management (IY TCM) Programme and how do people experience/perceive the programme and its effects? To answer this overarching question, there are two strands of sub-questions that first are addressed individually before being combined (Figure 1).

To this end, this mixed methods systematic review can be divided into three phases: two independent and yet concurrently conducted strands for the quantitative (multilevel meta-analysis) and qualitative evidence (qualitative meta-synthesis) and one final cross-synthesis to connect these two strands (Figure 2).

Methods

A protocol for this review was submitted through the PROSPERO database.

Studies included in the quantitative strand of this review must have met the following criteria:
1. Population: early childhood and primary school teachers of children ages three- to eight-years-old
2. Intervention: IY TCM
3. Comparison: treatment-as-usual or waitlist control
4. Design: RCTs

The primary quantitative outcomes for this review were:
1. Teacher classroom management strategies
2. Child conduct problems

A *post hoc* child behaviour difficulties analysis was added to also include measures of hyperactivity and peer problems.

Secondary outcomes included:
1. Teacher collaboration with parents
2. Child prosocial behaviours
3. Child academic readiness

Studies included in the qualitative strand of this review reported qualitative (i.e., non-numerical) data related to the IY TCM Programme.
1. Data from qualitative studies or from mixed methods studies reporting qualitative outcomes;
2. Studies clearly state that the participants' responses pertain to IY TCM;
3. Those studies that combined IY TCM with additional programmes were included so long as data specific to IY TCM were reported separately.

This review searched electronic databases, websites related to the IY Series, and reference lists of included studies (Figure 3). The search also included studies recommended by researchers in the field. Initial search terms were pared down to the most parsimonious set without compromising sensitivity (Figure 4). Two independent reviewers screened studies for relevance.

Quantitative data were extracted into Microsoft Excel 2010. Studies were assessed using the Cochrane 'Risk of Bias' tool. Applying multilevel analysis techniques to a meta-analysis allows researchers to approximate the overall effect size (grand mean) on an outcome using all of the relevant outcome data available. Using the raw data reported in each included study, adjustments were first made according to the above ICC equations for the clustering of participants within studies before calculating the Hedges' g effect sizes and running these in the multilevel meta-analysis to calculate the Hedges' g grand mean (β_0). Statistical analyses were run in R Studio (Version 3.2.2) using the metafor package (Viechtbauer, 2010).

Qualitative data was extracted into NVivo 11 for analysis. Analysis was based in a grounded theory approach, which operates both inductively and deductively, and aims to generate, not test, theory (Glaser & Strauss, 1967).

Findings from each strand were cross-synthesised using framework analysis and an integrative grid (Flemming, 2009).

Results
See Figure 5 for PRISMA flowchart. Fourteen records were included in this review and jointly described nine studies that fit into the quantitative, qualitative, or both sections of this paper. The nine included studies took place across five different countries: one study in England and two studies each in Ireland, Jamaica, the United States, and Wales.

Effects of interventions (multilevel meta-analysis)
See Table 1 and Figures 6-13 for a summary of the effects of interventions. There was a small, statistically significant effect of the IY TCM intervention on reducing teacher negative classroom management strategies, child conduct problems, and high-risk child conduct problems. There was a moderate, statistically significant effect of the IY TCM intervention on increasing teacher positive classroom management strategies. None of the included studies reported data on teacher collaboration with parents. There was no statistically significant effect of the IY TCM intervention on increasing child prosocial behaviours or high-risk child prosocial behaviours. Only one study reported on child academic readiness, so a multilevel meta-analysis was not possible for this outcome.
　　See Table 2 and Figures 14-16 for a summary of these *post hoc* multilevel meta-analysis results. There was a small, statistically significant effect of the IY TCM intervention on reducing child behaviour difficulties and high-risk child behaviour difficulties.

Stakeholder experiences (qualitative meta-synthesis)
Analysing the findings from each included study in this qualitative strand produced an overarching understanding of how key stakeholders (predominantly classroom teachers) experience the IY TCM Programme (Figure 17). What emerged was a cyclical process of engaging in the training and observing effective outcomes. Throughout the course, the teachers cycled between primary and secondary learning opportunities. Ultimately, this led to their experiences of the effects of IY TCM training, and outcomes described by stakeholders are explained as they pertain to teachers, classrooms, and children (Figures 18 and 19).

Conclusions

Decisions about which programmes to implement in schools are based on a variety of factors, including effectiveness of a given programme and how acceptable/appropriate it is for the context. By systematically reviewing effectiveness trial evidence alongside data on stakeholders' experiences with the IY TCM Programme, and then cross-sysnthesising the findings from both strands, this study provides the most comprehensive picture for both decision-makers and researchers in understanding if the IY TCM Programme benefited children and teachers and the processes of how people experience it.
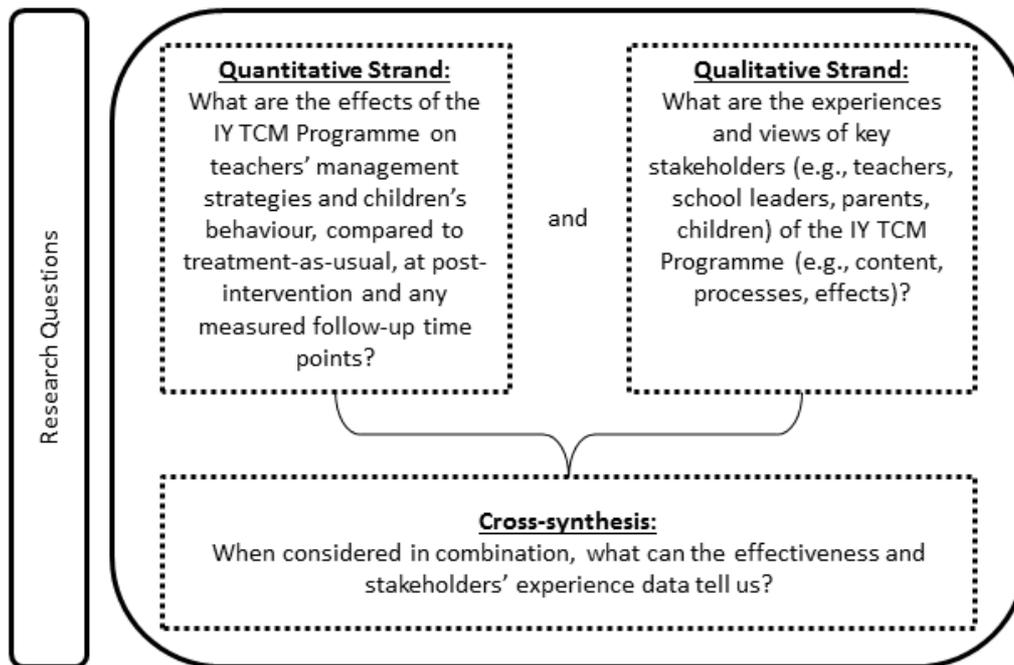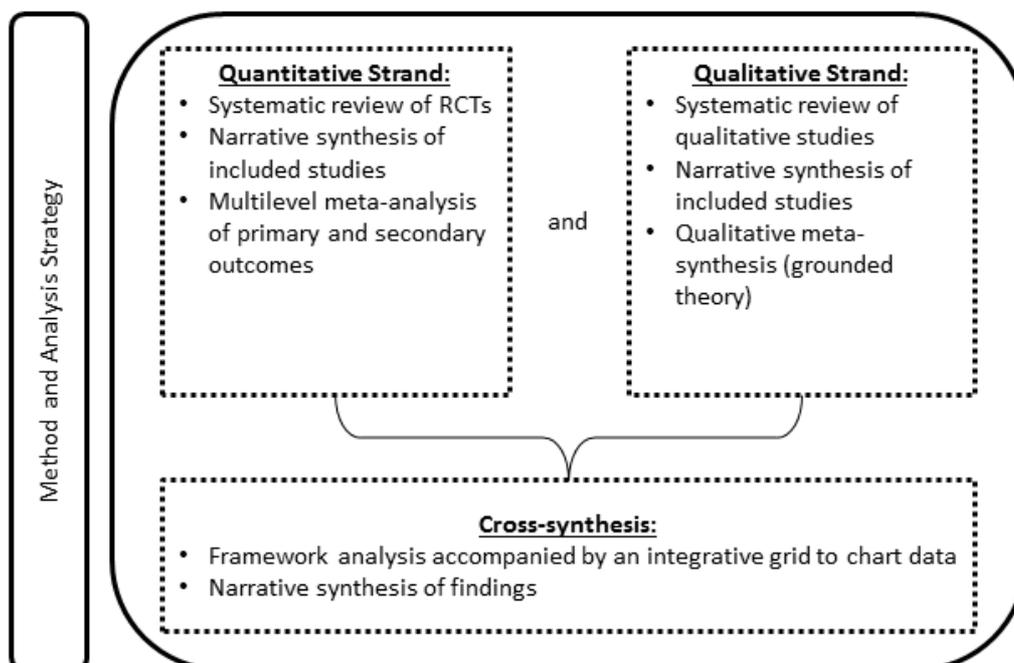
Figure 1. Research questions

Figure 2. Research design and methods

Databases:	
1.	Applied Social Sciences Index and Abstracts (ASSIA)
2.	British Education Index
3.	Cochrane Central Register of Controlled Trials (CENTRAL)
4.	CINAHL
5.	EMBASE
6.	ERIC
7.	Linguistics and Language Behaviour Abstracts
8.	MEDLINE
9.	PAIS International
10.	ProQuest Dissertations and Theses
11.	Social Services Abstracts
12.	Sociological Abstracts
13.	PsycINFO
Websites:	
1.	Campbell Collaboration Library http://www.campbellcollaboration.org/lib/
2.	Cochrane Collaboration Library http://www.cochranelibrary.com/cochrane-database-of-systematic-reviews/
3.	Incredible Years Series Library http://incredibleyears.com/research-library/
4.	Centre for Evidence-Based Early Intervention https://www.bangor.ac.uk/psychology/cebei/publications.php.en

Figure 3. List of databases and websites searched

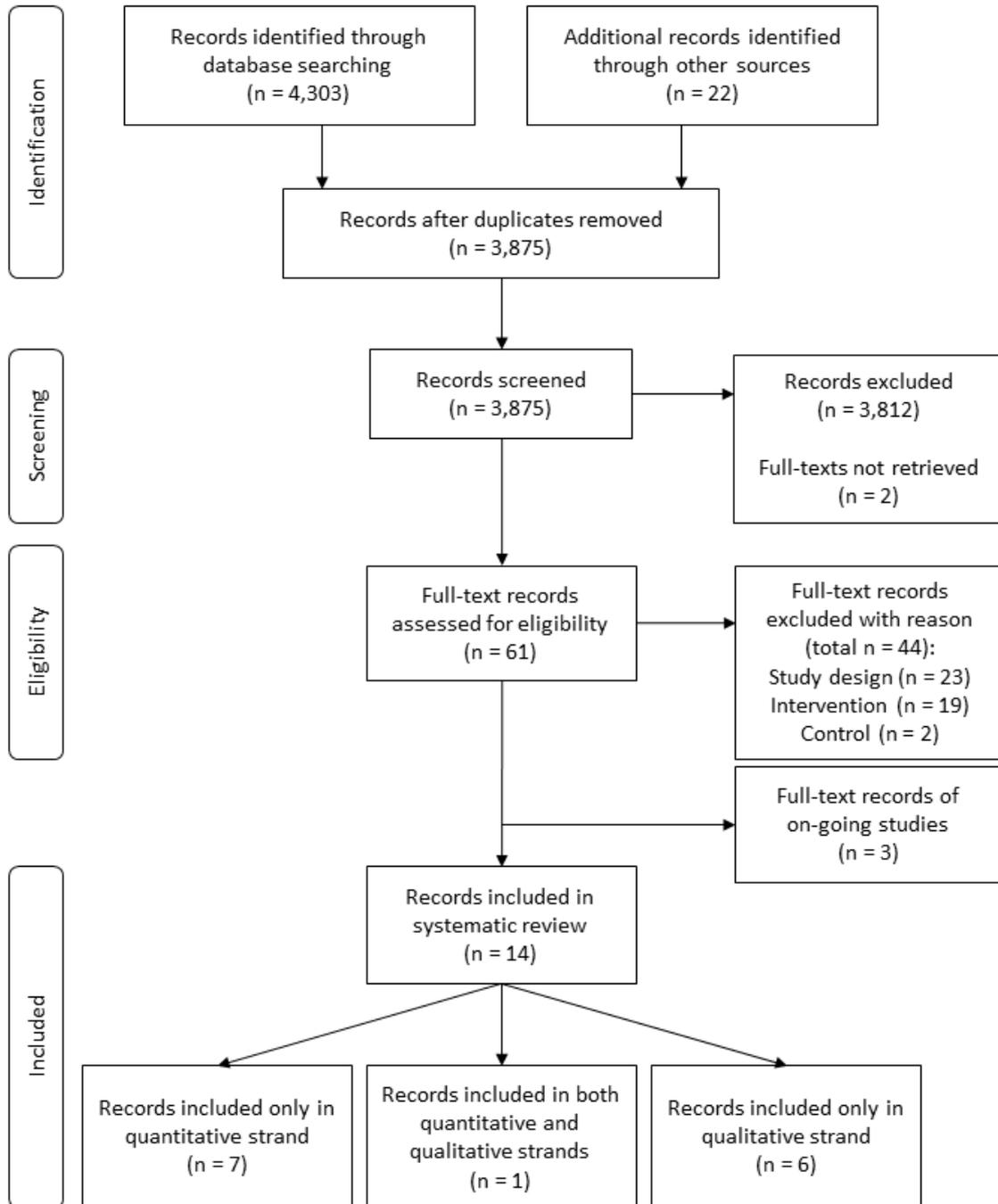| 1	"incredible years".af.
2	"program*".af.
3	"teacher classroom management".af.
4	"teacher training".af.
5	2 or 3 or 4
6	1 and 5

Figure 4. Search terms

Figure 5. PRISMA flowchart

Table 1. Multilevel meta-analysis results for primary and secondary outcomes

Outcome	N(k)	β_0	SE	95% CI	I^2	Tau^2	Chi^2 (p-value)
Primary							
Teacher negative strategies	7(3)	-0.32*	0.15	(-0.62, -0.01)	L1: 0.00 L2: 0.00	L1: 0.00 L2: 0.00	4.09 (0.66)
Teacher positive strategies	7(3)	0.44**	0.16	(0.13, 0.74)	L1: 0.00 L2: 0.00	L1: 0.00 L2: 0.00	5.16 (0.52)
Child conduct problems	11(3)	-0.20*	0.09	(-0.38, -0.01)	L1: 0.00 L2: 0.00	L1: 0.00 L2: 0.02	10.62 (0.39)
Sensitivity	8(2)	-0.11	0.10	(-0.32, 0.09)	L1: 0.00 L2: 0.00	L1: 0.00 L2: 0.01	5.95 (0.55)
High risk subgroup	8(3)	-0.33***	0.07	(-0.47, -0.18)	L1: 0.00 L2: 0.00	L1: 0.00 L2: 0.00	4.55 (0.71)
Secondary							
Child prosocial skills	6(4)	0.18	0.11	(-0.04, 0.40)	L1: 0.00 L2: 0.00	L1: 0.05 L2: 0.00	13.77 (0.02)
Sensitivity	4(3)	0.13*	0.06	(0.02, 0.24)	L1: 0.00 L2: 0.00	L1: 0.00 L2: 0.00	3.43 (0.33)
High risk subgroup	4(3)	0.31	0.17	(-0.03, 0.65)	L1: 0.00 L2: 0.00	L1: 0.06 L2: 0.00	8.23 (0.04)

N=number of effect sizes (Level 1); k=number of studies (Level 2); β_0= Hedges' g ('Grand Mean);
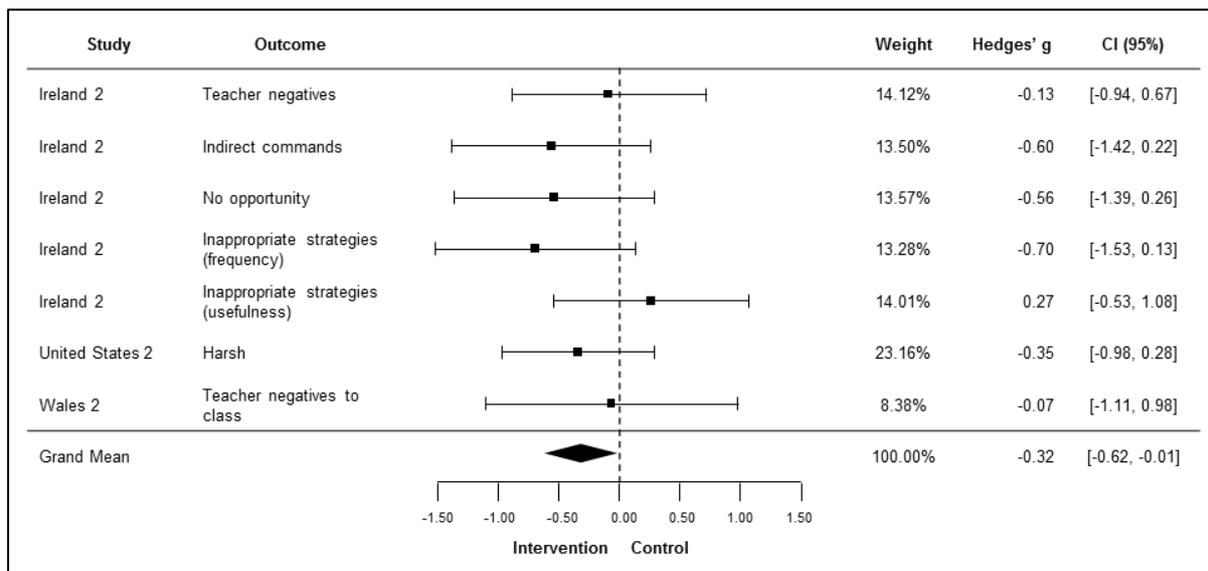**p<0.05, **p<0.01, ***p<0.001*

Figure 6. Multilevel meta-analysis of teacher negative classroom management strategies
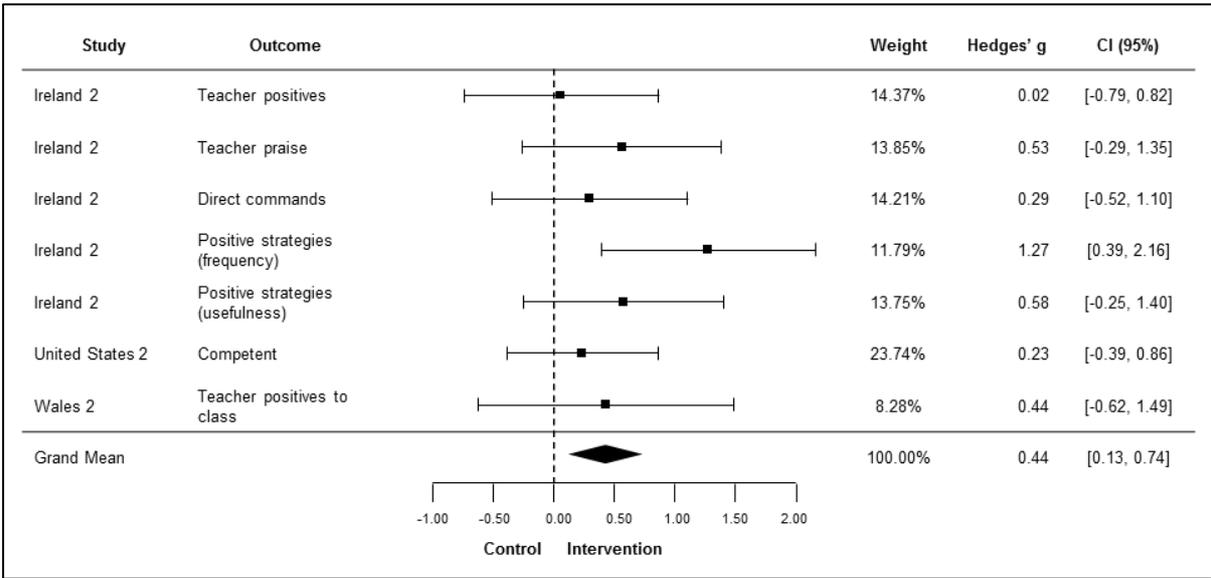
Figure 7. Multilevel meta-analysis of teacher positive classroom management strategies

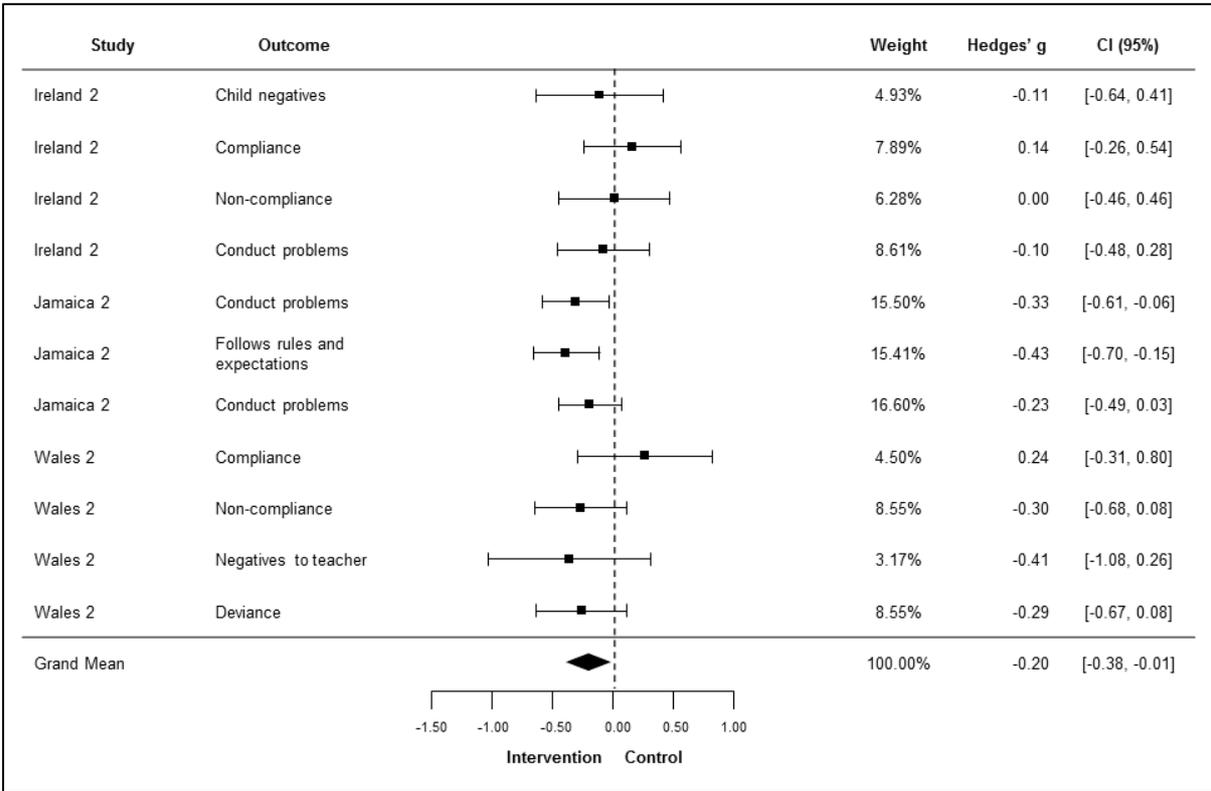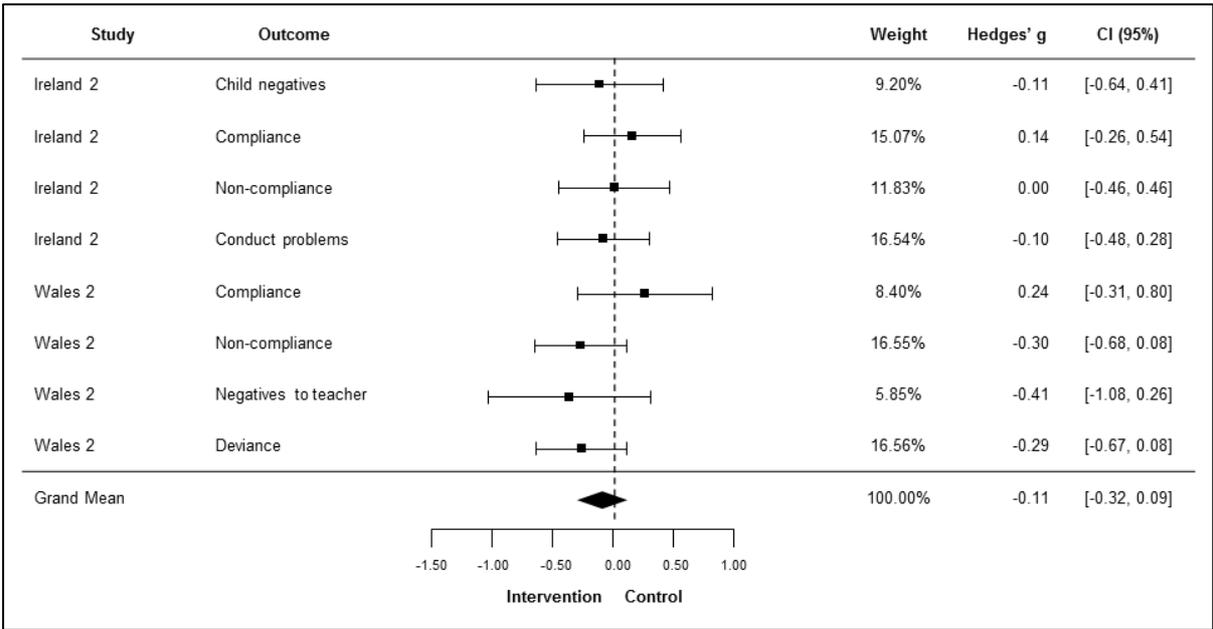Figure 8. Multilevel meta-analysis of child conduct problems

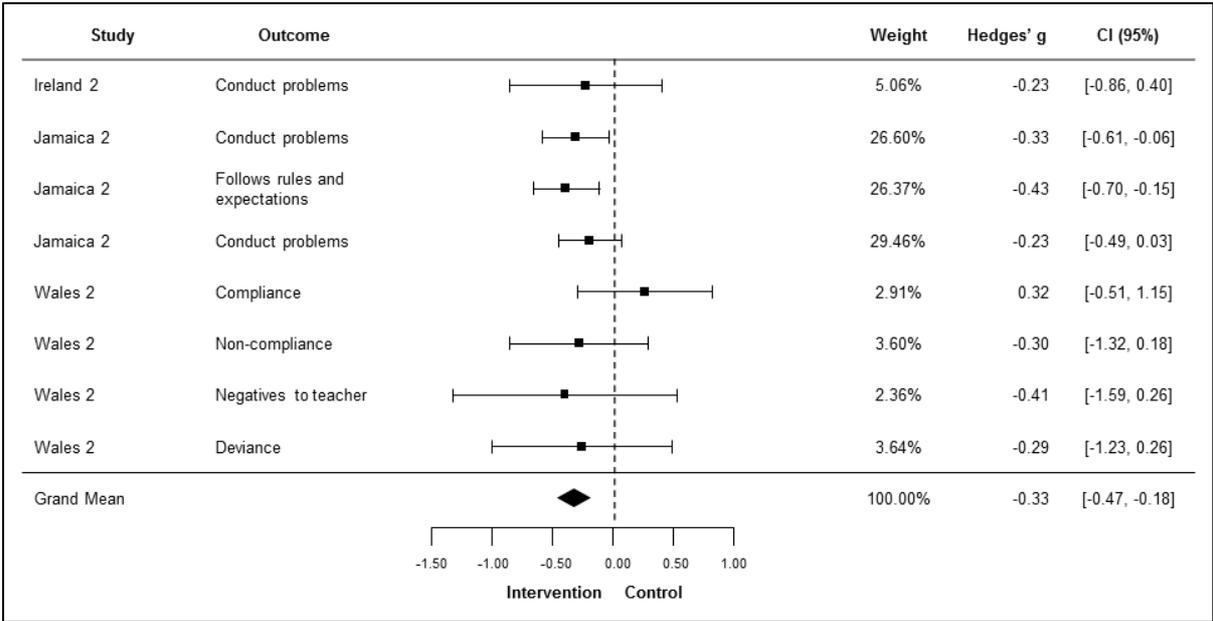Figure 9. Sensitivity analysis of child conduct problems

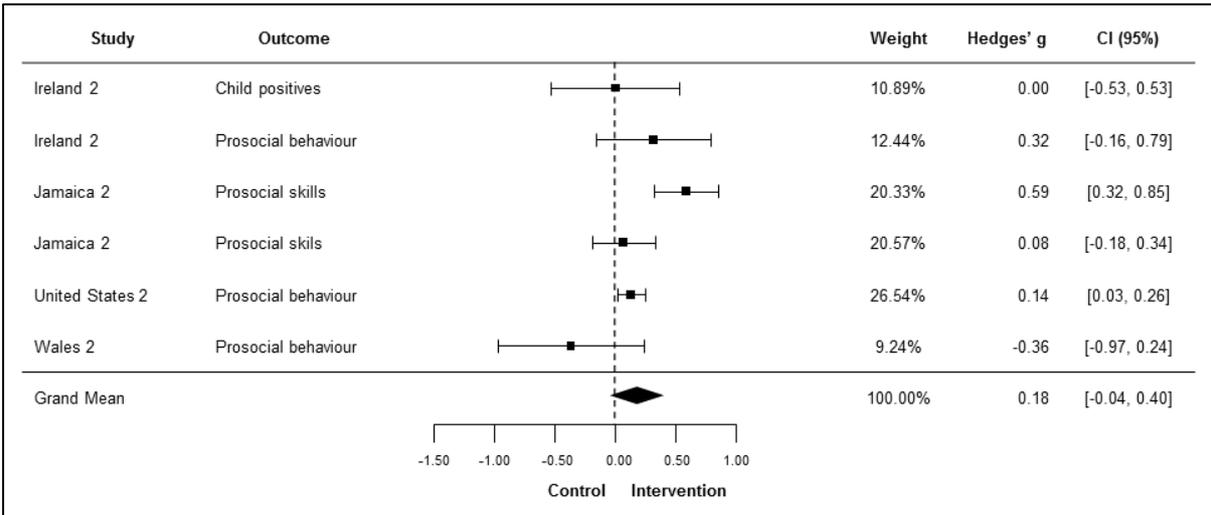Figure 10. Multilevel meta-analysis of high-risk child conduct problems

Figure 11. Multilevel meta-analysis of child prosocial behaviours
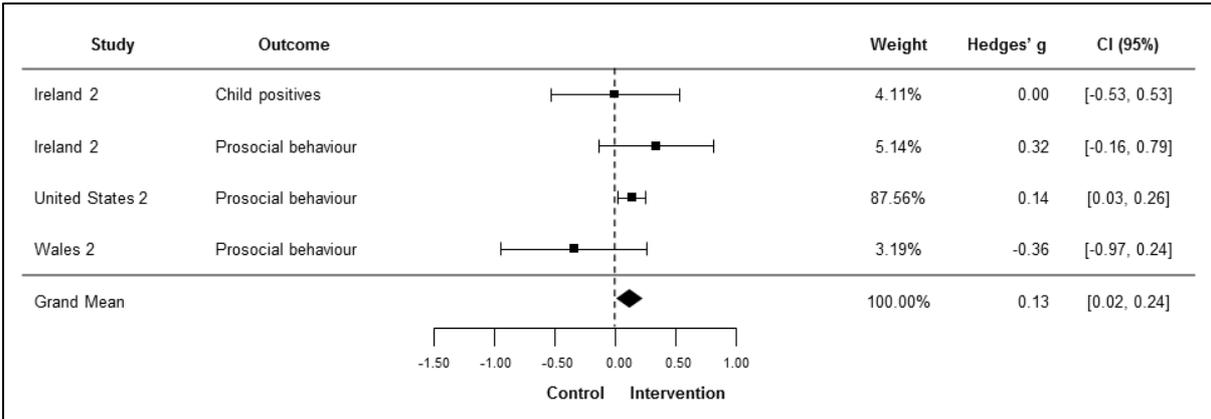
Figure 12. Sensitivity analysis of child prosocial behaviours
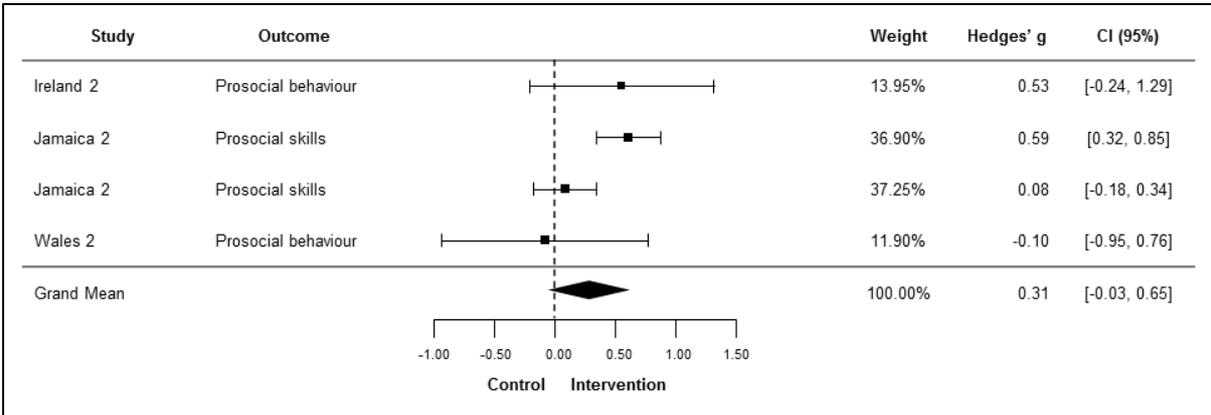
Figure 13. Multilevel meta-analysis of high-risk child prosocial behaviours

Table 2. Multilevel meta-analysis for post hoc outcomes

Outcome	N(k)	β_0	SE	95% CI	I^2	Tau^2	Chi^2 (p-value)
Post hoc analysis							
Child behaviour difficulties	21(4)	-0.20*	0.08	(-0.35, -0.04)	L1: 0.00 L2: 0.00	L1: 0.00 L2: 0.02	26.89 (0.14)
Sensitivity	13(3)	-0.12*	0.06	(-0.23, -0.01)	L1: 0.00 L2: 0.00	L1: 0.00 L2: 0.00	9.13 (0.69)
High risk subgroup	17(3)	-0.37***	0.05	(-0.46, -0.28)	L1: 0.00 L2: 0.00	L1: 0.00 L2: 0.00	13.63 (0.63)

N=number of effect sizes (Level 1); k=number of studies (Level 2); β_0= Hedges' g ('Grand Mean);
*p<0.05, **p<0.01, ***p<0.001

Figure 14. Multilevel meta-analysis of child behaviour difficulties

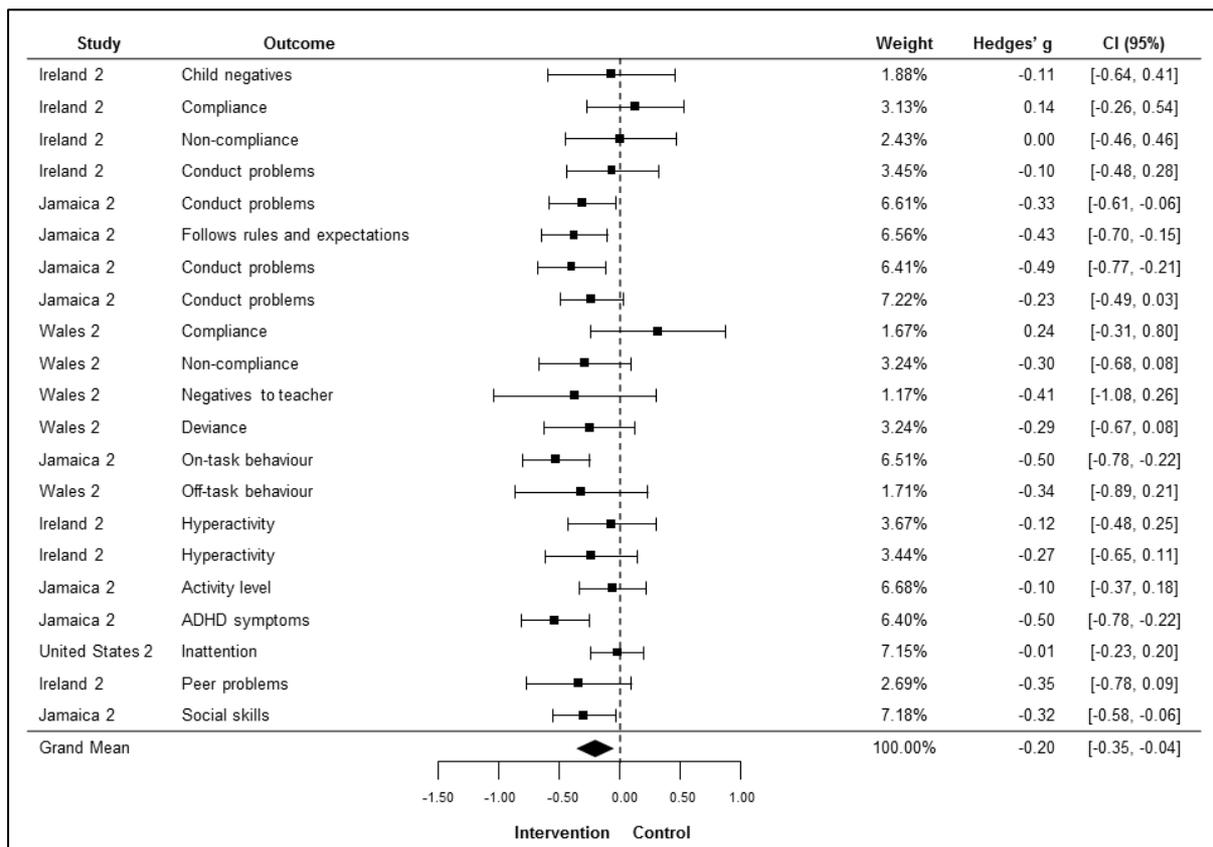| Study	Outcome		Weight	Hedges' g	CI (95%)
Ireland 2	Child negatives		1.88%	-0.11	[-0.64, 0.41]
Ireland 2	Compliance		3.13%	0.14	[-0.26, 0.54]
Ireland 2	Non-compliance		2.43%	0.00	[-0.46, 0.46]
Ireland 2	Conduct problems		3.45%	-0.10	[-0.48, 0.28]
Wales 2	Compliance		1.67%	0.24	[-0.31, 0.80]
Wales 2	Non-compliance		3.24%	-0.30	[-0.68, 0.08]
Wales 2	Negatives to teacher		1.17%	-0.41	[-1.08, 0.26]
Wales 2	Deviance		3.24%	-0.29	[-0.67, 0.08]
Wales 2	Off-task behaviour		1.71%	-0.34	[-0.89, 0.21]
Ireland 2	Hyperactivity		3.67%	-0.12	[-0.48, 0.25]
Ireland 2	Hyperactivity		3.44%	-0.27	[-0.65, 0.11]
United States 2	Inattention		7.15%	-0.01	[-0.23, 0.20]
Ireland 2	Peer problems		2.69%	-0.35	[-0.78, 0.09]
Grand Mean			100.00%	-0.12	[-0.23, -0.01]

Figure 15. Sensitivity analysis of child behaviour difficulties

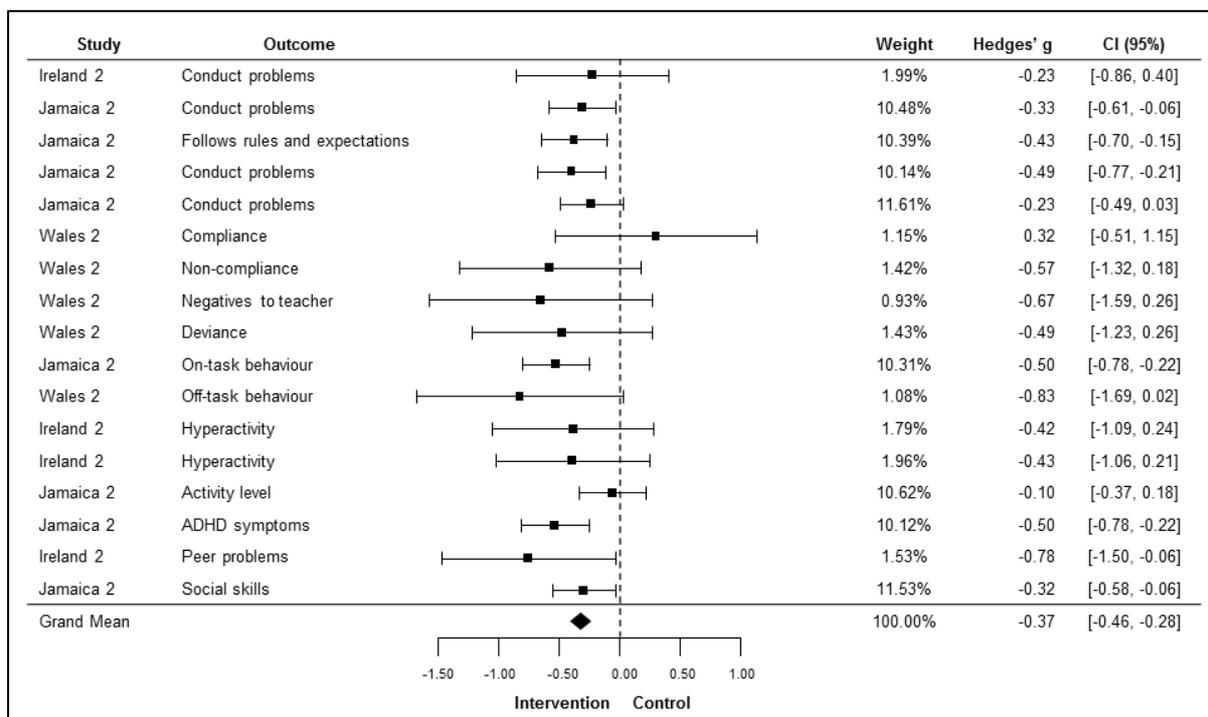| Study	Outcome		Weight	Hedges' g	CI (95%)
Ireland 2	Conduct problems		1.99%	-0.23	[-0.86, 0.40]
Jamaica 2	Conduct problems		10.48%	-0.33	[-0.61, -0.06]
Jamaica 2	Follows rules and expectations		10.39%	-0.43	[-0.70, -0.15]
Jamaica 2	Conduct problems		10.14%	-0.49	[-0.77, -0.21]
Jamaica 2	Conduct problems		11.61%	-0.23	[-0.49, 0.03]
Wales 2	Compliance		1.15%	0.32	[-0.51, 1.15]
Wales 2	Non-compliance		1.42%	-0.57	[-1.32, 0.18]
Wales 2	Negatives to teacher		0.93%	-0.67	[-1.59, 0.26]
Wales 2	Deviance		1.43%	-0.49	[-1.23, 0.26]
Jamaica 2	On-task behaviour		10.31%	-0.50	[-0.78, -0.22]
Wales 2	Off-task behaviour		1.08%	-0.83	[-1.69, 0.02]
Ireland 2	Hyperactivity		1.79%	-0.42	[-1.09, 0.24]
Ireland 2	Hyperactivity		1.96%	-0.43	[-1.06, 0.21]
Jamaica 2	Activity level		10.62%	-0.10	[-0.37, 0.18]
Jamaica 2	ADHD symptoms		10.12%	-0.50	[-0.78, -0.22]
Ireland 2	Peer problems		1.53%	-0.78	[-1.50, -0.06]
Jamaica 2	Social skills		11.53%	-0.32	[-0.58, -0.06]
Grand Mean			100.00%	-0.37	[-0.46, -0.28]

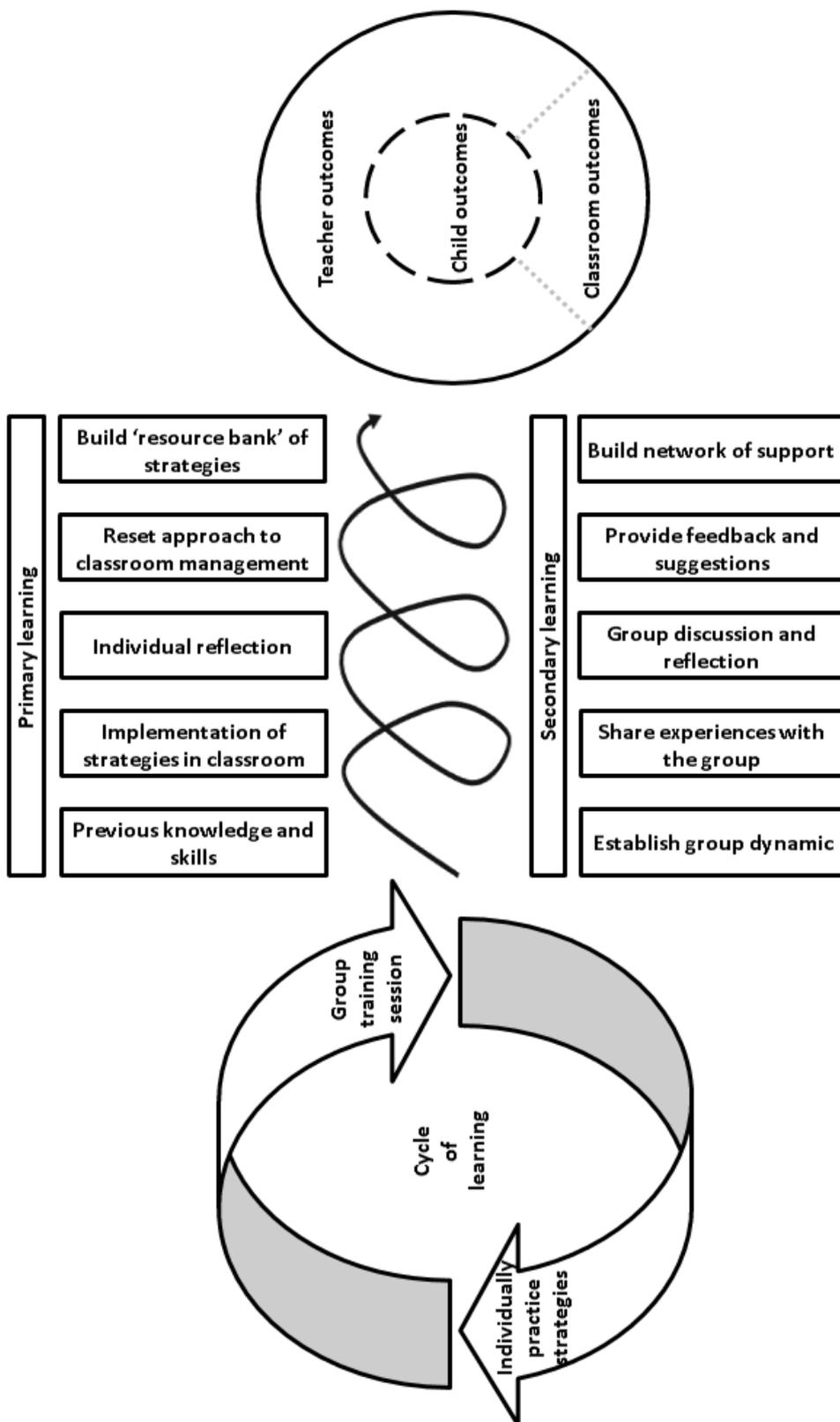Figure 16. Multilevel meta-analysis of high-risk child behaviour difficulties

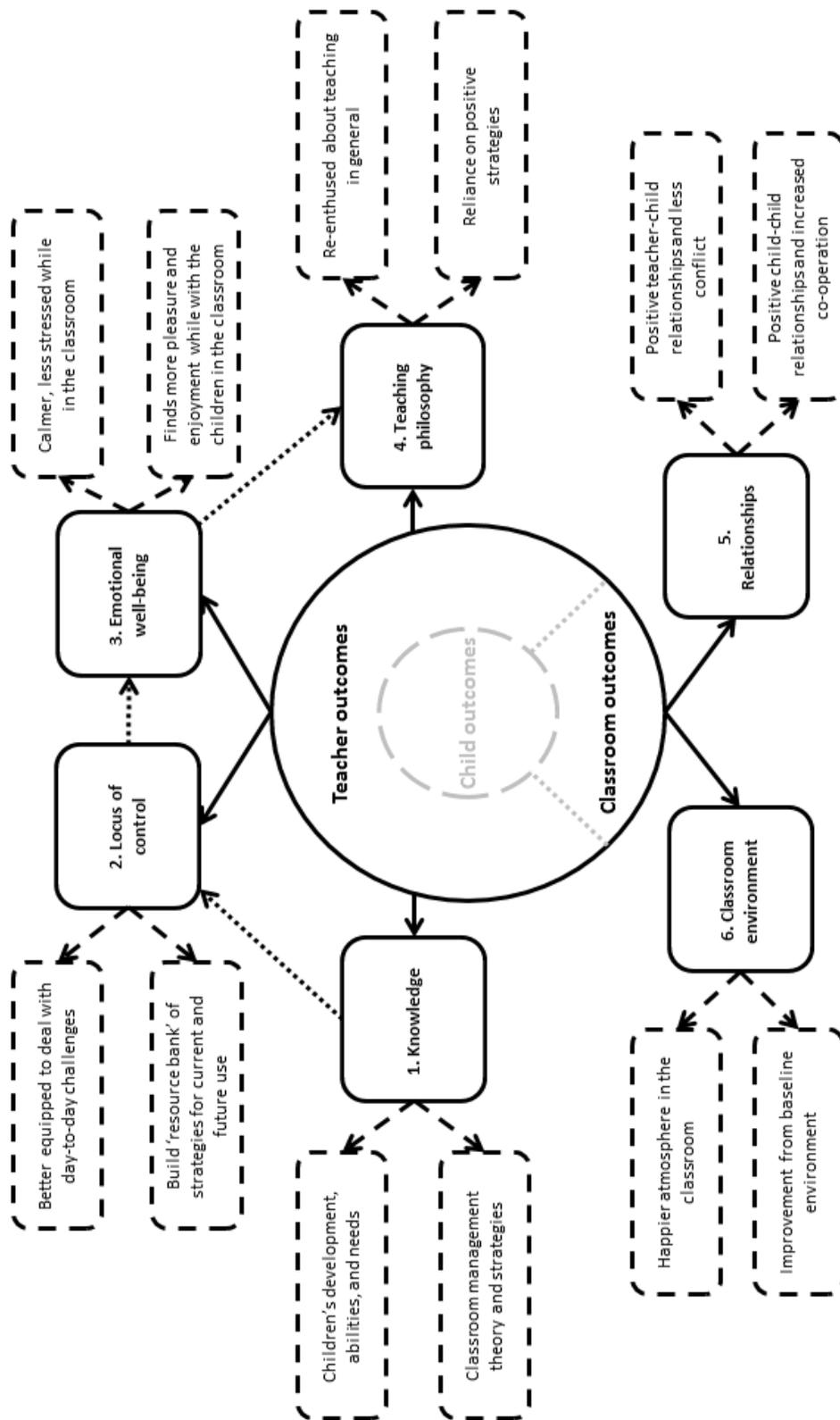Figure 17. Cycle of learning from qualitative meta-synthesis

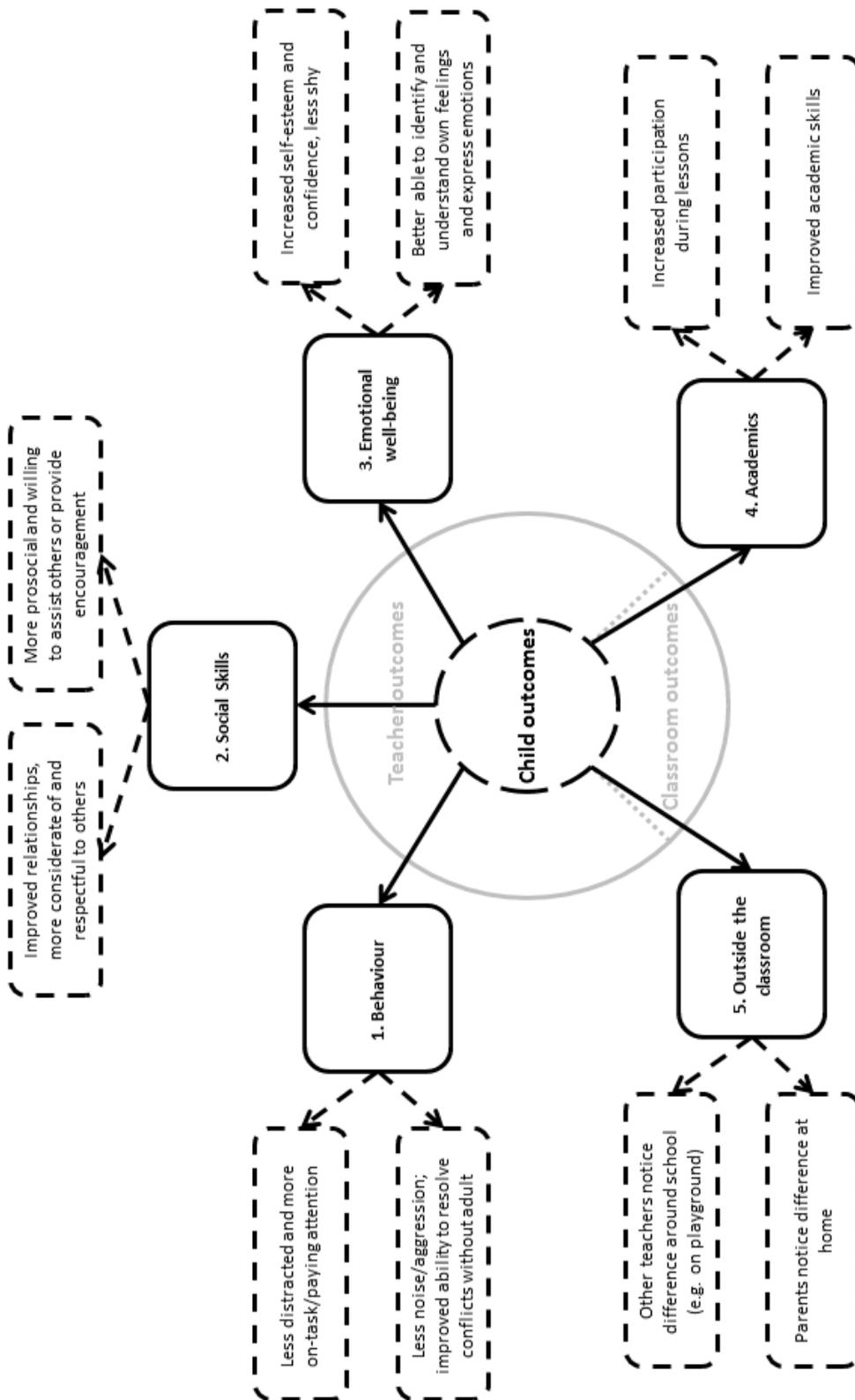Figure 18. Teacher and classroom outcomes from qualitative meta-synthesis

Figure 19. Child outcomes from qualitative meta-synthesis

References

Baker, J. A., Clark, T. P., Crowl, A., & Carlson, J. S. (2009). The Influence of Authoritative Teaching on Children's School Adjustment Are Children with Behavioural Problems Differentially Affected?. *School Psychology International*, *30*(4), 374-382.

Baker-Henningham, H. (2011). Transporting evidence-based interventions across cultures: using focus groups with teachers and parents of pre-school children to inform the implementation of the Incredible Years Teacher Training Programme in Jamaica. *Child: Care, Health and Development, 37*(5), 649-661. doi:http://dx.doi.org/10.1111/j.1365-2214.2011.01208.x

Baker-Henningham, H., Scott, S., Jones, K., & Walker, S. (2012). Reducing child conduct problems and promoting social skills in a middle-income country: cluster randomised controlled trial. *The British Journal of Psychiatry, 201*(2), 101-108. doi:http://dx.doi.org/10.1192/bjp.bp.111.096834

Baker-Henningham, H., & Walker, S. (2009). A qualitative study of teacher's perceptions of an intervention to prevent conduct problems in Jamaican pre-schools. *Child: Care, Health and Development, 35*(5), 632-642. doi:http://dx.doi.org/10.1111/j.1365-2214.2009.00996.x

Davenport, J., & Tansey, A. (2009). *Outcomes of an Incredible Years Classroom Management Programme with teachers from multiple schools*. Retrieved from Trinity College Dublin, National Educational Psychological Service.

Flemming, K. (2009). Synthesis of quantitative and qualitative research: an example using Critical Interpretive Synthesis. *Journal of Advanced Nursing, 66*(1), 201-217.

Gebbie, D. H., Ceglowski, D., Taylor, L. K., & Miels, J. (2012). The role of teacher efficacy in strengthening classroom support for preschool children with disabilities who exhibit challenging behaviors. *Early Childhood Education Journal, 40*, 35-46.

Girard, L.-C., Girolametto, L., Weitzman, E., & Greenberg, J. (2011). Training early childhood educators to promote peer interactions: Effects on children's aggressive and prosocial behaviors. *Early Education and Development, 22*(2), 305-323.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery grounded theory: strategies for qualitative research.* New York, NY: Aldine.

Hickey, G., McGilloway, S., Hyland, L., Leckey, Y., Kelly, P., Bywater, T., . . . O'Neill, D. (2015). Exploring the effects of a universal classroom management training programme on teacher and child behaviour: A group randomised controlled trial and cost analysis. *Journal of Early Childhood Research*, 1-21.

Hutchings, J., Martin-Forbes, P., Daley, D., & Williams, M. E. (2013). A randomized controlled trial of the impact of a teacher classroom management program on the classroom behavior of children with and without behavior problems. *Journal of School Psychology, 51*(5), 571-585.

Hyland, L. (2014). *The Incredible Years Teacher Classroom Management Programme in Ireland: A process evaluation and observational assessment of teacher-pupil outcomes.* (PhD), National University of Ireland Maynooth

Kokkinos, C. M. (2007). Job stressors, personality and burnout in primary school teachers. *British Journal of Educational Psychology, 77*, 229-243.

Marlow, R., Hansford, L., Edwards, V., Ukoumunne, O. C., Norman, S., Ingarfield, S., . . . Ford, T. (2015). Teach

Martin, P. A. (2009). *From small acorns: The positive impact of adopting simple teacher classroom management strategies on global classroom behaviour and teacher-pupil relationships.* (PhD), University of Wales, Bangor.

McGilloway, S., Hyland, L., Mháille, G., Lodge, A., O'Neill, D., Kelly, P., . . . Donnelly, M. (2011). *Positive classrooms, positive children: A randomised controlled trial to investigate the effectiveness of the incredible years teacher classroom management programme in an Irish context (short-term outcomes).* Retrieved from Archways Ireland: www.iyirelandstudy.ie

McGilloway, S., Mháille, G., Furlong, M., Hyland, L., Leckey, Y., Kelly, P., . . . Donnelly, M. (2012). *Parents, teachers, and early childhood intervention: Long-term outcomes of the Incredible Years Parent and Teacher Classroom Management training programmes (combined 12-month report).* Retrieved from Archways Ireland: www.iyirelandstudy.ie

Murray, D. W., Murr, N., & Rabiner, D. L. (2012). *Preliminary effects of the Incredible Years Teacher Training Program on classroom management skills.* Paper presented at the Society for Research on Educational Effectiveness. http://search.proquest.com/docview/1011396534?accountid=13042

Murray, D. W., Rabiner, D. L., & Carrig, M. M. (2014). *Grade level effects of the Incredible Years Teacher Training Program.* Paper presented at the Society for Research on Educational Effectiveness.

Shepard, S. A., Doctoroff, G. L., Dickstein, S., & Seifer, R. (2008). *An independent replication of the Incredible Years Classroom Management Teacher Training Program in Head Start.* Paper presented at the Society for Prevention Research.

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software, 36*(3), 1-48.

Webster-Stratton, C. (2001). The incredible years: parents, teachers, and children training series. *Residential Treatment for Children and Youth, 18*(3), 31-45.