

Non-pharmacological interventions for attention-deficit/hyperactivity disorder (ADHD) delivered in school settings: systematic reviews of quantitative and qualitative research

Michelle Richardson,¹ Darren A Moore,^{2†}
Ruth Gwernan-Jones,^{2†} Jo Thompson-Coon,³
Obioha Ukoumunne,³ Morwenna Rogers,³
Rebecca Whear,³ Tamsin V Newlove-Delgado,³
Stuart Logan,³ Christopher Morris,⁴ Eric Taylor,⁵
Paul Cooper,⁶ Ken Stein,³ Ruth Garside⁷
and Tamsin J Ford^{1*}

¹Child Health Group, University of Exeter Medical School, Exeter, UK

²Evidence Synthesis & Modelling for Health Improvement,
University of Exeter Medical School, Exeter, UK

³National Institute for Health Research (NIHR) Collaboration for Leadership in
Applied Health Research and Care South West Peninsula (PenCLAHRC),
University of Exeter Medical School, Exeter, UK

⁴Peninsula Cerebra Research Unit (PenCRU), University of Exeter Medical School,
Exeter, UK

⁵Institute of Psychiatry, King's College London, London, UK

⁶Centre for Special Educational Needs and Inclusive Education (CSENIE),
Hong Kong Institute of Education, Hong Kong, China

⁷The European Centre for Environment and Human Health (ECEHH),
University of Exeter Medical School, Truro, UK

*Corresponding author

†Joint second authors

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Disclaimer: This report contains quotations from transcripts of interviews conducted in the course of research and contains language that may offend some readers.

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Scientific summary

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Background

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders. Approximately 2–5% of school-aged children hold diagnoses and the prevalence is reported to be rising. School can be particularly challenging for children with ADHD. ADHD-related behaviours impair them, as well as challenging their teachers, parents and peers. Although the effectiveness of medication is well established, it remains controversial. There has been less systematic synthesis into the effectiveness of non-pharmacological behavioural treatments, although beneficial effects have been reported for both symptom and scholastic outcomes. Few published reviews have considered non-pharmacological interventions in school settings independently of those delivered predominantly in other settings, such as at home and in clinic. Those that have do not focus on the synthesis of evidence from controlled trials or explore attitudes and experience. This series of systematic reviews sought to evaluate the effectiveness and cost-effectiveness of non-pharmacological interventions delivered in school settings for pupils with, or at risk of, ADHD and to explore the factors that may enhance, or limit, the effective delivery of such interventions.

Objectives

Four systematic reviews and an overarching synthesis of these reviews are reported.

Review 1 aimed to synthesise the effectiveness and the cost-effectiveness of non-pharmacological interventions delivered in school settings for children with, or at risk of, ADHD.

Review 2 considered quantitative studies that explore attitudes towards school-based non-pharmacological interventions for pupils with ADHD.

Review 3 synthesised the attitudes and experiences of pupils, teachers, parents and others who use ADHD interventions in school settings.

Review 4 explored the experience of ADHD in school among pupils, their parents and teachers more generally.

The four reviews were subsequently brought together in an overarching synthesis which aimed to relate the reviews to each other.

Data sources

Twenty electronic databases [Applied Social Sciences Index and Abstracts/ProQuest, MEDLINE/OvidSP, EMBASE/OvidSP, PsycINFO/OvidSP, British Education Index/ProQuest, Australian Education Index/ProQuest, Education Research Complete/EBSCOhost, Education Resources Information Center/ProQuest, The Cochrane Library (Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects, Cochrane Central Register of Controlled Trials, Cochrane Methodology Register, Health Technology Assessment, NHS Economic Evaluation Database), The Campbell Library, Health Management Information Consortium/OvidSP, Social Policy and Practice/OvidSP, Social Sciences Citation Index, Conference Proceedings Citation Index, Conference Proceedings Citation Index – Social Science & Humanities (via ISI Web of Science)] were searched from 1980 to February–August 2013. Three separate searches were conducted for the four systematic reviews; they were supplemented with forward and backwards citation chasing, website searching, author recommendations and hand-searches of key journals.

Review 1: synthesis of the effectiveness and the cost-effectiveness of non-pharmacological interventions

Method

Two independent reviewers were involved in study selection, data extraction and quality appraisal. Controlled trials were included where (1) non-drug interventions were evaluated; (2) participants were aged between 4 and 18 years; (3) participants were preschool, school or further education college attendees; (4) $\geq 50\%$ of participants were identified with or at risk of ADHD; and (5) one of the following child outcomes related to ADHD were assessed: core ADHD symptoms (inattention/hyperactivity/impulsivity); ADHD-related symptoms (internalising/externalising/social skills); and scholastic behaviours and outcomes (scholastic adjustment/curriculum achievement/standardised achievement).

Random-effects meta-analyses were conducted separately for randomised controlled trials (RCTs) and non-RCTs where data permitted, otherwise data were synthesised narratively. Moderator analyses were conducted to examine which programme features, including intervention packages, intervention delivery characteristics and participant characteristics, were linked with effectiveness.

Results

A total of 25,866 references were identified, of which 54 studies met the inclusion criteria (39 RCTs; 15 non-RCTs). Forty-seven contained suitable data for meta-analysis. Across studies, 15 types of intervention packages were classified; however, few interventions consisted of common sets of programme features. Focusing on the meta-analysed RCTs ($n = 36$), beneficial effects ($p < 0.05$) were observed for several outcomes including core ADHD symptoms [child-based neurocognitive assessments ($d_+ = 0.44$, $p = 0.001$ for 'inattention'; $d_+ = 0.33$, $p = 0.001$ for 'hyperactivity/impulsivity') and teacher-rated outcomes of 'inattention' ($d_+ = 0.60$, $p = 0.01$)], ADHD-related symptoms [teacher-rated 'externalising' symptoms ($d_+ = 0.28$, $p = 0.03$)], and scholastic behaviours and outcomes [teacher-rated 'perceptions of school adjustment' ($d_+ = 0.26$, $p = 0.02$) and 'standardised achievement' ($d_+ = 0.19$, $p = 0.02$)].

There was weaker evidence for the beneficial effect of non-pharmacological interventions on observer-rated 'inattention' ($p = 0.08$); teacher-rated 'hyperactivity/impulsivity' ($p = 0.08$) and 'curriculum achievement' ($p = 0.08$). Beneficial effects were more likely to be observed for relatively objective assessments than perception-based measures. Of these perception-based measures, beneficial effects were reported for teacher-rated outcomes, but not for children and parents. Substantial heterogeneity in effect size estimates across studies was reported. Effect sizes varied considerably both within and between different outcomes.

Moderator analyses were not able to clarify which programme features were linked with effectiveness. No studies included economic outcomes, thus the cost-effectiveness of non-pharmacological interventions targeting children with, or at risk of, ADHD cannot be established and compared with other available treatments. The majority of included studies targeted children at elementary school (40/54 studies) and none of the included studies was from the UK. The methodological quality of the trials was generally low. Although overall the evidence indicates the beneficial effects of non-drug intervention, the heterogeneity in effect sizes points to the lack of standardised interventions and shared outcome measures across the included studies.

Review 2: synthesis of quantitative studies that explore attitudes towards non-pharmacological interventions

Method

Included studies measured attitudes of those with experience of non-pharmacological school-based interventions for ADHD. Study selection, data extraction and quality appraisal assessment were independently conducted by two reviewers. A narrative synthesis was employed; mean scores on attitude scales were converted into percentages where possible and compared across studies.

Results

A total of 4114 references were identified, of which 28 papers met the inclusion criteria. The included studies represented the attitudes of a variety of school practitioners. Attitudes were measured in relation to nine types of intervention identified across studies. Most studies used bespoke attitude measures rather than existing standardised instruments. The included papers were of low quality and therefore prone to bias. Particular issues included lack of definitions of interventions and failure to pilot vignettes and attitude measures developed by authors.

Likert scale scores were converted to percentages, allowing comparison across 19 of the 28 included papers. There was a lack of consistency among attitudes towards particular types of interventions, although most interventions were rated positively or neutrally. The only intervention that consistently recorded positive attitudes from educators was daily report cards, an intervention where behaviour is monitored and recorded at school on a card or in a book that the pupil then takes home to share with their parent or carer. No variables were found to consistently affect attitudes towards interventions.

Review 3: synthesis of attitudes and experiences of pupils, teachers, parents and others using attention-deficit/hyperactivity disorder interventions in school settings

Method

Included studies reported primary research using qualitative data collection and analysis regarding attitudes towards, and experience of, non-pharmacological interventions in school settings. Study selection, data extraction and quality appraisal assessment were independently conducted by two reviewers. A meta-ethnographic approach was used to synthesise findings across included studies. Analysis used an iterative process of thematic analysis, reciprocal translation and a line-of-argument synthesis.

Results

A total of 10,573 references were identified, of which 33 papers met the inclusion criteria outlined above. Only 12 of the studies were focused on a particular intervention; the majority of included studies instead considered a range of interventions or strategies used in participants' school settings. All studies received more positive than negative quality appraisals, although they typically contained mainly descriptive analysis. Only two of the studies included participants from the UK.

Seven main themes were identified and used to organise and guide the synthesis:

1. individualising interventions
2. structure
3. time
4. impact of interventions
5. problem situated within the child
6. relationships
7. expectations.

A line-of-argument was developed that offers an explanatory model of the experience of interventions and teaching strategies for ADHD in school settings. The synthesis revealed three main tensions related to responding to ADHD in schools, regarding how structured and tailored they ought to be and issues regarding the time available for intervention use. There were some concerns reported by participants in reviewed studies that interventions may be effective for specific targeted skills and behaviours, but not impact the academic achievement. There were also issues concerning how well skills and knowledge learned during interventions are applied beyond the intervention period. It is clear that interventions may influence relationships, attitudes and participants' perception of ADHD and school, but, equally, these contextual factors may impact the experience of interventions.

Review 4: synthesis of the experience of attention-deficit/hyperactivity disorder in school among pupils, their parents and teachers more generally

Methods

Studies were included that involved school-related experiences about ADHD. Methods corresponded to those described for review 3, with the addition of the use of an index paper for two subreviews.

Results

A total of 10,573 references were identified, of which 34 studies met the inclusion criteria for review 4, seven of which included participants from the UK. These were divided into four groups for initial synthesis by participant type, then combined in a synthesis of reviews 4a–d.

Study data collection most often involved interviews, and data analysis most commonly included thematic analysis. Overall, the quality of study methods were good and many of the studies involved the development of theory.

In review 4a, which synthesised studies about pupils diagnosed with ADHD, pupils expressed most concern over difficulties in relationships. They described the classroom as a place in which they found it difficult to learn. Stigma was identified in a number of studies, as was the tendency for pupils to make polarised biological attributions for ADHD, and these contributed to poor pupil self-perceptions.

In review 4b, which synthesised studies about teachers, teachers of pupils diagnosed with or at risk of ADHD described their main professional responsibility to be to their classroom as a whole, and this could lead them to be reluctant to accommodate the individual needs of a pupil. Teachers described time pressures and lack of knowledge about ADHD to be further barriers. Teachers tended to attribute ADHD symptoms to problems in the home such as poor parenting, or to biological factors. Such polarised attributions could limit choices for treatment.

In review 4c, which synthesised studies about parents, mothers of pupils diagnosed with ADHD commonly reported experiencing conflict with school staff, feeling blamed for their child's behaviour and dismissed when sharing information or making requests to school staff.

Review 4d, which synthesised studies exploring experiences of multiple participant types, primarily detailed interactions of factors already identified in reviews 4a–c, but further illuminated the importance of support from the wider school and the national context.

The synthesis of reviews 4a–d found that the context of school could aggravate symptoms of ADHD through the nature of its expectations. When behaviour was determined to threaten learning in the school, stigma could operate to protect existing school practice. Stigma could impact relationships negatively and aggravate ADHD symptoms further, leading to escalating marginalisation. Polarised attributions for ADHD further drew attention away from school contributions to ADHD symptoms. It was concluded that an important aspect of addressing ADHD symptoms is to explore the potential for adaptation to school practice in interaction with existing knowledge about approaches to pupil adaptation.

Overarching synthesis

The overarching synthesis synthesised the findings from all four reviews. An inductive approach was used to explore the complexity of the context in which non-pharmacological school-based interventions for ADHD are used, drawing on findings from the two qualitative reviews (reviews 3 and 4). Second, a deductive approach to synthesis was taken to consider potential relationships between possible moderators and effectiveness, using review 1 results and examining how findings from the other reviews may provide potential explanations and relevant information.

The inductive approach identified contextual issues that impact the implementation and effectiveness of interventions operating at several levels. These levels formed a hierarchy moving from the pupil diagnosed with ADHD, the classroom, the school, to the sociopolitical level. Issues are seen across and within these levels and include the attributional beliefs that teachers and pupils hold about ADHD, the relationships that pupils with ADHD have with their teachers and peers and that their parents have with their teachers, and the stigma that may be experienced because of ADHD symptoms, diagnosis or attendance of an intervention. The hierarchical nature of these levels suggest that, without school and sociopolitical level policy and support, non-pharmacological interventions for ADHD may be less effective.

The deductive approach found links across the systematic reviews, as well as some refutational evidence. It emphasised the importance of psychoeducation for teachers, parents and pupils to help overcome lack of knowledge and stigma around ADHD. The relevance of building relationships between parents, teachers, pupils and peers was also highlighted. Outcomes that did not often feature in review 1 studies appeared to be important in reviews 3 and 4, such as attitudes held by pupils towards school and/or interventions, perceptions of agency, attributions about ADHD and self-concept. The overarching synthesis suggested that the following might be predicted to moderate intervention effectiveness: age, sex, duration of intervention, medication status, type of classroom, school level, support for teachers and the quality of relationships between the pupil with ADHD and their teachers and peers, home–school collaboration and the presence of stigma.

Discussion and conclusions

Strengths of the four reviews and overarching synthesis include the comprehensive search strategies employed. Review 1 included a wider range of non-pharmacological interventions and outcome measures and benefited from a larger set of controlled trials than previous reviews. Reviews 3 and 4 represent the first systematic reviews of qualitative research on the experience of school-based interventions for ADHD and the experience of ADHD in schools, respectively, of which we are aware. The breadth of both interventions and outcomes in reviewed studies presented a challenge for categorisation, analysis and interpretation in reviews 1–3. Across reviews, relatively few studies were conducted in the UK, limiting the applicability of findings to UK education. In reviews 1 and 2, the poor methodological quality of some included studies was identified as a barrier to establishing effectiveness or comparing attitudes. In review 3 the descriptive analysis used by the majority of studies constrained theorising during synthesis. Studies in review 4 lacked detail regarding important issues such as gender, pupil maturity and school level.

Given the nature of the review findings and challenges in synthesising across reviews, recommendations for research and, in particular, implications for policy and practice, can only be tentative. An implication for the design and implementation of interventions is that the particular context for a pupil with ADHD, their classroom, school and issues at the sociopolitical level need to be actively considered. The qualitative reviews suggest that stigma and marginalisation may be increased through intervention. This is an important consideration for implementation. The findings from reviews 3 and 4 suggest that psychoeducation about ADHD could usefully be provided to school staff, pupils with ADHD and their peers as an adjunct to any intervention that targets children with, or at risk of, ADHD.

Different stakeholder priorities imply a need for interventions with multiple components that tackle different aspects of the difficulties that young people with ADHD face in coping with school. Given the importance of relationships highlighted by reviews 3 and 4 and the possible reduced effectiveness of social skills training for pupils with ADHD suggested by review 1, support for relationships with teachers and peers seems an important additional component of interventions.

Recommendations for future research are organised by methodological issues and gaps in the research literature. Key methodological recommendations include more examination of both what works and for whom during intervention research. A formal intervention mapping process could enhance the selection of appropriate behaviour change techniques and examination of potential moderators. Non-pharmacological interventions that target children with or at risk of ADHD should be rigorously evaluated, conforming where feasible to Consolidated Standards of Reporting Trials (or other relevant) guidelines. In particular cluster randomised controlled designs should be used that aim to reduce bias wherever possible. Exploration of the experience and attitudes of participants, alongside such research, would provide information about participant meaning and intervention processes to support the development of theory about for whom, why and how these interventions might work.

Gaps in current research present opportunities for the development and testing of standardised tools to describe programme features relevant to ADHD, so that the design, reporting, replication, implementation and synthesis of interventions that target children with or at risk of ADHD can be enhanced. Given the wide range of outcome measures reported in review 1, identification of gold-standard outcome measures assessing aspects related to ADHD would facilitate comparison across studies. No relevant cost-effectiveness studies were detected during review 1. There may be scope for modelling of potential cost-savings should effectiveness be demonstrated. Findings from the overarching synthesis suggest that a range of potential moderators, including age, gender, medication use, method of intervention delivery, intensity and duration of intervention, ought to be researched alongside intervention trials given their potential importance.

Study registration

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Editorial contact: nhredit@southampton.ac.uk

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