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Parenting interventions, ADHD and homework: a systematic review

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ABSTRACT

Extant evidence indicates that there is a stronger link between homework difficulties and ADHD than in the general population of children. In addition, parents' involvement in education is an important factor in academic success. Despite the well-established challenges that homework presents to children with ADHD, none of the existing treatment protocols or standard therapeutic options are specifically designed to target homework difficulties. This study aims to identify, describe and appraise studies that have empirically evaluated interventions to optimise the homework performance of children with ADHD. The three databases searched were: Medline, PsycInfo, Embase. The keywords 'ADHD' and 'Homework' were used in combination to search the three databases. The search was designed to identify therapeutic interventions which sought to aid parents of children with ADHD to optimise their child's homework performance. The systematic review included 14 studies. The quality of the trials was mixed and generally low; for the other trial types ($n=5$) STROBE scores ranged from 6 to 14. The literature in this field points to increased awareness of the need to focus on specific areas of functional impairment in the lives of children with ADHD and to tailor therapeutic supports to enhance a child's educational trajectory.

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Introduction

ADHD is characterised by an ongoing pattern of developmentally inappropriate levels of inattention and or hyperactivity/impulsivity causing functional impairment (American Psychiatric Association 2013). Children with ADHD experience a range of challenges in everyday life (Merrill et al. 2017; Antshel and Barkley 2020) which may often be made more burdensome by the myths, stigma and misrepresentation that all too often prevail in societal discourse (Gavin and McNicholas 2018; Wayman 2022). One of the most robust impairments associated with ADHD is academic underachievement (Frazier et al. 2007). While there is debate in the educational literature as to the extent to which homework completion is linked to academic success, extant evidence indicates

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that there is a stronger link between homework difficulties and ADHD than in the general population of children (Cooper, Robinson, and Patall 2006; Epstein et al. 1993). The symptom profile of ADHD is such that students with it often struggle with multiple elements of the homework process: accurately writing down the homework assignments, remembering to bring home the relevant materials, responding to direction to commence homework, staying on task for the duration required, breaking down tasks into manageable components in addition to oppositional behaviour and parent child conflict during homework time (Barkley, 2006). Alongside the direct impact of ADHD related homework challenges on academic achievement, the secondary consequences on the child's psychological wellbeing are significant (Barkley et al. 2006). Within the context of clinical practice it appears reasonable to hypothesise that many children with ADHD experience increased levels of stress and anxiety, contributed to in part by persistent homework worries and fears about missing assignments and poor performance. Furthermore, many children with ADHD establish very negative attitudes to applying themselves to academic work which it appears reasonable to postulate are fuelled in part by the parental conflict and heightened negative emotion regularly experienced at homework time. Despite the significant literature on parent-child conflict occurring within the context of ADHD, there is a paucity of data as to the role homework plays within this cycle of conflict (Barkley et al. 2002; Edwards et al. 2001; Medina and Sibley 2015). The negative sequelae that emanate from poor academic performance frequently endure throughout the child's school years and the demotivating impact acts as a further barrier to successful school engagement which in turn contributes to the poor outcomes associated with ADHD as do the frequently occurring comorbidities such as Specific Learning Difficulties, Oppositional Defiant Disorder (ODD) and Dyspraxia (Barkley et al. 2006; Kent et al. 2011; Robb et al. 2011).

Broadly speaking, evidenced based interventions for ADHD can be assigned to three categories: medication, behavioural interventions (parenting) and school supports (NICE Guidelines 2019). Despite the well-established challenges that homework presents to children with ADHD, none of the existing treatment protocols or standard therapeutic options are specifically designed to target homework difficulties nor have existing interventions proven to be routinely effective in this regard (NICE Guidelines 2019; Merrill et al. 2017). There are many parent guides which promote strategies to engender positive homework behaviours for children without ADHD (Olympia, Jenson, and Hepworth-Neville 1996; Weiner, Sheridan, and Jenson 1998). However, very few programmes have been designed and empirically evaluated specifically for children with ADHD. The ADHD literature over recent years has increasingly highlighted the benefits of targeting functional outcomes as opposed to limiting improvements to the domain of 'symptoms' only (DuPaul, Eckert, and Vilaro 2012; Pelham and Fabiano 2008; Pelham, Fabiano, and Massetti 2005). Reviewing ADHD practice guidelines through this prism, it is reasonable to infer that ADHD guidelines and by extension clinical practice has not kept pace with this recommended shift in therapeutic/outcome focus which in part may explain the lack of research/clinician drive to develop and implement empirically validated interventions to facilitate positive change with homework despite its enduring role in a child's life.

Parenting can impact on academic performance in many ways, notably parenting styles resulting in secure attachments and self-regulation in children are linked to

academic success (Pianta 1997). In addition, parents involvement in education is an important factor in academic success (Gonzalez-DeHass, Willems, and Doan Holbein 2001). However, parents are not typically intuitively aware or naturally resourced to identify and implement strategies to manage the myriad challenges of parenting a child who is resistant to homework and who by virtue of their ADHD struggles with distractibility and disorganisation (Kay et al. 1994). Numerous parenting programmes exist; however most existing empirically validated parenting programmes for ADHD do not include a specific input on homework related parenting challenges (e.g. Barkley, 1998; Webster-Stratton 2011). In addition, the parenting techniques required to manage homework in the context of ADHD need to be tailored to the particular challenges of the homework process many of which differ fundamentally and have underpinnings distinct to the typically 'non-compliant' behaviours targeted by generic ADHD parenting courses. Furthermore, while medication is known to be effective in enhancing attention span (MTA 1999) and, as such, if optimally titrated and timed, may play a significant role in remediating homework problems associated with ADHD, it may be less effective in targeting ADHD related difficulties such as resistance to commencing homework, organisational shortfalls and planning assignments. In addition, key contingencies which are known to be effective such as parent-teacher communication are not targeted through medication treatment (Vannest et al. 2010; Wells, Epstein et al. 1993). Moreover, most schools are insufficiently resourced with inadequate ADHD training provided to teachers to facilitate the level of targeted support necessary to help children with ADHD develop the skills to offset the challenges homework presents (Landrum et al. 1993. "educational and classroom management").

Given the unique and significant challenges that homework presents to children with ADHD and the evident dearth of practice guidelines encompassing interventions targeting functional outcomes in homework, it is both timely and necessary to begin to bridge this gap. Consequently, this study aims to establish a greater understanding of the extant empirical evidence and to provide an overview of existing programmes. It is hoped that in turn it might increase the practical application and research focus on this topic and ultimately result in evidenced-based interventions relating to homework forming a key element of comprehensive ADHD clinical management and treatment guidelines underpinned by functional outcomes.

This study aims to identify, describe and appraise studies that have empirically evaluated interventions to optimise the homework performance of children with ADHD.

Method

Search parameters and inclusion criteria

The PRISMA guideline for systematic reviews was followed (Moher et al. 2009). The PRISMA protocol was drawn up at the outset of the review process.

Inclusion criteria

Interventions involving primarily children with ADHD receiving homework performance interventions. The search included only interventions involving parents in at least one component of the process.

Exclusion criteria

Interventions aimed exclusively at systems level such as schools or educational professionals such as teachers or children themselves without incorporating a strand aimed at parents were excluded.

Interventions

The search was designed to identify therapeutic interventions which sought to aid parents of children with ADHD to optimise their child's homework performance rather than studies focusing on the prevalence, symptom profile or impact of homework related difficulties in ADHD. Studies with broader aims than homework optimisation were included if homework outcome measures were incorporated (i.e. parenting interventions which were focused on the challenges for children with ADHD in the home and not just at homework time). Parenting interventions which did not have a homework focus or did not measure homework related outcomes were not included. Consideration was given to the complete range of therapeutic models (e.g. behavioural therapy, motivational interviewing, psychoeducation), theoretical underpinnings (e.g. executive function deficits, organisational skills deficits) and settings (e.g. both health and educational settings).

Outcomes

Intervention studies which evaluated any outcomes related to any aspect of homework performance were included. Therefore, studies which evaluated children's ADHD symptom profile, functional impairment, range of problems evident at homework time and organisational skills deficits were included. In addition, studies which included outcomes measuring the feasibility and tolerability of the intervention were incorporated.

Study design

Due to the limited research on this topic all study types were considered for inclusion. Therefore, a range of study designs including descriptions of therapeutic programmes with case descriptions, open trials, feasibility studies and randomised controlled trials were included. There was no minimum length of follow-up.

For pragmatic reasons, only English-language studies were included.

Search strategy

Three databases were searched: Medline, PsycInfo, Embase. The keywords 'ADHD' and 'Homework' were used in combination to search the three databases. Search terms and database subject headings related to ADHD (i.e. Attention Deficit Hyperactivity Disorder [subject heading] OR ADD* OR ADD* with hyperactivity OR hyperkinetic disorder OR hyperactivity) were combined with those terms for homework (i.e. [assignment] OR study). Owing to the differing search procedures deployed by the three databases, slightly altered versions of this search strategy were used in each database.

The second author independently screened all abstracts. When the first and second author differed in their opinions regarding abstract inclusion, the abstract was included for full-text review. The data was managed using word processing software. A template was devised to capture key information from each study. This included the following:

study setting, participant groups, study type, nature of the intervention, follow-up, outcome measures utilised, timepoints for data collection, dropout rates and treatment outcomes.

Quality assessment

In order to assess study quality in a standardised manner, papers were reviewed according to different protocols depending on study type.

Randomised controlled trials

To assess risk of bias in the Randomised Controlled trials, a modification of the Cochrane Collaboration's Tool for Assessing the Risk of Bias was used (Higgins and Green 2011). This tool covers six domains. These domains are: selection bias (including random sequence generation and allocation concealment), performance bias, detection bias, attrition bias (completeness of outcome data), reporting bias and 'other'. For the purposes of this analysis, the criteria used were random sequence generation, allocation concealment and completeness of outcome data. Completeness of Outcome data was defined by use of intention-to-treat analysis or multiple imputation analysis (Sterne et al. 2009). The remaining criteria were not used as the nature of the trials were such that other criteria were inapplicable. For example, blinding regarding knowledge of an intervention was not feasible as experimental conditions did not allow for same. Blinding of outcome measures was not used as self-report measures were used extensively in included studies. Due to the subjectivity of the criteria 'selective reporting' bias and 'any other' bias, these categories were deemed too ambiguous for inclusion.

Other study types

To assess the quality of other trial types and observational reports, the STrengthening the Reporting of OBServational studies in Epidemiology (STROBE) criteria were used (Von Elm et al. 2007). This consists of 22 criteria which describes the specific detail required for all aspects of the report write-up, including title and abstract, introduction, methods, results, discussion and other information such as funding. Within each category lists are provided outlining the required information, for example, explicitly describing efforts to control bias with clear definition of potential confounders.

In the absence of an available tool to rate the quality of papers describing therapeutic programmes with case illustrations, a modification of the STROBE criteria was used excluding inapplicable criteria such as statistics and results with 12 criteria remaining including background, rationale, programme design, setting, participants, results, limitations, interpretation, generalisability and funding.

Results

Study selection

The literature search is represented in Figure C1. There were 33 records after duplicates were removed. These were screened at 'abstract' level. There was a 94% agreement between both rating authors (BG & CT). Following abstract screening, 16 papers were

reviewed for eligibility by ‘full text’ appraisal. At this point, 14 studies were included in the systematic review.

Study characteristics

An outline of the 14 studies included is summarised in Table A1 (RCTs) and Table B1 (Other Study types). The study types included were mixed: case descriptions (2); open trials (3); RCT (9); analysis of one arm of RCT (1). 13 of the studies were conducted in the USA, one being from Germany. Of those studies that provided details of explicit recruitment procedures, two recruited from clinical settings only with 8 studies including recruitment from schools. Sample sizes (excluding case description studies $n = 2$) ranged from 11 to 579. Where details were provided (9 studies) the age range of children was 5–17. Of the nine RCTs, five included details of age range with three interventions delivered to under 11/12s and two delivered to 11–14/15 year olds. Both of the interventions delivered to this age range involved parents in very different ways. Sibley et al.’s (2016) Supporting Teens Autonomy Daily (STAND) programme (age range 11–15) involved a manualised Individual Parent-teen skills based therapy blended with motivational Interviewing. Meyer et al.’s (age range 11–14) intervention consisted of a once off session directed to teens with parents present (characterised as a self-monitoring group) compared to a parent monitoring group both of which resulted in a significant decrease in reported homework problems.

All RCTs screened for ADHD with diagnostic evaluation, with 3 studies involving parent only and not the child in the assessment. Both school and home questionnaires were utilised for diagnostic purposes in five studies with two studies not utilising parent questionnaires. Within the Other Study Types (Table B1), the papers describing programmes with case illustrations ($n = 2$) did not describe diagnostic screening procedures. Of the 5 trials within the ‘Other Studies’ Category, four utilised diagnostic evaluation with parent and/or child with one utilising questionnaires only.

Of papers ($n = 11$) that described ADHD subtype, the range was between 0% and 73% for inattentive subtype and 27–100% for combined subtype. Of those that described medication status (6/7 RCT and 4/7 in the non-RCT study types), the reported range of children on ADHD medication was between 7% and 100%.

With respect to the setting of the intervention, 5 were delivered in both the school and clinic setting. Interventions varied between 4 and 60 weeks in length. The total intervention hours varied between 1.5 h in total and over 400 h in total. The parent component of the intervention varied between 1.5-hours in total and 35 h in total. Where detailed, mothers were more commonly involved in the therapeutic intervention. Within the parenting interventions, a range of different components were included to varying degrees, including standard parenting techniques and strategies to manage homework time, organisational skills, time-management, study skills and school-home collaboration.

The outcome measures utilised were highly varied, consequently for the purposes of this review, it was decided to include only the most consistently used measure focusing on homework problems solely: the Homework Problem checklist (HPC) (Anesko et al. 1987). This checklist assesses parent views of homework performance. The HPC measures two factors; Factor 1 Inattention/Avoidance (for example a child who is distractible and resists starting homework) and Factor 2: Poor Productivity and Non-

Adherence with rules (child does not know what homework is designated and does not complete/return same). These factors have demonstrated adequate validity (Power et al. 2006).

Of the 7 RCTS, five utilised the HPC: one found no significant difference following the intervention, one found a significant decrease with Factor 1 only and three studies found a significant decrease in HPC scores (with no difference between interventions in the two trials that compared two active homework conditions). With respect to the Other Studies category, three of the five trials reported a reduction in HPC scores. Of studies that reported intervention adherence, high adherence was described.

Quality

The quality of the trials was mixed and generally low (Table A1): only one RCT of seven met two of three selected Cochrane Criteria for low risk of bias, for the other trial types ($n = 5$) STROBE scores ranged from 6-14; the two programme descriptions with case illustrations both scored 6 (out of 12 on modified STROBE criteria).

Discussion

Strengths and limitations

The strength of this study lies in the fact that although ADHD is known to result in very significant academic impairment with homework being a key challenge, no systematic review of this area has been previously carried out and as such the findings synthesised in this paper are a novel addition to the existing literature.

Studies were very varied in the intervention design and personnel involved making direct comparisons challenging. Due to the small sample size in many studies, there was insufficient power to accurately establish treatment effects. Many studies were ambiguous in their recruitment strategies and demographic detail was often not sufficient. The quality of many of the studies was low. Most included studies contained a surprising degree of ambiguity as to the exact components of the experimental condition; for example, frequently inputs were defined in terms of ‘number of sessions’ with no definition of session length. Crucially due to the range of differences in intervention design, identification of the role of key features of the intervention protocols was not possible. For example, an important question to address is the degree to which the need for or potential impact of parental involvement in children’s homework varies according to age/developmental stage of the child. Unfortunately this cannot be elucidated from the extant data.

Summary of key findings

This synthesis of all reported homework interventions for ADHD, the first of its kind, represents a novel addition to the paucity of data that exists in this field. A core finding is the very varied picture which has emerged with respect to the theoretical underpinnings and key components of the interventions appraised; pedagogical theory appears largely absent from the protocol designs. There are marked differences in the extent to which different personnel (children, parents and teachers) are involved in

the interventions and the situating of the intervention between educational and clinical settings is also variable. The intensity of the intervention (as defined by ‘intervention hours’) ranged between 1.5 h in total and over 400 h in total (with a range of 1.5–35 h direct to parents). The intervention of 1.5 h in total duration was as effective with respect to homework outcomes (HPC) as that of the intervention with the most hours and more effective than an intervention of over 400 h in total (35 directed to parents) in which children were assigned individualised homework according to a controlled protocol based on IQ and ability. While theoretical underpinnings varied and intervention components encompassed a myriad of techniques, training parents in key behavioural principles (contingency management) in addition to facilitating home-school collaboration were common elements of many of the interventions as was organisational skills training.

The aforementioned variability of interventions is highlighted by two of the RCTs (Abikoff et al. 2013; Meyer and Kelley 2007) which compared two experimental interventions incorporating different therapeutic elements/training with different theoretical underpinnings resulting in the same degree of change on HPC score. For example, the Abikoff study (Abikoff et al. 2013), compares Organisational Skills Training (OST) with Parents and Teachers Helping Kids Organise (PATHKO). OST is based on the premise that homework related difficulties are underpinned by a skills deficit whereas in PATHKO the theoretical assumption is that difficulties relate to a ‘performance deficit model’. In OST the focus therefore is to teach new skills with the intervention primarily directed to children with parents joining for 10 min at the end of a session to ‘prompt and praise skill use’. In contrast the PATHKO model, reflecting its ‘performance deficit’ underpinnings, centres contingency management as a pivotal element. Therefore, this intervention is primarily aimed at parents (with child joining at the end of a session) to set homework rules and reinforce ‘end point goals’ such as bringing home all the books required for homework or completing homework within the designated time-frame. The impact of age, IQ and comorbidity has been insufficiently explored to date.

Methodological issues

It has been previously argued that meaningful outcomes in ADHD intervention research should focus on functional change as opposed to symptoms *per se* (Langberg et al. 2010; DuPaul, Eckert, and Vilaro 2012; Pelham and Fabiano 2008; Pelham, Fabiano, and Masetti 2005). It is difficult to ascertain the generalisability of many of the outcome measures utilised in included studies to all aspects of the homework process, for example improved math (sum) accuracy may not be accompanied by increases in spelling accuracy or enhanced capacity to remain accurate and careful when answering free-text responses in subjects such as English. Without a more comprehensive exploration of the practical impact for the child of narrowly defined ‘improvements in accuracy’, the import of such findings remains questionable not merely in terms of the child’s academic performance but in terms of understanding the potentially more far-reaching psychological benefits to the child of a more positive and ‘successful’ homework experience.

While most studies included a breakdown of ADHD categorisation, there was no exploration of the key elements in the intervention as they pertained to specific

subtype symptom clusters and therefore it was not possible to determine which aspect of a specific intervention was effectively targeting inattentive or combined type profile (or components thereof). Similarly, most studies did not report functional outcomes relative to the specifics of baseline impairment (e.g. listing particulars of organisational skills deficits and the nature of the improvement). Without details of the impact of the intervention on particular ADHD profiles and descriptors of the functional improvements, delineating key therapeutic elements remains elusive and will not provide sufficient guidance for clinical decision making within the typical resource limitations of educational and/or mental health services. Similarly inadequate details were provided as to parental factors including parental ADHD and academic background in addition to practical impairments such as availability of a quiet space and desk to complete homework.

No studies that were reviewed described incorporating a qualitative component to inform the intervention design as to the views of parents regarding the key elements of the homework process that they found challenging nor were the views of parents sought as to what they might seek to achieve through a homework focused intervention and what if anything they thought might be usefully provided in this regard.

Future research directions and clinical implications

The therapeutic alliance is an established component of therapeutic outcome (Martin, Garske, and Katherine Davis 2000). Therapist/client goal alignment is regarded as a requirement for successful outcomes which are meaningful to the client. Given that in many of the included studies there were multiple clients (child, parent, teacher), it would be useful for future intervention designs to establish and then incorporate the key objectives of all parties as to what, in their view, would represent homework 'success', as it may be, as is often the case in clinical situations, that the goals of different 'clients' related to one index child may be varied and in some cases non-aligned and non-compatible. A criticism of much of the research within this field is that while outcome measures have definite utility for the purposes of standardisation and replication, these measures may not dovetail with clients' needs, preferences or expectations. This may be a factor in outcomes where parents indicated they perceived no change in their child's homework behaviour while specific measures indicated improved homework accuracy. Qualitative analysis is therefore likely to be useful to help develop outcome measures which are functionally meaningful. To this end, this group have completed a qualitative analysis of parents' perspectives as to the challenges of homework and ADHD and interventions perceived as helpful (Author, Year).

The extent to which the intervention conditions represented 'child-centred' practice is also questionable, further underlining the benefits of a qualitative component to intervention design. Given that two of the RCTs involved eight-week summer programmes of nine hours per day, qualitative exploration may well be useful to establish from children their subjective experiences of such intense intervention and to further understand how they might like to spend their summers to maximum therapeutic gain (or otherwise). It may well be, for example, that for some children and parents, 'giving up' almost their entire summers for the purposes of homework improvement may be a non-aligned goal with questionable capacity for replication in a real world setting and potentially with some adverse unintended consequences.

Most studies involved a preponderance of mothers relative to fathers, as is the case in the child therapy literature in general; however, this detail and its implications were not highlighted in any intervention analysis. It is interesting to consider the potential gender biases and assumptions that underpin interventions typically aimed at mothers (Fabiano et al. 2009). This is an under researched area within this field and further research may help to identify different therapeutic elements which parents of either gender can utilise to support homework success.

It is noteworthy that outcomes from the MTA, the largest and most comprehensive study conducted on children with ADHD, have indicated that the behavioural intervention was superior to the community control on two outcome variables only: homework problems and negative parenting (Langberg et al. 2010). Subsequent homework focused research was built on the premise that given the ‘bundled’ interventions that comprised the behavioural component of the MTA (which involved a limited specific homework focus), further specific, well defined homework protocols were necessary to optimise outcomes (Langberg et al. 2010; Wells; Epstein et al. 1993; Power et al. 2012). Key components identified as central to a successful systematic homework protocol in ADHD include (A) Goal setting and contingency contracting (B) conjoint behavioural consultation including problem-solving strategies (Kahle and Kelley 1994; Power, Karustus, and Habboushe 2001). These elements have been extensively explored against the backdrop of homework problems in children without ADHD (Kahle and Kelley 1994; Englund et al. 2004; Gonzalez-DeHass, Willems, and Doan Holbein 2005; Jaynes 2005). Despite this elucidation of what are described as key homework intervention components, several outstanding questions remain as to the most effective, efficient mechanism of intervention delivery within real-world settings.

Home-school collaboration is accepted as a key element to educational success, with the Daily Report Card (DRC) appraised as an effective tool to achieve this, as reflected in the number of interventions in which it was incorporated (Fabiano et al. 2010). However, the differences in theoretical underpinnings of the intervention protocols influenced how the DRC was utilised within the intervention framework and, as such, provides a clear example as to how even the most simple yet effective of interventions could be rendered more or less effective dependent on research protocol. For example, in the OST model the DRC was amended to a Daily Assignment Record (DAR) to allow recording of whether the child has practiced the specific skill being taught (for example, putting all required papers in a binder); whereas in PATHKO the standard DRC was utilised and employed to target end-point organisational behaviours (for example, 85% of work completed). Understanding the most effective model of daily reporting as a component of facilitating positive change with respect to homework has potential clinical impact; it can be relatively readily implemented in most real-world settings with low associated costs; however, its effectiveness depends on clarifying the assumptions underpinning its use to allow the model to be tailored to the specific needs of the individual child.

The huge range of intervention hours involved in different protocols has undoubted resource implications. Costings and economic analysis are therefore an important element of future trials. This point is underscored by the fact that similar outcomes were described despite the aforementioned dramatic variability in intervention intensity. It is therefore clear that the trials to date have been insufficiently focused on establishing

the key element of the intervention crucial to facilitating positive change; this is mirrored by methodology which has been inadequate to distil this essential detail as to the 'effective dose' of intervention required.

Therefore, a research framework is necessary which can separate the key effective elements of therapy, establish optimal session numbers and duration of treatment and facilitate a mechanism whereby parents can be empowered to work directly with educational settings to short-circuit the all too frequent barriers to effective clinic-school interventions. Given that all of the interventions incorporated different elements, further research is necessary to establish the key aspects necessary to positive outcomes as blending these elements in a single therapeutic programme would then be likely to enhance functional gains for the child. Many of the studies incorporated a level of resource allocation, personnel involvement and school-home-clinic cohesion that is exceptionally rare in typical settings outside a research framework. While it is undoubtedly important that intervention efficacy is established, a key component of real-world effectiveness is the 'goodness of fit' of the therapeutic model within the myriad constraints and realities of typical educational and clinical settings.

Given the range of children on ADHD medication (7%–100%) within this research cohort, all studies provided inadequate detail on medication characteristics to inform an understanding as to the relationship between enduring homework problems and possible sub-optimal medication dosing regimens. To this end further studies are required which incorporate a methodology that results in an improved characterisation of enduring homework problems in the context of detailed outlines of medication regimens. The somewhat surprising number of children experiencing significant ongoing homework difficulties despite medication use suggest that further studies are required to inform and direct clinician's focus as to the need to regularly review and ensure that the medication regimen is specifically providing adequate cover to optimise homework performance (where necessary). Further subcategorization of the particular functional challenges that remain for the child despite medication optimisation could usefully inform the fine-tuning of the pivotal elements required in parenting interventions for this subgroup of children.

Conclusion

The literature in this field points to an increased awareness of the need to focus on specific areas of functional impairment in the lives of children with ADHD and to tailor therapeutic supports to meaningfully enhance a child's quality of life and developmental and educational trajectory. Thirteen (of fourteen) studies included in this review were published in the last 10 years pointing to an optimistic outlook for the desire for enhanced interventions within this crucially important aspect of children's lives. Identification of the essential active ingredient of the intervention together with the 'dose required' is lacking, yet essential to the development of empirically validated and costed manualised homework interventions which will facilitate enhanced standardisation and quality of multimodal treatment guidelines and clinical practice. Despite the aforementioned gaps in the existing literature, the results of this study point to the need for parents and practitioners to recognise the outsized impact, and untapped

potential, of homework in the lives of many students with ADHD. While further research is necessary to inform evidenced based practice, the findings of this review indicate the immediate need for practitioners and parents to receive training as to the likely manifestations of ADHD related difficulties with homework, the benefits of differentiated homework programmes within Individual Education Plans, the utility of Daily Report Cards as a mechanism for home-school collaboration (a key indicator of likely successful outcome) and the fundamental need to support parents to support their children with ADHD to gain mastery of the skillset required to successfully complete homework. This is crucial given the evidence presented as to the greater role that homework plays as a mediator of academic success for students with ADHD compared with the general student body together with the key implications described as to the impact of 'homework failure' and associated strife at home on core attitudinal and behavioural characteristics pertaining to a student with ADHD's sense of their own academic potential and capacity to succeed.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Dr. Conal Twomey is a Senior Clinical Psychologist. Dr Twomey provides psychological assessment, formulations, and interventions to adults with moderate-to-severe mental health difficulties. He is also a research scientist with publications in various areas such as the online delivery of psychotherapy, open-source psychology, predictors of mental health service usage, and the therapeutic use of personality assessment.

Elisha Minihan has been working as a researcher for University College Dublin from 2019 to present. She has worked on various research projects primarily surrounding occupational stress and the effects of such on mental health and wellbeing. More recently she has focused on the effects of the COVID-19 pandemic on essential workers and how it has impacted on their wellbeing. Elisha is also an assistant psychologist working with the HSE in child and family psychology department.

Prof. Gary O'Reilly is Professor/Director of the Doctoral Training Programme in Clinical Psychology at University College Dublin. He is both a practicing clinician and an academic researcher. In recent years a significant focus of his work is the development and evaluation of child friendly Cognitive Behaviour Therapy (CBT) interventions for young people delivered through a computer game and App called "Pesky Gnats".

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Appendices

Appendix A

Author; Country	Participants			ADHD Diagnosis				Medication	ADHD Subtype		Intervention					Quality			Outcome	
	N	Age Range	% M	Diagnostic Interview		Questionnaire		%***	Inattentive	Combined	Time			Setting		Description	R	A	C	HPC Score
				Parent	Child	Home	School				Wk	Hours		School	Clinical					
												Total	Parent							
Merrill et al, 2017 USA	75	5-12	70.67	+	+	+	+	100***	20	77**	8	372.5hh	12.5	X	X	Group based Parent Intervention with one individual session: BPT + DRC (FSS, HSP & COPE); DRC goals specific to homework accuracy. HW focused sessions based on HSP manual. Children attended Summer Treatment Programme.SS	-	-	-	No significant decrease
Sibley et al, 2016 USA	128	11-15	65.05	+	-	+	+		38.65	61.35	10	12	12	XX	XX	Supporting Teens Autonomy Daily (STAND): Manualised Individual Parent teen skills-based therapy blended with Motivational Interviewing targeting homework	-	-	+	HPC not utilised.

Abtkhoff et al, 2013 USA	15 8-11 8	65.4 7	+	+	+	+	35.42	60.9	39.1	12	P	25	O	25	P	20	O	5	+	behaviours with additional group element for parents. Parents and Teachers Helping Kids Organise (PATHKO) trained parents & teachers to reinforce children for end-point target goals. Organisational Skills Training (OST) involved skills building provided primarily to the child.	-	-	-	+	Significant decrease with both. No significant difference between.			
Power et al, 2012 USA	19 9	32	+	+	+	+	43	52	48	12	23.5	13.5	+	+	+	Family School Success Program: directed to parent & child equally. Standard parenting plus CBC and DRC with both group and individual sessions.	-	-	+	+	-	-	-	-	-	+	Significant decrease (Factor 1) with FSS	
Langberg et al, 2010, USA	57 9	80	-	+	-	-	-	+	100	60	411 hb	35	+	+	+	Parent Training including DRC; token economy used to support homework completion & strategies for structuring HW setting. Children received extensive input.	-	-	-	+	+	-	-	-	-	-	+	Significant decrease with BT (to 14 mths)
Molina et al 2008 USA	23	75.5	+	+	+	+	30.5	49.5	50.5	10	46gy	6	+	+	+	Challenging Horizons Program: primarily directed to (individual and group) students and targeting broad range of areas including HW; group sessions for parents focusing on parenting skills training.	-	-	-	-	-	-	-	-	-	-	-	HPC not utilised



Meyer et al., 2007 USA	42	11-14	85.6	+	+	+	+	93	—	—	4	1.5zz	1.5	-	+	Self-monitoring group; study skills training directed to students with parents present. Parent Monitoring group; study skills training directed to both students and parents.	-	-	-	Significant decrease with both interventions. No significant difference between interventions.
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+ = present; - = absent; * No Age Range provided; Grade 2-6; HPC: Homework Problem Checklist; ** Predominantly hyperactive/impulsive; %*** Included medication trial; **** No age range provided; Grade 6-8; X: Analog Classroom setting not indicated; XX setting not indicated; ZZ excluding X4 telephone calls; YY: Plus meeting counselor 2/wk; contact with parents and help with H/W.CBC: Conjoint Behavioural Consultation; Daily Report Card: DRC; BPT: Behavioral Parent Training; HH: Child in Summer Treatment Programme for 8 weeks (=360 hrs); P: Parents And Teachers Helping Kids Organise (PATHKO); O: Organisational Skills Training (OST).

R: Random Sequence Generation; A: Allocation Concealment; C: Completeness of Outcome Data.

Appendix B

Table B1: Study characteristics of other study types.

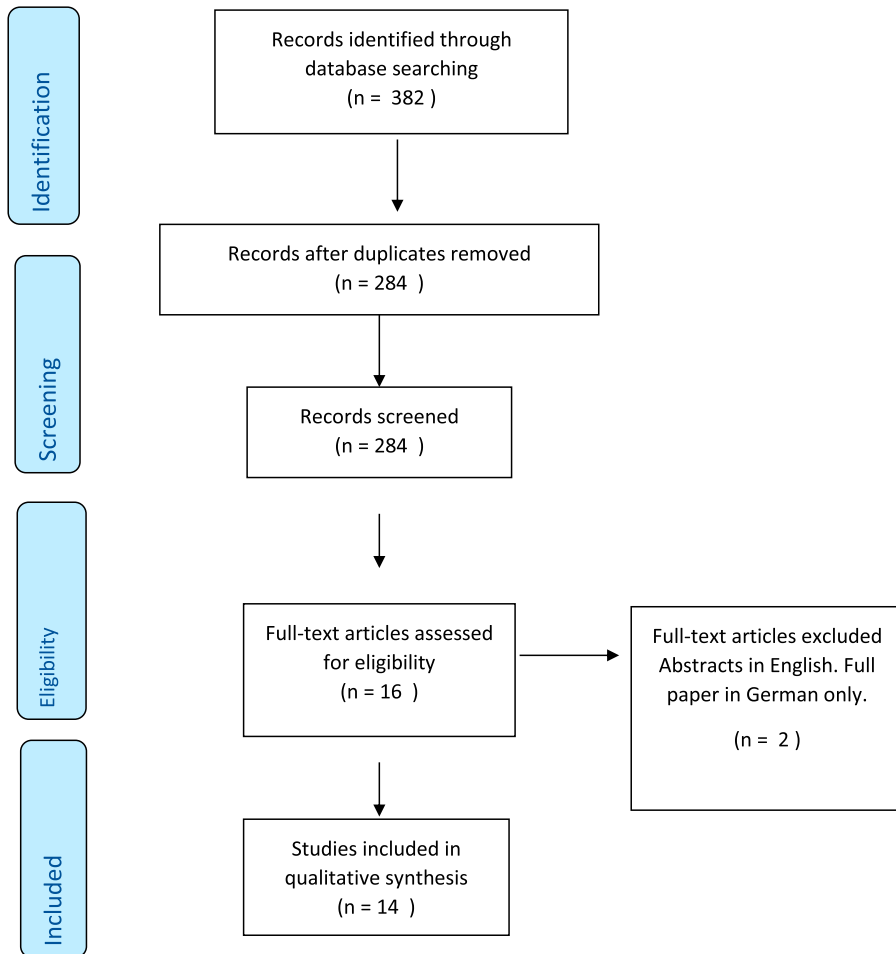
Author; Country	Participants			ADHD Diagnosis				Study Type	Med	ADHD Subtype		Intervention				Quality STROBE Score	Outcome HPC Score		
	N	Age Range	% M	Diagnostic Interview		Questionnaires				% Inattentive	Combin ed	Time		Setting				Description	
				Parent	Child	Home	School					Weeks	Hours		Scho ol				Clin ic
													Total	Parent s					
Hogue et al, 2016 USA	2	14-17	50	—	—	—	—	—	50	50	Variable KK	17z	15z	w	w	Changing Academic Support in the Home for Adolescents with ADHD: individual program which includes family psychoeducation, clinical family intervention to enhance motivation to change and training to improve homework planning and organization and involves parent and child equally.	6		—
Ciesielki et al, 2015 USA	35	10-14	71.42	***	***	—	—	—	51.43**	42.86**	7	10.5	10.5	w	w	Academic Success for Young Adolescents: group intervention which parents and adolescents attended together. Standard parenting techniques including behavioural contracts in addition to organization skills, time-management skills and study skills.	13	Significant reduction	
Clarke et al, 2015 USA	92		67	+	+	—	+	—	55.4	44.6	12	14.5 ZZ	14.5	+	+	Family School Success: parenting training & elements of educationally focused interventions; involves parent group meetings, individualised Family Therapy &	13	Parental adherence predictor of outcome	



Pfiffner et al, 2013 USA	57	^	70.1	7	—	—	—	—	—	—	—	—	—	—	—	—	—	7	11.5	w	w	14	family school consultations. Group behavioural parent training (including standard parenting techniques in addition to strategies for managing homework time, organisation and other areas of difficulty), classroom behavioural intervention & a child social and independence skill group.	Significant reduction
Raggi et al, 2009 USA	11	11-13	91	+	+	+	+	+	+	+	+	+	+	+	+	+	+	73	7.5	+	+	11	Homework Intervention Programme: individual parent training in HW management & parent-teacher consultation.	Observable reduction (visual analysis)
Froelich et al, 2002 Germany	18	6-12	94.4	4	+	+	+	+	+	+	+	+	+	+	+	+	+	44.4	6	w	w	7	Parent Management Training delivered individually focusing on positive attention, reinforcement with token system. Parent component preceded child CBT intervention.	Significant reduction.
Habboushe et al, 2001 USA	5	*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	40	10.5	+	+	6	Homework Success Program: Group Parenting sessions focusing on home-school collaboration, homework rituals, goal setting and reinforcement strategies. Concurrent sessions with child recommended.	Reduction

* Grade 2-6 (Mean age 10 yrs 3mths); X= Hyperkinetic Conduct Disorder; ^ Grade 2-5 (Mean age 8.1 years); **ADHD-NOS=2.86; *** Clinic Interview does not specify child/parent; Z: Estimate (session time not defined);

W: not described; ZZ: unclear if child attending separate group; KK: 4 modules of 2-4 sessions which can be initiated and completed at any point

Appendix C**Figure C1.** PRISMA flow diagram.