small to large compared to wait-list controls; however, in comparison to active control groups, these effects wane to a small effect on the frequency of core symptoms and no effect on the severity. Limitations of the review are discussed in light of further

from CBT with foundational mindfulness skills, focusing on tolerating distress and accepting emotions (Knouse et al., 2008). The shared principles are that cognition impacts behaviour and use of problem-solving skills.

2.3 Psychological underpinnings

Figure 1. A Cognitive-Behavioural Model of Impairment in Adult Attention-Deficit Hyperactivity Disorder (Safren et al., 2004)

2.4 Rationale and Relevance for Educational Psychology (EP) Practice

Furthermore, more EPs are becoming trained in CBT (Squires & Dunsmuir, 2011) and

3) Participants	Adolescents aged 11-17	Study includes children under the age of 11 and adolescents over the age of 17.	This review aims to focus on children who have begun secondary school, which begins at age 11. The symptom criteria in the DSM-5 for ADHD changes from age 17 (six) to 18 (five) suggesting a potential difference between the two ages; moreover, the differential number of symptoms may indicate that those 18 and older belong to a heterogeneous group (e.g. less impaired – Kooij, 2005; Vitola et al., 2016), which may affect intervention selection and response.
4) Language	Studies published in the English language.	Studies published in a language other than English.	The authors of this review do not have resources for translation.
5) Country of study	Study conducted in an Organisation for Economic Co-operation and Development (OECD)		

6) Intervention	a) Interventions must have at least two CBT principles - which can also include third wave of CBT such as ACT and DBT.	a) Interventions with one

	and/or the severity of symptoms

Table 3

The final five studies included in the systematic literature review

Boyer, B. E., Geurts, H. M., Prins, P. J. M., & Van der Oord, S. (2015). Two novel CBTs for adolescents with ADHD: the value of planning skills. European & Child Adolescent Psychiatry, 24(9), 1075–1090. https://doi.org/10.1007/s00787-014-0661-5

Meyer, J., Ramklint, M., Hallerbäck, M. U., Lööf, M., & Isaksson, J. (2021). Evaluation of a structured skills training group for adolescents with attention-deficit/hyperactivity disorder: A randomised controlled trial. European Child & Adolescent Psychiatry. https://doi.org/10.1007/s00787-021-01753-2

Controlled Trial. Journal of the American Academy of Child and Adolescent Psychiatry, 54(4), 275–282. https://doi.org/10.1016/j.jaac.2014.12.016

Vidal, R., Castells, J., Richarte, V., Palomar, G., García, M., Nicolau, R., ... & Ramos-Quiroga, J. A. (2017). " Group therapy for adolescents with attention-

The total weighting (WoE D) for each study is presented below. This takes scores from WoE A, B and C and averages them to give a total score. A summary of the scores is presented below:

Table 4

Overall Weight of Evidence across all studies

Study	Methodological Quality (WoE A)	Methodological Relevance (WoE B)	Topic Relevance to the review question (WoE C)	Overall weighting of

3.3 Study Participants

Across the five studies, there were 601 participants with four studies reporting suitable demographic variables though Schramm et al. (2015) only provided age, medication, and gender which gave it a low WoE A rating.

All studies but one (Vidal et al., 2015) had inclusion/exclusion criteria similar to school practice and excluded participants with: untreated substance abuse, active suicidality and severe mood disorders as these may have interfered with the intervention.

All studies had explicit sampling and screening procedures to ensure tha6n56o82 (er)2hes sity

All studies were Randomised Controlled Trials, however all but Boyer et al. (2015) had either a wait-list control or active control group, which contributed to its low WoE B. Schramm et al. (2016) had both an active and wait-list control, however there was no follow-up phase which means we cannot infer maintenance effects; it had limited information on the randomisation sequence except participants being stratified by gender, and did not provide details on whether allocation to groups were concealed which could implicate researcher bias or therapist effects, which links to its low WoE B.

Vidal et al. (2015) and Sprich et al. (2016) both monitored patients weekly for medication adherence and gathered quantitative data on the intake; further, either they ensured that the pre-assessment was completed before their stringent randomisation process (Vidal et al., 2015) or did not share the randomisation sequence with the therapists, thus controlling for therapist effects (Sprich et al. 2016), which contributed to their high WoE B ratings.

3.5 Measures

Three studies (Schramm et al., 2015; Sprich et al., 2016; Vidal et al., 2015) used clinicians to assess symptoms pre- and post- intervention to measure behavioural change which provides a third-party view; of which two ensured that the clinician was blind to treatment allocation lowering the likelihood of bias during assessment, resulting in higher WoE B ratings. Moreover, these three studies had more informants (e.g., parent, adolescent, clinician – Sprich et al., 2016; Vidal et al., 2015) providing a holistic picture of the adolescent's behaviour change.

Meyer et al. (2021) only used parental and self-ratings on Adult ADHD-Self Report Scale for Adolescents (Cronbach's alpha = 0.89-0.91) but the authors constructed the 'Impact of ADHD Symptoms' which measured the severity of symptoms, raising their WoE C rating to Medium, however they received a lower WoE score on the Measurement as the validity was not reported.

3.6 Intervention

Even though all studies varied in terms of the format, all interventions were adapted for adolescents with ADHD by teaching relevant skills and included key components of core CBT such as: psychoeducation, cognitive skills e.g., self-

In this same vein, CBT interventions have homework and behavioural experiments to ensure transfer in other settings which was carried out by all studies.

Meyer et al. (2019) had a high WoE A rating on implementation fidelity because they had a detailed intervention manual, ensured ongoing supervision and coding of sessions which ensured therapist adherence. Moreover, they did a sensitivity analysis on ‘completers’ and 'non-completers’ of the intervention to highlight if there were any differences, which there were not.

3.7 Findings and Effect Sizes

Effect sizes were reported on the relevant outcomes pertinent to this review as standardised mean differences (Cohen’s d) in Table 5.

Looking at the findings from Boyer et al. (2015), the considered effect sizes included their CBT-plus planning group (i.e. within-group treatment) as that intervention was similar to the other studies in this review. They reported a moderate-to-large (d = .72) reduction in ADHD symptoms from pre-post treatment which was maintained at 3-month follow-up, lending to stronger WoE C ratings because it demonstrates the effectiveness of the intervention. However, the overall WoE D rating is low, so one needs to be cautious with these results.

As can be seen, all studies reported decreases in the primary outcome measures, in comparison to wait-

to hyperactivity (d = 0.27; Schramm et al., 2016) on the two studies that separated ADHD symptoms into inattention and hyperactivity.

Meyer et al. (2021) found that there were small reductions on frequency of ADHD symptoms between the DBT-based group and psychoeducational control group which were maintained at 6-month follow-up. However, there was no effect on the severity of ADHD symptoms. However, it is important to note that this sample had 65.8% females which is unrepresentative of the gender distribution of ADHD.

ADHD symptoms (Adolescent)	Intervention Group vs Control Group (pre-post)	0.16	No Effect/Small
ADHD symptoms (Adolescent)	Intervention Group vs Control Group (pre-follow-up)	0.33	Small
ADHD symptoms (Parents)	Intervention Group vs Control Group (pre-post)	0.2	Small
ADHD symptoms (Parents)	Intervention Group vs Control Group (pre-follow-up)	0.11	No Effect
Impact of ADHD Symptoms	Intervention Group vs Control Group (pre-post)	0.03	No Effect
Impact of ADHD Symptoms	Intervention Group vs Control Group (pre-follow-up)	0.03	No Effect

	Active Control (n = 37)		
	Waitlist Control (n = 36)		
ASC Inattention (Parents)	Training vs Active Control	0.29	Small
	Training vs Waitlist Control	0.5	Medium
ASC Inattention (Teachers)	Training vs Active Control	0.17	No Effect
	Training vs Waitlist Control	0.22	Small
ASC Attention (Adolescent)	Training vs Active Control	0.04	No Effect
	Training vs Waitlist Control	0.13	No Effect
ASC & SDQ	Training vs Active Control	0.06	No Effect
Hyperactivity/Impulsivity (Parents)	Training vs Waitlist Control	0.27	Small
	Training vs Active Control	0.09	No Effect

ADHD-RS - Overall (Parent) ADHD-RS	CBT vs Control Group	1.09	Large

eta-squared, psychometrica.de was used to convert these values to Cohen's d for comparison across all studies, these are reported in Table 5.

4. Conclusions and Recommendations

This review aimed to evaluate the effectiveness of CBT-based interventions on reducing the frequency and severity of diagnostic ADHD symptoms among secondary-school aged adolescents and examined this through the appraisal of randomised controlled trials.

The three with wait-list controls had medium-to- large reductions in the frequency -
(teacher; parent; clinician Schramm et al., 2015) and medium-to-large reductions in severity (Sprich et al., 2016; Vidal et al., 2012). However, the hi4 Tc -0.(hi)6 (4 T4 (r),)2 (t)2 ng

However, there are caveats in this review. Ethnicity was not reported in all the studies, but one (Sprich et al., 2016) sample was 91.7% white which makes it less generalisable. Future studies need to have diverse samples and report ethnicity.

Participants in Sprich et al. (2016) were self-referred with parental involvement making it less generalisable e.g. pupils whose parents are not readily available, There was no parental involvement in other studies (Meyer et al., 2021; Vidal et al., 2015) yet the results were still positive.

Additionally, in the Medium (Vidal et al., 2012) and High-rated (Sprich et al., 2016) WoE D studies, both samples were medication-treated. There are two interpretations of this, one of which is that these findings may not be generalisable to the general ADHD population. Indeed, 7.4% of adolescents received medication according to a study (McCarthy et al., 2012). However, these samples were mostly from clinical settings with severe needs which may be representative of those who get referred in secondary school to EP services who have complex needs. Moreover, medication typically works to reduce hyperactivity and impulse control, and there were further reductions in all domains of ADHD which suggests that CBT made an impact over and above that of medication.

Considering the above discussion, CBT-based interventions, when adapted for adolescents with ADHD, can be suggested as a targeted intervention for those with ADHD with varying levels of severity, delivered in either a 1:1 or group format, as a suitable adjunct to that of medication for a range of ages of adolescents.

5. References

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Appendix A – List of Excluded Studies

Table 6
List of excluded studies

Article	Exclusion criteria number(s)
Miranda, A., & Presentacion, M. J. (2000). Efficacy of cognitive-behavioral therapy in the treatment of children with ADHD, with and without aggressiveness. Psychology in the Schools , 37(2), 169–182. https://doi.org/10.1002/(SICI)1520-6807(200003)37:2<169::AID-PITS8>3.0.CO;2-8	3 - There were no secondary school-aged children or data from relevant age was not disaggregated
Wilmshurst, L. A. (2002). Treatment programs for youth with emotional and behavioral disorders: An outcome study of two alternate approaches. Mental Health Services Research, 4(2), 85–96. https://doi.org/https://dx.doi.org/10.1023/A:1015200200316	2 The participants did not have a main diagnosis of ADHD 3 There were no secondary school-aged children or data from relevant age was not disaggregated
Riggs, P. D., Winhusen, T., Davies, R. D., Leimberger, J. D., Mikulich-Gilbertson, S., Klein, C., Macdonald, M., Lohman, M., Bailey, G. L., Haynes, L., Jaffee, W. B., Haminton, N., Hodgkins, C., Whitmore, E., Trello-Rishel, K., Tamm, L., Acosta, M. C., Royer-Malvestuto, C., Subramaniam, G., … Liu, D. (2011). Randomized Controlled Trial of Osmotic-Release Methylphenidate With Cognitive-Behavioral Therapy in Adolescents With Attention-Deficit/Hyperactivity Disorder and Substance Use Disorders. Journal of the American Academy of Child And Adolescent Psychiatry , 50(9), 903–914. https://doi.org/10.1016/j.jaac.2011.06.010	2 The participants did not have a main diagnosis of ADHD 3 There were no secondary school-aged children or data from relevant age was not disaggregated

http://ovidsp.ovid.com/ovidwb.cgi?T=JS&PAGE=reference&D=psyc9&NEWS=N&AN=2013-06326-013	relevant age was not disaggregated

Calabria, A. M. (2021). The effectiveness of mindfulness-based interventions when treating elementary and adolescent students with attention deficit hyperactivity disorder. Dissertation Abstracts International Section A: Humanities and Social Sciences, 82(12-A), No-Specified. http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=psyc18&NEWS=N&AN=2021-65612-271	1 The study was not peer-reviewed
Andersen, A. C., Sund, A. M., Thomsen, P. H., Lydersen, S., Young, S., & Novik, T. S. (n.d.). Cognitive behavioural group therapy for adolescents with ADHD: a study of satisfaction and feasibility. http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=psyc18&NEWS=N&AN=2021-65612-272	1 The study was not peer-reviewed

Appendix B – Mapping The Field

Table 7
Overview of Included Studies

			Active control - progressive muscle relaxation training. Group sessions (60 mins) twice a week for 12-15 sessions followed by play time.		
Meyer et al. (2021)	Sweden	15-18 years (n =164)	SSTG- age-adapted version of a manualised DBT-based (combination of traditional CBT with DBT) intervention 14 weekly 2-hour eek	d	G

								There also was small reductions on the impact of ADHD symptoms (d = 0.16) in comparison to no effect in control group (d = .03). In SKILLS control group, only parental reports in control group at 6-month follow-up (d = 0.45), but with completers it was also at 2-weeks post-treatment (d = 0.22)
Sprich et al. (2016)	America	14-18 years (n = 46)	CBT-adapted for adolescents with ADHD 12 sessions (10 1:1 with therapist, 2 with parent)	RCT, 4/8 month, with 4-month follow up for the interventi on group	CBT-adapted for adolescents with ADHD (N = 24)	Wait-list control (N = 22)	IE-rated ADHD severity ratings and CGI	Severity of ADHD symptoms reduced post-intervention. IE-rated parent assessment: 10.93 (95% CI: -12.93, -8.93; p < .0001) IE-rated adolescent assessment 5.24 (95% CI: -7.21, -3.28; p < .0001)

Appendix C – Weight of Evidence A, B, C

Weight of Evidence A (WoE A)

These criteria were adapted from Kratochwill (2003) Group-Based Design protocol which was used to evaluate the methodological

External Validity Indicators

	Strong evidence (3)	Promising evidence (2)	Weak evidence (1)
	Detailed level of description regarding demographic variables, beyond age and gender and bears relevance to inclusion/exclusion criteria	Detailed level of description regarding demographic variables beyond age, gender	Limited description about demographic variables
	Rationale for sample size specified	Rationale for sample size specified	Rationale for sample size specified
	Sampling procedures described in detail	Sampling procedures described in detail	Sampling procedures described in detail
	Measures variables that have relevance for intended outcomes	Measures variables that have relevance for intended outcomes	Measures variables that have relevance for intended outcomes
	Inclusion/exclusion criteria similar to school practice	Inclusion/exclusion criteria similar to school practice	Inclusion/exclusion criteria specified
	Evidence provided that sample represents target population		
	Complete and detailed description of the context within which the intervention occurs	Detailed description of some but not all contextual components	Provides overview of contextual components but lack details

Provided evidence of perceived benefits from the intervention for all participant groups	Provided evidence of perceived benefits from the intervention for some participant groups	Provided evidence th12 -0 t ge

WoE A Methodological Quality Scores

Table 10

Overall WoE A scores for studies in this review

Study	Measurement	External Validity Indicators	Durability/Generalisation	Implementation Fidelity	Overall WoE A (1)
Boyer et al. (2015)	2	3	3	2	2.5 (Medium)
Meyer et al. (2021)	2	3	3	3	2.75 (High)
Schramm et al. (2016)	2	1	2	1	1.5 (Low)
Sprich et al. (2016)	3	2	3	3	2.75 (High)

Weight of Evidence B (Wo E B)

This section assesses how appropriate each study research design is for answering the current review question.
The criteria and rationale are presented below in tables. Following this, a summary of the WoE B scores is presented.

Table 12

Summary of WoE B Ratings

Study	Control Group	Follow - up Phase	Randomisation	Monitoring around medication	Independent clinician	Overall WoE B Rating
Boyer et al. (2015)	1	3	2	2	1	1.8 (Low)
Meyer et al. (2021)	3	3	2	2	1	2.2 (Medium)

Weight of Evidence C (WoE C)

Age of participants	Sample includes adults	Sample includes only older adolescents	Sample includes a range of adolescents	It is suggested that treatment for ADHD needs to change according to the developmental stage (e.g. children, adolescence and adults; Young & Myanthi Amarasinghe, 2010) and thus this review aims to solely include adolescents (including older adolescents) as other reviews tend to review children and early adolescents (e.g. Chronis et al., 2006) and adults (e.g. Young et al., 2020). It is also likely that adolescents are better equipped to cope with CBT intervention than children, due to their developing maturity (e.g. Antshel et al., 2012). However, young adolescents were also included since at this age, they begin secondary school which can be challenging for pupils with ADHD (Thompson et al., 2003). As a result, evaluating the impact on this age group may have beneficial implications for transition support.
Outcome Measures	Measured ADHD symptoms solely, not according to clinical criteria	Measured ADHD symptoms according to clinical criteria or measured the severity of symptoms	Measured ADHD symptoms according to clinical criterion and has a measure of measuring the severity of symptoms	

Table 14

Summary of WoE C Ratings

Study	Amount of informants for rating measures	CBT-based	Age of Participants	Outcome Measures	Overall WoE C Rating
Boyer et al. (2015)	1	3	3	1	2 (Low)
Meyer et al. (2021)	2	2	2	3	2.25 (Medium)
Schramm et al. (2016)	3	1	3	2	2.25 (Medium)
Sprich et al. (2016)	3	3	2	2	2.5 (High)
Vidal et al. (2015)	3	3	1	3	2.5 (High)

The overall weighting of evidence C is the average of the above four criteria - the scores were added up and the total was divided by four. Studies were rated in a tercile fashion:

Note 1: WoE C ratings receive a rating of low <2.25, medium if between 2.25 and 2.41, and high if >2.4

Appendix D- Coding Amendments

Sections of Kratochwill (2003) that were excluded

Section heading	Section removed/modified	Rationale
I. General Study Characteristics	Section A: General Study Characteristics	The study characteristics are discussed within the review, besides A5. which is not relevant to the review question.
Section B: General Design Characteristics	Section B: General Design Characteristics	Studies are discussed further in WoE B. All studies are randomised controlled trials. Further evaluation of randomisation is included elsewhere in this review .
	Section C4- C6: Data Analysis	This will be covered in mapping the field. Familywise error rate controlled – Type 1 error. MANOVA will be in mapping the field
	Section C7. Coding, C8. Interactive Process	The studies included do not report on qualitative data.
	Section C9. Rival Interpretations	This is not relevant to the aims of the study.
	Section D: Type of Program	This was excluded as all studies within this review are 'intervention' programs.
	Section D4: Social comparison	This has been removed as the research question is about the effectiveness of ADHD symptoms and not how it would compare to their non-ADHD counterparts.
	Section E: Stage of Program	This was excluded as it is not relevant for the review.
II. Key Features of Coding for studies and Rating Level of Evidence/Support	Section A1	Not relevant for this review (A1 & A2) or no differences between studies (A3-A5).

B2. Multi-method	This was excluded as it is discussed in other parts of the review.
B3. Multi-source	This was excluded as it is discussed in other parts of the review.
B4. Extent of Engagement Section B.6: Cultural appropriateness of the Measures	Not relevant for this review.
Section C: Comparison group	This is excluded as it will be further evaluated and discussed in WoE B.
Section D: Primary/Secondary outcomes are statistically significant	This is excluded as it will be discussed in detail within the study, and secondary outcomes are not discussed.
Section E: Cultural significance	This is excluded as it is not relevant to the purpose of this review question.
Section F: Educational/clinical significance.	This is excluded as it is discussed in detail within this review.
Section H4: Durability/generalisation of intervention and outcomes	This is excluded as this review question looks at the impact on those with ADHD, so it is not relevant to the review question.
Section I: Intervention Components	One of the studies had identifiable components, but this was excluded, as mentioned in other parts of the review.
Section G1.3 Rationale for sample size specified.	All studies chose participants with adolescents with ADHD, so this was excluded.
Section G2. Participant characteristics specified for treatment and control group	This is excluded as it is not relevant to the purpose of this review question.

C3. Sufficiently large N ☒YES ☐NO ☐N/A

Statistical Test: two tailed t-test
. O H Y H O

ES: 0.50

N required: 100

F. Concurrent or Historical Intervention Exposure (select one)

B7.1

G1.6. Inclusion/exclusion criteria specified ☒ Yes ☐ No

G1.7. Inclusion/exclusion criteria similar to school practice ☒ Yes ☐ No

G1.8. Specified criteria related to concern ☒ Yes ☐ No

G1. Rating for Sampling (select 0, 1, 2, or 3): ☒3 ☐2 ☐1 ☐ 0

G3. Adequately reported characteristics of participants/sample. Adequate level of detail in description of participants.

G3.1. ☒1 Yes

G3.2 ☐0 No (Incomplete or no evidence)

G4. Details are provided regarding variables that:

G4.1 Have differential relevance for intended outcomes ☒ Yes ☐ No

Specify: measured medication

G4.2 Have relevance to inclusion criteria ☒ Yes ☐ No

Specify: _They listed the ADHD diagnosis, age of participants as well as other relevant inclusion/exclusion criteria

G5. Transferability of the intervention.

G.5.1. ☒ 3 Complete and detailed description of the context within which the intervention occurs.

G.5.2. ☐ 2 Detailed description of some but not all contextual components

G.5.3. ☐ 1 Provides overview of contextual components but lack details

G.5.4. ☐ 0 No description of context

G6. Participant perceptions of benefits of intervention (treatment group)

G.6.1. ☐ 3 Provided evidence of perceived benefits from the intervention for all participant groups.

G.6.2. ☒ 2 Provided evidence of perceived benefits from the intervention for some participant groups.

G.6.3. ☐ 1 Provided evidence that participants did not perceive benefits from the intervention.

G.6.4. ☐ 0 Did not investigate participants' perceptions of benefits.

G. OVERALL Rating for External Validity (select 0, 1, 2, or 3): 3 2 1 0

Score range: Score of 3 (7-9), Score of 2 (4-6), Score of 1 (1-3)., with G3 and G4.1 and G4.2 constituting 1 point each.

H. Durability/Generalization of Intervention and Outcomes

H1. Follow-up assessment

H1.1 Timing of follow up assessment: ☒ Yes ☐ No
Specify 6 months

H1.2. Number of participants included in the follow up assessment: ☒ Yes ☐ No

Specify n = 57 for control and n = 71 for intervention

H1.3, Consistency of assessment method used: ☒ Yes ☐ No

H3.1 Evidence is provided regarding the extent to which outcomes are manifested in contexts that are different from the intervention context ☐ Yes ☒ No

H3.2 Documentation of efforts to ensure application of intervention to other settings ☒ Yes ☐ No

Specify: home assignments to complete

OVERALL Rating Durability/Generalization (select 0, 1, 2, or 3): 3 2 1 0

J. Implementation Fidelity

J1. Evidence of Acceptable Adherence (answer J1.1 through J1.3)

J1.1 ☒ Ongoing supervision/consultation

J1.2 ☒ Coding intervention sessions/lessons or procedures

J1.3 ☐ Audio/video tape implementation (select J1.3.1 or J1.3.2):

J1.3.1 ☒ Entire intervention

J1.3.2 ☐ Part of intervention

J2. Manualization (select all that apply)

J2.1 ☒