











Table 1: Core Components of the PATHS® Intervention (Adapted from PATHS® UK, 2018)

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Curriculum Component	Description
Self-awareness	This key component teaches children emotional understanding using a developmental approach







“Child\*” OR



<b>Age of Participants</b>	Participants in the study are of English primary school age (4-11 years)	Participants that are either younger than 4 years old or older than 11 years of age.	The review is evaluating an intervention for primary school aged pupils.
<b>Settings</b>	The intervention is carried out in a mainstream school setting by education staff.	The intervention is delivered in settings that are not educational or by professionals not typically based in schools.	The review aims to evaluate the effectiveness of the PATHS® curriculum when delivered by school staff within educational settings.
<b>Intervention</b>	The PATHS® intervention is included in at least one or more of the intervention conditions.	The included intervention conditions do not use PATHS® as an intervention for social-emotional competence.	The review aims to evaluate the effectiveness of the PATHS® curriculum.
<b>Outcomes</b>	The study has at least one outcome measuring social and/or emotional competence.	The study does not include an outcome measure that measures social and/or emotional competence.	This review aims to evaluate the effectiveness of the PATHS® curriculum specifically on social-emotional competence.
<b>Geographical Context and Language of Publication</b>	Studies writ6 215.09 82.824 reW* n03 1		

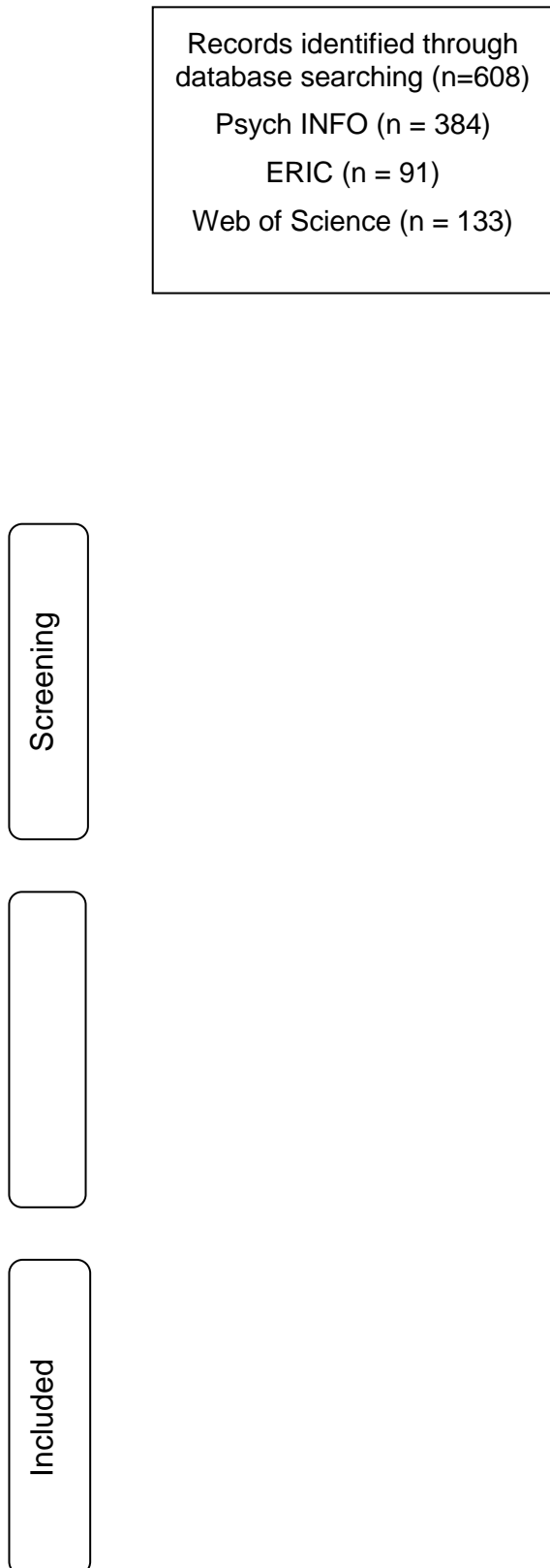


Figure 1: Flow diagram to depict the literature search and selection process based on PRISMA Statement Recommendations (Moher et al., 2010).





5). WoE D provides a summary of the overall strength of the evidence in answering the current review qu

reported the gender of participants in the intervention group. The percentage of females ranged from 47% (Novak et al., 2017) to 50.1% (Humphrey et al., 2018).

### **Study Design**

The research design of each study was considered using the WoE A and B ratings. A hierarchy of evidence developed by Petticrew and Roberts (2003), suggests that when addressing the 'effectiveness' of a group intervention the most appropriate research design is a Randomised Controlled Trial (RCT).

Five studies (Bierman et al., 2010; Humphrey et al., 2018; Little et al., 2012; Malti et al., 2011; Novak et al., 2017) used a cluster RCT and gained a high WoE B rating. Cluster RCTs randomise groups of participants (e.g., classes or schools) to study conditions rather than individuals. All the cluster RCTs used random allocation of participants to the intervention and control groups. In two studies (Humphrey et al., 2018; Little et al., 2012) the randomisation procedure was carried out independently of the research team. Employing an independent research team to randomise groups reduces the possibility of bias, therefore increasing the likelihood that the results are unbiased.



intervention the following

The total number of PATHS® lessons delivered per year ranged from 43 (Humphrey et al., 2018) to 63 (Novak et al., 2017). PATHS® lessons were delivered between 1-3 times per week and ranged from 20

Table 6: Summary of PATHS Implementation Across Included Studies

Study	Total Duration of Intervention	Number of PATHS® Lessons	PATHS® Lesson Duration	Frequency of PATHS® lessons	Interventionist
Bierman et al. (2010)	3 academic years	1 <sup>st</sup> Grade: 57 2 <sup>nd</sup> Grade: 46 3 <sup>rd</sup> Grade: 48	20-30 minutes	2-3 per week	Class Teacher
Novak et al. (2017)	1 academic year	63			





Table 7: Summary of Effect Sizes for Included Studies: Pro-social Behaviour Outcomes

Study	Sample Size	Outcome Measures for Prosocial Behaviour	Effect Size Cohen's <i>d</i>	Effect Size Descriptor	Significance Value	Overall WoE D Rating
Novak et al. (2017)	N=568 Intervention N = 280	Social Competence Scale: Prosocial Behaviour Subtest.	0.16	Negligible	$p > 0.05$	1.9 (Medium)
Curtis & Norgate (2007)	Control N = 288 N = 287 Intervention N = 114 Control N = 173	Strengths and Difficulties				

Table 8: Summary of Effect Sizes for Included Studies: Emotion Regulation Outcomes

Study	Sample Size	Outcome Measures for Emotion Regulation	Effect Size Cohen's <i>d</i>	Effect Size Descriptor	Significance Value	Overall WoE D Rating
Novak et al. (2017)	N =568 Intervention N = 280 Control N = 288	Social Competence Scale: Emotion Regulation Subtest	0.18	Negligible	$p < 0.10$	1.9 (Medium)
Little et al. (2012)	N = 4019 Intervention classes = 102 Control classes = 94	PATHS Teacher Rating Survey: Emotional Regulation Subtest	-0.02	Negligible	$p > 0.05$	2.1 (Medium)

Table 9: Summary of Effect Sizes for Included Studies: Social-Emotional Competence Outcomes

Study	Sample Size	Outcome Measures for Social-Emotional Competence	Effect Size Cohen's <i>d</i>	Effect Size Descriptor	Significance Value	Overall WoE D Rating
Little et al. (2012)	N = 4019  Intervention classes = 102  Control classes = 94	PATHS Teacher Rating Survey: Social Competence Scale	-0.01	Negligible	$p > 0.05$	2.1 (Medium)
Seifer et al. (2004)	N =150  Intervention N = 62  Control N = 88	Psychological Impairment Rating Scale: Social and Emotional Composite	0.38	Small	$p < 0.05^*$	1.4 (Low)
Bierman et al. (2010)	N = 2,937  Intervention Classes = 190  Control Classes = 180	Teacher Observation of Classroom Adaptation-Revised and Social Health Profile.	0.34	Small	$p < 0.001^*$	2.1 (Medium)







Finally, Bierman et al. (2010) reported a small but significant effect ( $d = 0.34$ ,  $p < 0.001$ ) of the PATHS® intervention on a measure of social-emotional competence. The study received 'high' ratings for its methodological relevance and relevance to the current review and therefore this evidence should be given due weight. It is, however, important to note that no baseline measures were completed pre-intervention.

## **Conclusions and Recommendations**

This review evaluated the effectiveness of PATHS® for improving the social-emotional competence of pupils aged 4-11 years. There was some evidence that PATHS® achieves this. However, only two studies (Bierman et al., 2010; Seifer et al., 2004) reported significant findings with small effect sizes and one of these studies (Seifer et al., 2004) received a 'low' WoE D rating.

Regarding prosocial behaviour, one study found the PATHS® intervention to have a significant impact with a large effect size (Curtis & Norgate, 2007). The study received an overall WoE rating of 'medium' and was highly relevant to the current review question. However, it received a 'low' rating for its methodological quality and rigour which highlights the need to interpret the findings with caution. Finally, the review found no evidence that the intervention resulted in significant improvements in primary school pupils' emotion-regulation.

The review's conclusions could be considered unexpected given that the PATHS® curriculum was designed to

Firstly, it has been argued that conventional methods of evaluating universal interventions do not fully capture the range of effects that the interventions produce. Greenberg and Abenavoli (2017) argue that a focus on the main effects of an intervention could miss clinically meaningful effects by failing to account for the heterogeneity that exists within universal samples. Universal interventions such as PATHS® may result in significant improvements in social-emotional competence for 'high risk' groups, whilst teaching basic social skills to children who have already mastered them will have very little effect (Engel et al., 2013).

cultural values and societal expectations (Wigelsworth et al., 2016). It could be that adaptations made to enable the PATHS® curriculum to be implemented across cultures influenced critical aspects of the intervention and impacted its efficacy (Wigelsworth et al., 2016). The impact of cultural transferability has been observed with other interventions (e.g. anti-bullying programmes) that were considered 'successful' in the USA but had mixed results when implemented within the UK (Ttofi et al., 2008).

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Social emotional competence: An essential factor for promoting positive



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## Appendix A: Excluded Studies Following Full Text Screening

Table 1: Studies Excluded at Full Text Screening

Reference	Reason for Exclusion	Inclusion/Exclusion Criteria Number
<p>Schonfeld, D. J., Adams, R. E., Fredstrom, B. K., Weissberg, R. P., Gilman, R., Voyce, C., ... &amp; Speese-Linehan, D. (2015). Cluster-randomized trial demonstrating impact on academic achievement of elementary social-emotional learning. <i>School Psychology Quarterly</i>, 30(3), 406.</p>	<p>The study did not contain at least one outcome measuring social and/or emotional competence.</p>	7
<p>Raimundo, R., Marques Pinto, A., &amp; Lima, M. L. (2013). The effects of a social-emotional learning program on elementary school children: The</p>		





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PATHS curriculum. *Prevention science*, 7(1), 91-102.

Humphrey, N., Barlow, A., & Lendrum, A. (2018). Quality matters: Implementation moderates student outcomes in the PATHS curriculum. *Prevention Science*, 19(2), 197-208.

the role of neurocognition in mediating behavioural outcomes.

Primary outcome was not investigating the effect of the PATHS intervention on social

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Panayiotou, M., Humphrey, N., & Hennessey, A. (2020). Implementation matters: Using complier average causal effect estimation to determine the impact of the Promoting Alternative Thinking Strategies (PATHS) curriculum on children's quality of life. *Journal of Educational Psychology*, 112(2), 236.

The study's primary outcome is a measure of quality of life rather than social and/or emotional competence.

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Table 2: Mapping the Field Table

Author, Date and Title	Study Design	Country and Setting	Participants	Intervention Details	Outcome Measures	Main Findings
<p><b>Author:</b> Bierman et al. (2010)</p> <p><b>Title:</b> The Effects of a Multiyear Universal Social-Emotional Learning Program: The Role of Student and School Characteristics.</p>	<p><b>Design:</b> Cluster Randomised Controlled Trial.</p> <p><b>Groups:</b> Random Allocation.</p> <p><b>Intervention:</b> 190 classrooms</p> <p><b>Control:</b> 180 classrooms</p>	<p><b>Country:</b> USA</p> <p><b>Setting:</b> Classes from Elementary Schools across three different sites (Tennessee, Washington &amp; Pennsylvania)</p>	<p><b>Sample size:</b> 2,937</p> <p><b>Age:</b> 6-9 years (Grade 1-3 in Elementary School)</p> <p><b>Gender:</b> Not Reported</p>	<p><b>Intervention:</b> Fast Track PATHS® Cur1 0 049.2 71.</p>		

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<p><b>Author:</b> Curtis &amp; Norgate (2007).</p>	<p><b>Design:</b> Cohort Study.</p>	<p><b>Country:</b> UK</p>	<p><b>Sample size:</b> 287</p>	<p><b>Intervention:</b> PATHS® Curriculum.</p>	<p><b>Teacher Ratings:</b> <i>Strengths and Difficulties Questionnaire (SDQ)</i> (Goodman, 1997; Goodman et al., 2010) provided teacher ratings on emotional symptoms; conduct problems; hyperactivity/inattention; peer relationship problems; prosocial behaviour.</p>	<p><b>Findings:</b> Children in the PATHS® schools showed significant improvements on measures of prosocial behaviour on the SDQ (Cohen's <math>d = 0.91</math>, <math>p &lt; 0.001</math>)</p>
<p><b>Title:</b> An Evaluation of the Promoting Alternative Thinking Strategies Curriculum at Key Stage 1.</p>	<p><b>Groups:</b> Non-Random Allocation. Control group due to receive intervention the following year.</p>	<p><b>Setting:</b> Mainstream Primary School</p>	<p><b>Age:</b> 5-7 years old. (Key Stage 1)</p>	<p><b>Duration:</b> One Academic Year.</p>	<p><b>Teacher Interviews</b> conducted and analysed qualitatively.</p>	<p><b>N.B.</b> scores on the SDQ for intervention and control group were significantly different prior to intervention so caution needed when interpreting post-intervention results.</p>
	<p><b>Intervention:</b> 5 schools N=114</p>		<p><b>Gender:</b> Not Reported.</p>	<p><b>Total PATHS lessons:</b> Not Reported.</p>	<p><b>Data Collection:</b> SDQ completed at the beginning (pre-test) and end (post-test) of an academic year. SDQ completed by same teacher at both timepoints.</p>	
	<p><b>Control:</b> 3 schools N=173</p>			<p><b>Lesson Duration:</b> Not Reported.</p>	<p><b>Frequency:</b> Not Reported.</p>	
				<p><b>Interventionist:</b> Class Teacher.</p>	<p><b>Control Condition:</b> Usual Practice.</p>	

<p><b>Author:</b> Little et al. (2012)</p>	<p><b>Design:</b> Cluster Randomised Controlled Trial</p>	<p><b>Country:</b> UK</p>	<p><b>Sample size:</b></p>	<p><b>Intervention:</b> PATHS® Curriculum.</p>	<p><b>Teacher Ratings:</b></p>	<p><b>Findings:</b></p>
<p><b>Title:</b> The Impact of Three Evidence-Based Programmes Delivered in Public Systems in Birmingham, UK.</p>	<p><b>Groups:</b> Random allocation of schools conducted independently of study authors.</p>	<p><b>Setting:</b> Mainstream Primary Schools in Birmingham, UK.</p>	<p>5,397 at baseline. 4,006 cases with all three sets of data.</p>	<p><b>Duration:</b> 2 academic years.</p>	<p><i>Strengths and Difficulties Questionnaire (SDQ)</i> (Goodman, 1997; Goodman et al., 2010) provided teacher ratings on emotional symptoms; conduct problems; hyperactivity/inattention; peer relationship problems; prosocial behaviour.</p>	<p>No significant effects of the PATHS® intervention on prosocial behaviour, emotional regulation or social-emotional competence were observed at the end of the second year of the intervention.</p>
	<p><b>Intervention:</b> 29 schools</p>		<p><b>Age:</b> Children aged 4-6 years (Reception, Year 1 and Year 2)</p>	<p><b>Lesson Duration:</b> 60 minutes</p>	<p><i>PATHS Teacher Rating Survey (PTRS)</i> provided a composite of seven scales including the Child Behaviour Questionnaire. This assessed a range of behaviours such as emotion regulation, pro-social behaviour and social competence.</p>	
	<p><b>Control:</b> 27 schools</p>		<p><b>Gender:</b> Not Reported.</p>	<p><b>Frequency:</b> Once per week.</p>	<p><b>Data Collection:</b></p>	
				<p><b>Interventionist:</b> Class Teacher.</p>	<p>Baseline in Sept 2009 First Follow up in June 2010 Second Follow up in June 2011</p>	
			<p><b>Control Condition:</b> Waitlist control condition in which children received services as usual. In some schools this involved Social and Emotional Aspects of Learning (SEAL) programme.</p>			





**Author:** Malti et al. (2011)

**Title:** The Effectiveness of Two Universal Preventative Interventions in Reducing Children's Externalising Behaviour: A Cluster Randomised Controlled Trial.

**Design:** Cluster Randomised Controlled Trial

**Groups:** Random allocation using computer randomisation.

**Intervention**  
PATHS only  
14 schools N=360

**Control:**  
14 schools  
N=356

**Triple P:**  
14 schools  
N=339

**PATHS + Triple P**  
14 schools  
N=306

**Country:**  
Switzerland

**Setting:**  
Mains25/F2 1S

**Author:** Seifer et al. (2004)      **Design:** Cohort Study.

**Title:** Implementation of the PATHS Curriculum in an Urban Elementary School.      **Groups:** No details of

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<b>II. E</b> – Cultural Significance (removed)	The relevance of the culture in which the research was conducted was considered in WoE C and was therefore removed from the current coding protocol.
<b>II. F</b> – Educational/Clinical Significance (removed)	The current review considered this separately and so it was removed from the coding protocol.
<b>II. G</b> – External Validity Indicators (removed)	This section of the coding protocol was removed as the intervention investigated was a universal intervention and therefore inclusion/exclusion criteria did not apply to the samples involved in the study.
<b>II. K</b> – Replication (removed)	This section was removed from the current review as it was not an essential characteristic of the studies included.
<b>II. L</b> – Site of Implementation (removed)	This section was removed as all studies were conducted in school settings as specified in the inclusion/exclusion criteria.

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## **Appendix D: WoE A Coding Protocol**

### **Coding Protocol: Group-Based Design**

B1.4 Randomized hierarchical design

*B2. Nonrandomized designs (if nonrandom assignment design, select one of the following)*

B2.1 Nonrandomized design

B2.2 Nonrandomized block design (between-participants variation)

B2.3 Nonrandomized block design (within-participants variation)

B2.4 Nonrandomized hierarchical design

B2.5 Optional coding of Quasi-



**D. Type of Program (select one)**

- D1. Universal prevention program
- D2. Selective prevention program
- D3. Targeted prevention program
- D4. Intervention/Treatment
- D5. Unknown

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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 Written material involving a detailed account of the exact procedures and the sequence in which they are to be used

J2.2 Formal training session that includes a detailed account of the exact procedures and the sequence in which they are to be used

J2.3 Written material involving an overview of broad principles and a description of the intervention phases

J2.4 Formal or informal training session involving an overview of broad principles and a description of the intervention phases

*J3. Adaptation procedures are specified (select one)*

yes

no

unknown





**Summary of Evidence for Group-Based Design Studies**

**Average Quality of Evidence across the Key Judgement Areas**

of X = 2+1+0+3+0





## **Appendix F: Rationale and Criteria for Weight of Evidence B (WoE B)**

WoE B considered the

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Reliability and Validity of outcome measures	Outcome measures to test social-emotional competence are described but no details provided regarding reliability or validity of the measures.	Reliability or validity data is provided for outcomes used to assess social-emotional competence.	Reliability and validity data are provided for outcomes to assess social-emotional competence.
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## Appendix G: Summary Table of WoE B

Table 6: Overall WoE B scores for studies included in the review

Study	Study Design	Comparison Group	Reporting of data collection	Reliability and Validity of outcome measures	Overall WoE B *
Bierman et al. (2010)	3	2	3	2	2.5 (high)
Novak et al. (2017)	3	2	3		

## Appendix H: Rationale and Criteria for Weight of Evidence C (WoE C)

WoE C evaluated the topic relevance of each study included in the current review. Four relevant topic areas were evaluated including the intervention location, participant characteristics, implementation fidelity and the setting of the intervention.

Table 7: WoE C Criteria

Criteria	1 – Low	2 – Medium	3 - High	Rationale
Intervention Location	Interventions took place in schools that are not located in OECD countries.	Intervention took place in schools within OECD countries.	Intervention took place in UK primary schools.	The location of the intervention is relevant as the current setting is UK schools. Studies that took place in UK schools are therefore more relevant to Educational Psychology practice as the findings are likely to be more similar to the current context.
Participant Characteristics	The study reports on 0-2 of the participant characteristics.			
Table 8 provides details of participant characteristics that could be included in each study.				

Implementation Fidelity	Self-report of fidelity with no additional support from independent source or no measures of implementation fidelity.	Self
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Table 8: Participant Characteristics detailed in each included study

<b>Participant Characteristic</b>	<b>Bierman et al. (2010)</b>	<b>Novak et al. (2017)</b>	<b>Curtis &amp; Norgate (2007)</b>	<b>Little et al. (2012)</b>	<b>Humphrey et al. (2018)</b>	<b>Seifer et al. (2004)</b>	<b>Malti et al. (2011)</b>
Age or School Year							
Gender							





## Appendix J: Overall Weight of Evidence D

The overall ratings for WoE A, B and C were given equal weightings and were added together and divided by three to give an overall WoE D rating. WoE D provides a summary of the overall strength of the evidence in answering the current review question and qualitative descriptors can be found in Table 11.

Table 10: Overall WoE D scores for studies included in the review

Study	WoE A Methodological Quality	WoE B Methodological Relevance	WoE C Topic Relevance	WoE D Overall weight of evidence
Bierman et al. (2010)	1.2	2.5	2.5	2.1 Medium
Novak et al. (2017)	1.2	2.5	2.0	1.9 Medium
Curtis & Norgate (2007)	1.2	2.0	2.3	1.8 Medium
Little et al. (2012)	1.4	2.5	2.3	2.1 Medium
Humphrey et al. (2018)	1.6	3.0	3.0	2.5 High
Seifer et al. (2004)	0.6	1.8	1.8	1.4 Low
				485.98 358