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Appendix A

Systematic Search Strategy and Study Flow

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Identification of Studies

An initial scoping search was conducted using Google Scholar and DelphiS (University of Southampton online journal search portal). The results of the search informed the identification of key search terms, which were applied to the PICOS framework (Higgins et al., 2019) (Table 1). Using the search terms, a search of the abstracts of published studies up to 26th March 2024 was conducted using the following online databases: PsycINFO and Education Resources Information Centre (ERIC).

Table 1

Search Terms Applied to the PICOS Framework

	Search Terms
Population (P)	student* OR primary* OR child* OR pupil*
Intervention (I)	PATHS OR "Promoting Alternative Thinking Strategies"
Comparison (C)	
Outcome (O)	
Setting (S)	school* OR education OR classroom* OR "school-based"

Inclusion and Exclusion Criteria

Table 2 presents the inclusion and exclusion criteria used in the current review.
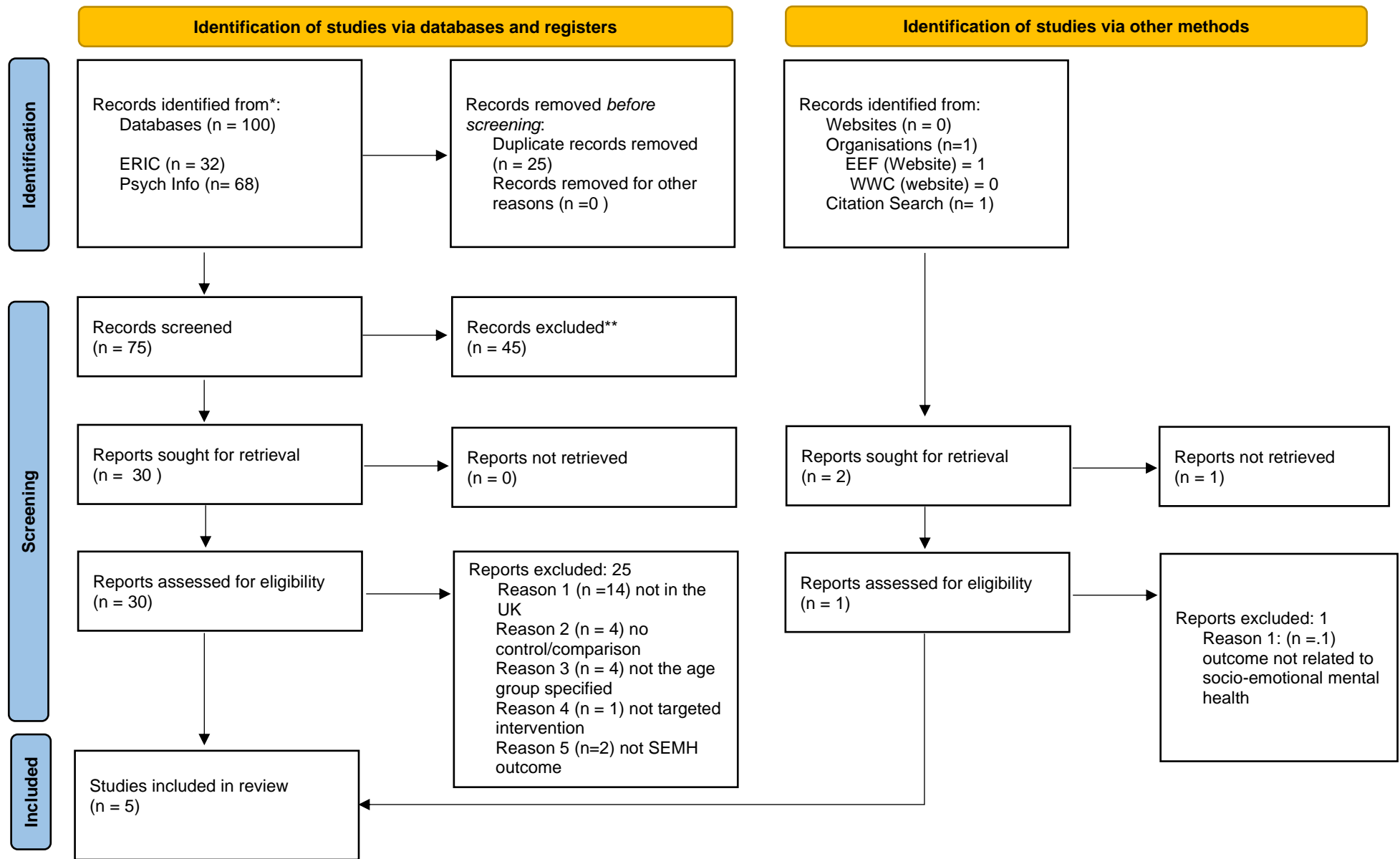
Table 2

Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Participants in Primary School (aged 5 -11)	Participants in pre school or secondary school
Paper available in English	Review Papers
	Non-empirical paper (e.g. opinion pieces, non theoretical paper)
Controlled intervention study (empirical study which compared an intervention group with a control comparison)	Did not include control comparison group
Assessed the efficacy of PATHS intervention	Intervention was another form of SEL intervention

Included outcomes related to socio-emotional mental health	Did not include outcomes related to socio-emotional mental health
Research conducted in school setting	Not conducted in a school setting
Research conducted in the UK	Not conducted in the UK

Study Flow

The flow of studies through the review is presented in the PRISMA (2020) flow diagram (Figure 1). Using the search terms from Table 1, 100 papers were identified, 25 of which were duplicates. 45 of the remaining 75 papers were excluded based on the title or abstract, leaving 30 studies to be assessed for eligibility. WWC (What Works Clearinghouse) and the EEF (Education Endowment Foundation) were searched for grey literature and searches were limited to full texts available in English. The references of recent systematic reviews were also hand-searched for relevant studies to include. From this, 2 further studies were identified. One of the studies did not explore the effect of the intervention on skills relating to socio-emotional mental health and therefore was excluded from the review. The other study was not accessible. Whilst an executive summary of part of this review can be found on the PATHS website, it contained limited methodological information and was not an empirical paper, therefore, its results were not included in the review. This left a total of 5 studies to be included in the review.

Identification of studies via databases and registers

Records identified from*:
Databases (n = 100)

ERIC (n = 32)
Psych Info (n= 68)

Records removed *before screening*:
Duplicate records removed (n = 25)
Records removed for other reasons (n =0)

Records screened
(n = 75)

Records excluded**
(n = 45)

Reports sought for retrieval
(n = 30)

Reports not retrieved
(n = 0)

Reports assessed for eligibility
(n = 30)

Reports excluded: 25
Reason 1 (n =14) not in the UK
Reason 2 (n = 4) no control/comparison
Reason 3 (n = 4) not the age group specified
Reason 4 (n = 1) not targeted intervention
Reason 5 (n=2) not SEMH outcome

Studies included in review
(n = 5)

Identification of studies via other methods

Records identified from:
Websites (n = 0)
Organisations (n=1)
EEF (Website) = 1
WWC (website) = 0
Citation Search (n= 1)

Reports sought for retrieval
(n = 2)

Reports not retrieved
(n = 1)

Reports assessed for eligibility
(n = 1)

Reports excluded: 1
Reason 1: (n =.1) outcome not related to socio-emotional mental health

Data Extraction Table

Study	Sample Characteristics	Design	Intervention	Control Condition (s)	SEMH related outcomes	Findings
(Berry et al, 2016)	5047 pupils across Year 1 and Year 1 (aged 5-7). 56 primary schools in Birmingham. (Data at all data collection points for 4006 children)	RCT	PATHS intervention delivered for two years. 1 hour was delivered per week, either as a one hour lesson or two 30 minute lessons). 44 lesson in Year 1 and 47 lessons in year 2. Universal intervention	TAU (standard classroom curriculum)	Primary outcome measure was the Strengths and Difficulties Questionnaire (SDQ) Teachers rate their pupils' difficulties for subscales: conduct problems, emotional difficulties, hyperactivity and peer relationships, pro-social behaviour Secondary measure was the PATHS Teacher Rating Scale (PTRS), a series of standardised subscales as follows: (1) emotion regulation; (2) pro-social behaviour; (3) social competence; (4) aggressive behaviour; (5) internalising/ withdrawn; (6) relational aggression; (7) peer relations; (8) inattention–hyperactivity; (9) impulsivity–hyperactivity; (10) learning behaviours; and (11) academic performance	At 12 months, non sig differences for the SDQ. However, sig differences on the PTRS subscales: social competence, aggressive behaviour, inattention–hyperactivity, impulsivity–hyperactivity, peer relations and learning behaviours Non-sig effect at 2-year point for SDQ and PTRS. Subgroup differences: sig effect at 24 months on pupils who test as having emotional difficulties as baseline compared to the control group on the SDQ subscales. Variation in fidelity. 47 out of a possible 94 PATHS teachers (50 %) could be said to have delivered the programme with ''high fidelity'

Humphrey et al., (2016)	5218 children in 45 schools. Aged 7-9 years	RCT	PATHS for 2 years (30-40 minute sessions twice a week)	TAU (standard classroom curriculum)	Primary outcome measure was the Strengths and Difficulties Questionnaire (SDQ) Teachers rate their pupils' difficulties for subscales: conduct problems, emotional difficulties, hyperactivity and peer relationships, pro-social behaviour	Statistically significant increase in teachers' perceptions of change in children's social–emotional competence
					Social and Emotional Competence Change Index (SECCI)	No statistically significant primary effects of PATHS on Emotional Symptoms. Hyperactivity/Inattention, or Conduct Problems at the ITT level. Statistically significant primary effect for the control group for Peer Problems and emotional symptoms
					Child-rated Social skills improvement system (SIS): subscales: communication, cooperation, assertion, responsibility, empathy, engagement, self-control	Subgroup analyses demonstrated that PATHS led to statistically significant increases in Pro-Social Behavior,and Engagement and emotional symptoms (mental health difficulties) among children classified as at-risk of menthal health difficulties)

Hennessey et al (2019)	5218 children in 45 schools. Aged 7-9 years	RCT	PATHS for 2 years (30-40 minute sessions twice a week)	TAU (standard classroom curriculum)	Primary outcome measure was loneliness - KIDSCREEN27 (KS27).	Children receiving PATHS were less likely to be "always lonely" compared to those in the usual practice group. Children in the PATHS intervention group are significantly more likely to report feeling "never lonely" or 'seldom lonely' compared to "always lonely" than the usual practice group Children in PATHS schools were less likely to be lonely at follow-up compared to children in usual practice schools
Panayiotou et al. (2020)	5218 children in 45 schools. Aged 7-9 years	RCT	PATHS for 2 years (30-40 minute sessions twice a week)	TAU (standard English curriculum.	psychological wellbeing (seven items), peers and social support (four items), and school environment (four items) subscales of the child self-report version of the Kidscreen-27	Small sig effect for psychological wellbeing. no such effects were observed for peer social support or school connectedness Sig medium large effect for peer social support and school connectedness when compliance was high (67% curriculum taught).

| Curtis & Norgate, (2007) | 287 pupils. 5 PATHS schools and 3 contol schools. | Quasi-experimenta | 101 Lesson of PATHS curriculum – timeframe not specified | Primary outcome measure was the Strengths and Difficulties Questionnaire (SDQ) Teachers rate their pupils' difficulties for subscales: conduct problems, emotional difficulties, hyperactivity and peer relationships, pro-social behaviour

Also semi-structured interviews were conducted with 17 teachers | Change over time in mean scores was statistically significant, as was the interaction between the two conditions, in all the dimensions within the SDQ change in scores from pre-test to post-test was significant for the intervention group but not for the control group. This indicates that children at PATHS schools showed significant reductions in all areas whereas those in the control schools made no significant change

Teacher interviews: child have better emotional literacy, empathy, developing self0control, developing cooperation and dealing with problems |

Appendix C

Quality Appraisal of Included Studies Using the Downs and Black (1998) Checklist

Checklist Items	Study				
	1	2	3	4	5
1. Hypothesis, aim, or objective clearly described?	Y	Y	Y	Y	Y
2. Main outcomes clearly described?	Y	Y	Y	Y	Y
3. Participant characteristics clearly described?	Y	Y	Y	Y	N (only general Year groups given)
4. Interventions clearly described?	Y	Y	Y	Y	Y
5. Confounders in each group clearly described?	Y	Y	Y	N	N
6. Main findings clearly described?	Y	Y	Y	Y	Y
7. Estimates of random variability provided?	Y	Y	Y	Y	N
8. Adverse events related to the intervention reported?	Y	Y	Y	Y	N

9. Participants lost to follow-up reported?	Y	Y	Y	Y	N
10. Exact probability values reported?	Y	Y	Y	Y	Y
11. Were people asked to participate representative of the target population?	Y	Y	Y	Y	Y
12. Were participants recruited representative?	Y	Y	Y	Y	Y
13. Intervention delivered in a representative context?	Y	Y	Y	Y	Y
14. Blinding of participants to the intervention?	Not Known	N	Not Known	Not Known	Not Known
15. Blinding of research measuring outcomes?	N	N	N	N	N
16. Unplanned analyses reported?	Not known	Not Known	Not Known	Not Known	Not Known
17. Did analyses adjust for different lengths of follow-up?	N/A	N	N	N	N
18. Were analyses appropriate?	Y	Y	Y	Y	Y
19. Reliable fidelity to intervention?	Y/N for Year 2, not for Year 1	Y/N (yes to frequency no to dosage)	Y	Y/N – results divided into high-fidelity and low-fidelity	Not Known

20. Valid and reliable measures?	Y	Y	Y	Y	Y
21. Were participants in different groups recruited from the same population?	Y	Y	Y	Y	Y
22. Were participants in different groups recruited over the same period of time?	Y	Y	Y	Y	Y
23. Randomisation to groups?	Y	Y	Y	Y	N
24. Random allocation appropriately concealed?	Not known	Not Known	Not Known	Not Known	N/A
25. Adequate adjustment for confounders in the analyses?	Y	Y	Y	Y	N
26. Loss to follow-up taken into account?	N/A	N/A	Y	n/a	N/A
27. Adequately powered? (adapted	Not Known	Not Known	Not Known	Not Known	Not Known

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