A systematic review of digital risk and mitigations in children aged 8 to 12

Challenges and Opportunities

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Contents

Executive Summary

Many children are spending a substantial amount of time online. However, most research thus far has explored issues such as the number of hours children are spending online (or on screens), rather than what they are doing online. This lack of understanding of the 'what' aspect of online behaviour is particularly important for children in late primary school and early secondary school. At this stage, children tend to have less parental supervision of their online activities and yet may lack the skills and experience to be safe online.

Young children tend to have direct parental supervision of their online activities, with parents sitting with and watching their child to help them online, while less than a quarter of parents of 8- to 12-year-olds report doing this. Therefore, at this age, children have more independence online, which is an important step in helping them develop their skills, but they are likely to continue to need support to become safe consumers of media.

This is also an important developmental stage. For example, children have more agency in choosing their friends, and less adult oversight of their social interactions. Acting in line with the norms of their groups can help them to feel a greater sense of belonging but it can also lead to peer pressure to act in line with norms, even when they would prefer not to. This can lead to negative behaviours online, such as cyberbullying or sharing inappropriate content.

Furthermore, at this age, children also tend to show an increase in risky behaviours. Young adolescents often underestimate risks and perceive greater potential benefits from risky behaviour. They are also more likely to use emotion-based reasoning, considering the social consequences of their decisions, rather than weighing the risks. Finally, adolescents may not be able to fully comprehend the possible consequences of their risky actions.

While the risks children may face online are generally well understood, the definition of resilience to these risks is less well defined. The term 'digital resilience' has been used in various reports and studies to mean slightly different things, but the overall concept is related to people's ability to prevent, respond, and quickly recover from negative online experiences. Digital resilience is not the same as digital literacy. Digital literacy is the effective use of digital technologies, while digital resilience relates to knowledge of risks.

There is a lack of evidence around what works to build digital resilience in children. Therefore, the current review outlines the key research in this area, including the areas of risk and digital resilience interventions.

Given the broad nature of the research topic, interdisciplinary databases were utilised to find relevant literature. These included the Australian Education Index (AEI; Cunningham Library, Australian Council for Educational Research), American Psychological Association PsycInfo (APA), British Education Index (BEI), Education Resource Information Centre (ERIC), and Professional Development Collection (PDC). Taken together, these databases cover more than 3.2 million academic sources across a wide range of national contexts.

A key parameter for database searching was that the research should focus on children aged 8-12 years. That is not to say that studies were ineligible if they contained, for example, two age groups (e.g., 8-12 and 15-18); however, there had to be clear and obvious representation of the target age group, in sampling, data collection, and analyses / interpretation specific to that target age group.

Furthermore, to reflect current trends in technologies, pedagogy, educational policy, legislation, and socio-cultural norms, the publication dates for suitable studies were set between 2014 and 2024. Earlier studies might reflect technologies, platforms, and digital behaviours that are obsolete or so uncommon as to not be of value to this review.

After search completion, a title and abstract screening was carried out in line with the PRISMA 2021 checklist to remove articles that did not meet the inclusion criteria. This initial Title and Abstract screening covered **780** sources, which were triaged to **24** sources for a second full-text screening. In this, we selected studies which had developed specific interventions to improve the safety of children online. After this stage, a final **seven** sources were included for critical review and narrative synthesis.

Our final selection of seven key papers covered a total sample of almost 4,000 young participants. Studies were conducted in Belgium, China, Iran, Ireland, the United Kingdom, and the United States. All studies aimed to investigate the effectiveness of educational interventions designed to enhance digital literacy, media literacy, and online safety among children aged 8-12.

Key findings suggested that engaging children in 'Community of Inquiry' discussions, led to the development of critical thinking skills which are essential for evaluating online information and combating misinformation. Multiple studies addressed the issues of grooming, harassment, and personal safety. By promoting children's awareness of online risks and providing with knowledge, skills, and strategies to navigate and mitigate these risks, these interventions aim to increase personal safety online. Several of the studies also discuss how to improve online wellbeing. For example, online civility and self-efficacy in handling problematic issues, and the role of digital citizenship in improving children's emotional wellbeing. One study investigated the effectiveness of a media literacy intervention which promotes critical thinking skills to empower children to navigate digital media environments and foster resilience and a sense of control and confidence online.

The 'Risk of Bias' quality analysis, which assesses four dimensions of the studies used in this review (Internal consistency; Measurement invariance; Measurement error; Hypothesis testing) on a four-point scale (Very Good; Adequate; Doubtful; Inadequate), suggested that no source was 'Very Good' on all four dimensions; indeed, six out of seven had at least one Inadequate rating. This emphasises the urgent need for high-quality, co-created, intervention research around digital resilience and mitigations, targeted at children aged 8-12.

Taken together these studies suggest key issues which should be considered when developing interventions to promote digital resilience in children aged 8-12. These are:

1. *Safe exposure*: Giving children the opportunity to explore safely, for example using project-based learning or reflecting on experiences, can enhance their digital resilience.
2. *Awareness raising paired with learning skills and strategies:* Raising children's awareness of online risks is important in helping them to identify potential risks. However, this needs to be paired with learning skills and strategies to reduce and respond to these risks to ensure that children know what to do when faced with these risks.
3. *Group-based learning*: Group discussions and groupwork can be effective in promoting digital resilience. Group based learning between peers or involving cross-age teaching

can both be effective. These discussions can foster critical thinking skills which help children to evaluate online information, combat misinformation and help them stay safe online.

List of Abbreviations

ONS	Office for National Statistics
Ofcom	Office of Communications
UKCIS	UK Council for Internet Safety
AEI	Australian Education Index
APA	American Psychological Association
BEI	British Education Index
ERIC	Education Resource Information Centre
PDC	Professional Development Collection
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
ICT	Information and Communications Technology
CASP	Critical Appraisal Skills Programme
COSMIN	Consensus-based standards for the selection of health measurement instruments
PROM	Patient-Reported Outcome Measures

1. Introduction

Around 98% of UK homes with children have access to the internet, which is significantly higher than homes without children (93%; Ofcom, 2023). Many children are spending a substantial amount of time online; for example, according to an ONS (2020) survey, 9 in 10 children are online every day. Almost half of the children surveyed reported spending three or more hours online on a school day and 22% reported spending more than seven hours a day online at the weekend. Social media exposure begins at an early age; around a quarter of children aged from 3 to 4 years have a social media profile (Statista, 2024). While there are a range of benefits to being online, for example around education, communication, and connection (Ofcom, 2023), there are also dangers.

1.1. Online Safety Act (2023) and Digital Engagement

To combat this, the Online Safety Act (2023) was developed, which aims to protect children and adults online. The strongest protections in the Online Safety Act have been designed to protect children and 'make the UK the safest place in the world to be a child online.' It aims to prevent children from accessing harmful and age-inappropriate content and to enable them to report problems. In terms of the priority content, the Act targets:

Primary priority content

- pornography
- content that encourages, promotes, or provides instructions for either:
    - o self-harm
    - o eating disorders
    - o suicide

Priority Content

- bullying
- abusive or hateful content
- content which depicts or encourages serious violence or injury
- content which encourages dangerous stunts and challenges
- content which encourages the ingestion, inhalation or exposure to harmful substances.

This shows the variety of harmful content which children can be exposed to online. Although children's use of the internet is increasing, academic research exploring the impact of this usage is lagging. This is partly due to the unprecedented increase in internet use in the last few years, for example, in 2015, 41% of children reported using the internet every day (Livingston & Bober, 2005) compared to around 90% in 2020 (ONS, 2020).

Understanding online safety is also challenging because content, platforms and activities are changing at a rapid pace; for example, TikTok was released in 2016, was the most downloaded app in 2018, and its video content is now penetrative and near ubiquitous across multiple platforms (e.g., TikTok content shared via WhatsApp, Instagram, Facebook, etc.). Safety issues are further complicated by the sheer wealth of content available. For example,

every minute, 500 hours of content is uploaded onto YouTube, 5,000 videos are viewed on TikTok, and 695,000 stories are shared on Instagram (World Economic Forum, 2021).

Managing harmful content is therefore an immense task which must be shared across levels. Governments, platforms, educational institutions, and users all have a responsibility to manage content and help people develop their skills in safely navigating the online environment. Interest in media literacy has therefore increased and Ofcom have recently launched a consultation on their three-year media literacy strategy. This aims to enhance people's ability to "use, understand and create media and communications across multiple platforms and services." A key focus is promoting the idea that media literacy is 'everybody's business' and targeting interventions where need is greatest.

However, most research thus far has explored issues such as the number of hours children are spending online (or on screens), rather than what they are doing online. This lack of understanding of the 'what' aspect of online behaviour is particularly important in children in late primary school and early secondary school. At this stage, children tend to have less parental supervision of their online activities and yet may lack the skills and experience to be safe online. For example, most children aged 3-7 do not own their own devices, while around 55% of children aged 8-12 do (Ofcom, 2023), giving them a greater ability to access the internet without adult oversight. Furthermore, parents of 3–7-year-olds report sitting with their children when they are online to help them, whereas parents of 8–12-year-olds do not do this as much and instead report asking and checking what their children are doing online (IBID). Therefore, at the age of 8-12, children have more independence online, which is an important step in helping them develop their skills, but they are likely to continue to need support to become safe consumers of media.

1.2 The Developing Young Person

This is also an important developmental stage, with psychological research suggesting that children are developing cognitive and social skills which are important to online safety (Halford & Andrews, 2010; Harter, 2006). For example, cognitive skills including 'Theory of Mind' develop around the age of 8 (e.g., Kuhn, 2000). Theory of Mind is the understanding that others have intentions, beliefs, desires, perceptions and emotions which may be different from our own, and these internal states can affect their actions and behaviours (Premack & Woodruff, 1978). Theory of Mind allows children to comprehend that people can have different beliefs about the same situation, can hold false beliefs and can dissemble. These are vital skills to remaining safe online.

Children at this age are also developing their social skills. For example, they have more agency in choosing their friends, and less adult oversight of their social interactions (e.g., Damon, 1988). Friendships at this age are based on shared preferences (e.g., Hartup 2006; Mariano & Harton, 2005), meaning that online communities around shared interests can be very appealing. Children also develop loyalty to friendship groups (e.g., Berndt, 2004) and act in line with group norms. While acting in line with the group can help them to feel a greater sense of belonging, it can also lead to peer pressure to act in line with norms, even when they would prefer not to (e.g., McIntosh et al., 2006). This can lead to negative behaviours online, such as cyberbullying (e.g., Yang et al., 2022) or sharing negative content (e.g., Cooper et al., 2016).

Furthermore, at this age, children also can show an increase in risky behaviours. There are several reasons for this; for example, young adolescents often underestimate risks and perceive greater potential benefits from risky behaviour (Smith et al., 2014). They are also more likely to use emotion-based reasoning, considering the social consequences of their decisions, rather than just weighing the risks, again showing the growing importance of group membership (Blakemore & Robbins, 2012). Finally, adolescents may not be able to fully comprehend the possible consequences of their risky actions (van den Bos & Hertwig, 2017). While research on risks has typically been conducted offline, it is likely that these issues will be important for understanding risky behaviours online.

1.3 Conceptualising digital resilience

While the risks children may face online are generally well understood, the definition of resilience to these risks is less well defined. The term 'digital resilience' has been used in various reports and studies to mean slightly different things, but the overall concept is related to people's ability to prevent, respond, and quickly recover from negative online experiences. Digital resilience is not the same as digital literacy. Digital literacy is the effective use of digital technologies, while digital resilience relates to knowledge of risks. An example of *digital literacy* is having the skills to search for content using a search engine, *but digital resilience* would involve being able to critically evaluate information provided by the search engine for accuracy. While there is a positive relationship between digital literacy and digital resilience, they are different and it is important that educators, researchers and policymakers recognize and address both aspects to ensure individuals are not only proficient in using technology but also capable of navigating the digital world safely and responsibly.

According to UKCIS (2020) digital resilience involves learning how to recognise, manage and recover from risks online. This consists of:

- o 1. Understanding when you are at risk
- o 2. Knowing what to do to seek help
- o 3. Learning from experiences
- o 4. Having appropriate support to recover

Digital resilience is not stable, but rather dynamic and malleable, and the ability to show digital resilience (including being able to recognise a risk or know what to do in response) may differ across time and across contexts, domains and online platforms. This suggests it is vital that we have an up-to-date research base to act as the foundation for the development of digital resilience interventions.

1.4 The Current Review

However, there is a lack of evidence around what works in building digital resilience among children. Therefore, the current review will outline the key research in this area, including the areas of risk and digital resilience interventions. We then narrow the focus gradually, removing papers based on various criteria, (see attached materials) to give a final selection of key papers which have developed interventions which aim to improve the safety of children online.

1.4.1 Main objectives:

- To understand the current literature around digital risk and resilience in children aged 8-12
    - Exploring which topics the literature has focused on and identifying any gaps in our current understanding.
- Explore interventions which have been developed to teach children 8-12 about digital risk and resilience.

1.4.2 Expected Outcome(s):

- To identify the best research that should be used by teachers and researchers when developing materials to teach children aged 8-12 about digital risk and resilience.

2. Method

2.1 Databases

Given the cross-sectional nature of the research topic, interdisciplinary databases were utilised. These included the Australian Education Index (AEI; Cunningham Library, Australian Council for Educational Research), American Psychological Association PsycInfo (APA), British Education Index (BEI), Education Resource Information Centre (ERIC), and Professional Development Collection (PDC). Taken together, these databases cover more than 3.2 million academic sources across a wide range of national contexts. Access to these databases was provided through the University of Glasgow Library. In developing the methodology and search protocols for this review, the Evaluation Team consulted with the College of Social Science's Academic Librarian, Lynn Irvine.

2.2 Inclusion and Exclusion Criteria

Only sources published in the English language were considered as part of this review. That does not mean that the research reported on was conducted in an English-speaking country, nor that the research was conducted / data gathered in the English language. It was important that we evaluated work conducted in non-English-speaking countries. However, to avoid possible complications due to mistranslation or cultural misinterpretation, this report only uses sources which were published in the English language.

A key parameter was that the research should focus on children aged 8-12 years. That is not to say that studies were ineligible if they contained, for example, two age groups (e.g., 8-12 and 15-18); however, there had to be clear and obvious representation of the target age group, in sampling, data collection, and analyses / interpretation specific to that target age group.

Furthermore, to reflect current trends in technologies, pedagogy, educational policy, legislation, and socio-cultural norms, the publication dates for suitable studies were set

between 2014 and 2024. Earlier studies might reflect technologies, platforms, and digital behaviours that are obsolete or so uncommon as to not be of value to this review.

It was imperative that all studies were peer-reviewed. Although not a guarantee of academic quality, this is an important consideration as giving an indicator of academic control and editorial oversight, given the ethical considerations and sensitivities surrounding much of this research. Additionally, for practical reasons of conducting the review, a source would have to be available as full text to be considered for evaluation. Given that the databases above, and the University of Glasgow Library, have such extensive access to relevant sources, we can be confident that we have not unfairly excluded any quality, relevant sources based on full-text (un)availability.

This report also focused on research where the aim was not simply to describe digital literacy and resilience, but to intervene to improve skills.

2.3 Search Strings

Following trial searches to refine the search terms, a list of search strings was created across three categories.

Table 1. Key search terms

Category	Key phrases
Population: primary school children aged 8-12 years old	"primary school" OR "elementary school" OR schoolchildren OR "school children" OR (school N50 children)
Context: Internet safety and risk	"internet safety" OR "online safety" OR "digital safety" OR "e safety" OR "cyber resilience" OR "digital resilience" OR "online risk" OR cyberbullying OR "cyber bullying" OR grooming OR "fake news" OR "inappropriate content" OR "digital literacy" OR "media literacy"
Intervention: Educational intervention	education OR actions OR measures OR prevention OR strategies OR program* OR intervention* OR competencies OR research

The key phrases identified in Table 1 were searched in combination across the five databases. Additional search terms along subject headings were adapted to each database (please see Appendix 1).

2.4 Search Results and Filtering

After search completion, a title and abstract screening was carried out in line with the PRISMA 2021 checklist to remove articles that did not meet the inclusion criteria (see Table 2).

Table 2. Summary of Search Results and Filtering across Databases

	AEI	APA	BEI	ERIC	PDC	Total
Total Hits	**40**	**287**	**55**	**295**	**103**	**780**
Not relevant to the topic	19	151	31	101	21	*-323*
Exploratory or focused on perspectives /use	12	77	10	77	12	*-188*
Outcome focused	3	14	2	6	7	*-32*
Other age range	2	3	2	20	10	*-37*
Not focused on education / social development	0	6	1	1	0	*-8*
Not an intervention	4	15	3	47	26	*-95*
Pathological focus	0	1	0	0	1	*-2*
Only about cyberbullying	0	5	1	11	9	*-26*
Removal of duplicates	--	--	--	--	--	*-45*
Retained for full text reading	**--**	**--**	**--**	**--**	**--**	**24**
Excluded after full text reading	--	--	--	--	--	*-17*
Included in final Narrative Review	**--**	**--**	**--**	**--**	**--**	**7**

Note. AEI = Australian Education Index; APA = American Psychological Association PsycInfo; BEI = British Education Index; ERIC = Education Resource Information Centre; PDC = Professional Development Collection.

If titles and abstracts appeared relevant, inclusion criteria appeared to be met and duplicates were removed, articles progressed to full text screening. 24 articles were identified for full-text review and were sought for retrieval.

A table was created which summarised the design, the location and sample, study aims, instruments used, findings, limitations, and finally whether the article was retained after full text screening. Screening was conducted following the same protocol as applied to the title and abstract screening. One article could not be accessed and one article was excluded as it focussed on ICT skills rather than digital risk and resilience skills.

Upon completion, seven articles were identified as relevant for review and were included in the synthesis.

2.5 Quality Assurance

Critical appraisal of studies was carried out using various quality measures. First, several areas of quality assurance were taken from the Critical Appraisal Skills Programme (CASP) checklist for randomised controlled trials (for the full list, please see Appendix 2). This consists of four sections: (A) whether the study is valid for a randomised controlled trial, (B) whether the study is methodologically sound, (C) what the results were, and (D) if the results will help locally.

For the purposes of this review, the six assessment questions included were:

1. Did the study address a clearly focused research question?
   (section A)
2. Was the assignment of participants to interventions randomised?
   (section A)
3. Were the study groups similar at the start of the randomised controlled trial?
   (section B)
4. Apart from the experimental intervention, did each study group receive the same level of care (that is, were they treated equally)?
   (section B)
5. Was the precision of the estimate of the intervention or treatment effect reported (that is, were confidence intervals (CIs) reported)?
   (section C)
6. Can the results be applied to your local population/in your context?
   (section D)

Quality was also assessed using the COSMIN Risk of Bias checklist (Mokkink et al., 2018). This was developed to transparently and systematically assess the methodological quality of published studies. It was primarily developed for assessing the reliability and measurement error of singe studies within systematic reviews of patient-reported outcome measures (PROMs). However, several of the standards are relevant for non-clinical studies as well, making this an appropriate assessment tool.

The checklist contains ten boxes with standards for PROM development and several measurement properties. According to the checklist manual, not all boxes need to be completed to assess study quality. Four boxes were chosen as relevant for the purposes of this review: (1) Internal consistency, (2) Measurement invariance, (3) Measurement error, and (4) Hypothesis testing. Each study was assessed for quality in these four standards, which resulted in a quality rating. The rating of the quality of each standard is determined by taking the lowest rating from within that standard (i.e. "the worst score counts" principle). Similarly, the overall rating of every study is determined using the same principle. The rating options are *Very Good, Adequate, Doubtful,* and *Inadequate.* This rating is then considered in the discussion and conclusion of these studies. The authors of the checklist recommend including studies with an *Inadequate* rating in systematic reviews, if it is noted that their inclusion may decrease the quality of presented evidence and trust is reduced in the conclusions that they give.

3. Findings

3.1 Method of Synthesis

A narrative synthesis was considered the most suitable method for systematically reviewing the literature and addressing the specific questions (Popay et al., 2006). This approach provides a structured method for synthesising findings from multiple studies. It adopts a textual approach to 'tell the story' of the findings from the included studies.

3.2 Study Characteristics

Seven articles were included in the narrative synthesis. Table 3 displays the individual study characteristics of these articles.

Table 3 – Study Characteristics of Narrative Synthesis Sources

Source	Design	Location and Sample	Aims	Instruments	Findings	Limitations
Seraji, Ansari, & Chosarih (2023)	Quasi-experimental design with pre-test and post-test measures. Comparison between three groups: control (CON), direct teaching (DT), and community of inquiry (CoI) group in enhancing game media literacy competencies	Iran, population was 6th grade female students. Three groups of 31-32 in each, total 95 participants.	To investigate the impact of the community of inquiry (CoI) method on the development of game media literacy competencies	(1) Functional test which included descriptive questions and performance presentation items in relation to Functional Consuming, Critical Consuming, Functional Prosuming, and Critical Prosuming; (2) Parent assessment scale in which parents scored their children's knowledge, behaviour, and competencies; (3) Self-assessment scale. All developed specifically for Iranian culture	The results from the analysis of variance (ANOVA) and the post hoc Scheffé's test demonstrated the significantly higher media literacy level of students in the CoI group compared with the DT and CON groups. A significant difference was also observed in the subscales of Critical Consumption, Functional Prosumption, and Critical Prosumption.	Short-term, didn't run any follow-up; didn't control for variables such as gaming experience, parental media literacy levels or family supervision; instruments developed for Iranian culture and study focused on female sixth-grade students, which might affect generalisability
Zhang, Zhu, Sang, & Questier (2024)	Experimental design with a pre-test and post-test. One class was randomly assigned to the experimental group and received a	China, two primary schools, total of 58 fifth-grade students from two classes.	To investigate the effects of a DML course on students' DML: technical skills, critical understanding,	Questionnaire divided into 4 parts: (1) background information; (2) the 23-item Digital Media Literacy Scale assessing technical skills, critical understanding, creation	The DML course significantly improved students' citizenship participation compared to the control group. No difference was found in their technical skills,	Small sample size; technical skills and creation and communication may have been influenced by integrating the DML course into the ICT

	Digital Media Literacy (DML) course, and the other class was the control group and received an ordinary ICT course. The effects were measured using ANCOVA and SEM	28 students in the experimental and 30 students in the control group	creation and communication, citizenship participation. Also to examine the relationship between students' DML, teacher's scaffolding support, and students' digital media experience	and communication, and citizenship participation; (3) Four items related to teachers' scaffolding support for students' use of digital media; (4) Seven items measuring students' digital media experience. All items on a 5-point Likert-type scale	critical understanding, and creation and communication. Students' digital media experience influenced their DML both pre-test and post-test. Teacher scaffolding had an effect post-test. The DML course positively contributed to the relationship between teacher's scaffolding support and students' DML	subject; only 10 topics covered in the DML course which may not be sufficient to fully explore increasing DML
Bright, Sayedul Huq, Patel, Miller, & Finkelhor (2022)	Randomised control trial design to evaluate the effectiveness of a curriculum in educating kindergarten to Grade 5 children about bullying, cyberbullying, and various types of abuse, measured at 3 weeks and 7 months after implementation	Florida, United States; total of 1,176 students from 72 classrooms in 12 schools, between kindergarten to Grade 5	To assess the impact of the Monique Burr Foundation's Child Safety Matters curriculum on children's knowledge of potentially risky situations, both in the short-term and long-term	14-item questionnaire developed by the researchers on child knowledge of safe and risky situations	Children in the treatment group showed significant increases in knowledge regarding safety information compared to those in the control group, even at 7-moth follow-up	Inability to link participants across data points, focus on knowledge rather than behavioural outcomes; developmental appropriateness / ceiling effect of the questionnaire?
Boulton et al. (2016)	Quasi-experimental pilot study with pre- and post-intervention assessments	Conducted across 5 primary schools in the United Kingdom. 291	To evaluate the effectiveness of the CATZ cross-age teaching intervention in enhancing	Open questions to assess knowledge of online risks and safety - designed to have high face validity and pilot-tested for reliability: researchers identified	CATZ tutors significantly improved in their knowledge of online risk and safety in comparison to controls (moderate to large effect sizes). Tutees	Convenience sample, lack of follow-up to see if improvements persisted

		students, with Year 6 students acting as CATZ tutors and Year 4 students as CATZ tutees	primary school children's knowledge of online risks and safety	which and how many of the seven themes of risks and safety were covered in answers; also questions on acceptability of the intervention	improved in their knowledge of online safety in comparison to controls	
Schilder, Brusselaers, & Bogaerts (2016)	Quasi-experimental design, pre-test post-test control group	Flanders, Belgium; 15 primary schools and a total of 22 classes, leading to a sample of 812 children at Time 1 and 819 children at Time 2, fourth and sixth grade students	To investigate the effectiveness of a school-based intervention on online risk awareness and behaviour among primary school children. Assess whether the intervention would lead to increased online risk awareness and decreased online risk behaviour among participants	Self-report questionnaires to measure online risk behaviour (15 questions) and online risk awareness (9 statements). Intervention was a 10-minute presentation by a research associate on various online risk behaviours	Positive effect on online risk awareness immediately after, with the effect still present 4 months later. However, those who received the intervention reported more online risk behaviour. Online risk awareness was associated with less risk behaviour, but this relationship was not moderated by awareness	Cross-sectional design limits causal inference. Individual responses were not matched over time. Reliance on self-report
Jones, Mitchell, & Beseler (2023)	Quasi-experimental design with intervention and control group	United States, nine states across the Northeastern, Midwest, Western, and Southern USA. Fourteen schools, total	To evaluate the impact of the Be Internet Awesome (BIA) programme, developed by Google, on digital citizenship education: knowledge of	Online survey on online behaviour, knowledge, and attitudes related to digital citizenship: technology use, knowledge of safety concepts, self-efficacy, etc. Also adapted the Online Civility Scale (OCS)	Significant positive effects on students' knowledge of online safety concepts and self-efficacy to handle online problems. However, it did not demonstrate significant effects on online privacy behaviours and attitudes, online	Baseline differences between intervention and control groups

		of 1,072 students in 4th-6th grade	online safety concepts, self-efficacy to handle online problems, online privacy behaviours and attitudes, online harassment, help-seeking from adults, and online civility behaviours		harassment, help-seeking or online civility	
O'Rourke & Miller (2022)	Pilot randomised control trial	Ireland; 441 children from 17 classrooms in seven schools	To investigate the effect of a media literacy intervention on the wellbeing of children aged 7-11	Personal surveys on wellbeing: Kidscreen 27-item measure to assess subjective wellbeing and a scale to measure screen consumption	Significant positive effect on children's wellbeing scores; higher levels of wellbeing among girls than boys; negative correlation with screen consumption	Pilot, no long-term assessment

Overall, studies included a total of 3,945 participants, all of whom were pupils in fourth, fifth or sixth grade (or equivalent). One of the studies included pupils aged 7-11, otherwise all included pupils aged between 8 and 12 years old. Studies were conducted in Belgium, China, Iran, Ireland, the United Kingdom, and the United States. The methodology of all studies was quantitative. All used experimental or quasi-experimental designs, employing a mix of cluster random and convenience sampling methods. All studies aimed to investigate the effectiveness of various educational interventions designed to enhance digital literacy, media literacy, and online safety among pupils aged 8-12. Specifically, the studies focused on:

1) Improving media literacy and critical thinking: Evaluating methods to improve pupils' abilities to critically evaluate information they find online, identify misinformation, and understand media content.
2) Enhancing online safety and personal security: Assessing the impact of educational programmes on pupils' awareness of online risks, including cyberbullying and grooming, and promoting behaviours that reduce these risks.
3) Promoting digital citizenship: Investigating strategies to boost pupils' digital citizenship skills, self-efficacy in managing online problems, and adherence to positive online practices.
4) Improving well-being: Exploring interventions aimed at reducing exposure to inappropriate content, mitigating mental health risks associated with online activities, and fostering a safe and supportive online environment.

Overall, these studies aim to provide empirical evidence on the efficacy of a variety of educational approaches in preparing young students to navigate the digital world safely and responsibly.

3.3 Study Outcomes

One study measures outcomes directly related to the first research question on decreasing information risk online. Seraji et al. (2023) emphasises the efficacy of the Community of Inquiry (CoI) method in enhancing media literacy competencies in elementary students. They suggest that engaging students in CoI discussions fosters critical thinking skills, which are essential for evaluating online information and combating misinformation. Several other studies also discuss information risk. For example, Zhang et al. (2024) examine the effects of a digital media literacy course on primary school students, suggesting that such interventions can enhance students' digital media literacy, including critical evaluation skills. By equipping students with the knowledge to critically assess online information, the course aims to mitigate information risks, including misinformation and fake news.

Four studies measure outcomes directly related to the second research question on increasing personal safety online. Bright et al. (2022) investigate the effectiveness of a curriculum which addresses risks associated with online interactions such as grooming and exposure to harmful online content. Boulton et al. (2016) evaluate the effectiveness of a cross-age teaching intervention which educates children about personal safety concerns including grooming and online harassment. Schilder et al. (2016) assess the effectiveness of an intervention that targets reducing online risk behaviour, including addressing concerns such as grooming and online exploitation. Jones et al. (2023) evaluate impact of a curriculum which aims to educate students about online safety and responsible digital citizenship, including

addressing personal safety concerns such as cyberbullying and online harassment. By promoting awareness among students about online risks and providing with knowledge, skills, and strategies to navigate and mitigate these risks, these interventions aim to increase personal safety online.

One study measures outcomes directly related to the third research question on increasing wellbeing online. O'Rourke and Miller (2022) investigate the effectiveness of a media literacy intervention which promotes critical thinking skills to empower pupils to navigate digital media environments and foster resilience and a sense of control and confidence online. Several of the above studies also discuss improving wellbeing online. For example, Jones et al. (2023) include in their outcome measures online civility and self-efficacy in handling online issues and discuss the role of digital citizenship in improving children's emotional wellbeing.

3.4 Quality Appraisal

The results of six assessment questions from the CASP checklist and four boxes from the COSMIN Risk of Bias (RoB) checklist are presented in Table 4.

Table 4 – Quality Appraisal

	CASP items						**COSMIN Risk of Bias items**			
	RQ	**Random ised**	**Simi lar at start**	**Equal treat ment**	**CI**	**Applic able locally**	**Internal consist ency**	**Measure ment invarianc e**	**Measure ment error**	**Hypoth esis testing**
Seraji et al. (2023)	Y	Cluster	Y	Y	Y	??	VG	I	VG	A
Zhang et al. (2024)	Y	Cluster	Y	Y	N	Possibl y	VG	I	VG	VG
Bright et al. (2022)	??	Cluster	Y	??	N	Possibl y	I	VG	I	D
Boulto n et al. (2016)	??	Cluster	??	Y	Y	Possibl y	I	I	VG	VG
Schild er et al. (2016)	Y	Cluster	Y	Y	N	Y	I	D	VG	D
Jones et al. (2023)	Y	Cluster	*	Y	Y	Y	I	I	A	A
O'Rour ke & Miller (2022)	Y	Cluster	??	Y	Y	Possibl y	VG	A	A	VG

Note. CASP Items -- Y = Yes; ?? (Can't Tell); * (Some Differences). COSMIN Items -- VG = Very Good; A = Adequate; D = Doubtful; I = Inadequate

Overall, studies were valid for a randomised controlled trial (section A). All but two (Boulton et al., 2016; Bright et al., 2022) had a clearly defined and explicitly stated research question and all engaged in random cluster sampling, meaning that pre-defined groups were randomly allocated to treatment or control conditions. All studies also accounted for all the participants who entered the study.

The studies were mostly methodologically sound (section B). In four studies (Bright et al., 2022; Seraji et al., 2023; Schilder et al., 2016; Zhang et al., 2024), control and intervention groups were similar at the start of the trial. In three studies (Boulton et al., 2016; Jones et al., 2023; O'Rourke & Miller, 2022), this was either unclear or there were minor differences between groups. In six studies, control and intervention groups received the same level of care apart from the experimental intervention, meaning they were treated equally. In one study (Bright et al., 2022), no alternative to the intervention was given. None of the studies were blind, meaning that neither the participants nor the investigators were blind to who was given the intervention.

Study results were not always reported comprehensively (section C). Four studies (Boulton et al., 2016; Jones et al., 2023; O'Rourke & Miller, 2022; Seraji et al., 2023) reported confidence intervals whilst three studies (Bright et al., 2022; Schilder et al., 2016; Zhang et al., 2024) did not. Most studies did not perform a cost-effectiveness analysis, but all but two studies (Bright et al., 2022; Schilder et al., 2016) reported effect sizes. Two studies (Bright et al., 2022; Schilder et al., 2016) could not match responses over time for privacy reasons, and so engaged in a cross-sectional between-subjects design. Most studies were short-term, although two of the studies included a long-term follow-up (Bright et al., 2022; Schilder et al., 2016).

Finally, the studies were mostly helpful locally (section D). All studies but one, designed specifically for Iranian culture (Seraji et al., 2023), could likely be used locally, with varying levels of adaptation needed. Two (Jones et al., 2023; Schilder et al., 2016) may be especially simple to apply and provide value to pupils in Scotland.

3.5 Key findings and recommendations from studies

Seraji et al., (2023) found that methods such as collaborative learning, multimodal inquiry, project-based practices and practical engagement were most effective in teaching digital literacy skills. They suggest that methods should provide opportunities for problem solving, group interaction and self-management. They recommend the community of inquiry method. This problem-oriented and group-based approach places the learner at the centre of the learning process. Learners are encouraged to creatively and critically engage in problem solving whilst sharing ideas and opinions. It is a dialogue-based approach based on principles of inclusiveness, participation, impartiality, inquiry-based reflection and shared cognition. It aims to integrate cognitive, emotional, and social dimensions related to media literacy (Shea et al., 2022). Seraji et al., (2023) compare the community of inquiry method to direct teaching and a control, specifically focusing on their impact on competencies related to both consuming (i.e., accessing and using) and "pro-suming" (i.e. participating in creating) digital media content. They follow previous literature in finding the community of inquiry method to be more effective than direct teaching in teaching media literacy competencies.

Zhang et al. (2024) found that pupils' digital experience and teacher scaffolding play an important role in children's digital media literacy education. They investigated the effectiveness of a digital media literacy course on technical skills, critical understanding, creation and

communication, and citizenship participation and find it to significantly influence only citizenship participation. However, they found that both pupils' prior experience online and teacher scaffolding has a positive impact on media literacy. Furthermore, they found the course positively contributed to the relationship between teacher scaffolding and pupils' media literacy. The course consisted of 10 topics: World around and world in mind; Meet media family; Fantastic sound; My lens speaks; Escape from stereotype; Cartoon factory; The faces of advertisement; Surf freely on the internet; Cell phone and life; and Treasure hunt in a media world. All of these involved a lecture and either a discussion or a small group experience.

Bright et al. (2022) found a classroom-based child maltreatment prevention programme was effective in increasing pupils' knowledge of safety, since those in the programme showed significant improvements in their knowledge of safe and risky situations compared to those in the control group, both immediately after the programme and at a 7-month follow-up. The programme empowered students to prevent, recognise, and respond appropriately to digital dangers, child abuse, and bullying and cyberbullying. It also covered disclosures, safe adults, and other general issues of safety awareness. It consisted of five safety rules: Know What's Up (i.e., ensuring a safe adult knows where you are and what you are doing), Spot Red Flags (i.e., identifying appropriate and inappropriate situations), Make a Move (i.e. getting away from a harmful situation), Talk it Up (i.e., telling a safe adult), and No Blame, No Shame (i.e., no matter what happens, it's not your fault). The curriculum can be found online at https://www.mbfpreventioneducation.org/. The authors recommend implementing classroom-based child maltreatment prevention education.

Boulton et al. (2016) found a cooperative cross-age teaching intervention, in which older students act as tutors to younger students, was effective in enhancing pupils' knowledge of online safety and risks. They emphasise the importance of risk awareness for preventing potential cyber risks from resulting in harm, highlighting that attempts to 'police' children's internet use through adult regulation, parental controls, and filters are far from effective. In the intervention, tutors were put in groups of about five students and have four 60-minute sessions over 2-3 weeks to prepare a 30-minute lesson about online risks and how to avoid them. They are provided with the content, but the details of the lesson are left up to them. They simply need to prepare a poster and a script of what is to be said. The content consists of seven areas of risk: People may not be who they say they are; Meeting strangers; Deliberately sharing personal information; Accidentally sharing personal information; Cyberbullying; Sharing personal photographs; and Computer viruses. The content also consists of knowledge of respective safe responses.

Once each group of tutors prepares their lesson, they deliver it a group of about five tutees. In the control condition, each student is provided with the content detailed above, and a class discussion takes place. The authors found that tutors significantly increased their knowledge of dangers and how to avoid them and tutees significantly increased in the latter. Effect sizes were medium to large. They used three theories to explain their approach: role theory, which suggests that if a young person is given a role as tutor, they will take their responsibilities seriously; cognitive theory, which suggests that cross-age teaching provides opportunities for learning and making links with existing schemas; and Vygotsky's sociocultural theory, which suggests that when tutors rework learning material into their own lessons and tutees learn from tutors, both groups will be working in their zone of proximal development. The authors also discuss the importance of pupils' desire to engage in education programmes for their effectiveness. They highlight that while children seem to be aware that they lack

knowledge of digital risks and would like training in e-safety, they are hesitant to receiving this training from teachers, and/or adults. This follows previous research which finds children to be hesitant to discuss pastoral issues with teachers. Indeed, they found that pupils deemed this intervention acceptable and expressed a desire to learn about online safety from older students.

Schilder et al. (2016) emphasised the importance of raising awareness and skills related to online safety among children aged 8-12, i.e. before they move into adolescence. Even though most research focuses on adolescents, children are online from a younger age and need to be prepared to engage with risks they are likely to encounter. Furthermore, in the pre-adolescent stage, children are less mature in their self-regulation and so are in greater danger online than adolescents. Finally, one of the most prominent changes in early adolescence is the shift towards autonomy and a peer orientation, which makes them more likely to engage in risky behaviour and less likely to respond to adult-led interventions once they enter this stage. The authors further highlight the scarcity of empirical information on ways to intervene children's digital risk behaviour. The intervention in the study consists of a 10-minute presentation by a research associate on digital risks across five topics: text contact, audio-visual contact, social network services, online games, and offline meetings with people met online. Participants completed questionnaires on their online risk awareness and behaviour both at the time of the intervention and again four months later. Questions asked about their behaviour in the last six months. This very short intervention was effective in raising awareness of online risks. Whilst it was not effective in decreasing reported risk behaviour and in fact those in the intervention condition seemed to increase in their reporting of risk behaviour, more risk awareness is still associated with less risk behaviour online. The lack of effect in the study may have been due to changes in reporting, i.e. greater awareness and memory of their own violations of safe internet use.

Jones et al. (2023) emphasised that digital citizenship was a promising tool to improve children's wellbeing. They cited a review of 35 youth digital citizenship resources across four themes: participation (e.g., digital access, security), empowerment (e.g., civic engagement, information quality), engagement (e.g., digital economy, computational thinking), and wellbeing (e.g., privacy, safety, positive behaviour; Cortesi et al., 2020). However, they stressed that little empirical research has been conducted to determine the effectiveness of digital citizenship resources and programmes. The authors investigated the effectiveness of a curriculum developed by Google in partnership with educators and researchers called the Be Internet Awesome (BIA) programme. This includes five lessons: Be Internet Smart (Share with Care), Be Internet Alert (Don't Fall for Fake), Be Internet Strong (Secure Your Secrets), Be Internet Kind (It's Cool to Be Kind), and Be Internet Brave (When in Doubt, Talk It Out). Each lesson contains 2-6 activities such as workshops, small group discussions, and role-play activities. Lessons are further reinforced with online games. The authors measured technology use, knowledge of online safety concepts, self-efficacy to handle online problems, online privacy behaviours, online harassment, help-seeking advice, and online civility. They found that those in the intervention group showed greater knowledge of some online safety concepts and of how to identify markers of a safe website and reported more self-efficacy in knowing what to do if they encountered something upsetting. There was no difference in online harassment behaviours and cyberbullying. This follows recent evidence that cyberbullying programmes which are most effective are comprehensive, whole-school bullying prevention programmes (Gafney et al., 2019). The authors suggest that reducing online harassment and cyberbullying go beyond what digital citizenship or internet safety interventions can provide (Finkelhor et al., 2020). They

recommend that some goals of digital literacy education should be revisited and concerns such as cyberbullying, privacy, and reputation should be covered by more well-established prevention programmes that target underlying causes of these concerns, such as evidence-based bullying prevention, social emotional learning, abuse prevention programmes, sexual health prevention programmes and programmes on healthy relationships (Durlak et al., 2010; Gafney et al., 2019). Furthermore, they suggest that other concerns need a creative approach. It may not be enough to introduce children to the risks and mitigations. For example, whilst encouraging children to seek help from adults is an important goal, increasing help-seeking behaviour may require more hands-on approaches such as role-playing.

O'Rourke and Miller (2022) discussed the wellbeing risks of screentime consumption and specifically advertising exposure. They acknowledged that a protectionist approach is ineffective in protecting children against the negative effects of media messages and that increasing critical media literacy skills is paramount. They evaluated the effectiveness of MediaWise (Safefood, 2017), a media education teaching resource focused on advertising literacy, and determined whether this can positively impact children's wellbeing. The authors found the programme to increased wellbeing scores among participants. The resource consists of four lessons: recognising the omnipresence of media and the motivations of advertisers, understanding that everybody has a point of view, recognising elements used in media and how these can affect emotions, and differentiating between a need and a want. They used a combination of discussion, active learning and collaborative learning. They recommended going beyond educating children about safety online to teaching them important media literacy skills in promoting their wellbeing.

4. Discussion

A cross-disciplinary search of high-quality academic databases aimed to extract relevant and quality research that should be used by teachers and researchers when developing materials to teach children aged 8-12 about digital risk and resilience. After search completion, a title and abstract screening was carried out in line with the PRISMA 2021 checklist to remove articles that did not meet the inclusion criteria. From 780 initial records that appeared to satisfy the inclusion criteria, title and abstract screening triaged this to 24 records that progressed to full-text screening. After full-text screening, a final seven sources were taken to full critical review and narrative synthesis. These papers covered a total sample of almost 4,000 young participants. Studies were conducted in Belgium, China, Iran, Ireland, the United Kingdom, and the United States. All studies aimed to investigate the effectiveness of various educational interventions designed to enhance digital literacy, media literacy, and online safety among pupils aged 8-12.

Risk of Bias quality analysis, which assesses four dimensions (Internal consistency; Measurement invariance; Measurement error; Hypothesis testing) on a four-point scale (Very Good; Adequate; Doubtful; Inadequate), suggested that no source was 'Very Good' on all four dimensions; indeed, six out of seven had at least one Inadequate rating. This emphasises the urgent need for high-quality, co-created, intervention research around digital resilience and mitigations, targeted at children and children aged 8-12.

Taken together these studies suggest key issues which should be considered when developing interventions to promote digital resilience in children aged 8-12. These are:

4. *Safe exposure*: Giving children the opportunity to explore safely, for example using project-based learning or reflecting on experiences, can enhance their digital resilience.
5. *Awareness raising paired with learning skills and strategies:* Raising children's awareness of online risks is important in helping them to identify potential risks. However, this needs to be paired with learning skills and strategies to reduce and respond to these risks to ensure that children know what to do when faced with these risks.
6. *Group-based learning*: Group discussions and groupwork can be effective in promoting digital resilience. Group based learning between peers or involving cross-age teaching can both be effective. These discussions can foster critical thinking skills which help children to evaluate online information, combat misinformation and help them stay safe online.

Safe exposure is a key component in developing children's digital resilience in that it gives them the opportunity to engage with appropriate activities and challenges. Attempts to avoid any possible risks, for example by using harsh forms of controls and over monitoring tend to be ineffective. They can lead children to feel that the adults in their lives do not trust them, which may make them reluctant to discuss their online activities, particularly if they see something upsetting or concerning. Instead, approaches which focus on developing children's digital resilience with exposure to appropriate challenges, alongside opportunities for support and reflection lead to more positive outcomes. Educators can use vignettes and scenarios to create safe exposure to age-appropriate online risks.

Awareness raising paired with learning skills and strategies: Risky experiences do not necessarily lead to harm; they can provide opportunities for development of digital resilience and create feelings of self-efficacy if children feel they have the skills to recognise and cope with them appropriately. Therefore, digital resilience can be promoted by teaching children about potential risks in order to help them to identify them. Importantly, this should be paired with helping them develop the knowledge and skills of how to respond to these online risks, how to seek help and how to recover.

Group-based learning: These studies reveal that digital literacy as not just an individual process, but a group process, where people are learning to "recognise, manage, and recover from online risks within and across individual, home, community, and societal levels." (Hammond et al., 2022, p. 3019). Family factors, such as open communication, and community factors, such as awareness and education about healthy use, interact to influence children's digital resilience. Digital resilience is an individual skill but learning as part of a community can embed those skills and make the online experience safer for everyone. Therefore, interventions which involve peers and group discussions can lead to improvements in digital literacy. Future interventions may also want to consider how best to involve families and broader communities to enhance the impact and reach of digital literacy programmes and raise awareness of risks and benefits.

It is also important to note that the online and offline worlds influence each other. Those who are most vulnerable or at risk offline are also most vulnerable online. For example, those who feel isolated or are searching for a sense of belonging may be more vulnerable to risks both offline and online. This might suggest that some children may be more at risk and have greater need for digital resilience training than others. Additionally, digital resilience is influenced by general resilience. Resilience is the process and outcome of successfully adapting to difficult or challenging life experiences, especially through mental, emotional, and behavioural flexibility. Therefore, targeting general resilience for example, coping strategies and emotion regulation may help children develop their digital resilience skills. This is another important avenue for future research.

In conclusion, the findings of this review suggest that there is a lack of evidence around what works to build digital resilience in children aged 8-12. However, studies suggest that safe exposure, Awareness raising paired with learning skills and strategies and group-based learning may be fruitful approaches for future interventions in this area.

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Appendix 1 – Subject headings and search terms across databases

	AEI	APA	BEI	ERIC	PDC
Population subject headings	Primary schools Primary school students	Elementary Schools Elementary School Students Primary School Students	SCHOOL children	Children Elementary Schools Elementary School Students	School children Elementary Schools PRIMARY schools JUNIOR SCHOOLS (Great Britain)
Context subject headings	Digital Literacy Internet Safety	Online behavior Cyberbullying Digital literacy	DIGITAL literacy MEDIA literacy	Digital Literacy Media Literacy	INTERNET safety INTERNET & children CYBERBULLYING ONLINE trolling DIGITAL literacy MEDIA literacy Information literacy Information literacy education
Intervention subject headings	Intervention Child safety Program Effectiveness	School Based Intervention Risk perception Harm reduction Risk taking	PROGRAM effectiveness (Education) EDUCATION research Educational evaluation Effective teaching	Intervention Child safety Program Effectiveness Safety education	Program Effectiveness (Education) Prevention of cyberbullying Educational evaluation Effective teaching

	Program development (Education)	Instructional effectiveness Program evaluation	Program development (Education) Elementary school curriculum
			Primary school curriculum

Appendix 2 – List of CASP Questions

Is the basic study design valid for a randomised controlled trial?

1. **Did the study address a clearly focused research question?**

   CONSIDER: Was the study designed to assess the outcomes of an intervention? Is the research question 'focused' in terms of: Population studied, Intervention given, Comparator chosen, & Outcomes measured?

2. **Was the assignment of participants to interventions randomised?**

   CONSIDER: How was randomisation carried out? Was the method appropriate? Was randomisation sufficient to eliminate systematic bias? Was the allocation sequence concealed from investigators and participants?

3. **Were all participants who entered the study accounted for at its conclusion?**

   CONSIDER: Were losses to follow-up and exclusions after randomisation accounted for? Were participants analysed in the study groups to which they were randomised (intention-to-treat analysis)? Was the study stopped early? If so, what was the reason?

Was the study methodologically sound?

4. **Were the participants 'blind' to intervention they were given? Were the investigators 'blind' to the intervention they were giving to participants? Were the people assessing/analysing outcome/s 'blinded'?**
5. **Were the study groups similar at the start of the randomised controlled trial?**

   CONSIDER: Were the baseline characteristics of each study group (e.g. age, sex, socio-economic group) clearly set out? Were there any differences between the study groups that could affect the outcome/s?

6. **Apart from the experimental intervention, did each study group receive the same level of care (that is, were they treated equally)?**

   CONSIDER: Was there a clearly defined study protocol? If any additional interventions were given (e.g. tests or treatments), were they similar between the study groups? Were the follow-up intervals the same for each study group?

What were the results?

7. **Were the effects of intervention reported comprehensively?**

   CONSIDER: Was a power calculation undertaken? What outcomes were measured, and were they clearly specified? How were the results expressed? For binary outcomes, were relative and absolute effects reported? Were the results reported for each outcome in each study group at each follow-up interval? Was there any missing or incomplete data? Was there differential drop-out between the study groups that could affect the

results? Were potential sources of bias identified? Which statistical tests were used? Were p values reported?

8. **Was the precision of the estimate of the intervention or treatment effect reported?**

    CONSIDER: Were confidence intervals (CIs) reported?

9. **Do the benefits of the experimental intervention outweigh the harms and costs?**

    CONSIDER: What was the size of the intervention or treatment effect? Were harms or unintended effects reported for each study group? Was a cost-effectiveness analysis undertaken? (Cost-effectiveness analysis allows a comparison to be made between different interventions used in the care of the same condition or problem.)

Will the results help locally?

10. **Can the results be applied to your local population/in your context?**

    CONSIDER: Are the study participants similar to the people in your care? Would any differences between your population and the study participants alter the outcomes reported in the study? Are the outcomes important to your population? Are there any outcomes you would have wanted information on that have not been studied or reported? Are there any limitations of the study that would affect your decision?

11. **Would the experimental intervention provide greater value to the people in your care than any of the existing interventions?**

    CONSIDER: What resources are needed to introduce this intervention taking into account time, finances, and skills development or training needs? Are you able to disinvest resources in one or more existing interventions in order to be able to re-invest in the new intervention?

Appendix 3. CASP Evaluations of Narrative Synthesis Sources

Reference	Is the basic study design valid for a randomised controlled trial?*	Was the study methodologically sound?*	What were the results?*	Will the results help locally?*
Seraji, Ansari, & Chosarih (2023)	3 questions: Yes / Can't tell / Yes Clearly focused research question; random cluster sampling; all participants were accounted for	3 questions: No / Yes / Yes Participants and investigators were not blind about who was given the intervention; groups were similar at the start of the trial; groups received the same level of care	3 questions: Yes / Yes / Yes Intervention effects were comprehensively reported; confidence intervals were reported; benefits outweighed the harms and costs	2 questions: Can't tell / Can't tell Results may be applicable in the Scottish population; the intervention may provide greater value to pupils in Scotland
Zhang, Zhu, Sang, & Questier (2024)	3 questions: Yes / Can't tell / Yes Clearly focused research question; random cluster sampling; all participants were accounted for	3 questions: No / Yes / Yes Participants and investigators were not blind about who was given the intervention; groups were similar at the start of the trial; groups received the same level of care	3 questions: Yes / No / Yes Intervention effects were comprehensively reported; confidence intervals were not reported; benefits outweighed the harms and costs	2 questions: Yes / Can't tell Results are applicable in the Scottish population; the intervention may provide greater value to pupils in Scotland
Bright, Sayedul Huq, Patel, Miller, & Finkelhor (2022)	3 questions: Can't tell / Can't tell / Yes Research question was clear but not explicitly stated; random cluster sampling; all participants were accounted for	3 questions: No / Yes / Can't tell Participants and investigators were not blind about who was given the intervention; groups were similar at the start of the trial; no alternative was given to those in the control condition	3 questions: Yes / No / No Intervention effects were comprehensively reported; confidence intervals were not reported; no effect sizes reported	2 questions: Yes / Can't tell Results are applicable in the Scottish population; the intervention may provide greater value to pupils in Scotland

Boulton et al. (2016)	3 questions: Can't tell / Can't tell / Yes Research question was clear but not explicitly stated; random cluster sampling; all participants were accounted for	3 questions: No / Can't tell / Yes Participants and investigators were not blind about who was given the intervention; unclear whether groups were similar at the start of the trial; groups received the same level of care	3 questions: Yes / Yes / Yes Intervention effects were comprehensively reported; confidence intervals were reported; benefits outweighed the harms and costs	2 questions: Yes / Can't tell Results are applicable in the Scottish population; the intervention may provide greater value to pupils in Scotland
Schilder, Brusselaers, & Bogaerts (2016)	3 questions: Yes / Can't tell / Yes Clearly focused research question; random cluster sampling; all participants were accounted for	3 questions: No / Yes / Yes Participants and investigators were not blind about who was given the intervention; groups were similar at the start of the trial; groups received the same level of care	3 questions: Yes / No / No Intervention effects were comprehensively reported; confidence intervals were not reported; no effect sizes reported	2 questions: Yes / Yes Results are applicable in the Scottish population; the intervention would provide value to pupils in Scotland
Jones, Mitchell, & Beseler (2023)	3 questions: Yes / Can't tell / Yes Clearly focused research question; random cluster sampling; all participants were accounted for	3 questions: No / Can't tell / Yes Participants and investigators were not blind about who was given the intervention; matching undertaken, but some differences at baseline between groups; groups received the same level of care	3 questions: Yes / Yes / Yes Intervention effects were comprehensively reported; confidence intervals were reported; benefits outweighed the harms and costs	2 questions: Yes / Yes Results are applicable in the Scottish population; the intervention would provide value to pupils in Scotland
O'Rourke & Miller (2022)	3 questions: Yes / Can't tell / Yes Clearly focused research question; random cluster	3 questions: No / Can't tell / Yes Participants and investigators were not blind about who was given the intervention; unclear	3 questions: Yes / Yes / Yes Intervention effects were comprehensively reported; confidence intervals were	2 questions: Yes / Can't tell Results are applicable in the Scottish population; the intervention may

	sampling; all participants were accounted for	whether groups were similar at baseline; groups received the same level of care	reported; benefits outweighed the harms and costs	provide greater value to pupils in Scotland