review

Countermeasures to misinformation: lessons from the social sciences and applications to education in the United States

Maithreyi Gopalan[ORCID], mgopalan@uoregon.edu
University of Oregon, USA

Francesca Lopez, flopez5@wisc.edu
University of Wisconsin-Madison, USA

Alia Shalaby, aliamshalaby@psu.edu
The Pennsylvania State University, USA

Elisa Serrano, elisa.serrano@utsa.edu
University of Texas at San Antonio, USA

Giselle Delcid, gmd5655@psu.edu
The Pennsylvania State University, USA

We synthesise evidence from about 400 studies on mis/disinformation published between 2010 and 2024, drawing on research from across the social sciences. Despite widespread misinformation related to education, we find few studies that focus on how it spreads or how to address 'systemic misinformation' in this context. Building on prior syntheses (Blair et al, 2024), we categorise the main strategies used to fight misinformation in the United States across various domains such as public health, climate change and science communication into four types: informational, educational, sociopsychological and institutional. We then assess which of these approaches, widely studied in other fields, might be most useful to thwart misinformation in the uniquely decentralised world of US public education. As past research has shown, informational strategies – like fact-checking, pre-bunking and labelling content for credibility – are the most studied. However, their success depends on many factors, such as the setting, how the message is delivered, the topic and the audience's beliefs. Educational approaches, like media literacy programmes, show some promise, but have predominantly worked in reducing online misinformation only. Interestingly, we find that sociopsychological and institutional strategies, though less studied – may be especially promising for addressing misinformation in US K-12 education. These approaches may be key in countering organised campaigns that contest equity-focused evidence-based teaching practices. We close by identifying ways to fill current research gaps and suggest combining the most effective elements of different strategies to examine what works – and in which contexts – when it comes to tackling misinformation in education.

Keywords systematic review • mis/disinformation • educational equity • education policy

Introduction and background

Over the past decade, the spread of misinformation – both online and offline – has become a central concern across multiple domains (Pennycook and Fazio, 2023). In response, a robust body of social science research has emerged that examines countermeasures to tackle misinformation through lab, online and field-based experiments, as well as meta-analyses and systematic reviews that explore the efficacy of those interventions and their underlying theoretical foundations.

In contrast to this growing evidence base, the literature that investigates misinformation within and around education – its forms, severity, pervasiveness, mechanisms of spread and how it can be countered – remains limited. Although several approaches to dispelling education misinformation in classroom-based, student-focused contexts exist (Barzilai et al, 2023; McGrew and Breakstone, 2023; Barzilai and Stadtler, 2025; Busch and Lombardi, 2025), few target the general public (which includes key stakeholders like parents, school leaders and policy makers) and/or identify specific mechanisms at play in education (for notable exceptions see Aguilar et al, 2019; Clark and Schmeichel, 2024).

What is so special about misinformation about education?

The lack of a robust evidence base to counter misinformation about education is concerning given the current political climate wherein polarising misinformation has fuelled book bans, educational gag orders and teacher self-censorship – developments that threaten the integrity of the US public education system (Educational Gag Orders, 2021) and democracy writ-large. The unique features of the education ecosystem, including the diverse network of stakeholders, the contested nature of what counts as valid evidence (Song and Herman, 2010), and the complex pathways through which research is mobilised by parents, educators and leaders to inform policy at school, district, state and federal levels (Fitzgerald and Tipton, 2023; White, 2025) complicates the nature of misinformation about education, making the identification of countermeasures to misinformation particularly complex but all the more urgent.

In a foundational article on the 'nature of misinformation in education', Kendeou and Johnson (2024) distinguish between misinformation at the individual, community and system levels. Specifically, they describe how 'individual level misinformation manifests as naive beliefs or misconceptions students hold before they receive instruction or because of instruction'. Indeed, many remedies proposed and studied so far have aimed to address this key category of misinformation among individuals, and in classroom contexts (see Rau and Premo [2025] for a review). The other two levels, however, are far more pervasive. That is, at the 'community level', misinformation manifests as flawed information or misconceptions about certain topics 'often around risk factors and treatments of learning disabilities' that gets shared widely. They also

clarify how misinformation 'at the system level' could lead to school, district, or state and federal educational policies and practices that often do not have strong scientific evidence. For example, despite significant evidence on the benefits of adopting asset-based and equity-focused pedagogies (Dee and Penner, 2017; López and Sleeter, 2023), there is significant backlash to adopting education policies that mandate such curricular approaches (López and Sleeter, 2023). It is these forms of 'systemic misinformation' that are especially troublesome and require appropriate structural remedies. Therefore, we refer to 'systemic misinformation' to conceptually capture Kendeou and Johnson's community- and systems-level categories. Mitigating systemic misinformation about education is key to promote a robust equity-oriented education science infrastructure (NASEM, 2022).

Our focus in this article is not on highlighting misinformation related to specific educational debates such as 'reading wars' (Pearson, 2004) or 'school vouchers' (Belfield and Levin, 2005) but rather on synthesising literature relevant to systemic misinformation about education. Although some education scholars have documented the historical and ongoing use of misinformation by conservative politicians to undermine public education (for example, Berliner and Biddle, 1996; Berliner and Glass, 2014; Schneider and Berkshire, 2020), there is now a renewed focus on understanding countermeasures to thwart systemic misinformation about education. This is particularly more salient in this political moment given that many school leaders either ignore the issue or lack the tools and knowledge to address it, despite teachers' calls for clearer, leader-endorsed guidance (Jochim et al, 2023).

Research objectives and questions

Specifically, in our review, we ask:

- What are the most prominent remedies that have been used to combat systemic misinformation in the social sciences?
- What are the mechanisms underpinning those remedies when interpreted using an interdisciplinary, behavioural sciences lens? Specifically, what are some of the key factors that moderate the effectiveness of those remedies and what challenges/limitations do they present?
- What are the key gaps in knowledge and disciplinary landscapes in which research examining the efficacy and suitability of the remedies in combating systemic misinformation have been rigorously evaluated?
- What are the key insights we can draw from published studies to inform efforts to counter systemic misinformation in education? Specifically, what are some of the key understudied topics that can guide future research as it relates to combating the diffusion of systemic misinformation about education?

To address these questions, we conducted a review of 398 articles and reports published across the social sciences identified using a systematic search strategy that we supplemented with forward and backward bibliographic searches, as well as expert recommendations. Our goal was to draw insights from published studies that can inform efforts to counter misinformation about education, particularly in this politically polarising moment.

Using the conceptual framework developed by Blair and colleagues (2024), we identified and categorised 11 prominent remedies used to combat misinformation into four broad types: (1) informational, which directly refute falsehoods with corrective facts both pre- and post-exposure to misinformation; (2) educational, which equip individuals with critical thinking skills to detect misinformation independently; (3) sociopsychological, which leverage identity-based appeals or social norms to discourage the belief in seeking and spreading of falsehoods; and (4) institutional, which aim for systemic reforms among entities responsible for disseminating misinformation (for example, media, policy makers, tech platforms). Our review builds on this framework but casts a wider net by including studies beyond randomised controlled trials (RCTs) that were not included in Blair and colleagues' synthesis due to our dual interest in both (1) understanding the nature and theoretical mechanisms underpinning systemic misinformation and (2) assessing the effectiveness of proposed remedies.

This article makes three central contributions. First, we draw attention to the striking paucity of research on 'systemic misinformation' about education and the implications of this evidence gap for policy and practice. Second, through a systematic synthesis, we compile a comprehensive set of countermeasures that have been tested in other politicised domains – such as climate change and public health – and discuss how these might be adapted for use to counter misinformation about education. Third, we analyse the effectiveness of these interventions with an eye towards what is most likely to work on education topics, under what conditions, and why.

Definition of terms

Despite the rapid growth of research on misinformation over the past decade, both the scope of the topic and the terminology used to describe it – particularly the distinctions among misinformation, disinformation, mal-information and related terms – remain contested (Shapiro and Norton, 2024; Van Der Linden et al, 2024). Central to these debates is the question of intentionality.

Shapiro and Norton (2024) define *disinformation* as 'the purposeful use of false information to deliberately deceive others' (for example, conspiracy theories), distinguishing it from *misinformation*, which they describe as 'false or misleading information spread without specific intent to deceive'. They argue that meaningful study of misinformation requires determining the factual accuracy of claims, a task they caution may be unfeasible or biased at best. In their view, assessments of factuality are complicated by researchers' own ideological orientations and by the cognitive reality that individuals, even those acting in good faith, frequently make factual errors.

In contrast, Van Der Linden et al (2024) contend that expert judgement is a foundational component of all scientific inquiry and that assessing misinformation requires moving beyond binary notions of factual accuracy to consider the quality and credibility of evidence. They emphasise the complexity of research communication in the social sciences, where claims often rest on probabilistic reasoning, contested concepts and evolving consensus. Furthermore, they note that 'what starts out as disinformation often becomes misinformation at the next remove' – as intentional falsehoods are repeated by others without awareness of their deceptive origins. In highly polarised environments, they warn that rigid definitional gatekeeping may obscure meaningful inquiry and inadvertently downplay harm.

Yet another term, mal-information, is often defined as legitimate information shared to cause harm, primarily by transmitting information 'designed to stay private into the public sphere' (Wardle and Derakhshan, 2017). Despite the distinctions between legitimate and false information, the dimension of harm and intention is also used in distinguishing between mal-and mis/disinformation, limiting the utility of such distinctions. Scholars also warn against the use of the term 'fake news' given its inadequacy in capturing the complex ways in which mis/dis/mal-information permeate in the society and how it has been co-opted by politicians to refer to any news/information that they disagree with (Wardle and Derakhshan, 2017; Directorate-General for Communications Networks, Content and Technology [European Commission], 2018). Overall, we agree with Van Der Linden et al (2024) and focus on elucidating mechanisms that counter false information rather than relying on narrow, conceptual distinctions that may exclude valuable research.

Accordingly, in this review, we adopt a broad, inclusive definition of misinformation – encompassing both intentional and unintentional false or misleading information – consistent with prevailing expert guidance (Vraga and Bode, 2020; Altay et al, 2023). We use the term misinformation throughout the review to describe the full spectrum of inaccurate or distorted information, regardless of intent, and are particularly focused in uncovering remedies to mitigate 'systemic misinformation' that operates through mis-, dis- and mal-information channels. Furthermore, following Stahl (2006), we conceptualise mis/disinformation not as discrete categories but as points along a continuum. This perspective aligns with a critical approach to misinformation about education, which calls for examining how information functions within systems of power, how it shapes individual and collective understanding, and how it has historically been used to marginalise or disenfranchise vulnerable communities.

Finally, we do not draw an explicit distinction between *online* and *offline* misinformation, nor do we treat these as requiring wholly distinct countermeasures (Del Vicario et al, 2016; Johansson et al, 2022; Geers et al, 2024). In the education sector, both forms are prevalent and often interrelated, with content circulating seamlessly between digital platforms and in-person contexts. Given this dynamic, our synthesis considers misinformation in all its forms as part of an interconnected ecosystem that influences educational policy, practice and public discourse.

Methods

Search strategy and categorisation of countermeasures/remedies

To conduct this interdisciplinary systematic review, we adopted a multi-pronged search strategy. We began with an in-depth examination of eight recent meta-analyses and systematic reviews that synthesised findings from experimental studies aimed at combating misinformation in the social and behavioural sciences – including communication studies, public health and psychology (Chan et al, 2017; Walter and Murphy, 2018; Walter and Tukachinsky, 2019; Walter et al, 2019; 2021; Janmohamed et al, 2022; Chan and Albarracín, 2023; Blair et al, 2024).

Building on this foundation, we conducted a systematic search of academic databases[1] using predefined search terms, generating an initial sample of 761 articles, screened according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (see Table 1 and Figure 1 for details on search

Table 1: Search strategy

Database: ERIC (through ProQuest) and APA PsycInfo
Search terms: ERIC search was conducted using the following search strings • misinformation OR misbelief* OR false information OR belief perseverance OR continued influence AND (retract* OR correct* between 2018 and 2024) • misinformation OR misbelief* OR false information OR belief perseverance OR continued influence AND retract OR correct OR memory updating OR debiasing **Filters:** • Years: 2010–present • Source Type(s): Academic Journals, Working Papers, Reports • Language: English APA PsycInfo search was conducted using the following search string • misinformation OR misbelief* OR false information OR belief perseverance OR continued influence AND (retract* OR correct*) **Filters:** • Years: 2018–2024 • Source Type(s): Academic Journals, Working Papers, Reports Language: English

Notes: Search was conducted in December 2024 and search strategy was based on the following criteria. Since we were interested in the effectiveness of messaging strategies, we landed on misinformation, misbelief* (in different forms), false information, belief perseverance and continued influence. These terms combined provided articles related to misinformation and even mal-information even though we did not include 'mal-information' as a search term. The terms 'belief perseverance' and 'continued influence' speak to why the spread of misinformation is so persistent and perhaps why some messaging strategies have not been effective in combating misinformation. We also included the terms 'retract*' and 'correct*' to include articles or studies that focused on measures to reverse the effect of misinformation. Even though we did not include 'pre-bunk' as a term because we were focused mostly on strategies to stop or reverse the effect of misinformation after misinformation was put out there, studies that used pre-bunking strategies/mechanisms were nevertheless included in our final abstract review/inclusion stage, as seen in our final review. The term 'memory updating' was included due to the role that memory plays in the continued spread of misinformation. Similarly, 'debiasing' was included, because one's biases or perceived understandings of messages they encounter plays a role in whether they believe what they are being exposed to and whether or not they spread it.

terms, databases and screening process). This corpus was supplemented through forward and backward citation tracking and expert-suggested additions (n = 166).[2]

Three trained research assistants (RAs) screened all abstracts for relevance, removing duplicates and excluding studies that were either (1) unrelated to the central research question (that is, strategies/interventions to counter systemic misinformation); or (2) were purely theoretical without much discussion of actionable remedies (for example, belief formation, memory recall effects, cognitive processing of information, and so on). Studies published prior to 2010 were also excluded to ensure the review emphasised contemporary research. This yielded a final sample of 398 articles for full-text review (see online Appendix for more details).

During the full-text review phase, articles were distributed among the RAs, who summarised each study's main findings and coded the disciplinary context in which the intervention was developed or tested (for example, psychology, communication, public health, political science, information science, interdisciplinary social science). The first author then grouped these into broader disciplinary categories for subsequent analysis (see Tables 5A and 5B for an overview of discipline and subdiscipline representation). Coding ambiguities were resolved collaboratively among the RAs and the lead authors.

Next, the first author also independently categorised each study into one of four overarching remedy types – informational, educational, sociopsychological and institutional – based on the RAs' summaries of findings. This classification was guided by three goals assessing: (1) whether intervention was implemented before (pre-bunking) or after (debunking) exposure to misinformation (both coded as informational); (2) whether it targeted individual skill development (educational) or psychological/behavioural changes (sociopsychological); and (3) whether it targeted consumers of misinformation (informational) or institutions and producers (institutional)?

Within each of the four categories, we further classified the remedies into 11 specific remedy types, adapting the taxonomy developed by Blair and colleagues (2024) as shown in Table 2 below..
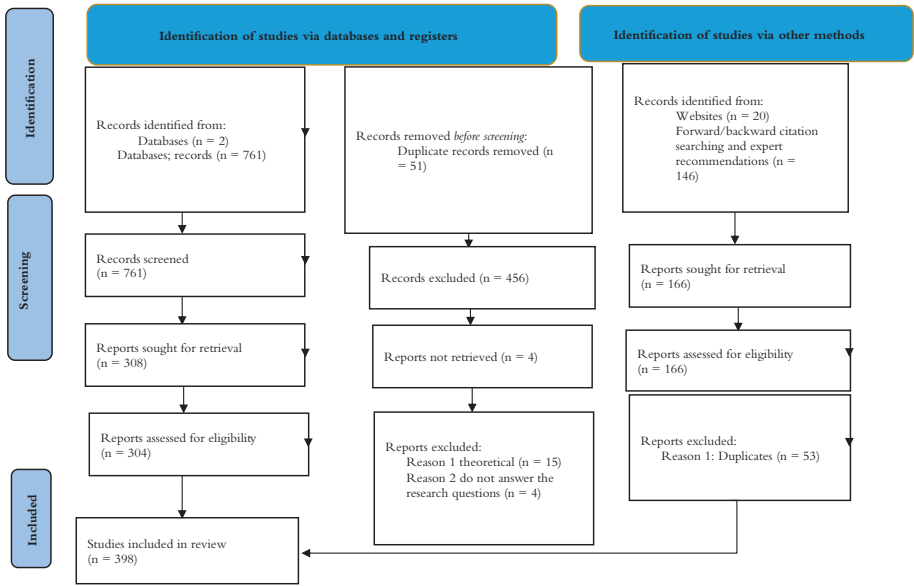
To ensure accurate categorisation, we employed multiple heuristics, including pattern recognition, keyword searches and full-text reviews when necessary. For instance, terms such as 'fact-check,' 'correction,' or 'retraction' typically indicated debunking remedies. When studies addressed multiple remedy types, we focused on the intervention most emphasised in the results, or the primary treatment condition tested. In observational studies, we classified the intervention type most directly implied by the study's findings. We also applied field-specific logic for classification where appropriate. For example, memory and recall studies generally aligned with

Table 2: Remedy types

A. Informational remedies
1. **Inoculation/pre-bunking** – interventions administered prior to misinformation exposure, often by equipping individuals with skills to recognise manipulation techniques.
2. **Debunking** – post-exposure interventions such as corrections, retractions and fact-checks designed to counter false beliefs.
3. **Credibility labels/tags** – cues that helped assess the trustworthiness of sources through indicators like source ratings or trust signals.
4. **Context labels/tags** – tools that provided supplemental information without making a direct credibility judgement, such as related articles or explanatory notes.
B. Educational remedies
1. **Media literacy** – interventions aimed at cultivating critical thinking and evaluative skills, often through digital literacy programmes, de-biasing videos, and others.
C. Sociopsychological remedies
1. **Accuracy prompts** – nudges or reminders encouraging individuals to consider the accuracy of information before sharing it.
2. **Friction** – strategies that deliberately slowed information processing by prompting users to pause and reflect.
3. **Social norms** – interventions leveraging peer influence or group norms to discourage misinformation sharing.
D. Institutional remedies
1. **Journalist training** – programmes aimed at improving content accuracy through changes to newsroom practices, professional development or editorial oversight.
2. **Platform alteration** – structural modifications to platforms that host or disseminate content, including algorithmic adjustments and moderation tools.
3. **Politician messaging** – interventions targeting political actors' role in spreading misinformation, often focused on improving messaging integrity or public accountability.

Source: Adapted from taxonomy developed by Blair et al, 2024.

Figure 1: PRISMA flow diagram

Source: Page et al, 2021.

debunking; studies emphasising identity or behavioural sharing were grouped under sociopsychological/social norms; and those emphasising misinformation detection by imparting skills were coded as educational (further categorised into critical thinking or media literacy skills).

In cases where interventions did not fit neatly into a subcategory, we classified them under the most conceptually aligned category and selected the closest subcategory based on the mechanism implied. Meta-analyses and reviews were categorised according to the predominant remedy type reviewed; theoretical articles were assigned categories based on the remedies their frameworks most directly informed.

Key findings

We now present some of our key findings related to our research questions. First, Table 3 summarises our findings related to our first research question regarding the prominence of remedies studied to combat misinformation across the social sciences between 2010 and 2024, using a similar categorisation put forward by Blair et al (2024). We also provide an overview of the mechanisms underpinning the theory of change embedded in these remedies along with a summary of the key moderators of the effectiveness of these remedies and their limitations/challenges, within each category in Table 4, in response to our second research question.

As shown in Table 3, informational remedies, especially those involving interventions, are the most common and well-studied across domains. Consequently, multiple meta-analyses have synthesised findings on the effectiveness of such strategies in countering misinformation (Chan et al, 2017; Chan and Albarracín, 2023). We highlight some key insights from our deeper synthesis of this literature in Table 4 and discuss those in what follows.

Table 3: Summary of remedy types

Remedy type	Number of studies
Informational	220
Context labels/tags	3
Credibility labels/tags	25
Debunking	165
Inoculation/pre-bunking	28
Educational	62
Media literacy	58
Other training	3
Institutional	26
Journalist training	6
Platform alteration	16
Politician messaging	4
Sociopsychological	78
Accuracy prompts	14
Friction	18
Social norms	46
Other	11
More generic piece rather than countermeasure/intervention per se	12
Grand total	**398**

Detailed corrective information. Overall, these reviews indicate that debunking efforts do not drastically change beliefs in misinformation, especially when messages are brief or lack detail. However, when debunking messages included comprehensive explanations – clarifying why the misinformation was false and offered accurate alternatives, they had a greater impact on reducing misinformation belief. These findings underscore the importance of factual alternatives and explanatory depth in correction design.

Corrective information format. Similarly, debunking interventions are more effective when they leverage design features that enhance comprehension and trust. For example, visual elements such as infographics or annotated images often outperform text-only corrections by increasing clarity and reducing cognitive effort (van der Meer and Jin, 2020). That said, although narrative-based corrections have been proposed as more engaging and emotionally resonant, in a registered report Ecker et al (2020) found no clear advantage of narrative over non-narrative formats in belief change or retention, provided that clarity and informativeness were preserved. This suggests that the structure of the correction may matter less than its clarity and content.

Similarly, hybrid correction formats – such as myth-versus-fact rebuttals accompanied by warnings about misinformation – were found to outperform simpler formats in reducing misinformation belief and enhancing recall (van der Meer and Jin, 2020). However, going beyond just formats, repeated exposure to corrective information has also been consistently found to be important for improving effectiveness of debunking strategies over time, especially in digital environments where misinformation can be encountered repeatedly (Walter and Tukachinsky, 2019).

Table 4: Key insights from our synthesis of the remedies tested in the Social Sciences

Category	Key findings	Additional notes
Informational remedies	**Content and format:** • Comprehensive explanations > brief debunking (Chan et al, 2017) • Visuals > text-only; hybrid formats best (van der Meer and Jin, 2020) • Narrative versus non-narrative: no difference (Ecker et al, 2020) **Domain and source:** • Effectiveness: health > bio > physical sciences/politics • Health professionals > anonymous sources (Vraga and Bode, 2017) • Social conversations > standalone corrections (Pennycook and Rand, 2019) **Timing and audience:** • Post-exposure > pre-bunking (Brashier et al, 2021) • Younger, educated audiences more receptive (Ecker et al, 2022) • Political identity blocks correction (Nyhan and Reifler, 2010)	**Effectiveness factors** • Explanatory depth + factual alternatives • Infographics, myth-versus-fact formats • Repeated exposure (Walter and Tukachinsky, 2019) • High-credibility sources • Post-exposure timing • Unfamiliar topics (where motivated reasoning might be lower) **Limitations/challenges** • Modest effects; belief persistence strong • Political resistance • Pre-bunking limited for subjective content • Real-world > lab effectiveness gap
Educational remedies	• Media literacy effective when culturally tailored (Guess et al, 2019) • Reflection-based > simple information (List et al, 2024) • Major Global South gaps (Blair et al, 2024)	**Effectiveness factors** • Cultural adaptation • Critical thinking training • 'Slowing down' techniques • Multi-strategy integration **Limitations/challenges** • Underutilised • Limited evaluation • Simple info interventions fail
Sociopsychological remedies	• Group identity central to belief correction (Van Bavel et al, 2024) • In-group alignment increases effectiveness (Rathje et al, 2023) • Accuracy nudges reduce sharing (Pennycook et al, 2020)	**Effectiveness factors** • In-group value alignment • Identity cues • Social norms messaging • Pre-sharing accuracy prompts **Limitations/challenges** • Under-researched • Group conformity resistance • Network pressure dynamics
Institutional remedies	• Highest potential to mitigate systemic misinformation, least studied (Blair et al, 2024) • Key areas: media literacy, journalist training, platform changes • Minimal systematic evaluation	**Effectiveness factors** • Platform algorithm changes • Journalist training programmes • Systemic media reforms **Limitations/challenges** • Major research gaps • No systematic evaluation • Limited Global South focus • Education system integration unclear

Topic/domain. Correction effectiveness varied significantly by content domain. Debunking efforts were most effective when targeting health and medical misinformation, followed by biological sciences, and were least effective in the physical sciences and politics. For instance, a meta-analysis on vaping misinformation interventions found that providing factual corrections with explanations had a small but significant impact ($r = 0.14$), while simple denials were far less effective (Janmohamed et al, 2022). Within the health domain, vaccine misinformation corrections were more successful than those addressing broader public health topics (Bode and Vraga, 2018). Notably, the effectiveness of corrections also varied by health topic, with greater success for vaccine misinformation than for other health domains (Walter et al, 2021). This variation was attributed to factors such as the level of public engagement with the topic and the credibility of the sources providing the corrections. In particular, studies like Nyhan and colleagues (2014), which tested corrections of vaccine myths, demonstrated meaningful reductions in misperceptions when messages came from medical professionals and included factual counterarguments, reiterating some common themes discussed earlier. In contrast, less salient or emotionally charged topics like sunscreen were harder to correct due to lower public awareness and weaker pre-existing attitudes (Bode and Vraga, 2015).

Source credibility. Studies also found that source credibility was a key moderator of effectiveness. Corrections from high-credibility sources, especially health professionals and official public health institutions, were more persuasive than those from algorithmic systems or anonymous peers (Bode and Vraga, 2015; Vraga and Bode, 2017). For instance, Vraga and Bode (2017) showed that Twitter corrections from authoritative sources (for example, the US Centers for Disease Control and Prevention [CDC]) were more effective at reducing misperceptions than those from unknown individuals. That said, corrections embedded in social media conversations (rather than standalone corrections) tended to perform better, likely due to the interpersonal trust and shared norms that govern social network interactions (Pennycook and Rand, 2019). Together, these findings illustrate the importance of both domain-specific factors (for example, salience, controversy) and communication context (for example, source trust, social proximity) in shaping how effectively misinformation can be countered in health-related domains. By contrast, corrections targeting political misinformation encountered greater resistance due to entrenched beliefs and partisan identity. All these moderators have direct implications for countering systemic misinformation about education given that that educational contexts increasingly intersect with political controversy.

Source credibility evaluation. Informational strategies that promoted source credibility evaluation – the third most common remedy in our scoping review – also received extensive scholarly attention. Walter et al (2019) found that fact-checking generally had a moderate positive effect on belief accuracy ($r = 0.30$). However, ideological alignment between the correction and the audience emerged as a strong moderator: fact-checks were more effective when they confirmed existing beliefs rather than contradicted them, a phenomenon aligned with motivated reasoning especially pervasive in political beliefs (Flynn et al, 2017). This dynamic is particularly relevant to education stakeholders – such as parents and school boards – whose belief systems may shape how they receive corrections about curricular content or instructional practices (Clark and Schmeichel, 2024).

Timing of correction. Timing matters. Even though pre-bunking interventions were well-represented in the remedies studied (a distant second when compared with

Table 5A: Social science disciplines in which remedies have been studied

Domains/discipline	Number of studies
Communication studies	107
Education	4
Information science	10
Law and ethics	1
Marketing and management	1
Political science	9
Psychology	200
Public health	45
Others	21
Grand total	**398**

debunking interventions that were most common), there is mixed evidence on their effectiveness. Regarding the effectiveness of pre-bunking (pre-emptive corrections) versus reactive debunking (post-exposure corrections), the study by Brashier et al (2021) provides valuable insights. Their research found that delivering corrections after exposure to misinformation (debunking) was more effective in reducing belief in false information compared to providing corrections before exposure (pre-bunking) or simultaneously.

Additionally, Roozenbeek et al (2020) explored the concept of psychological inoculation, where individuals are exposed to weakened forms of misinformation to build resistance against future exposure. Their findings support the idea that pre-bunking can be effective, especially when addressing objective claims. However, they also found that the effectiveness of pre-bunking diminishes when dealing with subjective or value-laden statements, highlighting challenges in politically polarised contexts.

Familiarity, prior beliefs and demographics. Topic familiarity also significantly moderated correction effectiveness. Corrections worked better when misinformation addressed unfamiliar topics, likely because people had fewer entrenched beliefs (Walter and Murphy, 2018). Corrections were also more persuasive when individuals had higher trust in the source, reinforcing the centrality of source credibility in counter-misinformation strategies. Demographic moderators mattered too: younger audiences and those with higher education levels were generally more receptive to factual corrections (Ecker et al, 2022). Studies further documented the challenge posed by political identity and misperceptions (Nyhan and Reifler, 2010). Individuals were less likely to accept corrections that conflicted with their ideological orientation, and real-world misinformation was harder to correct than fabricated misinformation presented in laboratory settings. This suggests that interventions designed for educational settings must account for both identity protection mechanisms and the authenticity of lived experience.

Walter and Tukachinsky (2019) highlighted the stickiness of misinformation, showing that even effective corrections often fail to eliminate belief in falsehoods entirely. While the average effect size of successful corrections was modest ($r = -0.05$, $p = 0.045$), indicating a persistent residual belief in the false information, their analysis underscores that belief persistence is particularly strong for misinformation that is identity-congruent or emotionally salient. They also found that corrections were more

Table 5B: Granular social science disciplines in which remedies have been studied

Discipline and sub-disciplines	Number of studies
Communication studies	107
General communication studies	57
Health communication	27
Mass communication	1
Media literacy	3
Political communication	16
Science communication	3
Education	3
General education	4
Information science	10
Artificial intelligence	1
Computer science	3
General information science	6
Law and ethics	1
Research ethics	1
Marketing and management	1
Consumer behaviour	1
Political science	9
General political science	6
Political behaviour	1
Political communication	2
Psychology	200
Cognitive psychology	100
Educational psychology	6
Forensic psychology	3
General psychology	68
Media psychology	1
Political psychology	2
Social psychology	11
Public health	42
General public health	36
Health literacy	1
Health policy	1
Health sciences	4
Others	16
Interdisciplinary	16
Grand total	**398**

effective when they were coherent, aligned with the audience's existing beliefs, and delivered by the original source of misinformation. Conversely, corrections were less effective if the misinformation originated from a credible source, had been repeated multiple times before correction, or if there was a significant delay between the misinformation and the correction. These findings suggest that once misinformation gets deeply entrenched, it becomes challenging to dislodge.

Educational remedies

Educational remedies − such as media literacy programmes and critical thinking training − have been identified as promising strategies despite their limited use as evidenced in Table 3. For example, Blair et al (2024) highlighted a significant gap in the implementation and evaluation of such educational remedies in the Global South, where misinformation can have profound impacts on public health and governance. They noted that while educational remedies seem promising in developed country contexts, it varied across different contexts and populations. For instance, digital media literacy programmes have been effective in improving individuals' ability to discern between true and false information, particularly when the content is tailored to the audience's cultural and educational background (Kahne and Bowyer, 2017; Guess et al, 2019).

Educational remedies also aim to alter the demand side of misinformation prospectively. For example, List and colleagues (2024) investigated how interventions aimed at enhancing critical thinking can affect individuals' susceptibility to misinformation. Specifically, they used a de-biasing video that prompted subjects to assess the truth more carefully versus falsehoods of potential misinformation in Colombia by 'slowing down' and reflecting on their own experiences. They found that while the de-biasing video intervention showed promising effects, a simple informational intervention, on the other hand, that provided individuals with information about their biases alone (with no additional educational component) had no impact on participants' scepticism towards potential misinformation in a polarised environment such as Colombia, underscoring the need for more educational remedies.

Finally, Blair et al (2024) underscored the importance of integrating educational remedies with other strategies, such as platform-based interventions and policy reforms, to create a multifaceted approach to combating misinformation. They argued that while educational programmes are crucial, they should be part of a broader ecosystem that includes technological and institutional measures to address the complex nature of misinformation spread, that our synthesis of the literature also reiterated.

Sociopsychological remedies

Recent work in social psychology and neuroscience calls for a fuller integration of social identity theory into misinformation research. Van Bavel et al (2024) argue that beliefs are not merely cognitive constructs but are embedded in group identities and attempts to correct misinformation must therefore contend with normative pressures within social networks. Interventions that align corrections with an individual's in-group values or identity cues show greater effectiveness (Sternisko et al, 2020; Rathje et al, 2023). Social norms messaging, though still under-researched, may also

offer promising avenues for educational settings where peer conformity and group identity are strong behavioral drivers. Additionally, accuracy nudges – simple prompts encouraging users to reflect on accuracy before sharing – have also shown measurable effects on reducing misinformation dissemination online (Pennycook et al, 2020). These simple interventions might be especially relevant in low-trust, high-volume information environments like classrooms or parent forums.

This expansion in foci from an individual-focused perspective that underpins frameworks and approaches in cognitive psychology, which has dominated the field of misinformation research, is important to note, a point we return to in the following discussion. We believe that the incorporation of the structural lens from social psychology and sociology to studying countermeasures in misinformation is vital.

Institutional remedies

Institutional remedies – those involving changes at the level of platforms, journalism, or science and political communication – are among the least studied, yet may offer the greatest promise, according to experts surveyed in a study (Blair et al, 2024). Based on the expert survey, Blair and colleagues identify three high-potential but under-researched strategies: (1) media literacy; (2) journalist training; and (3) platform alterations. Yet, as of 2024, they report that few studies have rigorously tested these interventions, particularly in the Global South. For instance, they note that almost no studies systematically evaluate how journalist training impacts misinformation mitigation or how platform-level algorithmic changes affect user behaviour across diverse contexts.

We found a similar gap in our own broader scoping review as well: institutional remedies, including policy-level or systemic solutions, are rare across all domains even in the Global North. While many interventions emphasise individual psychology or digital/media literacy, no studies assess how institutional structures (for example, media ecosystem) could be reformed to resist misinformation more systemically. Specifically, it remains to be seen how institutional remedies can be customised to the educational context (for example, how interventions can inform/reform educational structures such as school governance, curriculum mandates, educational media) and made actionable given that the core underlying data and research evidence infrastructure is being dismantled at the federal levels of governance.

Remedies to thwart misinformation in and around education: a critical gap

Indeed, this leads to our third research objective: what are the key gaps in knowledge and disciplinary landscapes in the published literature on misinformation? In this section, we examine which social science disciplines are represented the most in this burgeoning misinformation literature.

Disciplinary landscape of misinformation research

Unsurprisingly, the largest body of misinformation research in our review originates from the field of psychology – particularly cognitive psychology. These studies

primarily examine the mental processes involved in information uptake, including memory formation, recall, belief persistence and susceptibility to correction. Closely related work in social psychology investigates how interpersonal dynamics, group identities and social norms influence the acceptance and spread of misinformation. Research in political psychology adds further depth by exploring the intersections between cognitive bias, ideological predispositions and political attitudes – particularly in the context of belief polarisation and motivated reasoning.

The field of communication studies, broadly defined, also featured prominently in our review. Within this domain, three subfields were especially well-represented: (1) health communication, which has examined a range of strategies to combat medical misinformation; (2) political communication, which analyses the circulation and effects of misinformation in political contexts; and (3) science communication, which focuses on translating complex scientific knowledge into accessible and accurate messages for public audiences.

Public health emerged as another major disciplinary contributor, with studies spanning: (1) health sciences, investigating the consequences of misinformation on population health outcomes; (2) health policy, which addresses regulatory and institutional responses to misinformation; and (3) vaccine studies, which concentrate on misinformation about immunisation and vaccine hesitancy.

A smaller subset of studies from political science, focusing on institutional responses to misinformation in governance and electoral systems, also emerged in our review. Similarly, the field of information science contributed by examining technological infrastructures – such as algorithms and platform-specific features – that facilitate or hinder the detection and diffusion of misinformation in digital environments. These studies, however, remain underrepresented relative to their relevance, particularly as platform dynamics become central to the misinformation ecosystem.

Other disciplinary strands identified include environmental science (primarily addressing climate change misinformation), marketing and management (focusing on commercial and brand-related misinformation), education (exploring pedagogical responses/trainings to misinformation), and law and ethics (which analyse the legal frameworks and ethical implications of regulating false information). Finally, we identified an interdisciplinary category for studies that explicitly draw on theories and methods from multiple fields, reflecting the complex, cross-cutting nature of misinformation as a social phenomenon.

We find that thwarting misinformation about education is quite underrepresented in the misinformation literature overall. Of the 398 studies we reviewed, only four were explicitly situated in the education space (one specifically using refutation texts with teacher education students). Besides, these focused on media/digital literacy or educational psychology rather than engaging directly with misinformation challenges in curricular content, pedagogical practice/policy or school leadership, that we consider to be the largest challenges facing systemic misinformation about education.

Even promising approaches such as refutation texts – which present misconceptions followed by corrective explanations – remain relatively rare in educational contexts (Aguilar et al, 2019; Ferrero et al, 2020; Danielson et al, 2024). Moreover, there is little evidence that these strategies are being systematically integrated with the broader interdisciplinary misinformation literature. This fragmentation impedes the development of context-specific, empirically grounded interventions that address the unique challenges educators face in this moment.

We next focused on drawing out some key insights from published studies to inform efforts to counter systematic misinformation about education, particularly in this politically polarising moment. Specifically, we were interested in identifying understudied topics that might be relevant to mitigating systematic misinformation in education to answer our fourth research question. We believe that the ways in which misinformation in education spreads and diffuses the diverse network of stakeholders – such as parents, school leaders and policy makers, remains understudied.

The understudied role of diffusion, networks and social transmission

Although much of the misinformation literature has focused on correcting false beliefs through cognitive or informational remedies, a growing body of work suggests that such approaches overlook a crucial dimension: the social dynamics of information diffusion (Toomey, 2025). As Centola (2021) argues, combating misinformation is not simply a matter of getting the facts right – it is about ensuring that those facts travel effectively within trusted social networks and community structures. In other words, information must not only be accurate but socially endorsed to have a meaningful impact.

Despite this insight, research on how (mis)information spreads through interpersonal networks, and the conditions under which accurate information can outcompete falsehoods, remains relatively sparse. Social learning, homophily and identity-congruent messaging all shape what individuals are likely to believe and share (Bail et al, 2018; Centola, 2018). Yet empirical studies that model these dynamics or test interventions at the network level are still the exception rather than the rule in the misinformation literature. Moreover, very few studies examine how network structure (for example, tight knit versus loosely connected communities) or platform design (for example, algorithmic amplification) mediate the success or failure of debunking efforts with few notable exceptions (Vosoughi et al, 2018; Guess et al, 2019).

This gap is particularly pressing in the education context, where misinformation often circulates not just through mass media, but via local parent networks, community Facebook groups and other online platforms, parent–teacher associations and/or school board meetings. Understanding how beliefs about curriculum, equity and/or evidence on culturally relevant pedagogies and policies spread within and between communities is critical for designing remedies that are not only informative but socially resonant. As such, future research must attend more seriously to the social architecture of misinformation: how it travels, who transmits it, and under what conditions accurate information can disrupt its momentum.

Limitations

This review is not without its limitations. First, finalising the search terms in any systematic review is an iterative process that is both a 'science and art' and we followed some best practices here (Alexander, 2020). Because our iterative search string combined with backward/forward citation and inclusions based on personal knowledge already produced about 400 studies that were relevant (based on multiple coders examining abstracts), we decided to stop the systematic search at that point and begin analysis. This could have led to the omission of some relevant articles. Specifically, while there are several student-facing, classroom-level remedies to mitigate

individual levels of misconceptions in education (Barzilai et al, 2023; McGrew and Breakstone, 2023; Barzilai and Stadtler, 2025; Busch and Lombardi, 2025), these were not included in our systematic search due to our focus on the community- and systems-level remedies more extensively as we find large gaps in the education literature at these levels. Indeed, a recent review synthesises educational remedies to combat misinformation more extensively (Rau and Premo, 2025) that future research should continue inquire into. Nevertheless, we acknowledge this as a limitation of our review.

Second, as described earlier, the categorisation of studies based on the 'type of remedy', especially when multiple interventions were tested, involved judgement calls. Similarly, we acknowledge that the disciplinary groupings used in the studies are also bound by some subjectivity.

Finally, when analysing the depth of the literature, especially as it relates to examining the efficacy of specific remedies and our synthesis of themes and methodological approaches used in the underlying studies, we used broadly accepted, consensus-based rules regarding the 'hierarchy of evidence'. Meta-analysis and systematic reviews received the largest weight followed by RCTs and other forms of empirical evidence along a continuum. That said, we do use our own subjective, research expertise when synthesising the evidence including our assessments of the sample size, study contexts and potential generalisability to specific educational contexts. We encourage future research to continue to carefully examine and assess the generalisability of these findings to other contexts.

Discussion and implications for education research and policy

This systematic review was designed to provide both a broad overview of the state of misinformation research across the social sciences and a deeper synthesis of the effectiveness of specific countermeasures developed and tested in fields such as public health, climate science and political communication that could be applied to education. These domains have contended with politically polarising misinformation for years, and their experiences offer valuable insights that could inform future research and practice within the education sector, which is now facing an escalating wave of coordinated misinformation campaigns. Our broad scoping review identified the most prominent remedies that have been tested broadly in several domains. This revealed a striking lack of empirical studies focused on countering the distinctive forms of 'systemic misinformation' currently targeting US public education. At the same time, our deeper review of interventions from adjacent domains points to a potential late-mover advantage: education researchers and stakeholders can now build on a decade of empirical insights from other fields to design and test more strategic, equity-aligned responses.

Several key insights emerge from the interdisciplinary literature on countering misinformation. First, informational remedies – such as fact-checking, corrections and credibility labels – can be effective under certain conditions. However, their impact varies considerably depending on factors such as topic salience, timing of intervention, message framing and audience predispositions. These findings, which we refer to as characteristic of the 'misinformation 1.0' research agenda, catalysed a broader scholarly shift towards more integrated models of belief formation – ones that account for identity, group norms and motivated reasoning (Van Bavel et al, 2021;

2024; Lewandowsky et al, 2023). This evolving 'misinformation 2.0' agenda reflects a more sophisticated understanding of how cognitive, emotional and social dynamics shape individuals' willingness to seek, accept or reject corrective information.

Education researchers should actively engage with and extend this agenda to avoid reinventing the wheel. Instead of relying primarily on educational approaches to dispel misconceptions that have largely focused on students in classrooms, network analyses of how school leaders engage with scientific evidence to counter misinformation spread among parents should be rigorously evaluated. Similarly, learning networks where teachers and leaders share their learnings across multiple schools and districts to support equity-focused pedagogical approaches must be tested by combining the best of informational and social psychological remedies we identified earlier.

Indeed, such an integration of identity-based and social–psychological insights offers a roadmap for more transformative, community-based approaches. Research consistently shows that affirming salient identities, especially those that tend to promote social belonging or expand social status, can increase individuals' receptivity to identity-congruent (mis)information, regardless of its factual basis (Sternisko et al, 2020; Rathje et al, 2023). Rather than viewing this tendency solely as a vulnerability, education leaders might harness these dynamics by engaging trusted parent networks and local communities to reinforce shared values and support evidence-based pedagogical practices. Strategically working within these value systems may offer more traction than confrontational or solely fact-based appeals.

Third, institutional–level remedies – those targeting systems rather than individuals – are arguably the most promising for education, albeit the most challenging to implement and evaluate rigorously. Rather than relying on isolated online experiments focused solely on belief change, future research should prioritise studying how beliefs translate into behavioural shifts, particularly among influential networks of parents, school boards and administrators (Centola, 2018; 2021). Moreover, given the organised and often well-funded nature of misinformation campaigns against public education – many of which originate from the same networks that have long targeted science education or climate change (López and Sleeter, 2023; Fagan, 2024) – piecemeal strategies such as pre-bunking or debunking alone are insufficient. A more comprehensive strategy is required.

Such a strategy might combine: (a) pre-bunking approaches designed to reduce affective polarisation and forewarn audiences about manipulation tactics through strategic messaging (Cook et al, 2017; Lewandowsky et al, 2023); (b) debunking interventions that move beyond simplistic retractions to offer compelling, evidence-based narratives and toolkits about equity-focused teaching practices; and (c) sociopsychological and network-based strategies that affirm social identities and leverage social norms to generate systemic pressure for change. We argue that this integrated approach – what we term a 'misinformation 3.0' agenda – requires interdisciplinary collaboration among psychologists, sociologists, communication scholars and education researchers. The stakes for public education are too high for any discipline to go it alone.

Notes

[1] We were guided by a senior university librarian (who also specialises in education) in our choice of database and search strategies. We started with thorough searches on ERIC

database because although it is an education–related database, it still provides a broad range of social science literature. Given our goals to include interdisciplinary journal articles, and the preponderance of publications related to this topic in psychology journals given that effective strategies to stop the spread of misinformation have psychological roots (Chan et al, 2017; Chan and Albarracín, 2023), we added PsycINFO as well in our search.

[2] The university librarian also provided expert guidance in selecting terms that would be broad enough to provide a substantial selection of articles and specific enough to be relevant to the purpose of our review. This expert guidance was combined with a shortlist of what search terms would be the most appropriate for the purpose of our review, following Chan et al's (2017) systematic review and the search terms that they used. See Table 1 for more specific details.

ORCiD ID
Maithreyi Gopalan https://orcid.org/0000-0002-1013-0672

Contributor statement
Conceptualisation: FL and MG; formal analysis: MG, GD, ES, AS; writing – original draft: MG; writing – review and editing: MG and FL.

Research ethics statement
The authors of this article have declared that research ethics approval was not required since the article does not present or draw directly on data/findings from empirical research.

Conflict of interest
The authors declare that there is no conflict of interest.

AI statement
We used Claude to assist in qualitative coding of the papers and topics addressed in the papers in addition to 4 human coders who are coauthors. We also used Chat GPT and Claude for editing the writing both for adding clarity and scholarly precision. The first author takes complete responsibility for checking plagiarism concerns and using AI as a copilot.

References
Alexander, P. A. (2020) Methodological guidance paper: the art and science of quality systematic reviews, *Review of Educational Research*, 90(1): 6–23. https://doi.org/10.3102/0034654319854352

Aguilar, S.J., Polikoff, M.S. and Sinatra, G.M. (2019) Refutation texts: a new approach to changing public misconceptions about education policy, *Educational Researcher*, 48(5): 263–72, doi: 10.3102/0013189x19849416

Altay, S., Berriche, M., Heuer, H., Farkas, J. and Rathje, S. (2023) A survey of expert views on misinformation: definitions, determinants, solutions, and future of the field, *Harvard Kennedy School Misinformation Review*, doi: 10.37016/mr–2020–119

Bail, C.A., Argyle, L.P., Brown, T.W., Bumpus, J.P., Chen, H., Hunzaker, M.B.F., et al (2018) Exposure to opposing views on social media can increase political polarization, *Proceedings of the National Academy of Sciences of the United States of America*, 115(37): 9216–21, doi: 10.1073/pnas.1804840115

Barzilai, S. and Stadtler, M. (2025) Learning to evaluate (mis)information in an online game: strategies matter! *Computers and Education*, 227: 105210, doi: 10.1016/j. compedu.2024.105210

Barzilai, S., Mor-Hagani, S., Abed, F., Tal-Savir, D., Goldik, N., Talmon, I., et al (2023) *Misinformation Is Contagious*: middle school students learn how to evaluate and share information responsibly through a digital game, *Computers and Education*, 202: 104832, doi: 10.1016/j.compedu.2023.104832

Belfield, C. and Levin, H.M. (2005) Vouchers and public policy: when ideology trumps evidence, *American Journal of Education*, 111(4): 548, doi: 10.1086/431183

Berliner, D.C. and Biddle, B.J. (1996) *The Manufactured Crisis: Myths, Fraud, and the Attack on America's Public Schools*, Basic Books.

Berliner, D.C. and Glass, G.V. (2014) *50 Myths and Lies That Threaten America's Public Schools: The Real Crisis in Education*, Teachers College Press.

Blair, R.A., Gottlieb, J., Nyhan, B., Paler, L., Argote, P. and Stainfield, C.J. (2024) Interventions to counter misinformation: lessons from the Global North and applications to the Global South, *Current Opinion in Psychology*, 55: 101732, doi: 10.1016/j.copsyc.2023.101732

Bode, L. and Vraga, E.K. (2015) In related news, that was wrong: the correction of misinformation through related stories functionality in social media, *Journal of Communication*, 65(4): 619–38, doi: 10.1111/jcom.12166

Bode, L. and Vraga, E.K. (2018) See something, say something: correction of global health misinformation on social media, *Health Communication*, 33(9): Article 9. doi: 10.1080/10410236.2017.1331312

Brashier, N.M., Pennycook, G., Berinsky, A.J. and Rand, D.G. (2021) Timing matters when correcting fake news, *Proceedings of the National Academy of Sciences*, 118(5): e2020043118, doi: 10.1073/pnas.2020043118

Busch, K.C. and Lombardi, D. (2025) Effective strategies for learning and teaching in times of science denial and disinformation, *Journal of Research in Science Teaching*, 62(6): 1417–24, doi: 10.1002/tea.70003

Centola, D. (2018) *How Behavior Spreads: The Science of Complex Contagions* (D. Centola, K.S. Cook and P. Hedström eds), Princeton University Press, doi: 10.2307/j.ctvc7758p

Centola, D. (2021) *Change: How to Make Big Things Happen*, Little, Brown.

Chan, M.P.S. and Albarracín, D. (2023) A meta-analysis of correction effects in science-relevant misinformation, *Nature Human Behaviour*, 7(9): 1514–25, doi: 10.1038/s41562–023–01623–8

Chan, M.P.S., Jones, C.R., Hall Jamieson, K. and Albarracín, D. (2017) Debunking: a meta-analysis of the psychological efficacy of messages countering misinformation, *Psychological Science*, 28(11): 1531–46, doi: 10.1177/0956797617714579

Clark, C.H. and Schmeichel, M. (2024) Can education save us from ourselves? Three psychological challenges to democracy, *Review of Educational Research*, 00346543241288245, doi: 10.3102/00346543241288245

Cook, J., Lewandowsky, S. and Ecker, U.K.H. (2017) Neutralizing misinformation through inoculation: exposing misleading argumentation techniques reduces their influence, *PLOS One*, 12(5): e0175799, doi: 10.1371/journal.pone.0175799

Danielson, R.W., Jacobson, N.G., Patall, E.A., Sinatra, G.M., Adesope, O.O., Kennedy, A.A.U., et al (2024) The effectiveness of refutation text in confronting scientific misconceptions: a meta-analysis, *Educational Psychologist*, doi: 10.1080/00461520.2024.2365628

Dee, T.S. and Penner, E.K. (2017) The causal effects of cultural relevance: evidence from an ethnic studies curriculum, *American Educational Research Journal*, 54(1): 127–66, doi: 10.3102/0002831216677002

DelVicario, M., Bessi, A., Zollo, F., Petroni, F., Scala, A., Caldarelli, G., et al (2016) The spreading of misinformation online, *Proceedings of the National Academy of Sciences*, 113(3): 554–9, doi: 10.1073/pnas.1517441113

Directorate-General for Communications Networks, Content and Technology (European Commission) (2018) *A Multi-Dimensional Approach to Disinformation: Report of the Independent High Level Group on Fake News and Online Disinformation*, Publications Office of the European Union, doi: 10.2759/739290

Ecker, U.K.H., Butler, L.H. and Hamby, A. (2020) You don't have to tell a story! A registered report testing the effectiveness of narrative versus non-narrative misinformation corrections, *Cognitive Research: Principles and Implications*, 5(1): 64, https://doi.org/10.1186/s41235-020-00266-x

Ecker, U.K.H., Lewandowsky, S., Cook, J., Schmid, P., Fazio, L.K., Brashier, N., et al (2022) The psychological drivers of misinformation belief and its resistance to correction, *Nature Reviews Psychology*, 1(1): 13–29, doi: 10.1038/s44159-021-00006-y

Educational Gag Orders (2021) PEN America, https://pen.org/report/educational-gag-orders/.

Fagan, E.J. (2024) *The Rise of Partisan Think Tanks and the Polarization of American Politics*, Oxford University Press.

Ferrero, M., Konstantinidis, E. and Vadillo, M.A. (2020) An attempt to correct erroneous ideas among teacher education students: the effectiveness of refutation texts, *Frontiers in Psychology*, 11: 577738, doi: 10.3389/fpsyg.2020.577738

Fitzgerald, K.G. and Tipton, E. (2023) A knowledge mobilization framework: toward evidence-based statistical communication practices in education research, *Journal of Research on Educational Effectiveness*, 1–21, doi: 10.1080/19345747.2023.2209082

Flynn, D.J., Nyhan, B. and Reifler, J. (2017) The nature and origins of misperceptions: understanding false and unsupported beliefs about politics, *Political Psychology*, 38(S1): 127–50, doi: 10.1111/pops.12394

Geers, M., Swire-Thompson, B., Lorenz-Spreen, P., Herzog, S.M., Kozyreva, A. and Hertwig, R. (2024) The online misinformation engagement framework, *Current Opinion in Psychology*, 55: 101739, doi: 10.1016/j.copsyc.2023.101739

Guess, A., Nagler, J. and Tucker, J. (2019) Less than you think: prevalence and predictors of fake news dissemination on Facebook, *Science Advances*, 5(1): Article 1. doi: 10.1126/sciadv.aau4586

Janmohamed, K., Walter, N., Sangngam, N., Hampsher, S., Nyhan, K., De Choudhury, M., et al (2022) Interventions to mitigate vaping misinformation: a meta-analysis, *Journal of Health Communication*, 27(2): 84–92, doi: 10.1080/10810730.2022.2044941

Jochim, A., Diliberti, M.K., Schwartz, H., Destler, K. and Hill, P. (2023) *Navigating Political Tensions Over Schooling: Findings from the Fall 2022 American School District Panel Survey*, Center on Reinventing Public Education, https://crpe.org/asdp-2023-politics-brief/.

Johansson, P., Enock, F., Hale, S., Vidgen, B., Bereskin, C., Margetts, H. and Bright, J. (2022) How can we combat online misinformation? A systematic overview of current interventions and their efficacy (No. arXiv:2212.11864). arXiv, doi: 10.48550/arXiv.2212.11864

Kahne, J. and Bowyer, B. (2017) Educating for democracy in a partisan age: confronting the challenges of motivated reasoning and misinformation, *American Educational Research Journal*, 54(1): 3–34, doi: 10.3102/0002831216679817

Kendeou, P. and Johnson, V. (2024) The nature of misinformation in education, *Current Opinion in Psychology*, 55: 101734, doi: 10.1016/j.copsyc.2023.101734

Lewandowsky, S., Ecker, U.K.H., Cook, J., Van Der Linden, S., Roozenbeek, J. and Oreskes, N. (2023) Misinformation and the epistemic integrity of democracy, *Current Opinion in Psychology*, 54: 101711, doi: 10.1016/j.copsyc.2023.101711

List, J.A., Ramirez, L.M., Seither, J., Unda, J. and Vallejo, B.H. (2024) Critical thinking and misinformation vulnerability: experimental evidence from Colombia, *PNAS Nexus*, 3: 10pgae361, doi: 10.1093/pnasnexus/pgae361

López, F. and Sleeter, C.E. (2023) *Critical Race Theory and its Critics: Implications for Research and Teaching*, Teachers College Press.

McGrew, S. and Breakstone, J. (2023) Civic online reasoning across the curriculum: developing and testing the efficacy of digital literacy lessons, *AERA Open*, 9: 23328584231176451, doi: 10.1177/23328584231176451

NASEM (2022) *The Future of Education Research at IES: Advancing an Equity-Oriented Science*, National Academies Press, doi: 10.17226/26428

Nyhan, B. and Reifler, J. (2010) When corrections fail: the persistence of political misperceptions, *Political Behavior*, 32(2): 303–30, doi: 10.1007/s11109-010-9112-2

Nyhan, B., Reifler, J., Richey, S. and Freed, G.L. (2014) Effective messages in vaccine promotion: a randomized trial, *Pediatrics*, 133(4): e835–42, doi: 10.1542/peds.2013-2365

Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., et al (2021) The PRISMA 2020 statement: an updated guideline for reporting systematic reviews, *British Medical Journal*, 372: n71. https://doi.org/10.1136/bmj.n71

Pearson, P.D. (2004) The reading wars, *Educational Policy*, 18(1): 216–52, doi: 10.1177/0895904803260041

Pennycook, G. and Fazio, L.K. (eds) (2023) *The Psychology of Misinformation*, vol 54, Current Opinion in Psychology.

Pennycook, G. and Rand, D.G. (2019) Fighting misinformation on social media using crowdsourced judgments of news source quality, *Proceedings of the National Academy of Sciences*, 116(7): 2521–6, doi: 10.1073/pnas.1806781116

Pennycook, G., Bear, A., Collins, E.T. and Rand, D.G. (2020) The implied truth effect: attaching warnings to a subset of fake news headlines increases perceived accuracy of headlines without warnings, *Management Science*, 66(11): Article 11. doi: 10.1287/mnsc.2019.3478

Rathje, S., Roozenbeek, J., Van Bavel, J.J. and Van Der Linden, S. (2023) Accuracy and social motivations shape judgements of (mis) information, *Nature Human Behaviour*, 7(6): 892–903, doi: 10.1038/s41562-023-01540-w

Rau, M.A. and Premo, A.E. (2025) Systematic review of educational approaches to misinformation, *Educational Psychology Review*, 37(2): 43, doi: 10.1007/s10648-025-10012-8

Roozenbeek, J., van der Linden, S. and Nygren, T. (2020) Prebunking interventions based on 'inoculation' theory can reduce susceptibility to misinformation across cultures, *Harvard Kennedy School Misinformation Review*, 1(2), doi: 10.37016//mr-2020-008

Schneider, J. and Berkshire, J. (2020) *A Wolf at the Schoolhouse Door: The Dismantling of Public Education and the Future of School*, The New Press.

Shapiro, J.N. and Norton, S. (2024) Why scholars should stop studying 'misinformation', *The Chronicle of Higher Education*, https://www.chronicle.com/article/why-scholars-should-stop-studying-misinformation.

Song, M. and Herman, R. (2010) Critical issues and common pitfalls in designing and conducting impact studies in education: lessons learned from the what works clearinghouse (phase I), *Educational Evaluation and Policy Analysis*, 32(3): 351–71, doi: 10.3102/0162373710373389

Stahl, B.C. (2006) On the difference or equality of information, misinformation, and disinformation: a critical research perspective, *Informing Science: The International Journal of an Emerging Transdiscipline*, 9: 083–96. doi: 10.28945/473

Sternisko, A., Cichocka, A. and Van Bavel, J.J. (2020) The dark side of social movements: social identity, non-conformity, and the lure of conspiracy theories, *Current Opinion in Psychology*, 35: 1–6, doi: 10.1016/j.copsyc.2020.02.007

Toomey, A. (2025) Address science misinformation not by repeating the facts, but by building conversation and community, *The Conversation*, http://theconversation.com/address-science-misinformation-not-by-repeating-the-facts-but-by-building-conversation-and-community-249121.

Van Bavel, J.J., Harris, E.A., Pärnamets, P., Rathje, S., Doell, K.C. and Tucker, J.A. (2021) Political psychology in the digital (mis)information age: a model of news belief and sharing, *Social Issues and Policy Review*, 15(1): Article 1. doi: 10.1111/sipr.12077

Van Bavel, J.J., Rathje, S., Vlasceanu, M. and Pretus, C. (2024) Updating the identity-based model of belief: from false belief to the spread of misinformation, *Current Opinion in Psychology*, 56: 101787, doi: 10.1016/j.copsyc.2023.101787

Van Der Linden, S., Lewandowsky, S. and Oreskes, N. (2024) Misinformation is real, and scholars need to study it, *The Chronicle of Higher Education*, https://www.chronicle.com/article/misinformation-is-real-and-scholars-need-to-study-it.

van der Meer, T.G.L.A. and Jin, Y. (2020) Seeking formula for misinformation treatment in public health crises: the effects of corrective information type and source, *Health Communication*, 35(5): 560–75, doi: 10.1080/10410236.2019.1573295

Vosoughi, S., Roy, D. and Aral, S. (2018) The spread of true and false news online, *Science*, 359(6380): 1146–51, doi: 10.1126/science.aap9559

Vraga, E.K. and Bode, L. (2017) Using expert sources to correct health misinformation in social media, *Science Communication*, 39(5): 621–45, doi: 10.1177/1075547017731776

Vraga, E.K. and Bode, L. (2020) Defining misinformation and understanding its bounded nature: using expertise and evidence for describing misinformation, *Political Communication*, 37(1): Article 1. doi: 10.1080/10584609.2020.1716500

Walter, N. and Murphy, S.T. (2018) How to unring the bell: a meta-analytic approach to correction of misinformation, *Communication Monographs*, 85(3): 423–41, doi: 10.1080/03637751.2018.1467564

Walter, N. and Tukachinsky, R. (2019) A meta-analytic examination of the continued influence of misinformation in the face of correction: how powerful is it, why does it happen, and how to stop it? *Communication Faculty Articles and Research*, doi: 10.1177/0093650219854600

Walter, N., Cohen, J., Holbert, R.L. and Morag, Y. (2019) Fact-checking: a meta-analysis of what works and for whom, *Political Communication*, doi: 10.1080/10584609.2019.1668894

Walter, N., Brooks, J.J., Saucier, C.J. and Suresh, S. (2021) Evaluating the impact of attempts to correct health misinformation on social media: a meta-analysis, *Health Communication*, 36(13): 1776–84, doi: 10.1080/10410236.2020.1794553

Wardle, C. and Derakhshan, H. (2017) *Information Disorder: Toward an Interdisciplinary Framework for Research and Policymaking*, Council of Europe, https://shorensteincenter.org/information-disorder-framework-for-research-and-policymaking/.

White, R.S. (2025) Superintendents' beliefs about and engagement in state education policy making, *Educational Policy*, 08959048251329324, doi: 10.1177/08959048251329324