University of St Andrews

LAIDLAW SCHOLARS

Strategies to Reduce Vaccine Hesitancy

A Systematic Scoping Review of Strategies to Reduce Vaccine Hesitancy: Exploring Their Impact on Public Trust and Attitudinal Change.

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INTRODUCTION

The World Health Organization lists vaccine hesitancy as one of the top ten global health threats (19). Measles, once eliminated in the United States, has resurged with over 1,000 cases reported by May 2025 (20). In Europe, more than 127,000 measles cases were recorded in 2024 due to falling immunisation coverage (21). While a growing body of research has examined strategies to address hesitancy, findings remain fragmented, with trust often overlooked as a central outcome.

OBJECTIVES

To map the range of strategies that have been implemented to reduce vaccine hesitancy.

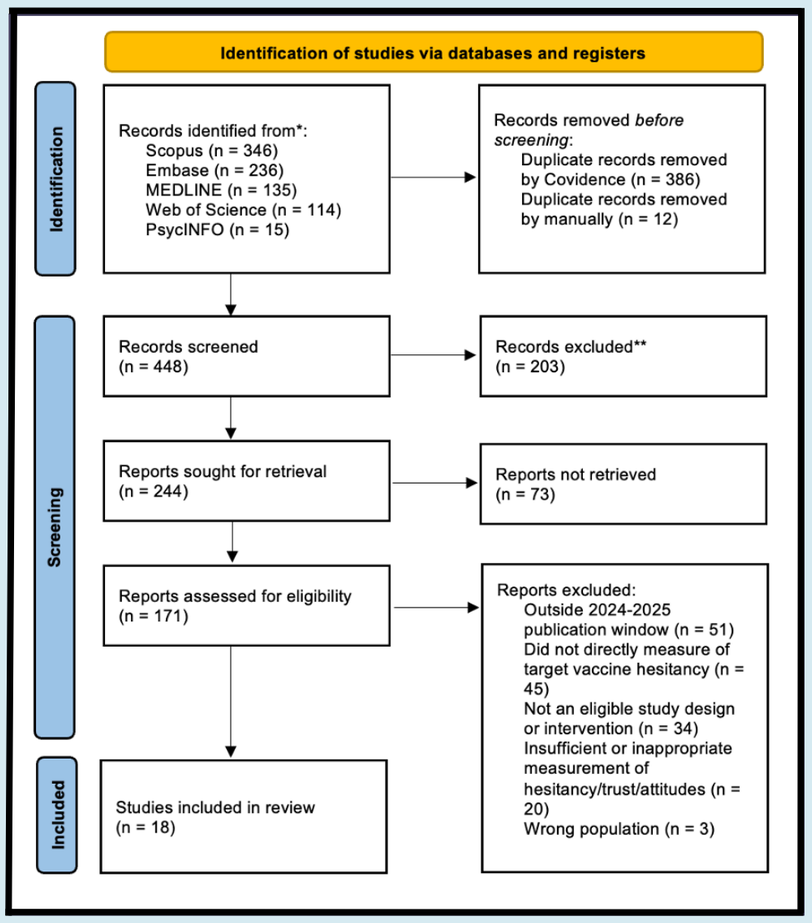
To examine the impact of these strategies on vaccine hesitancy, public trust and attitudinal outcomes.

To identify knowledge gaps and provide evidence-based insights that can inform policymakers, public health practitioners, and future intervention efforts.

METHODS

1. **The review followed PRISMA-ScR and JBI guidance, with input from a second reader and supervisor.**
2. **Searches were conducted in June 2025 across Scopus, Embase, MEDLINE, Web of Science, and PsycINFO.**
3. **Eligible studies were RCTs from 2024–2025 focusing on vaccine hesitancy, confidence, or trust in the general public.**
4. **Records were managed in Covidence, where duplicates were removed and two reviewers independently screened all titles, abstracts, and full texts.**
5. **Data were extracted into Excel by two reviewers, covering study characteristics, interventions, and outcomes, then merged into a single dataset.**
6. **Quality was assessed with the JBI RCT tool, with reviewers' assessments combined into one summary.**
7. **Results were synthesised narratively and grouped by intervention type, mapping effects on hesitancy, trust, and attitudes.**

PRIMSA CHART



Study	Intervention	Hesitancy	Trust	Attitudes
Abroms et al. (2024) (1)	Social media	No change	No change	Moderate Positive ↑
Al-Maghaireh et al. (2024) (2)	Message framing	High ↓	Significant ↑	Positive ↑
Atif et al. (2024) (3)	Message framing	No change	N/A	Moderate Positive ↑
Béchard et al. (2024) (4)	Message framing	No change	No change	Moderate ↑ (pro-vaccine only)
Byerley et al. (2024) (5)	Educational intervention	Moderate ↓	Significant ↑	Positive ↑
Carlson et al. (2025) (6)	Information exposure	High ↑	No change	Positive ↑
Cotter et al. (2025) (7)	Message framing	Moderate ↓ (conservatives)	Confidence ↑ (conservatives)	Moderate ↑ (conservatives)
Flusberg et al. (2024) (8)	Message framing	Small ↓	No change	Positive ↑
Islam et al. (2024)(9)	Ambassador outreach	Small ↓	No change	No change
Jibril et al. (2024) (10)	Educational intervention	High ↓	Confidence ↑	Positive ↑
Li et al. (2024) (11)	Artificial intelligence	Moderate ↓ (misbeliefs only)	N/A	Mixed (slight ↑ low-belief; backfire high-belief)
Lu (2025) (12)	Storytelling	Moderate ↓ (resistant/neutral)	Confidence ↑ (resistant/neutral)	Positive ↑ (less conspiracy belief)
Mancuso et al. (2025) (13)	Educational intervention	Moderate ↓	High ↑ (esp. conservatives)	Positive ↑ (expertise/hope ↑; fear unchanged)
Qin et al. (2024) (14)	Storytelling	No change	N/A	HPV-specific ↑; General: No change
Redd et al. (2024) (15)	Message framing	High ↑ (backfire; abstract framing)	N/A	Backfire (gender effects)
Shi et al. (2024) (16)	Message framing	Moderate ↓ (low-hesitant only)	Small ↑	No change
Yorulmaz-Demir & Kocoglu-Tanyer (2025) (17)	Educational intervention	Indirect ↓	N/A	Positive ↑ (advocacy/literacy ↑)
Yuan et al. (2025) (18)	Affective priming	No change	Small ↑ (info accuracy; safety worry ↓)	Mixed (distress indirectly ↓ acceptance)

RESULTS

Intervention results on hesitancy and trust/attitudes are summarised in the table on the right.

Eighteen RCTs with a combined sample of 20,350 participants were included. The most common intervention was message framing (7 studies), followed by educational programmes (4), digital tools (4), storytelling (2), and single studies on social media engagement, community ambassador outreach, AI-based misbelief correction, and affective priming.

Educational programmes and digital tools consistently reduced hesitancy and improved confidence. Message framing produced mixed results. Autonomy-affirming messages built trust in some groups, while loss framing sometimes increased hesitancy. Storytelling interventions were particularly effective among hesitant or resistant subgroups, whereas ambassador outreach and social media had only limited impact. Emerging approaches such as AI-generated corrections and affective priming showed early promise but require further testing.

CRITICAL APPRIASAL

The overall quality of evidence was mixed. Randomisation and baseline comparability were generally strong, but blinding of participants, intervention deliverers, and outcome assessors was often weak or unclear. Most outcomes relied on self-reported attitudes, which may introduce bias.

DISCUSSION

No intervention achieved both reduced hesitancy and higher uptake, showing a gap between attitudes and behaviour. Trust improved most with empathetic, culturally sensitive approaches like storytelling or autonomy-affirming messages, highlighting the role of credibility and cultural identity in vaccine communication.

GAPS & NEXT STEPS

Future studies should use standardised definitions and measures of vaccine hesitancy.

Research should include longer follow-up periods to test durability of interventions.

Greater focus is needed on low- and middle-income countries, where barriers are highest.

Clearer reporting and methodological transparency are essential.

Combining digital and AI-driven strategies with trust-building dialogue is a key area for innovation.

CONCLUSION

The most effective strategies to reduce vaccine hesitancy combine clear education with cultural sensitivity and trust-building dialogue. Digital and AI tools offer promise, but they cannot replace the human dimension of trust. Lasting success in immunisation depends not only on uptake, but on building sustained confidence in vaccines and the institutions that provide them.

References & full paper

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