

Yes, **inoculation theory** can be used to **prepare audiences to resist misinformation** by preemptively exposing them to weakened forms of misleading arguments and teaching them how to recognize and refute manipulative techniques.

## 1. Introduction

Inoculation theory, originally developed in the 1960s, is a psychological framework that likens resistance to persuasion to the way vaccines build immunity to viruses. By exposing individuals to a "weakened dose" of misinformation—such as common manipulation techniques or misleading arguments—along with refutations, audiences develop cognitive "antibodies" that help them recognize and resist future misinformation (Traberg et al., 2022; Lewandowsky & Van Der Linden, 2021; Roozenbeek et al., 2022; Van Der Linden, 2023; Lu et al., 2023; Roozenbeek et al., 2022; Basol et al., 2020; Van Der Linden et al., 2017). Recent research demonstrates that inoculation interventions, including games, videos, and narrative-based messages, can significantly improve people's ability to spot misinformation, reduce its perceived credibility, and decrease the likelihood of sharing false content (Roozenbeek et al., 2022; Lu et al., 2023; Roozenbeek et al., 2022; Basol et al., 2020; Hu et al., 2023; Neylan et al., 2023; Biddlestone et al., 2022). These effects are robust across various topics (e.g., health, climate change, politics), delivery formats (active vs. passive), and populations, though their longevity and scalability can vary (Maertens et al., 2020; Maertens et al., 2025; Maertens et al., 2020; Green et al., 2022; McPhedran et al., 2023; Jiang et al., 2022; Piltch-Loeb et al., 2021; Trecek-King & Cook, 2024; Hopkins et al., 2023; Traberg et al., 2024; Linden & Roozenbeek, 2020; Roozenbeek et al., 2020; Biddlestone et al., 2025; Van Der Linden et al., 2017). Inoculation is now widely recognized as a promising, scalable, and cost-effective strategy for building societal resilience against misinformation.

## 2. Methods

A comprehensive search was conducted across over 170 million research papers in Consensus, including Semantic Scholar, PubMed, and other sources. The search targeted inoculation theory, psychological resistance, misinformation, prebunking, and related interventions. In total, 1,010 papers were identified, 489 were screened, 354 were deemed eligible, and the top 50 most relevant papers were included in this review.

## Search Strategy

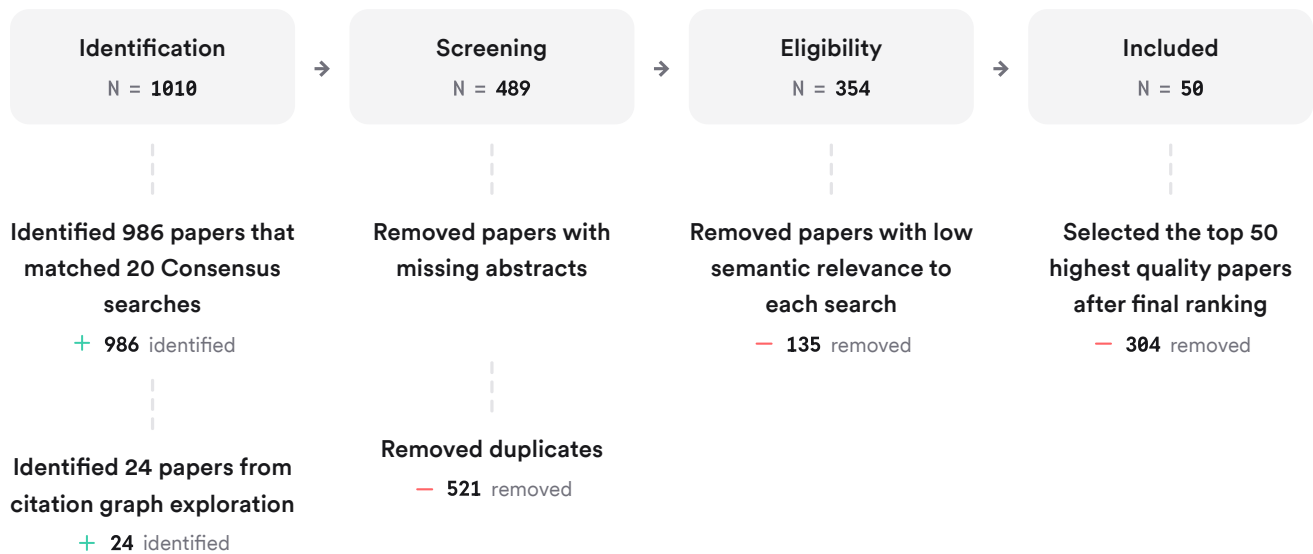


FIGURE 1 Flow diagram of the literature search and selection process.

Eight unique search strategies were used, covering foundational theory, mechanisms, delivery formats, critiques, interdisciplinary expansion, and audience/contextual factors.

## 3. Results

### 3.1 Core Mechanisms of Inoculation

Inoculation interventions typically include two components: (1) a forewarning of an impending persuasive attack (threat), and (2) exposure to weakened arguments or manipulative techniques, along with refutations (refutational preemption) (Traberg et al., 2022; Lewandowsky & Van Der Linden, 2021; Van Der Linden, 2023; Roozenbeek et al., 2022; Green et al., 2022; Van Der Linden et al., 2017; Compton et al., 2016). This process motivates individuals to generate counterarguments and increases their resistance to future misinformation.

### 3.2 Formats and Delivery Methods

Inoculation can be delivered through various formats:

- **Passive:** Audiences receive information about manipulation techniques and refutations (e.g., videos, infographics) (Roozenbeek et al., 2022; Lu et al., 2023; Roozenbeek et al., 2022; Green et al., 2022; Basol et al., 2020; Piltch-Loeb et al., 2021; Hu et al., 2023; Biddlestone et al., 2025; Neylan et al., 2023).
- **Active:** Audiences actively engage in generating counterarguments or identifying misinformation (e.g., games like "Bad News," interactive workshops) (Roozenbeek et al., 2022; Basol et al., 2020; Trecek-King & Cook, 2024; Hu et al., 2023; Hopkins et al., 2023; Linden & Roozenbeek, 2020; Roozenbeek et al., 2020; Neylan et al., 2023).
- **Experiential:** Audiences are misled and then debriefed, enhancing learning through experience (Trecek-King & Cook, 2024).

Active and experiential formats often yield stronger and longer-lasting effects than passive ones (Green et al., 2022; Trecek-King & Cook, 2024; Hu et al., 2023; Hopkins et al., 2023).

### 3.3 Effectiveness and Longevity

Meta-analyses and large-scale studies show that inoculation interventions:

- Reduce the perceived credibility and sharing of misinformation (Roozenbeek et al., 2022; Lu et al., 2023; Roozenbeek et al., 2022; Basol et al., 2020; Hu et al., 2023; Buczel et al., 2022; Neylan et al., 2023; Biddlestone et al., 2022).
- Improve the ability to discern trustworthy from untrustworthy content (Roozenbeek et al., 2022; Lu et al., 2023; Roozenbeek et al., 2022; Basol et al., 2020; Hu et al., 2023; Buczel et al., 2022; Neylan et al., 2023; Biddlestone et al., 2022).
- Are effective across topics (health, climate, politics), delivery formats, and populations (Roozenbeek et al., 2022; Maertens et al., 2020; Green et al., 2022; McPhedran et al., 2023; Jiang et al., 2022; Piltch-Loeb et al., 2021; Trecek-King & Cook, 2024; Hopkins et al., 2023; Traberg et al., 2024; Linden & Roozenbeek, 2020; Roozenbeek et al., 2020; Biddlestone et al., 2025; Van Der Linden et al., 2017).
- Effects can last from weeks to months, but may decay over time without booster interventions (Maertens et al., 2020; Maertens et al., 2025; Maertens et al., 2020; Green et al., 2022; Basol et al., 2020; Hu et al., 2023; Hopkins et al., 2023; Biddlestone et al., 2025).

### 3.4 Limitations and Challenges

Challenges include:

- **Scalability:** Passive interventions (e.g., short videos) are more scalable but may be less effective than active ones (Roozenbeek et al., 2022; Lu et al., 2023; Roozenbeek et al., 2022; Johnson & Madsen, 2024; Green et al., 2022; Basol et al., 2020; Hu et al., 2023; Hopkins et al., 2023; Biddlestone et al., 2025; Neylan et al., 2023).
- **Engagement:** Some audiences may be hesitant to engage with inoculation interventions, especially if they perceive themselves as less vulnerable to misinformation or distrust the source (Johnson & Madsen, 2024; Harjani et al., 2023).
- **Cultural and contextual adaptation:** Effectiveness can vary across cultures and platforms, requiring tailored approaches (Hopkins et al., 2023; Traberg et al., 2024; Bessarabova et al., 2024; Harjani et al., 2023).
- **Decay of effects:** Without reinforcement, the protective effects of inoculation may diminish over time (Maertens et al., 2020; Maertens et al., 2025; Maertens et al., 2020; Green et al., 2022; Basol et al., 2020; Hu et al., 2023; Hopkins et al., 2023; Biddlestone et al., 2025).

## Key Papers

Paper	Intervention Type	Sample/Setting	Key Results
(Roozenbeek et al., 2022)	Video-based, passive	6 RCTs + 1 field (n=29,096)	Videos improved recognition of manipulation, discernment, and sharing decisions
(Basol et al., 2020)	Game-based, active	RCT (n=196)	"Bad News" game improved ability to spot misinformation and boosted confidence
(Lu et al., 2023)	Meta-analysis	42 studies, 42,530 subjects	Inoculation reduced misinformation credibility, improved discernment, and sharing of real info
(Roozenbeek et al., 2022)	Game-based, technique	2 experiments (n=2,188)	Technique-based inoculation reduced susceptibility to real-world misinformation
(Maertens et al., 2020)	Game-based, longitudinal	3 experiments	Inoculation effects can last up to 3 months, but may decay without reinforcement

**FIGURE 2** Comparison of key studies on inoculation theory and misinformation resistance.

## Top Contributors

Type	Name	Papers
Author	Jon Roozenbeek	(Traberg et al., 2022; Roozenbeek et al., 2022; Maertens et al., 2020; Roozenbeek et al., 2022; Basol et al., 2020; Pilditch et al., 2022; Hopkins et al., 2023; Traberg et al., 2024; Linden & Roozenbeek, 2020; Roozenbeek et al., 2020; Biddlestone et al., 2025; Neylan et al., 2023; Harrop et al., 2023; Van Der Linden et al., 2017; Harjani et al., 2023; Biddlestone et al., 2022)
Author	S. van der Linden	(Traberg et al., 2022; Lewandowsky & Van Der Linden, 2021; Roozenbeek et al., 2022; Maertens et al., 2020; Van Der Linden, 2023; Lu et al., 2023; Roozenbeek et al., 2022; Maertens et al., 2025; Maertens et al., 2020; Green et al., 2022; Basol et al., 2020; Jiang et al., 2022; Piltch-Loeb et al., 2021; Pilditch et al., 2022; Hopkins et al., 2023; Traberg et al., 2024; Linden & Roozenbeek, 2020; Roozenbeek et al., 2020; Biddlestone et al., 2025; Neylan et al., 2023; Harrop et al., 2023; Van Der Linden et al., 2017; Harjani et al., 2023; Biddlestone et al., 2022)
Author	R. Maertens	(Maertens et al., 2020; Roozenbeek et al., 2020)
Journal	<i>Science Advances</i>	(Roozenbeek et al., 2022)
Journal	<i>Journal of Cognition</i>	(Basol et al., 2020)
Journal	<i>Royal Society Open Science</i>	(Roozenbeek et al., 2022; Johnson & Madsen, 2024; Pilditch et al., 2022)

FIGURE 3 Authors & journals that appeared most frequently in the included papers.

## 4. Discussion

The evidence strongly supports the use of inoculation theory as a proactive, scalable, and effective strategy for preparing audiences to resist misinformation (Traberg et al., 2022; Lewandowsky & Van Der Linden, 2021; Roozenbeek et al., 2022; Van Der Linden, 2023; Lu et al., 2023; Roozenbeek et al., 2022; Basol et al., 2020; Van Der Linden et al., 2017; Compton et al., 2016). By forewarning individuals and exposing them to weakened forms of manipulative techniques, inoculation interventions foster critical thinking, increase skepticism toward misleading content, and reduce the likelihood of misinformation spreading (Roozenbeek et al., 2022; Lu et al., 2023; Roozenbeek et al., 2022; Basol et al., 2020; Hu et al., 2023; Buczel et al., 2022; Neylan et al., 2023; Biddlestone et al., 2022). Active and experiential formats, such as games and interactive workshops, tend to produce stronger and longer-lasting effects than passive formats, though passive interventions are more scalable (Green et al., 2022; Trecek-King & Cook, 2024; Hu et al., 2023; Hopkins et al., 2023; Biddlestone et al., 2025).

However, challenges remain in scaling interventions, maintaining long-term effects, and adapting strategies to diverse audiences and cultural contexts (Maertens et al., 2020; Maertens et al., 2025; Johnson & Madsen, 2024; Maertens et al., 2020; Green et al., 2022; Basol et al., 2020; Hu et al., 2023; Hopkins et al., 2023; Traberg et al., 2024; Bessarabova et al., 2024; Biddlestone et al., 2025; Harjani et al., 2023). Engagement and trust in the source of inoculation messages are also critical for success (Johnson & Madsen, 2024; Harjani et al., 2023). Booster interventions and integration with media literacy programs may help sustain and amplify the protective effects (Maertens et al., 2025; Lahiri, 2024; Trecek-King & Cook, 2024; Hopkins et al., 2023; Biddlestone et al., 2025).

## Claims and Evidence Table







Claim	Evidence Strength	Reasoning	Papers
Inoculation theory interventions reduce susceptibility to misinformation	 Strong	Robust evidence from RCTs, meta-analyses, and field studies	(Traberg et al., 2022; Lewandowsky & Van Der Linden, 2021; Roozenbeek et al., 2022; Maertens et al., 2020; Van Der Linden, 2023; Lu et al., 2023; Roozenbeek et al., 2022; Basol et al., 2020; Van Der Linden et al., 2017; Compton et al., 2016)
Active and experiential inoculation formats are most effective	 Strong	Games and interactive activities yield stronger, longer-lasting effects	(Roozenbeek et al., 2022; Green et al., 2022; Basol et al., 2020; Trecek-King & Cook, 2024; Hu et al., 2023; Hopkins et al., 2023; Linden & Roozenbeek, 2020; Roozenbeek et al., 2020; Biddlestone et al., 2025)
Inoculation effects can last weeks to months, but may decay	 Strong	Longitudinal studies show effects persist but diminish without reinforcement	(Maertens et al., 2020; Maertens et al., 2025; Maertens et al., 2020; Green et al., 2022; Basol et al., 2020; Hu et al., 2023; Hopkins et al., 2023; Biddlestone et al., 2025)
Passive, scalable interventions (e.g., videos) are effective but less durable	 Moderate	Short videos and infographics improve resistance, but effects may be weaker	(Roozenbeek et al., 2022; Lu et al., 2023; Roozenbeek et al., 2022; Green et al., 2022; Basol et al., 2020; Piltch-Loeb et al., 2021; Hu et al., 2023; Biddlestone et al., 2025; Neylan et al., 2023)
Engagement and trust in the source are critical for success	 Moderate	Hesitancy and distrust reduce willingness to engage with interventions	(Johnson & Madsen, 2024; Harjani et al., 2023)
Cultural/contextual adaptation is needed for global effectiveness	 Moderate	Effectiveness varies across cultures and platforms	(Hopkins et al., 2023; Traberg et al., 2024; Bessarabova et al., 2024; Harjani et al., 2023)

FIGURE Key claims and support evidence identified in these papers.

## 5. Conclusion

Inoculation theory provides a robust, evidence-based framework for preparing audiences to resist misinformation. By preemptively exposing people to weakened forms of manipulative techniques and teaching them how to refute them, inoculation interventions can significantly reduce susceptibility to misinformation, improve discernment, and decrease the spread of false content. The most effective interventions are active, engaging, and tailored to the audience, but scalable passive formats also show promise.

### 5.1 Research Gaps

Despite strong evidence, gaps remain in understanding the long-term durability of inoculation effects, optimal delivery formats for diverse populations, and strategies for scaling interventions globally. More research is needed on booster interventions, cultural adaptation, and integration with other media literacy efforts.

#### Research Gaps Matrix

Topic / Attribute	Active (Games)	Passive (Videos)	Experiential	Booster/Long-term	Cross-cultural
Misinformation resistance	12	10	4	3	2
Discernment improvement	8	7	2	2	1
Sharing reduction	7	6	2	1	1
Engagement/hesitancy	3	4	1	1	1
Cultural adaptation	2	2	1	GAP	2

FIGURE Matrix showing research coverage by topic and study attribute; gaps indicate areas for future research.

### 5.2 Open Research Questions

Future research should address how to sustain inoculation effects over time, optimize interventions for different audiences, and integrate inoculation with broader media literacy and digital resilience strategies.



Question	Why
How can booster interventions be designed to sustain inoculation effects against misinformation over the long term?	Effects decay over time; boosters may help maintain resistance.
What are the most effective formats for delivering inoculation interventions to diverse and global audiences?	Scalability and cultural adaptation are key for global impact.
How can inoculation theory be integrated with media literacy and fact-checking programs for maximal resilience?	Combining approaches may yield synergistic benefits for misinformation resistance.

FIGURE Open research questions for future investigation into inoculation theory and misinformation resistance.

In summary, inoculation theory offers a powerful, evidence-based approach to preparing audiences to resist misinformation, but ongoing research is needed to optimize, scale, and sustain its effects across diverse contexts.

*These papers were sourced and synthesized using Consensus, an AI-powered search engine for research. Try it at <https://consensus.app>*

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