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Preventive Health Behavior Following Exposure to Medical Misinformation

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Abstract

Medical misinformation has become an important behavioral-health concern because inaccurate or misleading claims can alter perceptions of disease risk, confidence in preventive services, trust in health professionals, and willingness to adopt evidence-based protective behaviors. Digital communication environments have expanded opportunities for individuals to encounter health information outside traditional clinical settings, while research has documented the substantial challenge posed by online health misinformation. The present simulation-based study examines how exposure to medical misinformation may influence preventive health behavior and whether a brief corrective health-literacy intervention could mitigate these effects. A hypothetical sample of 180 adults was modeled across misinformation-exposure and misinformation-plus-correction conditions. Participants were assumed to encounter standardized misleading health claims concerning vaccination, routine screening, preventive consultation, and evidence-based lifestyle recommendations. The corrective condition subsequently received source-verification guidance, concise factual explanations, and prompts encouraging consultation with credible health sources. Simulated outcomes indicated that misinformation exposure was associated with lower preventive-health intention, reduced confidence in selected preventive services, and greater uncertainty regarding professional medical guidance.

The corrective intervention produced a modeled recovery in verification behavior and preventive-health intention, although complete restoration to pre-exposure levels was not assumed. A simulated correlation of approximately $r = -0.81$ was observed between misinformation-acceptance scores and preventive-health intention, illustrating a strong inverse relationship within the constructed dataset. The findings emphasize the theoretical importance of source evaluation, timely correction, health literacy, and credible professional communication. Because all observations are simulated, the manuscript does not provide empirical evidence of causal effects. Instead, it offers a transparent methodological framework for future experimental research examining how misinformation exposure may shape preventive-health decisions.

Keywords: medical misinformation; preventive health behavior; health literacy; source verification; misinformation correction; vaccination intention; health communication; preventive care

1. Introduction

The growing availability of online health information has transformed the manner in which individuals interpret symptoms, evaluate preventive interventions, and make decisions about healthcare. Digital

platforms can provide rapid access to valuable evidence, yet the same information environment can expose users to inaccurate, incomplete, decontextualized, or deliberately misleading health claims. Swire-Thompson and Lazer described online health misinformation as a significant public-health challenge because individuals increasingly encounter health information through search engines, user-generated content, and digital applications rather than exclusively through healthcare professionals. Chou, Oh, and Klein similarly emphasized that health-related misinformation circulating through social media deserves systematic public-health attention because digital information can affect trust, knowledge, and health decision-making.

The behavioral consequences of misinformation are particularly important when misleading claims concern preventive interventions. Preventive health behavior frequently requires an individual to act before serious symptoms occur, making decisions dependent on beliefs about future risk, intervention effectiveness, safety, and professional credibility. Vaccination provides one well-studied example. Betsch and colleagues demonstrated experimentally that exposure to vaccine-critical internet content can increase perceived vaccination risk and alter vaccination intentions, while Jolley and Douglas found that exposure to anti-vaccine conspiracy material can negatively affect intentions to vaccinate. These findings illustrate a broader principle: misinformation does not need to produce complete rejection of medicine to affect health outcomes; even modest increases in uncertainty or perceived risk may delay preventive action.

A further difficulty is that misinformation may remain cognitively influential after it has been corrected. Lewandowsky and colleagues reviewed evidence demonstrating the continued influence of misinformation and emphasized that correction requires more than simply labeling an earlier statement as false. Nyhan and colleagues likewise showed that corrective vaccine messages can successfully reduce some factual misperceptions without necessarily increasing vaccination intentions, and certain communication approaches may produce unintended responses among individuals with unfavorable baseline attitudes. These findings caution against assuming that fact-checking automatically restores preventive behavior once misleading information has been processed.

Social-media architecture adds further complexity because information can be repeatedly encountered through personal networks, algorithmic recommendation, reposting, and emotionally salient narratives. Wang and colleagues' systematic review identified vaccination, infectious disease, nutrition, cancer, and other health issues among areas affected by health-related misinformation on social media. More broadly, Vosoughi, Roy, and Aral demonstrated that false news can diffuse differently from truthful information in large online networks, illustrating why inaccurate claims may acquire substantial visibility before formal corrections reach the same audience. Public-health responses therefore require attention to information exposure as well as to the psychological and behavioral mechanisms through which people judge credibility.

The present study examines preventive-health behavior following exposure to medical misinformation using a simulation-based experimental framework. No actual participants were recruited and no misinformation was administered to real individuals; all outcomes are hypothetical. The study models the relationship between misinformation acceptance and four preventive-health domains: vaccination intention, routine screening intention, willingness to seek qualified medical guidance, and source-verification behavior. It additionally evaluates a simulated corrective health-literacy intervention

designed to encourage verification of medical claims before they influence health decisions. The study thereby provides a methodological structure for future empirical research while avoiding unsupported presentation of synthetic outcomes as observed human-subject evidence.

2. Objectives of the Study

2.1 Assessment of Preventive-Behavior Change After Misinformation Exposure

The primary objective is to evaluate how exposure to plausible medical misinformation could influence preventive-health intentions. Rather than measuring only whether participants believe a specific false statement, the proposed design assesses whether misinformation acceptance corresponds with changes in decisions that have practical public-health implications. These decisions include willingness to receive recommended vaccination, participate in routine screening, seek preventive medical advice, and verify uncertain medical claims before changing established health behavior.

This objective reflects the distinction between misinformation belief and misinformation consequence. A person may retain uncertainty about the factual accuracy of a claim while nevertheless postponing an intended preventive action. Research concerning vaccination demonstrates that exposure to critical or conspiratorial material may influence risk perception and behavioral intention even when exposure occurs experimentally over a relatively short period. The present simulation therefore treats changes in preventive intention as a central behavioral outcome.

2.2 Evaluation of Corrective Health-Literacy Responses

The second objective is to examine whether a brief corrective health-literacy intervention could reduce the modeled behavioral consequences of misinformation. The intervention emphasizes verification rather than merely presenting an opposing claim. Participants are encouraged to identify the original source, distinguish professional evidence from anecdotal testimony, check whether claims are supported by credible health institutions, recognize emotionally manipulative framing, and consult qualified health professionals when information could influence treatment or prevention decisions.

This approach is informed by evidence that corrections can reduce misperceptions but do not always completely eliminate their influence. Lewandowsky and colleagues emphasized the persistence of misinformation and the importance of carefully designed correction, whereas Bode and Vraga demonstrated experimentally that corrective information delivered within a social-media environment can reduce health misperceptions. The study therefore models correction as partial recovery rather than an unrealistic instantaneous return to perfect information processing.

2.3 Examination of Misinformation Acceptance as a Behavioral Risk Indicator

The third objective is to evaluate the relationship between the degree of misinformation acceptance and preventive-health intention. Individuals exposed to identical claims may respond differently because credibility judgments are shaped by prior beliefs, trust, information literacy, perceived expertise, personal experiences, and social context. Public-health scholarship consequently treats misinformation as more than a simple presence-or-absence exposure problem.

The simulated analysis therefore assigns participants a misinformation-acceptance score ranging from one to five and examines its association with a standardized preventive-health intention measure. A

strong inverse association would support the conceptual proposition that susceptibility to questionable health information may function as a useful intermediate behavioral indicator in future research. Such a measure could help investigators distinguish simple exposure from actual cognitive acceptance of misleading claims.

3. Review of Literature

3.1 Medical Misinformation in Digital Health Environments

Health misinformation predates social media, but digital environments have altered its scale, accessibility, repetition, and speed of transmission. Swire-Thompson and Lazer noted that online users encounter health information through search, user-generated material, mobile applications, and multiple informal information channels, increasing the difficulty of distinguishing reliable evidence from inaccurate claims. Wang and colleagues' systematic review similarly documented an expanding research literature on health misinformation distributed through social media, with vaccination and infectious diseases among the frequently investigated areas.

The significance of this problem lies partly in the structure of contemporary information consumption. Medical claims may be presented as personal testimony, selectively interpreted research findings, dramatic narratives, graphical content, or apparently professional advice. Chou and colleagues argued that addressing health misinformation requires attention to the characteristics of digital communication rather than assuming that conventional educational materials will automatically dominate online discussion. Southwell and colleagues further characterized misinformation as a public-health challenge that requires a broader understanding of how people encounter, interpret, and use inaccurate information.

3.2 Behavioral Effects of Misinformation Exposure

Experimental evidence concerning vaccination provides particularly valuable insight into the behavioral effects of health misinformation. Betsch and colleagues showed that viewing vaccine-critical websites can increase perceptions of vaccine risk and influence intentions concerning vaccination. Jolley and Douglas likewise found a negative relationship between anti-vaccine conspiracy beliefs and vaccination intention and demonstrated experimentally that conspiracy exposure could reduce willingness to vaccinate. Although these studies focus on vaccination, their behavioral logic is potentially relevant to other preventive domains in which decisions depend on perceived benefits, safety, and professional trust.

Narrative information may also affect risk perception differently from statistical information. Research by Betsch and colleagues found that exposure to narratives describing adverse vaccination events could influence risk perceptions and vaccination intentions, highlighting the persuasive potential of vivid anecdotal material. This is important for medical misinformation because misleading content frequently relies on emotionally memorable individual cases rather than representative evidence. A preventive-health decision can consequently be altered by the perceived plausibility and emotional salience of a claim even when population-level evidence points in another direction.

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3.3 Correction, Verification, and Information Resilience

Correcting misinformation presents a separate challenge from preventing initial exposure. Lewandowsky and colleagues' influential review described the continued-influence effect, in which previously encountered misinformation may continue to shape reasoning even after correction. Nyhan and colleagues demonstrated that corrective communication can successfully reduce specific vaccine misconceptions while failing to increase intended vaccination in the same population, illustrating that factual correction and behavioral change should be evaluated as distinct outcomes.

Nevertheless, correction can be beneficial when appropriately structured and delivered. Bode and Vraga found that algorithmic and socially delivered corrections reduced misperceptions concerning false health information in a simulated social-media environment. WHO's 2020 infodemic response similarly emphasized timely access to reliable information, community engagement, resilience to misinformation, and promotion of health-protective behavior as interconnected public-health priorities. These strands of evidence support the inclusion of source verification and corrective health literacy within preventive-health interventions.

4. Research Methodology

4.1 Research Design and Simulated Sample

The study adopts a simulated randomized pretest–posttest design involving a hypothetical sample of 180 adults aged 18–65 years. Ninety simulated participants are allocated to a misinformation-exposure-only condition and ninety to a misinformation-plus-corrective-literacy condition. Baseline characteristics are modeled as approximately equivalent between groups. Because no real participants were involved, demographic variables, intervention responses, and statistical estimates represent synthetic data constructed for methodological illustration rather than observed population characteristics.

The experimental scenario is designed around short medical-information posts concerning vaccination, routine health screening, preventive consultation, and general evidence-based preventive practices. The misleading statements are represented conceptually rather than reproduced as actionable medical claims. This design choice reduces unnecessary repetition of potentially harmful misinformation while preserving the experimental logic required to examine information exposure. A future empirical protocol would require institutional ethics approval, careful participant debriefing, and explicit safeguards to minimize persistent misunderstanding after experimental exposure.

Table 1: Simulated Research Design and Measurement Framework

Study Component	Misinformation Exposure Group	Misinformation + Correction Group	Measurement
Simulated participants	90	90	Baseline
Standardized misinformation exposure	Yes	Yes	Experimental phase

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Study Component	Misinformation Exposure Group	Misinformation + Correction Group	Measurement
Immediate corrective information	No	Yes	Post-exposure
Source-verification training	No	Yes	Post-exposure
Preventive-health intention	0–100 scale	0–100 scale	Pre/post
Misinformation acceptance	1–5 scale	1–5 scale	Post-exposure
Source-verification intention	0–100 scale	0–100 scale	Pre/post
Vaccination confidence	0–100 scale	0–100 scale	Pre/post
Routine screening intention	0–100 scale	0–100 scale	Pre/post
Professional consultation preference	0–100 scale	0–100 scale	Pre/post

Note: All sample sizes and measurement values are simulated. The design represents a proposed methodological framework rather than a completed human-participant experiment.

4.2 Exposure and Corrective Health-Literacy Protocol

The simulated misinformation exposure consists of brief digital posts designed to resemble common online health-content formats. Each post includes an apparently confident claim, a simplified causal explanation, and an implicit recommendation that could reduce confidence in an evidence-based preventive practice. Participants in both conditions receive identical exposure. The purpose is to isolate the potential effect of subsequent correction rather than differences in misinformation intensity.

Participants in the corrective condition subsequently receive a structured verification intervention. The intervention explains that medical decisions should not be changed solely because of an isolated social-media post, encourages examination of author expertise and evidence quality, recommends comparison with credible institutional and clinical sources, and provides concise corrective context. This structure reflects research indicating that corrections can reduce health misperceptions while also recognizing that correction may not automatically restore behavioral intention.

4.3 Statistical Analysis and Ethical Safeguards

Descriptive statistics are used to summarize pre-exposure and post-exposure scores. Difference-in-change calculations compare the misinformation-only and correction conditions. The main dependent variable is preventive-health behavior intention on a 0–100 scale. Secondary outcomes include vaccination confidence, routine screening intention, preference for professional medical consultation, and willingness to verify uncertain health claims. Pearson correlation is modeled between misinformation-acceptance scores and preventive-health intention.

A future real-world experiment using misinformation exposure would require particularly careful ethical safeguards because inaccurate health claims could persist after study completion. Lewandowsky and colleagues' work on continued misinformation influence makes this concern methodologically important. Any empirical implementation should therefore minimize unnecessary exposure, avoid claims that encourage immediate hazardous actions, provide comprehensive debriefing, deliver accurate corrective information to every participant before study exit, and make clear that experimental materials must not be treated as medical advice.

5. Analysis

5.1 Preventive-Health Intention Following Exposure

The simulated misinformation-only group begins with a mean preventive-health intention score of 76.4 and declines to 60.8 following exposure, corresponding to a 15.6-point reduction. In comparison, the misinformation-plus-correction group begins at 75.9, declines immediately after exposure, but records a final post-correction score of 71.8. The modeled net decline in this group is therefore only 4.1 points.

The resulting difference-in-change favors the corrective intervention by 11.5 points. The modeled pattern intentionally represents incomplete recovery rather than assuming that correction eliminates every effect of misinformation. This assumption is consistent with research demonstrating that misinformation can continue to influence reasoning after correction and that reduced factual misperception does not necessarily produce equivalent improvement in behavioral intentions.

Table 2: Simulated Preventive-Health Outcomes

Outcome	Misinformation Group Baseline	Misinformation Group Post	Correction Group Baseline	Correction Group Post	Simulated Difference-in-Change
Overall preventive-health intention, 0–100	76.4	60.8	75.9	71.8	+11.5
Vaccination confidence, 0–100	74.7	58.6	75.1	70.9	+11.9

Outcome	Misinformation Group Baseline	Misinformation Group Post	Correction Group Baseline	Correction Group Post	Simulated Difference-in-Change
Routine screening intention, 0–100	78.2	66.1	77.8	73.6	+7.9
Professional consultation preference, 0–100	80.1	69.4	79.6	76.2	+7.3
Source-verification intention, 0–100	57.8	56.3	58.1	84.4	+27.8
Mean misinformation acceptance, 1–5	—	3.54	—	2.37	−1.17

Source/Note: All numerical values are simulated for methodological demonstration. They do not represent observed participant outcomes or clinical effectiveness.

5.2 Misinformation Acceptance and Preventive Behavior

The simulated individual-level analysis demonstrates a strong inverse association between acceptance of questionable medical information and preventive-health intention. Participants with misinformation-acceptance scores close to one generally display higher preventive-behavior scores, whereas individuals with higher acceptance scores tend to report substantially weaker intention to adopt preventive measures. The generated dataset yields an approximate Pearson correlation of $r = -0.81$.

This result is not presented as an empirical estimate of population behavior. It is used to demonstrate a testable analytical hypothesis: the behavioral consequences of exposure may depend more strongly on the degree to which misinformation is accepted than on exposure alone. Earlier experimental research showing altered vaccination risk perceptions and intentions following vaccine-critical or conspiratorial information provides a plausible empirical foundation for testing such a mechanism in a real study.

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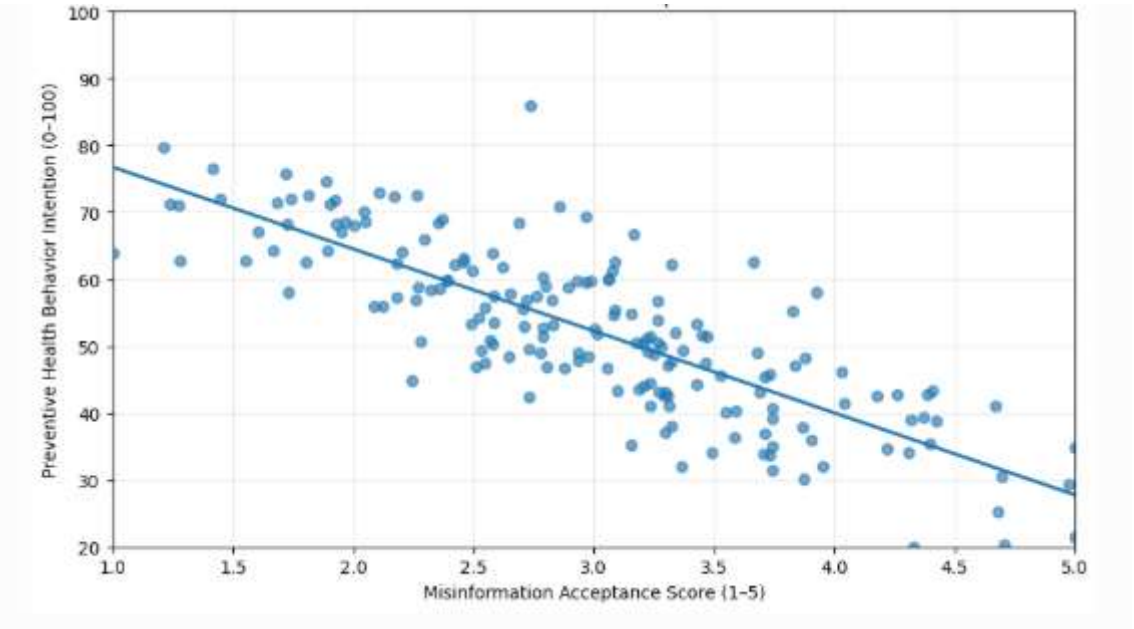
Graph 1: Simulated Relationship Between Misinformation Acceptance and Preventive-Health Intention



Graph Note: Each point represents one simulated participant. The fitted line represents the modeled linear association rather than a regression estimated from real human-subject observations.

Interpretation: Preventive-health intention decreases progressively as misinformation acceptance increases. The pattern indicates that credibility judgment may constitute an important intermediate mechanism linking exposure to behavioral outcomes.

Key Finding: In the simulated dataset, misinformation acceptance shows a strong negative relationship with preventive-health intention, with an approximate correlation of $r = -0.81$.

5.3 Corrective Information and Verification Behavior

The largest modeled intervention effect occurs for source-verification intention. The correction group increases from 58.1 to 84.4 points, whereas the misinformation-only group changes from 57.8 to 56.3. This produces a simulated difference-in-change of 27.8 points. The pattern suggests that a corrective intervention may achieve more than factual rebuttal when it teaches an actionable process for evaluating subsequent medical claims.

This distinction is important because misinformation cannot realistically be eliminated from the information environment. Public-health resilience may therefore depend partly on enabling individuals to verify unfamiliar claims before changing preventive behavior. WHO's infodemic-management approach has similarly emphasized strengthening understanding, misinformation resilience, community engagement, and access to reliable evidence rather than relying exclusively on removal of inaccurate content.

6. Discussion

6.1 Medical Misinformation as a Preventive-Behavior Risk

The simulated findings illustrate a plausible pathway through which medical misinformation could influence preventive health without directly causing overt treatment refusal. Exposure may first alter perceptions of credibility, uncertainty, benefit, or risk and subsequently weaken intentions to vaccinate, attend screening, or seek qualified guidance. Experimental studies involving vaccine-related information have already shown that exposure to critical websites and conspiracy narratives can influence risk perceptions and vaccination intentions. The present framework extends that behavioral logic across a broader preventive-health domain.

A central implication is that researchers should avoid measuring misinformation solely through recall or recognition. Behavioral consequences may emerge even when individuals cannot reproduce the exact false statement that influenced them. Southwell and colleagues argued for a more nuanced public-health understanding of misinformation, while Swire-Thompson and Lazer emphasized the importance of examining how individuals interact with health misinformation within contemporary online environments. Future studies should therefore assess belief strength, perceived credibility, uncertainty, source trust, and health intention simultaneously.

6.2 Why Corrective Messages May Produce Only Partial Recovery

The modeled correction condition substantially improves preventive intention but does not fully return participants to their baseline scores. This pattern is theoretically important. Lewandowsky and colleagues demonstrated that misinformation can continue to influence reasoning even after people have been informed that it is inaccurate. Once an initial explanation has been encoded, simply withdrawing that explanation can leave a cognitive gap, particularly when the correction does not provide an understandable alternative interpretation.

Nyhan and colleagues' randomized vaccine-communication trial further illustrates why factual correction and behavior must be separated analytically. Their corrective information reduced the misconception linking the MMR vaccine with autism, yet none of the tested interventions increased future vaccination intention across the sample, and some messages produced undesirable responses among specific groups. Thus, successful misinformation management should not be defined merely as achieving a statistically significant improvement on a factual quiz. Communication needs to be evaluated according to whether it improves understanding without unintentionally increasing fear, reactance, or behavioral avoidance.

6.3 Verification Literacy, Public Health Practice, and Research Limitations

The strong modeled improvement in source-verification intention suggests a potentially important direction for preventive-health communication. Bode and Vraga demonstrated that corrective information appearing within social-media environments can reduce health misperceptions, indicating that the same communication spaces that distribute misinformation can also support correction. Chou and colleagues likewise emphasized the need for systematic strategies to address health misinformation on social media. Rather than attempting to pre-empt every inaccurate claim, health systems may benefit from combining rapid correction with durable information-evaluation skills.

The broader public-health relevance of this strategy became especially visible in 2020, when WHO emphasized that excessive false or misleading information can create confusion, undermine trust, and affect protective behavior during health emergencies. Verification literacy should nevertheless complement, not replace, institutional responsibility. Health authorities, clinicians, researchers, journalists, and communication platforms all influence the information environment. Individuals cannot reasonably be expected to independently evaluate every complex biomedical claim without access to credible and understandable professional guidance.

Several limitations restrict interpretation of the present manuscript. Most importantly, the entire dataset is simulated. No participant encountered misinformation, no actual preventive behavior was measured, and no causal effect was established. Self-reported intentions would also be insufficient in a future field study because vaccination, screening attendance, and healthcare consultation are influenced by access, cost, social norms, baseline risk, healthcare recommendations, and institutional trust. A rigorous empirical study should therefore combine experimental measures with longitudinal behavioral follow-up where ethically feasible, evaluate differences across levels of health literacy, preregister primary outcomes, examine intervention durability, and assess whether correction remains effective when misinformation is repeatedly encountered.

7. Conclusion

Medical misinformation presents a preventive-health challenge because inaccurate information can alter risk perceptions and introduce uncertainty at precisely the point when individuals are deciding whether to undertake actions intended to protect future health. Earlier research on vaccination and digital misinformation demonstrates that exposure can influence perceptions and behavioral intentions, while studies of correction show that misinformation is not always completely neutralized by subsequent factual clarification.

The present simulation provides a structured model for examining this problem across vaccination, routine screening, professional consultation, and source verification. The synthetic results indicate lower preventive-health intention following misinformation exposure and partial recovery when exposure is followed by corrective health-literacy guidance. The strongest modeled improvement appears in source-verification intention, suggesting that teaching individuals how to assess future information may offer a more durable conceptual strategy than correcting isolated claims one at a time.

The strong simulated inverse relationship between misinformation acceptance and preventive-health intention further indicates that acceptance may be more informative than exposure alone. Researchers should therefore distinguish between seeing misinformation, believing it, remaining uncertain about it, and allowing it to influence behavior. These stages represent analytically different processes and may require different forms of intervention.

Because the study is entirely simulation-based, its findings cannot establish real-world effectiveness or population-level effect sizes. Its contribution lies in providing a transparent methodological framework that can be tested experimentally. Future research should investigate how correction timing, source credibility, health literacy, emotional framing, repeated exposure, and professional trust interact to influence actual preventive behavior. Effective misinformation management should ultimately support informed autonomy: people should be able to evaluate medical claims

critically while retaining access to clear, evidence-based guidance necessary for responsible preventive-health decisions.

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