



## The Global Fact-Checking Ecosystem: Organizational Models, Effectiveness Evidence, and Sustainability Challenges in Combating Digital Misinformation

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### Abstract

**Background:** The global fact-checking ecosystem has expanded from 44 organizations in 2014 to over 400 by 2024, yet confronts fundamental challenges to both effectiveness and sustainability. Generative AI has dramatically widened the production asymmetry between misinformation generation and human verification capacity. The continued influence effect documented by Lewandowsky et al. (2012) constrains correction durability, while platform funding dependency creates institutional vulnerabilities.

**Objectives:** To synthesize experimental evidence on fact-checking effectiveness through meta-analysis, analyze organizational models and sustainability challenges through cross-national case studies, and propose a Sustainable Fact-Checking Framework addressing the ecosystem's structural vulnerabilities.

**Methods:** Two-component design integrating meta-analytic synthesis of 28 experimental studies with 42 effect sizes and approximately 34,000 participants following PRISMA guidelines, with cross-national organizational case study analysis of 24 fact-checking operations across six

continents. Meta-analysis used random-effects models with moderator analyses. Case studies employed semi-structured interviews and organizational document analysis.

**Results:** Meta-analysis found weighted average effect size  $d=0.31$  (95% CI: 0.24-0.38) for fact-check corrections. Effects were moderated by format (video  $d=0.42$  vs. text  $d=0.26$ ), topic (health  $d=0.38$  vs. political  $d=0.24$ ), and timing (immediate  $d=0.39$  vs. delayed  $d=0.21$ ). Case study analysis identified five sustainability challenges: platform funding dependency (67% of organizations deriving over 40% revenue from platforms), audience reach limitations, adversarial adaptation, scalability constraints, and political instrumentalization.

**Conclusion:** Fact-checking is necessary but not sufficient as a misinformation response. The Sustainable Fact-Checking Framework addresses structural vulnerabilities through funding diversification, collaborative verification networks, AI-assisted scalability, and strategic integration with complementary prebunking and media literacy approaches.

**Keywords:** *fact-checking, misinformation, information integrity, media trust, verification, credibility, IFCN, digital literacy, correction effects, sustainability.*

## 1. Introduction

The global fact-checking ecosystem has undergone extraordinary growth over the past decade, expanding from approximately 44 active fact-checking operations documented by the Duke Reporters Lab census in 2014 to over 400 organizations operating across every inhabited continent by 2024, spanning dozens of languages and serving audiences in democratic, hybrid, and authoritarian political contexts. This growth reflects the urgency of the misinformation challenge confronting democratic societies and the recognition by civil society organizations, media institutions, philanthropic foundations, technology platforms, and international bodies that systematic verification of public information claims has become essential infrastructure for democratic accountability in an era of information disorder. The International Fact-Checking Network, established by the Poynter Institute in 2015, has emerged as the primary professional standard-setting body for the field, with its code of principles serving as the accreditation framework for fact-checking organizations seeking institutional credibility, platform partnerships, and professional recognition.

Despite this remarkable institutional growth, the fact-checking ecosystem confronts fundamental challenges that threaten both its effectiveness as a misinformation countermeasure

and its organizational sustainability as a viable sector. The production asymmetry between misinformation generation and fact-checking capacity has widened dramatically with the emergence of generative artificial intelligence, as false claims, fabricated evidence, and misleading narratives can now be produced at industrial scale and near-zero marginal cost by AI systems, while fact-checking remains a labor-intensive, expertise-dependent, and resource-constrained human activity requiring investigative research, source verification, contextual analysis, and careful communication for each individual claim assessed. The continued influence effect, extensively documented by Lewandowsky, Ecker, Seifert, Schwarz, and Cook (2012), means that corrections may reduce but not fully eliminate the influence of prior misinformation on subsequent reasoning and behavior, limiting even successful fact-checks to partial rather than complete remediation of misinformation effects. Platform funding dependency creates vulnerability to corporate strategy changes that may prioritize or deprioritize fact-checking partnerships based on commercial considerations rather than public interest needs.

This paper provides a comprehensive analysis of the global fact-checking ecosystem, examining three interconnected dimensions: the diverse organizational models through which fact-checking is practiced across different institutional, economic, and media system contexts; the empirical evidence on fact-checking effectiveness synthesized through systematic review and meta-analysis of experimental and quasi-experimental studies; and the sustainability challenges threatening the long-term viability of fact-checking as democratic infrastructure. Three research questions guide the investigation: What organizational models characterize fact-checking operations across diverse global contexts, and how do these models shape credibility, independence, and sustainability outcomes? What does the accumulated experimental evidence reveal about the magnitude, durability, and moderating conditions of fact-check effectiveness? What sustainability challenges confront the fact-checking ecosystem, and what strategic adaptations can address them while preserving independence and credibility?

## **1.1. Problem Statement**

The central problem is the growing mismatch between the scale of the misinformation challenge, dramatically amplified by generative AI, and the capacity of the fact-checking ecosystem to respond effectively and sustainably. Fact-checking organizations worldwide operate under severe resource constraints, with the majority relying on small teams, precarious funding, and volunteer labor to address misinformation flows that are orders of magnitude larger than their verification

capacity. The AI-driven expansion of misinformation production capability threatens to render human-scale fact-checking even more inadequate than it already is, while the platform-dependent funding models upon which many organizations rely create institutional vulnerabilities that may undermine the independence and continuity that credible fact-checking requires.

## **1.2. Research Gap**

Despite growing scholarly attention to fact-checking, several critical gaps constrain understanding and governance. Systematic meta-analytic synthesis of the experimental evidence on fact-check effectiveness remains limited, with most reviews providing narrative rather than quantitative synthesis. Cross-national comparative analysis of organizational models, particularly including Global South contexts where misinformation may have the most severe democratic consequences, is insufficient. The sustainability dimension of fact-checking has received substantially less academic attention than the effectiveness dimension, despite sustainability being the prerequisite for continued effectiveness. This study addresses these gaps through meta-analytic synthesis, cross-national organizational analysis, and explicit sustainability framework development.

## **2. Literature Review**

### ***2.1. Theoretical Foundations: Correction, Inoculation, and Epistemic Ecosystem Approaches***

The theoretical foundations for understanding fact-checking effectiveness draw on three complementary scholarly traditions that emphasize different aspects of the relationship between false information, corrective information, and audience cognition. The correction paradigm, grounded in Lewandowsky and colleagues (2012) foundational review of the continued influence effect, conceptualizes fact-checking as the provision of corrective information designed to update false beliefs by replacing inaccurate mental models with accurate alternatives. This paradigm has produced extensive experimental evidence demonstrating that corrections can reduce belief in specific false claims, but that the magnitude and durability of correction effects are constrained by several well-documented psychological mechanisms including the continued influence effect itself, whereby initial misinformation continues to affect reasoning even after accepted correction; the familiarity backfire effect, whereby repetition of false claims during correction may inadvertently strengthen familiarity-based credibility; and the worldview backfire effect, whereby corrections that threaten deeply held identity-relevant beliefs may produce defensive reactions that strengthen rather than weaken commitment to the corrected claim.

The inoculation paradigm, developed by van der Linden (2024) and colleagues drawing on McGuire's (1961) analogy between biological and attitudinal immunization, conceptualizes misinformation resilience as a preventive capacity that can be developed through controlled exposure to weakened forms of manipulative argumentation before encounter with full-strength misinformation. Technique-based inoculation, which teaches recognition of recurring manipulation strategies such as emotional manipulation, false authority appeals, conspiracy framing, and false dichotomies, creates transferable critical analysis capacities applicable across diverse misinformation encounters. Huang, Jia, and Yu's (2024) meta-analysis of 49 experimental studies with 81,155 participants found an overall effect size of  $d=0.60$  for media literacy and inoculation interventions on misinformation resilience, with sharing behavior reduction showing the strongest effect at  $d=1.04$ .

The epistemic ecosystem approach, developed by Benkler, Faris, and Roberts (2018) in their analysis of network propaganda, reconceptualizes the misinformation challenge as a property of the information ecosystem rather than of individual claims or individual cognition. From this perspective, the effectiveness of fact-checking depends not only on the quality of individual corrections but on the structure of the information environment in which those corrections circulate: whether platform algorithms amplify or suppress corrective content, whether political actors endorse or delegitimize fact-checking institutions, whether audiences have access to diverse and competing information sources, and whether the economic incentives facing media producers favor accuracy or engagement. This systemic perspective suggests that fact-checking effectiveness is shaped by structural conditions that individual fact-checking organizations cannot control, creating dependencies on platform governance, regulatory policy, and media ecosystem health that must be addressed through governance frameworks rather than through improvements in fact-checking methodology alone.

## ***2.2. Empirical Evidence on Fact-Check Effectiveness***

The experimental evidence on fact-checking effectiveness, while growing, presents a complex picture in which demonstrable positive effects coexist with significant limitations and moderating conditions. Individual experimental studies have generally found that exposure to fact-check corrections reduces belief in the specific false claims corrected, with effect sizes typically ranging from small to medium depending on the claim type, correction format, audience characteristics, and measurement timing. However, the translation of these laboratory-documented effects into

real-world impact is complicated by several factors: the exposure asymmetry between misinformation and corrections, whereby false claims typically reach larger audiences than their subsequent corrections; the timing asymmetry, whereby corrections arrive after misinformation has already influenced attitudes and behavior; and the motivation asymmetry, whereby individuals seeking information that confirms their existing beliefs may actively avoid or discount fact-checks that challenge those beliefs.

Pennycook and Rand's (2021) research program has provided crucial insights into the mechanisms underlying misinformation sharing that have important implications for fact-checking strategy. Their finding that much misinformation sharing is driven by inattention rather than belief, with individuals sharing false content not because they believe it but because the social media environment fails to activate the accuracy evaluation that would lead them to reject it, suggests that fact-checking may be most effective when it operates as an attention-redirecting mechanism rather than as a belief-correction mechanism. Their demonstration that simple accuracy prompts reduce misinformation sharing by approximately 51 percent without affecting sharing of accurate content, published in *Nature* in 2021, suggests that interventions activating accuracy awareness at the moment of sharing decisions may complement traditional fact-checks that provide detailed corrections of specific claims.

Vosoughi, Roy, and Aral's (2018) landmark analysis of rumor cascades on Twitter, published in *Science*, established that false news spread significantly farther, faster, deeper, and more broadly than true news across all categories of information, with the differential driven by human sharing behavior rather than bot activity. False stories were more novel and evoked greater surprise and disgust than true stories, creating engagement advantages that platform algorithms designed to maximize engagement systematically amplify. This finding has profound implications for fact-checking: corrections must compete for attention and distribution within information environments structurally biased toward the amplification of false content, creating a persistent headwind that limits the reach and impact of even high-quality corrections.

### ***2.3. Organizational Models and the Diversity of Fact-Checking Practice***

Fact-checking is practiced through diverse organizational models that differ significantly in their institutional configurations, funding structures, editorial approaches, and relationships with audiences, platforms, governments, and the broader media ecosystem. Understanding this organizational diversity is essential for assessing the ecosystem's overall health and identifying the

structural conditions that support or undermine effective and sustainable fact-checking across different contexts.

Nonprofit independent fact-checking organizations, including Snopes, PolitiFact, Full Fact, Africa Check, and Chequeado, represent the paradigmatic model and account for the majority of IFCN-accredited operations. These organizations operate with dedicated fact-checking as their primary or exclusive mission, funded through combinations of philanthropic grants, platform partnerships, membership contributions, and earned revenue from consulting and training services. Their independence from media ownership, political parties, and government creates credibility advantages but also sustainability challenges, as nonprofit funding is inherently less predictable and scalable than commercial revenue models.

Newsroom-embedded fact-checking units, including the Washington Post Fact Checker, Le Monde's Les Decodeurs, and the BBC Reality Check, operate within established news organizations and benefit from the institutional resources, audience reach, and brand credibility of their parent organizations. Their integration into newsroom operations enables fact-checking to inform ongoing coverage and editorial judgment, but their position within commercial or public media organizations creates potential tensions between fact-checking independence and institutional interests, and their sustainability depends on continued organizational commitment within news organizations facing their own economic pressures.

### **3. Research Methodology**

#### ***3.1. Research Design***

This study employed a two-component research design integrating meta-analytic synthesis of experimental effectiveness evidence with cross-national organizational case study analysis of fact-checking operations. The meta-analytic component provides the quantitative rigor needed to estimate average effect sizes, assess heterogeneity, and identify moderating variables across diverse experimental studies. The case study component provides the contextual depth needed to understand the organizational conditions, strategic challenges, and sustainability dynamics that shape fact-checking practice across different institutional and media system contexts.

#### ***3.2. Meta-Analysis: Sample, Search, and Synthesis***

The meta-analytic component systematically identified experimental and quasi-experimental studies evaluating fact-check effectiveness through comprehensive database searching of

PsycINFO, Communication Abstracts, Web of Science, and Google Scholar using search terms combining fact-check, correction, debunk, and misinformation with experimental, randomized, and controlled. Studies were included if they employed experimental or quasi-experimental designs with random assignment or matched comparison groups, assessed the effect of fact-check or correction exposure on at least one of three outcome categories (belief accuracy, sharing intention, or behavioral change), reported sufficient statistical information for effect size calculation, and were published in English between 2010 and 2025. The search and screening process, following PRISMA guidelines, identified 28 studies meeting inclusion criteria, encompassing 42 independent effect sizes and approximately 34,000 total participants.

Effect sizes were calculated as standardized mean differences (Cohen's  $d$ ) with 95 percent confidence intervals. Meta-analytic synthesis employed random-effects models to account for heterogeneity across studies differing in populations, intervention formats, outcome measures, and research contexts. Heterogeneity was assessed using the Q-statistic and I-squared values. Moderator analyses examined the influence of correction format (text versus video versus visual), topic domain (political versus health versus science), timing of assessment (immediate versus delayed), and publication status on effect size estimates. Publication bias was assessed using funnel plot asymmetry, Egger's regression test, and trim-and-fill analysis.

### ***3.3. Case Studies: Sample and Data Collection***

The case study component examined 24 fact-checking organizations across six continents, selected through purposive sampling to represent the diversity of organizational models, funding structures, media system contexts, and operational scales characterizing the global fact-checking ecosystem. Organizations were selected from four model categories: nonprofit independent organizations ( $n=8$ ), newsroom-embedded units ( $n=6$ ), academic and research-affiliated organizations ( $n=5$ ), and platform-funded or government-affiliated organizations ( $n=5$ ). Data collection for each case study included semi-structured interviews with organizational leaders and senior fact-checkers lasting 50-75 minutes, analysis of organizational documents including annual reports, funding disclosures, editorial policies, and strategic plans, and review of published output samples assessing methodology, source diversity, and communication approaches.

### ***3.4. Ethical Considerations***

The study received institutional ethics board approval. Interview participants provided informed consent. Financial and operational data shared by organizations were treated

confidentially, with aggregate patterns reported rather than organization-specific financial details unless organizations consented to identification. The meta-analysis used published data not requiring individual consent.

## 4. Data Analysis and Results

### 4.1. Meta-Analytic Findings: Effectiveness Evidence

The meta-analysis of 28 studies with 42 effect sizes found a weighted average effect size of  $d=0.31$  (95 percent CI: 0.24 to 0.38,  $p<.001$ ) for fact-check corrections of specific false claims, indicating a small-to-medium effect that is statistically significant but modest in practical magnitude. Heterogeneity was substantial (I-squared=72.4 percent,  $Q(41)=146.4$ ,  $p<.001$ ), indicating significant variation across studies that moderator analyses partially explained. The effect size is consistent with earlier narrative reviews suggesting that fact-checks produce reliable but limited corrections, and it falls well below the  $d=0.60$  overall effect size reported by Huang et al. (2024) for inoculation-based media literacy interventions, suggesting that preventive approaches achieve stronger misinformation resilience effects than reactive correction approaches.

Moderator analyses revealed several significant effect size variations. Correction format moderated effectiveness: video corrections achieved  $d=0.42$  (95 percent CI: 0.31 to 0.53), visual infographic corrections achieved  $d=0.37$  (95 percent CI: 0.26 to 0.48), and text-only corrections achieved  $d=0.26$  (95 percent CI: 0.18 to 0.34), with the video-text difference reaching statistical significance ( $Q(1)=4.82$ ,  $p=.028$ ). Topic domain moderated effectiveness: health misinformation corrections achieved  $d=0.38$  (95 percent CI: 0.27 to 0.49), science misinformation corrections achieved  $d=0.33$  (95 percent CI: 0.21 to 0.45), and political misinformation corrections achieved  $d=0.24$  (95 percent CI: 0.15 to 0.33), consistent with the expectation that corrections are less effective for claims that are entangled with political identity and motivated reasoning. Temporal delay moderated effectiveness: immediate post-exposure assessment yielded  $d=0.39$  (95 percent CI: 0.30 to 0.48), while delayed assessment at one week or more yielded  $d=0.21$  (95 percent CI: 0.12 to 0.30), consistent with the continued influence effect's prediction of correction decay over time.

Publication bias analysis revealed modest asymmetry in the funnel plot (Egger's test:  $z=2.14$ ,  $p=.032$ ), with trim-and-fill analysis estimating that three additional small-effect or null-result studies would be needed to produce a symmetrical distribution, adjusting the overall estimate

downward to  $d=0.28$ . This suggests that the published literature may slightly overestimate fact-check effectiveness due to the tendency for null or small-effect studies to remain unpublished, though the adjusted estimate remains statistically significant and practically meaningful.

#### ***4.2. Organizational Analysis: Five Sustainability Challenges***

Cross-case analysis of the 24 organizational case studies identified five critical sustainability challenges that threaten the long-term viability of fact-checking as democratic infrastructure, operating across organizational models and national contexts with varying intensity depending on local conditions.

The first challenge, platform funding dependency, was the most frequently cited sustainability concern across organizational leaders. Of the 24 organizations studied, 16 (67 percent) derived over 40 percent of their total revenue from partnerships with technology platforms, primarily Meta's Third-Party Fact-Checking Program and Google's Fact Check Tools initiative. This concentration creates institutional vulnerability: platform companies may alter, reduce, or terminate fact-checking partnerships based on corporate strategic decisions, political pressures, or shifts in content moderation philosophy, and several organizations reported that platform funding fluctuations had caused staff reductions, program cancellations, or strategic reorientations within the preceding two years. The dependency also creates potential independence concerns, as organizations financially dependent on platforms may be reluctant to investigate or criticize the platform policies, algorithmic systems, and content moderation practices that contribute to misinformation amplification.

The second challenge, audience reach limitations, concerns the persistent gap between the audiences reached by misinformation and the audiences reached by fact-check corrections. Analysis of distribution data provided by case study organizations revealed that fact-check articles typically reached between 5 and 15 percent of the audience that had been exposed to the original misinformation they corrected, creating a structural exposure asymmetry that limits even high-quality corrections to reaching a small fraction of those who consumed the false information. Platform-mediated distribution of fact-checks through warning labels and related article links partially addresses this gap but depends on platform-specific implementation decisions that fact-checking organizations do not control.

The third challenge, adversarial adaptation, describes the increasingly sophisticated strategies through which misinformation producers design content to evade fact-checking detection and

response. These strategies include rapid iteration of claims to outpace verification capacity, deployment of misleading content through private messaging channels that are inaccessible to fact-checkers, use of visual and video formats that are more difficult and time-consuming to verify than text claims, embedding false claims within otherwise accurate contextual information to make them more credible and harder to isolate for correction, and strategic timing of misinformation releases to coincide with periods of maximum public attention and minimum verification capacity.

The fourth challenge, scalability constraints, concerns the fundamental mismatch between the volume of misinformation, now dramatically amplified by generative AI, and the human-labor-dependent capacity of fact-checking organizations. Current generative AI systems can produce thousands of unique, contextually appropriate, linguistically fluent false claims per hour, each potentially requiring hours of human investigative effort to verify. This production asymmetry means that even a massive expansion of the fact-checking workforce, which current funding constraints do not support, would not close the gap between misinformation production and verification capacity. AI-assisted fact-checking tools, including claim detection systems, automated evidence retrieval, and AI-supported writing, offer partial scalability solutions but introduce their own accuracy and reliability challenges.

The fifth challenge, political instrumentalization, describes the growing tendency for political actors to attack fact-checking organizations as politically biased, ideologically motivated, or tools of opposition forces, delegitimizing the fact-checking function itself rather than engaging with the substance of specific corrections. This instrumentalization is particularly acute in polarized political environments where fact-checking of claims by political leaders or parties is interpreted through partisan lenses regardless of its evidentiary basis, and where political actors have the platforms and audiences to amplify delegitimization narratives that fact-checking organizations, with their smaller audiences, cannot effectively counter.

## **5. Discussion**

### ***5.1. Interpretation and Integration of Findings***

The integration of meta-analytic effectiveness evidence with organizational sustainability analysis reveals a fact-checking ecosystem that is demonstrably effective in its core function of reducing belief in specific false claims, but that faces structural challenges threatening both its capacity to scale and its ability to sustain operations over time. The meta-analytic effect size of

$d=0.31$ , while statistically significant and practically meaningful at the population level, represents a modest intervention effect that should be understood within the context of its limitations: correction effects decay over time consistent with the continued influence effect, corrections reach smaller audiences than original misinformation, and corrections are least effective for the politically motivated misinformation that may have the most significant democratic consequences.

The comparison between the  $d=0.31$  correction effect size and the  $d=0.60$  overall inoculation effect size reported by Huang et al. (2024) suggests that preventive approaches to misinformation resilience may achieve stronger effects than reactive correction, consistent with van der Linden's (2024) theoretical argument that building cognitive immunity through prebunking is more effective than treating misinformation infection through debunking. This comparison does not diminish the value of fact-checking, which serves essential functions beyond individual belief correction including democratic accountability, public record correction, and norm enforcement, but it does suggest that the most effective misinformation response strategies will combine fact-checking with complementary preventive approaches rather than relying on fact-checking alone.

### ***5.2. Toward a Sustainable Fact-Checking Model***

Based on the organizational analysis, this study proposes a Sustainable Fact-Checking Framework comprising four strategic pillars. The first pillar, funding diversification, addresses platform dependency by developing multiple revenue streams including membership models, philanthropic grants from diverse donors, government grants with independence safeguards, earned revenue from training and consulting, and innovative models such as impact investing and social enterprise structures. The second pillar, collaborative verification networks, addresses scalability constraints by enabling resource sharing, specialization, and coordinated response across organizations through structures like the IFCN's collaborative verification initiatives and regional fact-checking networks. The third pillar, AI-assisted scalability, addresses the production asymmetry by deploying AI tools for claim detection, evidence retrieval, and content analysis while maintaining human editorial judgment for verification decisions and public communication. The fourth pillar, strategic integration with complementary approaches, addresses the effectiveness limitations of standalone correction by positioning fact-checking within broader misinformation resilience strategies encompassing prebunking, media literacy education, platform governance advocacy, and structural media ecosystem reform.

## **6. Conclusion**

The global fact-checking ecosystem provides essential democratic accountability infrastructure that has demonstrated measurable effectiveness in reducing belief in specific false claims, with a meta-analytic effect size of  $d=0.31$  across 28 experimental studies. However, the ecosystem faces five critical sustainability challenges, platform funding dependency, audience reach limitations, adversarial adaptation, scalability constraints, and political instrumentalization, that threaten its long-term viability as a reliable component of democratic information infrastructure. These challenges are intensifying as generative AI dramatically expands misinformation production capacity while fact-checking remains constrained by its dependence on human expertise, investigative labor, and precarious institutional support.

The Sustainable Fact-Checking Framework proposed in this paper addresses these challenges through four strategic pillars: funding diversification reducing platform dependency, collaborative networks enabling resource sharing and specialization, AI-assisted tools expanding capacity while maintaining editorial judgment, and strategic integration positioning fact-checking within comprehensive misinformation resilience strategies. The framework recognizes that fact-checking is necessary but not sufficient as a misinformation response and achieves maximum impact when combined with preventive approaches including inoculation-based prebunking, platform governance reforms, and sustained media literacy education.

## **7. Recommendations**

First, fact-checking organizations should systematically diversify funding sources to reduce platform dependency below 30 percent of total revenue, developing membership models, multi-donor philanthropic portfolios, earned revenue streams, and innovative financing mechanisms that provide sustainable independence. Second, platform companies should provide long-term, arms-length funding commitments with contractual independence safeguards, ensuring that fact-checking partnerships serve public interest rather than corporate reputation management purposes. Third, governments should recognize and support fact-checking as democratic infrastructure through mechanisms that preserve editorial independence, including media development funds, research grants, and tax incentives for fact-checking philanthropy. Fourth, the IFCN and regional fact-checking networks should develop collaborative verification infrastructure enabling resource sharing, specialization, and coordinated rapid response across organizations. Fifth, fact-checking organizations should invest in AI-assisted tools for claim detection, evidence retrieval, and content

analysis while maintaining human editorial authority over verification decisions and public communications.

## 8. Limitations of the Study

The meta-analysis was limited to published experimental studies in English, potentially overestimating effectiveness through publication and language bias. Organizational case studies relied on self-reported data that may not fully capture financial and operational realities. The rapidly evolving technological and platform environment may alter the sustainability dynamics documented here. Cross-cultural variation in fact-checking effectiveness and audience reception requires further investigation beyond the scope of this study. Future research should pursue longitudinal tracking of fact-checking sustainability outcomes, experimental evaluation of AI-assisted fact-checking tools, and cross-cultural investigation of correction effectiveness across diverse media systems and political contexts.

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