Factors Associated with Information Credibility Perceptions: A Meta-Analysis

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Abstract

Research on factors influencing information credibility judgment is increasing, whereas their findings are mixed. This study conducted a meta-analysis of 85 empirical studies, synthesizing the effects of twelve frequently examined source, content, channel, and receiver factors on information credibility perception. Results reveal that message quality, source credibility, and message fluency have large correlations with credibility perception, while other factors show small-to-medium correlations. Personal topic knowledge does not have a significant relationship with credibility perception. Gender composition, information channel, topic, and research method significantly moderate the aggregated relationships. The theoretical and practical implications are discussed.

Keywords: Meta-analysis; information credibility perceptions; information processing; misinformation

Factors Associated with Information Credibility Perceptions: A Meta-Analysis

The proliferation of misinformation (Allen et al., 2020) has not only raised scholarly concerns about the mechanisms underlying misinformation belief but also reignited the discourse on factors influencing individuals' judgments of information credibility (Lee & Shin, 2021). Credibility judgment has been a longstanding area of focus in communication, information, and psychology disciplines. Scholars have conceptualized information credibility judgment as individuals' subjective perceptions of the veracity of the content of communication (e.g., Appelman & Sundar, 2016), interchangeably referring to it with conceptually equivalent terms, such as perceived information believability, trustworthiness, and reliability (e.g., Self, 1996). Research on credibility assessment has pinpointed various factors, including the source, content, and channel characteristics of information, as well as personal traits, which influence individuals' inclination to believe or reject a piece of information (e.g., Metzger, 2007; Metzger & Falangin, 2003). However, despite the extensive empirical research on factors influencing information credibility judgment, there is a lack of reflection on this body of knowledge.

While previous review studies have synthesized various message- and individual-level factors (Bryanov & Vziatysheva, 2021), as well as cognitive and socio-affective drivers (Ecker et al., 2022) associated with credibility judgments, there has yet to be a statistical review of these factors' relative influences on credibility perceptions. Indeed, conflicting findings have been reported in the literature. For instance, discrepancies exist regarding the effects of source factors (e.g., source expertise) on credibility perceptions (Jung et al., 2016; Sui & Zhang, 2021), necessitating a robust synthesis of the associations between credibility perception and its precursors based on accumulated empirical evidence. As the synthesis of the relative importance of the extant informational (e.g., source, content, and channel) and individual (i.e., receiver) factors influencing credibility judgment could inform theoretical

refinement in this area, it is essential to employ a meta-analytic technique to provide a quantitative synthesis of the factors' associations with credibility judgment.

Research has shown that the impact of extant informational and individual factors on credibility perceptions may vary based on information contexts (Flanagin & Metzger, 2000) and cultural differences (Luo et al., 2014). For instance, Luo et al. (2014) found that cultural contexts moderated the effects of message sidedness on credibility perceptions, with individuals from collectivist cultural backgrounds more likely to rely on normative cues (i.e., consistency with others) to judge information credibility. Similarly, Flanagin and Metzger (2000) also found that information channels influence individuals' credibility perceptions. Despite numerous findings, no studies have statistically examined whether the variations in effect sizes across studies can be explained by certain contextual and methodological differences. Identifying factors accounting for the variances in effect sizes could inform methodological and contextual selections for future studies in this field. Hence, a meta-analysis is necessary to pinpoint potential moderators explaining the discrepancies in study results.

Previous meta-analytic research provided statistical syntheses on the associations between credibility perceptions and information source factors, including source credibility (Ma & Atkin, 2016), source expertise (Ismagilova et al., 2020), source homophily (Ismagilova et al., 2020), and the number of sources (i.e., social endorsement cues; Wang et al., 2023). However, existing meta-analyses provide only a scattered synthesis of the effect sizes of specific factors (source factors) on credibility judgments within contexts, such as health (Ma & Atkin, 2016) or commercial contexts (Ismagilova et al., 2020). This scattered focus has led to conflicting findings across these meta-analytic studies. For example, Ismagilova et al. (2020) found positive and significant associations between source trustworthiness and credibility perceptions, while Ma and Atkin (2016) found non-significant

associations between these two factors. Moreover, scant meta-analyses aggregated the effects of other types of factors, such as content (e.g., argument quality), channel (e.g., media interactivity), and receiver factors (e.g., personal knowledge) on credibility judgments or examined the sources of variations in their effects. Therefore, a comprehensive meta-analysis including various studies conducted in varying contexts is needed.

This study has three aims. First, it synthesizes the frequently examined sources, content, channels, and receiver factors influencing information credibility perceptions. Second, it meta-analyzes the effects of these factors on credibility perceptions to compare their relative importance in shaping individuals' credibility perceptions. Third, this study examines how some contextual (e.g., media channel, information topic, and demographic factors) and methodological elements (e.g., research and sampling methods) could explain the variations in the aggregated relationships. By quantitatively synthesizing the accumulated empirical evidence, this study can provide a robust estimation of the effects of the current informational and individual factors on information credibility perceptions, as well as identify factors accounting for variations in effect sizes.

Factors Related to Information Credibility Judgment

Previous studies have adopted diverse theoretical approaches to explore how individuals judge information credibility, such as prominence-interpretation (P-I) theory (Fogg, 2003), dual processing model of credibility assessment (Metzger, 2007), modality-agency-interactivity-navigability model (Sundar, 2008), unifying framework of credibility assessment (Hilligoss & Rieh, 2008), semantic-surface-source (3S) model (Lucassen et al., 2013), and audience acts of authentication model (Tandoc Jr. et al., 2017). These models reflected a range of informational and individual factors based on which people form information credibility perceptions. In this study, we synthesized twelve prominent source, content, channel, and receiver factors influencing people’s information credibility perceptions

from the existing theoretical frameworks and literature (see Figure 1), providing an overview of the key factors influencing information credibility judgment in extant literature.

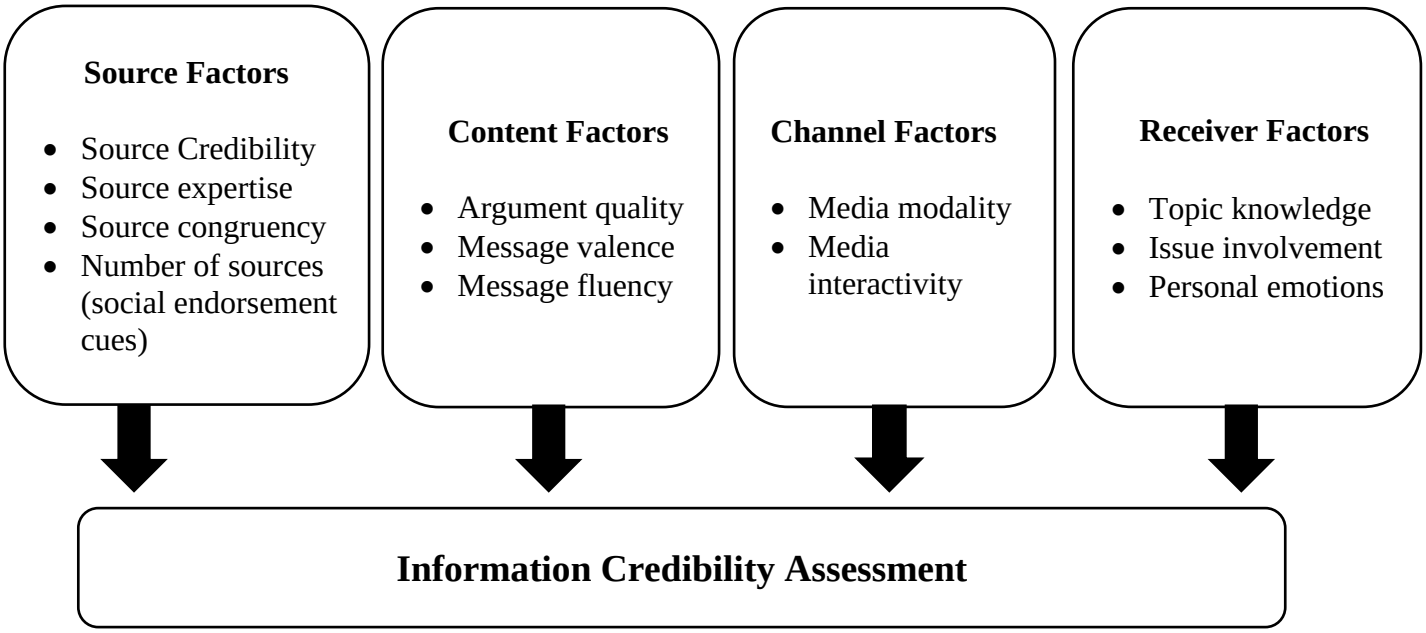

Figure 1. Factors Influencing Information Credibility Judgment

Source Factors

The literature on information credibility frequently examined how source features of information (i.e., source credibility, expertise, congruency, and the number of sources) affect individuals' credibility judgment by serving as peripheral cues or altering the amount of deliberative attention paid to judge credibility (Briñol & Petty, 2009). Information source can be referred to as a person, thing, or place from which information comes, arises, or is obtained (Lee & Shin, 2021; Metzger et al., 2003). Sundar and Nass (2001) explicate information source in three dimensions- sender (e.g., gatekeepers such as editors or journalists), technology (e.g., interface agents such as computers), and receiver dimensions (e.g., computer users). Existing studies often regard sources as a heuristic means based on which people judge information credibility (e.g., Hilligoss & Rieh, 2008; Metzger, 2010) and document four main source factors - source credibility, source expertise, source congruency, and number of sources (social endorsement cues) - that influence individuals' information

credibility judgment. Table S1 in the Supplemental Materials provides the definitions of the four source factors and explanations for the relationships between these factors and credibility perception. Although numerous studies have examined the relationships between these source factors and credibility perceptions, their results were mixed (e.g., Jung et al., 2016; Sui & Zhang, 2021). For example, while studies yielded a positive relationship between the number of sources (social endorsement cues) and credibility perceptions (e.g., Chih et al., 2020), others yielded non-significant results (e.g., Lee et al. 2021). Hence, this study employs meta-analytic methods to synthesize the effects of these source factors on information credibility perceptions and asks:

> **RQ1**: To what extent are the aggregated source factors (i.e., source credibility, expertise, congruency, and the number of sources) related to information credibility perception?

Content Factors

In addition to source factors, existing research has also examined the influence of content factors on information credibility judgment. Information content refers to the nature, properties, and quality of the information presented in a message (Metzger et al., 2003). Scholars have argued that forming a credibility judgment relies not only on individuals' attention to superficial cues, such as source cues, but also on their comprehension and retention of the content (Metzger et al., 2003). By synthesizing the empirical evidence from information credibility literature, this study argues that content factors also play an important part in rendering the information more or less credible and thus aggregated three primary content factors (i.e., argument quality, content fluency, and content congruency) influencing credibility judgment. Table S1 in the Supplemental Materials provides the detailed definitions of these three content factors and explanations for their associations with credibility perception. Extant literature reflects the inconsistencies in the effects of content factors on

credibility perceptions, and there is a dearth of studies quantitatively aggregating the overall associations between content factors and credibility perception (e.g., Hassan & Barber, 2021; Koch & Zerback, 2013). Therefore, this study aims to employ meta-analytic methods to address this gap and raise the following research question:

> **RQ2:** To what extent are the aggregated content factors (i.e., argument quality, content fluency, and content congruency) related to information credibility perception?

Channel Factors

Beyond the source and content features of information, people also depend on information channel characteristics (i.e., how the information is presented) to make judgments about information credibility, akin to 'judging a book by its cover.' Information channels refer to the facilities (e.g., media) through which a source transmits and delivers information to the receiver (Metzger et al., 2003). Channel features of information include specific modalities of communication such as text, audio, or video (Metzger et al., 2003). Such features may also differ across different media forms. For printed media, such as newspapers, the channel features might include the layout or glossiness of the paper. For online media, channel cues may include the appearance and interface design of the webpage (Wathen & Burkell, 2002). Two channel features documented as important cues for information credibility judgment in previous studies are media modality (Sundar et al., 2021) and media interactivity (Sundar, 2008). Table S1 in the Supplemental Materials aggregates the definitions of these two channel factors and explains their associations with credibility judgment. In light of the inconsistent findings regarding the relations between these channel factors and information credibility perception (e.g., Li & Suh, 2015; Westerwick, 2013), this study asks:

RQ3: To what extent are the aggregated channel factors (i.e., media modality and media interactivity) related to information credibility perception?

Receiver Factors

Information credibility judgment varies among individuals, as some may perceive the same information as more credible than others (Lee & Shin, 2021). This means that personal characteristics of the receivers, such as demographics, domain knowledge, personal experience, and emotions, may influence how credibility evaluation is conducted (e.g., Ecker et al., 2022; Lucassen et al., 2013). These features not only affect the extent to which information is processed and evaluated (Metzger et al., 2007), but also interact with source, content, and channel factors to determine information credibility judgments (Lee & Shin, 2021). This study summarizes three receiver factors (topical knowledge, issue involvement, and personal emotions) associated with information credibility perceptions in previous research. Table S1 in the Supplemental Materials provides the definitions of the three receiver factors and explanations concerning their associations with credibility judgment. However, the findings on the associations between these receiver factors and information credibility perceptions are often inconsistent. For example, while some studies have found positive associations between topical knowledge and credibility perception (e.g., Bucy et al., 2014), others have found negative ones (e.g., Lanero et al., 2020). Therefore, we ask:

RQ4: To what extent are the aggregated receiver factors (i.e., topical knowledge, issue involvement, and personal emotions) related to information credibility perception?

Potential Moderators

The relationship between information credibility perception and its related factors may vary due to study characteristics, such as study contexts and methodologies used. To explore these variations, this meta-analysis identifies six contextual and two methodological

moderators that may affect the relationships between information credibility perceptions and its related factors.

Contextual Moderators

Contextual moderators such as sample characteristics or study contexts can influence the relationships between variables. This study proposes six moderators—age, gender, education, country of samples, media channel, and information topic—that may affect the aggregated relationships. Previous research has found that demographics might alter how information is processed and evaluated. For example, gender differences can influence credibility judgment, with men more likely to rely on superficial cues, such as endorsement cues, than women (Yin et al., 2018). Age has also been found to influence information credibility judgment; older adults are less sensitive to credibility cues in message content than younger adults (Liao & Fu, 2014). Additionally, individuals with higher levels of education tend to judge information more critically than those with lower educational levels (Lucassen et al., 2013). Moreover, cultural context can shift the impact of content on credibility, with those from collectivist or Eastern cultures being more influenced by normative cues (Luo et al., 2014). Therefore, demographic factors such as gender, age, education, and country could potentially moderate the relationships that are aggregated in this study.

The credibility of information can also be influenced by factors such as the medium through which it is conveyed and its topics. Regarding the moderating effects of information channels, some studies (e.g., Melican & Dixon, 2008) found that Internet news was perceived as less credible than news from other media channels (e.g., television or printed newspapers), while others (Flanagin & Metzger, 2000) found no significant differences in credibility judgments across various channels. Thus, further studies are warranted to examine whether people's judgments of information credibility vary across different information channels. The topic of information might also moderate the aggregated relations in this study. For instance,

previous studies (e.g., Flanagin & Metzger, 2000) have shown that entertainment information was perceived as significantly more credible than commercial information. Given that the associations between credibility perceptions and its related factors could vary across different contextual factors, we propose:

> **RQ5**: Do the associations between information credibility perception and its related factors vary based on contextual moderators (i.e., age, gender, education, country of samples, media channel, and information topic)?

Methodological Moderators

The nature of methodologies can influence study results, enabling different inferences, such as causal or correlational (Babbie, 2004). The techniques used for gathering data and the specific approaches to hypothesis evaluation in various research methods, like experiments or surveys, can yield varying outcomes on the influence of the variables studied. For example, experimental designs are capable of examining causal relationships, while cross-sectional surveys are more suitable for identifying associations between variables (Babbie, 2004). Therefore, this meta-analysis examines the extent to which the choice of research method may alter the combined findings. Additionally, the precision in estimating the magnitude of effects can vary between non-random/convenience samples and those that are random or representatively sampled (Ou & Ho, 2021). Hence, the type of sampling technique employed is also regarded as a potential influencing factor. The following research question is proposed:

> **RQ6**: Do the associations between information credibility perception and its related factors vary based on methodological moderators (e.g., research and sampling methods)?

Methods

Study Retrieving

To conduct a comprehensive search of the empirical literature on information credibility, we combined the extant conceptually equivalent terms of information credibility to carry out literature searching on databases. Thus, terms such as “Trustworthiness” OR “Believability” OR “Accuracy” OR “Truthfulness” OR “Reliability” OR “Authenticity” combined with terms such as “Information” OR “Message”, OR “News” were used for searching for the relevant literature. Articles were searched across multiple electronic databases. *EBSCOhost*, *ScienceDirect*, *Web of Science*, *Communication & Mass Media*, *PsycINFO*, and *PsycAbstracts* were used as primary sources, and *Google Scholar* was utilized as a supplementary source for literature searching. The title, abstract, and text of each retrieved article were reviewed to determine their suitability for the current review as well as to ensure there were no duplicates. The initial database search was conducted until January 2023, with a total of 2,461 articles retrieved. Besides, six additional articles were identified from the reference list of the collected publications, resulting in 2,467 articles for literature screening (see Figure 1). To reduce the impacts of publication bias, both unpublished and published articles were searched.

Study Inclusion Criteria

Only English articles fulfilling the following inclusion criteria were eligible for the meta-analysis: (a) measuring factors influencing information credibility perceptions, (b) measuring information credibility/believability/accuracy/truthfulness/reliability/authenticity perceptions as an outcome variable, (c) quantitative empirical studies that included necessary statistics for effect size estimation (e.g., sample size, correlations, *F*-values, *t*-values), and (d) written in English. Therefore, studies examining the perceptions of other conceptually-inequivalent terms (e.g., perceived information quality; Maltz, 2000), measuring information

credibility perceptions as independent variables or moderators (e.g., Flanagin et al., 2014), using qualitative methods (e.g., interviews; Choi, 2020), and written in other languages (e.g., Kim, 2007) were excluded. Figure 2 shows the filtering process of studies following the Preferred Reporting Item for Systematic Reviews and Meta-analysis (PRISMA) guidelines (Deshpande, 2013). After going through the filtering process, 85 empirical studies were deemed eligible for inclusion and for coding.

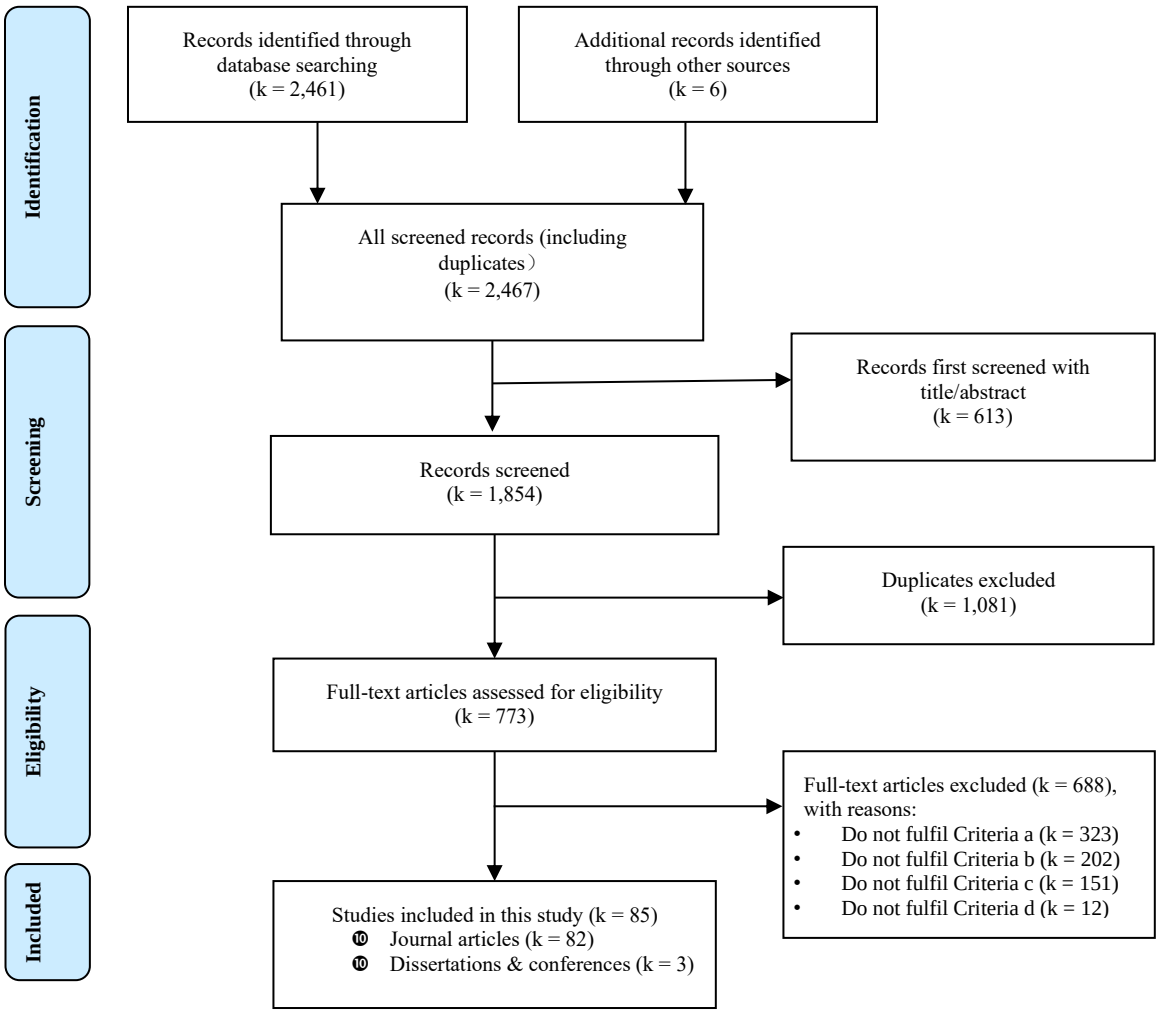

Figure 2. The Filtering Process of Studies Included in the Meta-Analysis Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Guidelines

Coding

Two coders were trained to code the study information. They independently coded the study elements, such as independent variables, outcome variables, sample size, and potential moderators. They coded the country of the sample as (1) Asia, (2) North America, (3) South America, (4) Europe, (5) Australia, (6) Africa, (7) multiple countries, and (8) not specified. The sample's mean age was coded as (1) Millennial and younger, (2) Gen X, (3) baby boomer and older, and (4) not specified. The sample's gender composition was coded as (1) number of males > number of females, (2) number of males < number of females, (3) number of males = number of females, or (4) not specified. The education composition of the sample was coded as (1) majority non-undergraduates and below, (2) majority undergraduates, (3) majority graduates and above, (4) others, and (5) not specified. The types of media channels were coded as (1) printed media (e.g., printed newspapers, magazines, or leaflets), (2) broadcasting media (e.g., TV, broadcast, or radio), (3) Internet media (e.g., e-commercial website or online forums), (4) social media (e.g., Facebook or Twitter), (5) other media platforms, and (6) not specified. The information topic was coded as (1) political topic, (2) health topic, (3) environment topics, (4) scientific topic, (5) commercial/economic topic, (6) multiple information topics, (7) other topics (e.g., social/local news), or (8) not specified. The coders coded research method as (1) survey, (2) experiment (3) not specified. Finally, the sampling method was coded as (1) non-representative sampling, (2) representative sampling, or (3) not specified. The *Krippendorff's alpha* for intercoder reliability ranged from .83 (mean age of samples) to 1.00 (sample size). The coding scheme for the moderators are provided in the Supplemental Materials.

Methods for Bivariate Relationship Aggregation

The weighted mean effect sizes were estimated using the random-effects model, which assumes that the true effect size varies across studies. First, we employed the formulas

by Rosenthal and DiMatteo (2001) and Peterson and Brown (2005) to convert all reported statistics (e.g., mean, standard deviation, risk ratio) into Pearson's correlation coefficients. As each study's sample should contribute only once to the overall effect sizes, we chose the study as the unit of analysis, adhering to the guidelines by Borenstein et al. (2009). Subsequently, we converted each study's correlation to Fisher's *z* score and aggregated the weighted mean effect sizes for each variable using methods by Hedges and Olkin (1985). All summarized effect sizes were then converted back to weighted correlations (i.e., Pearson's *r*) for interpretation purposes. We interpreted the results of the weighted mean effect sizes in accordance with the comparison thresholds for correlations by Cohen (1992).

Methods for Moderator Analyses

We examined the moderating effects of some contextual and methodological factors to account for the differences observed across the combined correlation coefficients. The identification of potential moderators was determined using the *Q* statistic, which measures the heterogeneity of effect sizes within a set of studies, and the I^2 value, which reflects the proportion of variation in effect sizes that is due to heterogeneity across studies. An I^2 value greater than 75% along with a statistically significant Q statistic indicates a considerable variance in study results, signalling the necessity for a moderator analysis (Huedo-Medina et al., 2006). Subgroup analyses within a random-effects model were performed to assess the impact of the identified moderators on the combined effect sizes (Borenstein & Higgins, 2013). For the statistical analysis, we utilized the R software (the *metafor* and *meta* packages).

Result

Basic Study Characteristics

85 studies were included in this meta-analytic review, yielding 143 independent effect sizes and a total sample size of 37,616. Table 1 shows the basic information of all the aggregated studies.

Results for Aggregated Bivariate Relationship

Table 2 presents the results of the estimated bivariate relations between all aggregated precursors and information credibility judgment. Regarding source factors, the association of source credibility with information credibility perceptions (r = .42, p < .001) at a medium-to-large level, whereas the associations of other source factors, such as source expertise (r = .26, p < .001), number of sources (r = .13, p < .001) and source congruency (r = .12, p < .05) with information credibility perceptions were at a small-to-medium level. Regarding the content factors, argument quality (r = .47, p < .001) and content fluency (r = .33, p < .001), had medium-to-large associations with information credibility perception; Content congruency (r = .20, p < .05) yielded small-to-medium level relationships with information credibility perceptions. With respect to the media channel factors, both media interactivity (r = .11, p < .05) and media modality (r = .09, p < .001) demonstrated small-to-medium-level associations with information credibility perception. Lastly, for the receiver factors, issue involvement (r = .27, p < .001) and personal emotions (r = .23, p < .05) yielded a small-to-medium correlations with information credibility perception. However, topical knowledge (r = .06, p = .37) did not have significant associations with information credibility perception.

Publication Bias Test

We tested for publication bias using three approaches: Funnel plots, Egger's tests (Egger et al., 1997), and Rosenthal's fail-safe *N* tests (Rosenthal, 1979). The results from the Fail-safe *N* tests indicated that the number of missing studies, which might overturn the

estimated associations of all aggregated relationships, exceeded the tolerance level of $5k + 10$ (Rosenthal, 1979). This indicates that publication bias has negligible effects on the aggregated relationships. Moreover, the symmetry observed in most funnel-shaped plots (see Figure S1) and the results from Egger's tests (see Table 2) suggest that publication bias was absent for most aggregated associations. However, the funnel plots and Egger's test results did reveal potential publication bias existing in the aggregated associations of content congruency and personal emotions with credibility perceptions. To address this, we employed the trim-and-fill analysis (Duval & Tweedie, 2000) to estimate adjusted effect sizes for these two relationships after correcting for publication bias. The results showed that the adjusted effect sizes were slightly different compared to those uncorrected for publication bias (r = .20. vs. $r_{adjusted}$ = .22. for content congruency; r = .23. vs. $r_{adjusted}$ = .23 for personal emotions). Thus, while there was a statistically significant publication bias present, it was not substantively meaningful.

Results for Moderator Analyses

The results of the moderation test revealed that the gender composition of samples, information channel, information topic, and research method significantly moderated some of the aggregated relationships (see Table 3). First, the gender composition of samples significantly moderated the association between content fluency and information credibility perception ($Q_{between}$ = 28.20, $p < .001$). The correlation between content fluency and information credibility perception were significantly stronger for studies with more male participants (r = .55, *95% CI* [.00,.1.10], k = 2) than for those consisting of more female participants (r = .30, *95% CI* [-.15,.75], k = 4) and those for not specifying gender composition (r = .21, *95% CI* [.10,.33], k = 7) .

Information channel significantly moderated the associations of content fluency ($Q_{between}$ = 96.62, $p < .001$) and topical knowledge ($Q_{between}$ = 19.57, $p < .001$) with

information credibility perception. In particular, the correlation between content fluency and information credibility perception was significantly stronger for studies focused on information on social media (r = .57, *95% CI* [.47, .67], k = 2), compared to those focused on information on Internet media (r = .18, *95% CI* [.08, .28], k = 3), printed media (r = .41, *95% CI* [.28, .54], k = 4). In addition, the correlation between topical knowledge and information credibility perception was significantly weaker for studies focused on information on social media (r = -.07, *95% CI* [-.11, -.02], k = 4) than for studies focusing on information on broadcasting media (r = .14, *95% CI* [-.31, .32], k = 2) and Internet media (r = .00, *95% CI* [-.08, .33], k = 3).

Information topic was a significant moderator in the relationship between source credibility ($Q_{between}$ = 62.10, p < .001) and information credibility perception. The correlation between source credibility and information credibility perception was stronger for studies focusing on health information topics (r = .64, *95% CI* [.54 .74], k = 3) than that for those focusing on commercial information topics (r = .41, *95% CI* [.20, .62], k = 7), science information topics (r = .24, *95% CI* [-.08, .55], k = 2), and multiple information topics (r = .07, *95% CI* [-.43, .58], k = 2; see Table 3).

Regarding the moderating roles of methodological moderators, research methods significantly moderated the associations of argument quality ($Q_{between}$ = 6.73, p < .05), content fluency ($Q_{between}$ = 25.54, p < .001), source credibility ($Q_{between}$ = 6.18, p < .05), source expertise ($Q_{between}$ = 5.18, p < .05), media interactivity($Q_{between}$ = 6.67, p < .05), and number of sources ($Q_{between}$ = 7.32, p < .01) with information credibility perception (see Table 3). Specifically, the correlations of argument quality, content fluency, source credibility, source expertise, media interactivity, and number of sources between information credibility perception were significantly stronger for survey studies, as compared to experimental studies.

Discussion

This meta-analysis synthesized 12 factors influencing information credibility perceptions and categorized them into four groups (i.e., source, content, channel, and receiver). It also aggregated their respective associations with credibility perceptions. The findings highlight that while the cumulative effects of most included factors on credibility perceptions were significant, the aggregated association between topical knowledge and credibility perceptions was nonsignificant and contingent on the media platforms used. The moderator analysis found that the associations between credibility perceptions and the included factors varied depending on specific contextual and methodological elements. This finding provides a deeper understanding of how contextual and methodological differences can result in varying credibility judgments among individuals.

Differential Effects of Aggregated Factors on Credibility Judgment

The strong effect of argument quality suggests that, beyond heuristic processing based on superficial cues (e.g., appearance of information), analytical processing plays a significant role in shaping credibility judgments. This observation contrasts with the cognitive miser model (Fiske & Taylor, 1991), which posits that individuals tend to engage in less effortful thinking and avoid extensive elaboration. Our findings align with a previous meta-analysis by Sarkar et al. (2020), indicating a moderate correlation between argument quality and individuals' trust in mobile commerce apps. However, this study did not explore specific elements within message content (e.g., statistics or logical strength) that may enhance or undermine argument quality. Future research should examine how different conceptualizations and operationalizations of argument quality affect credibility judgments.

The aggregated correlation between source credibility and information credibility perception is robust, consistent with previous studies that have found information consumers typically regard source credibility as a critical heuristic for assessing credibility in various

contexts (e.g., Ou & Ho, 2023; Sui & Zhang, 2021). However, despite the significant impact of source credibility on credibility judgments, research indicates that individuals' perceptions of source credibility vary, moderated by factors such as social identity (Becker, 2021) and personal ideology (e.g., Landreville & Niles, 2019). Landreville and Niles (2019) discovered that partisanship alignment with a news host boosts the perceived credibility of the host and, subsequently, the news content. These contextual and individual factors complicate the task of combating misinformation by relying solely on corrections from reputable or reliable sources. This highlights the necessity for a more comprehensive examination of potential factors (e.g., personal cultural worldview and social identity) that influence the impact of source credibility on information credibility judgments.

We observed non-significant and heterogeneous correlations between topical knowledge and perceptions of information credibility. Previous research has provided mixed findings on whether personal knowledge of a topic assists in individuals' credibility judgments (e.g., Lanero et al., 2020; Sui & Zhang, 2021). Our meta-analysis suggests that individuals with more knowledge about a topic tend to be more skeptical about the credibility of related claims, potentially lowering their credibility ratings. This skepticism may stem from the tendency of well-informed individuals to employ critical thinking over heuristic processing in credibility assessments, leading to more critical judgments of information (Santon & Cook, 2019). This finding resonates with the 3S model (Lucassen et al., 2013), which contends that those with higher domain knowledge analytically evaluate credibility based on the content of information, whereas those with less expertise may rely on surface features for intuitive credibility evaluations. Future research could explore additional moderators that influence the impact of topical knowledge on credibility judgments, such as the measurement of knowledge (subjective vs. actual) and the veracity of information.

Moderation Effects of Contextual and Methodological Factors

Moderator analyses revealed that the correlation between content fluency and credibility perceptions was stronger in studies involving more males than in those with more females. Previous research and theories (e.g., the selectivity model; Meyers-Levy, 1989) have highlighted gender differences in information processing patterns (e.g., Meyers-Levy & Sternthal, 1991; Yin et al., 2018), suggesting that males tend to rely on superficial attributes, while females are inclined to utilize all available cues to assess information credibility. Thus, educational strategies to combat misinformation may need to consider these gender differences in information processing and credibility judgments. Strategies emphasizing the importance of scrutinizing all elements of information and promoting comprehensive thinking might be particularly beneficial for males who tend toward heuristic processing. However, it is crucial to note that our coding for gender composition was based on the reported proportions in each study. For example, a study with a composition of 51% male and 49% female participants (e.g., Abedin et al., 2021) was coded as 'more males than females.' Considering the slight difference in the gender proportion, it is difficult to claim these studies are predominantly one gender over the other. Therefore, the moderating effects of gender composition on the aggregated relationships should be interpreted with caution.

Stronger effects of media fluency on credibility perceptions were observed in studies focusing on social media compared to those on other platforms. A possible explanation is that messages on social media are often delivered in a colloquial and concise manner, making them more straightforward, understandable, and readable (e.g., Daniel & Camp, 2020), thereby enhancing processing fluency and perceived credibility. Previous research supports these findings, showing that message features like readability on social media can increase processing fluency and user engagement (e.g., Pancer et al., 2019). However, the fluency attributes of social media messages, which align with human heuristic processing, could

make individuals more vulnerable to misinformation on these platforms. Therefore, interventions to combat misinformation should increase individuals' awareness of the risks associated with the intuitive processing of social media content and promote critical engagement with information, including verifying its accuracy before acceptance.

Significant negative effects of topical knowledge on perceptions of information credibility were observed in studies focusing on social media compared to those on other media platforms. This indicates that individuals with greater knowledge are less likely to trust information from social media than from other sources, such as broadcast media. This concurs with previous research showing that those with higher education levels (Hwang & Jeong, 2023) or greater cognitive abilities (e.g., De Keersmaecker et al., 2020) are better at identifying misinformation and are therefore more skeptical of unverified content on social media. While it may not be practical to increase people's knowledge on every specific topic, it is feasible to enhance the misinformation discernment ability by improving their digital media literacy (Guess et al., 2020). Such enhancements can aid individuals in distinguishing authentic news from fabrications, thus decreasing the likelihood of accepting misinformation on social media.

The link between source credibility and credibility perception was found to be stronger in studies on health-related topics (e.g., cancer or AIDS) than in those on non-health topics (e.g., commercial or scientific). This indicates that individuals trust health information from sources with high credibility more than those with low credibility. Despite the notable impact of source credibility on trust in health information, previous research indicates that individuals' perceptions of source credibility vary, often influenced by motivated reasoning or differences in political worldviews and ideologies (Wittenberg & Berinsky, 2020). Thus, simply offering corrections from highly credible sources might not suffice to alter beliefs, particularly if the corrections contradict individuals' existing worldviews or beliefs (Nyhan &

Reifler, 2010). Corrections from credible sources within one's own social or ideological group, or from trusted individuals within one's social circle, may be more effective in increasing individuals'' acceptance of corrective information (e.g., Margolin et al., 2018; Vraga & Bode, 2018). Future research could explore the comparative effectiveness of corrections from in-group versus out-group sources.

Theoretical Implications

Through a comprehensive meta-analysis, this study is the first to aggregate the effects of multifaceted factors (source, content, channel, and receiver) on credibility perceptions and to identify the sources of variation in their effects. The strong effects observed for argument quality and source credibility suggest that credibility judgments are significantly influenced by both heuristic and analytic information processing (Metzger & Flanagin, 2015). However, the exact relationship between these two modes of credibility assessment remains unclear. Some scholars propose a sequential relationship between intuitive and analytical assessment, positing that heuristic credibility assessment acts as a gatekeeper, determining whether individuals will further engage in systematic or analytical assessment (e.g., Schwarz & Jalbert, 2023; Wathen & Burkell, 2002). Conversely, other theories (e.g., Metzger's dual-processing model of information credibility judgment) posit a trade-off relationship, suggesting that individuals' engagement in either mode of credibility judgment (e.g., systematic vs. heuristic) is contingent on their motivations or abilities. Future research should delve into whether intuitive and analytical modes of credibility assessments are concurrent, sequential, or part of a trade-off mechanism.

This study revealed varying effects of informational factors (source, content, channel) on credibility judgments, suggesting that individuals do not process all information characteristics unselectively when assessing credibility. This observation aligns with the prominence-interpretation (P-I) theory (Fogg, 2003), which posits that people selectively

attend to and judge certain elements of information. Metzger's dual-processing model of information credibility judgment (2003) may shed light on this selective approach, proposing that individual motivations and capabilities dictate how different informational cues are employed and the specific modes of credibility judgment engaged (e.g., systematic versus heuristic). As not all aspects of information are processed to the same extent, a promising direction for future research could be to explore the motivational and individual determinants that direct attention to various cues and examine how this selective information processing shapes individuals' credibility perceptions.

This study also offers valuable insights into how contextual and methodological elements moderate the effects of source, content, channel, and receiver factors on credibility perceptions. The observed moderation effects of gender composition, information channels, and information topics underscore the roles individual differences and informational contexts play in credibility assessments. Future research could further investigate how multiple individual and contextual elements interact with information characteristics to influence information processing and judgment. Additionally, the meta-analysis reveals larger effect sizes for correlational studies than for experimental studies, emphasizing the roles of research methods in influencing the study results. Nonetheless, the scarcity of studies within certain subgroups calls for a cautious interpretation of these moderation effects.

Practical Implications

As false beliefs arise through the same mechanisms establishing credibility perceptions (e.g., Ecker et al., 2022), examining the formation of credibility perceptions can inform the development of strategies mitigating misinformation beliefs. The strong influence of source credibility on credibility perceptions suggests that communication interventions against misinformation might focus on teaching people to discern credible sources. Moreover, the large effects of argument quality on credibility perceptions underscore the

potential of using evidence-based or plausible arguments to counter misinformation. While individuals are prone to engage in motivated reasoning (e.g., biasing opinions based on personal values and perspectives), this study shows that evidence and logical arguments substantially influence their assessment of information credibility (Lucassen et al., 2013b; Shan, 2016). Presented with sufficient opposing evidence, individuals may be prompted to re-evaluate and potentially revise their prior beliefs to align with the factual information (e.g., Redlawsk et al., 2010; Wittenberg & Berinsky, 2020). Therefore, strategies aimed at reducing the acceptance of misinformation could involve providing evidence-based corrections, which help mitigate the risk of the worldview backfire effect, a phenomenon where correcting misinformation that contradicts one's beliefs paradoxically strengthens their conviction in the misinformation (Wittenberg & Berinsky, 2020).

We also found that heuristic cues (e.g., content fluency and social endorsement) significantly influence credibility perceptions. Consequently, individuals may become more vulnerable to misinformation if they depend solely on these superficial cues for credibility judgments. It is essential for individuals to recognize the dangers of overreliance on heuristic cues and to engage in more analytical evaluation of information. However, it must be recognized that few will undertake such analytical information evaluation (Schwarz & Jalbert, 2023). Therefore, communication practitioners should develop interventions (e.g., media literacy education) to encourage deliberation and discourage mindless sharing of uncertain information (e.g., Bago et al., 2020). Considering the prominent role of heuristic processing in the credibility assessment of information, misinformation correction would be more effective when it is less mentally demanding—for instance, using succinct visual corrections rather than verbose, jargon-heavy fact-checking articles (Schwarz et al., 2016). With the advent of artificial intelligence (AI), it is imperative for individuals to be aware that cues triggering heuristic processing (e.g., content congruency or political ideology) might be

seamlessly employed in AI-generated content to mislead them (e.g., Yang et al., 2023). Therefore, users should critically evaluate AI-created content with caution and scepticism.

Limitations

This study has several limitations. First, meta-analyses that predominantly consist of published research might potentially skew results. Although we conducted multiple tests and indicated weak evidence of publication bias, a greater inclusion of unpublished studies would have enhanced the robustness of this meta-analysis. Therefore, future meta-analyses should include more unpublished studies to enhance robustness. Second, this meta-analysis only aggregated results from cross-sectional studies. Subsequent meta-analyses should incorporate studies with longitudinal designs (e.g., Holtrup et al., 2023) to provide a more comprehensive meta-analysis. Third, we only synthesized the effects of 12 factors on credibility perceptions, which is not exhaustive. Factors such as political polarization (e.g., Sarwar et al., 2020) or message emotionality (Vendemia, 2017) were not considered. Future research should aim for a more comprehensive analysis by examining additional factors. Fourth, the intricate relationships between aggregated factors (e.g., source credibility) and information credibility perceptions warrant investigations into a wider range of moderators affecting these relationships. Future meta-analyses should explore the impacts of additional moderators (e.g., the conceptualizations of each factor), to provide a more detailed understanding of variations in effect sizes. Lastly, this study included only English-written articles. Some non-English studies (e.g., Li, 2017), have also provided significant insights into information credibility judgment. Future reviews should incorporate studies published in other languages and venues.

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Table 1

Basic Study Characteristics

Study characteristics	***N***	**Study characteristics**	***N***
Country	**85**	**Media platform**	**85**
America	43	Printed media	14
Asia	8	Broadcasting media	2
Europe	14	Internet media	35
Multi-countries	1	Social media	28
Not specified	19	Not specified	5
Age group	**85**	Other platforms	1
Most Generation Z	21	**Information Topic**	**85**
Most Millennials	31	Health topic	20
Most Generation X	8	Commercial information	16
Not specified	25	Science topic	4
Gender Composition	**85**	Political topic	11
Male > Female	17	Environmental topic	2
Male < female	49	Multiple topic	16
Male = Female	1	Other topics (i.e., local news)	9
Not specified	18	Not specified	7
Research method	**85**	**Sampling method**	**85**
Survey	19	Representative	55
Experiment	66	Non-representative	7
Education Composition	**85**	Not specified	23
Majority non-undergraduates and below	7		
Majority undergraduates	31		
Majority graduate or above	15		
Not specified	32		

Table 2

Summary of Effect Sizes and Test for Publication Bias

	Effect Size				Heterogeneity Test		Test for Publication Bias			Trim & Fill Adjusted Estimates
	k	***N***	**Weighted-Mean *ES***	***95%CI***	***Q* statistic**	***I²***	***z***	***p***	***Fail-safe N***	
Source Factors										
Source Credibility	14	5,475	.42***	[.26, .57]	357.84***	96.23%	.21	.84	4,472	-
Source Congruency	8	5,540	.12*	[.03, .19]	108.70***	95.91%	.03	.97	206	-
Source Expertise	12	7,825	.26***	[.14, .38]	321.79***	92.84%	-1.42	.16	1,518	-
Social Endorsement (Number of Sources)	20	10,284	.13***	[.02, .23]	238.78***	93.77%	1.07	.28	1,472	-
Content Factors										
Argument Quality	12	4,103	.47***	[.25,.69]	367.51***	96.41%	1.25	.21	3,343	-
Content Fluency	13	2,432	.33***	[.16, .50]	124.33***	89.87%	-.00	.99	994	-
Content Congruency	7	6,119	.20*	[.01, .39]	102.73***	96.97%	2.21*	.03	679	.22*
Channel Factors										
Media Interactivity	10	2,866	.11*	[.05, .17]	22.83**	62.82%	1.76	.08	151	-
Media Modality (Textual vs. Visual)	15	5,910	.09***	[.05, .16]	24.90*	42.05%	1.77	.08	257	-
Receiver Factors										
Topical Knowledge	9	7,668	.06	[-.09, .21]	215.27***	96.52%	-.04	.97	70	-
Issue Involvement	15	6,362	.27***	[.11, .43]	290.65***	96.62%	1.04	.30	2,843	-
Personal Emotions	8	3,480	.23*	[.05, .42]	146.17***	95.70%	-2.05*	.04	368	23*

Note. k = number of studies; N = total sample size for all studies combined; ES = effect size; *95%CI* = lower and upper limits of 95% confidence interval for effect size; Q, I^2 = measure of homogeneity; Fail-safe N = statistics for fail-safe N test; For Trim and Fill adjusted estimates, only relations having statistically significant publication bias were examined.
*$p < .05$, **$p < .01$, ***$p < .001$.

Table 3

The Effects of Moderators on the Correlations between Aggregated Factors and Information Credibility Perception

Moderators	**Aggregated Factors**	$Q_{between}$	**Subgroups**	***k***	***r***	***95% CI***
Gender Composition	Content Fluency	28.02***	Male < Female	4	.30	[-.15, .75]
			Male > Female	2	.55	[.00, .1.10]
			Not Specified	7	.21	[.10, .33]
Media Platform	Content Fluency	96.62***	Printed Media	4	.41	[.28, .54]
			Social Media	2	.57	[.47, .67]
			Internet Media	3	.18	[.08, .28]
			Not Specified	4	.23	[.13, .33]
	Topical Knowledge	19.57***	Broadcasting Media	2	.14	[-.31, .32]
			Internet Media	3	.00	[-.08, .33]
			Social Media	4	-.07	[-.11, -.02]
Information Topic	Source Credibility	62.10***	Commercial Information	7	.41	[.20, .62]
			Health Information	3	.64	[.54, .74]
			Science Information	2	.24	[-.08, .55]
			Multiple Information	2	.07	[-.43, .58]
Research Method	Argument Quality	6.73*	Experiment	5	.23	[.13, .33]
			Survey	7	.59	[.43, .75]
	Content Fluency	25.54***	Experiment	11	.27	[.12, .40]
			Survey	2	.57	[.48, .66]
	Source Credibility	6.18*	Experiment	7	.26	[.11, .40]
			Survey	7	.49	[.31, .67]
	Source Expertise	5.18*	Experiment	10	.13	[.08, .19]
			Survey	2	.31	[.07, .56]
	Media Interactivity	6.67*	Experiment	7	.08	[-.04, .20]
			Survey	3	.24	[.12, .35]
	Social Endorsement (Number of Sources)	7.32**	Experiment	13	.16	[.07, .24]
			Survey	7	.39	[-.61,1.40]

Note. *r* = Pearson's *r*; *k* = number of studies; *95%CI* = lower and upper limits of 95% confidence interval for effect size.

**p < .05, **p < .01, ***p < .001.*