Int. J. Human–Computer Studies 193 (2025) 103378

Contents lists available at ScienceDirect

International Journal of Human - Computer Studies

journal homepage: www.elsevier.com/locate/ijhcs

Exploring the effects of location information on perceptions of news credibility and sharing intention

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ARTICLE INFO

Keywords:
News credibility
Location information
Online misinformation
Bias

ABSTRACT

In recent years, the integration of location-based services into social media platforms has seen a significant surge, coinciding with the growing challenges posed by the proliferation of fake news online. However, the influence of location data on readers' perceptions of online news credibility, particularly in relation to the reporters' whereabouts, remains unclear. To investigate this relationship, we conducted a 3 (Topics: crime, science, health) × 2 (Location anchor: event-anchored or participant-anchored) × 4 (Proximity to location anchor - no, same, close-by or faraway location) mixed-method online study (N = 288) on Prolific. Our data collection involved presenting participants with news articles and assessing their credibility assessments and sharing intentions based on the proximity of those disseminating the news to both the subject matter of the news and the audience consuming it. Our findings reveal that the proximity of the reporter's location to the readers' location had a noticeable adverse impact on perceptions of news credibility and the likelihood of sharing it. Furthermore, we also identified a weak positive correlation between sharing intentions and trust in social media platforms. In addition, we observed that crime news were generally perceived as less credible compared to health and science news. Our research contributes significantly to a nuanced understanding of how location-based cues impact user behaviour when interacting with online news articles. Furthermore, it provides design insights for social media platforms aiming to enhance user trust and promote pro-social behaviours.

1. Introduction

Social Networking Sites (SNSs) are now deeply embedded in our daily routines, constituting the largest portion of our online media engagement. On average, individuals spend 2 h and 27 min per day on these platforms (Kemp, 2022). This extensive use of social media has a profound impact on the news consumption behaviour of individuals. According to a recent survey conducted by the Pew Research Center (Anon, 2022), 31% of adults in the U.S. regularly obtain news from Facebook, with a quarter obtaining news from YouTube, while others rely on other platforms like X (Twitter, 14%), Instagram (13%), TikTok (10%), or Reddit (8%) for their news consumption needs. Interestingly, more than half of X (Twitter) users access news regularly on the platform (Mason and Katerina, 2021).

While social media can be convenient and entertaining, the rampant spread of misinformation by malicious users and bots is a significant challenge for social media platforms (Collins et al., 2021). These platforms and, in turn, their users are inundated with fabricated news, deceptive information, manipulated videos, altered facts, and rumours. Given that more than half of social media users encounter fake news on a daily basis (Ahuja and Kumar, 2020), this is having increasing societal impact, causing confusion, polarisation and mistrust (Bin Naeem and Kamel Boulos, 2021). Importantly, much of the policing and verification of content on social media is being left to the online users themselves (Bruns, 2008; Spence et al., 2013).

Previous studies have shown how different heuristic cues affect users' credibility perception of information shared on social media, such as authority cues (Sundar et al., 2009), bandwagon cues (Lin et al., 2016b), and endorsement cues (Lee et al., 2021b). In this paper, we explore an additional heuristic cue that could allow users of social media platforms to discern the credibility of online news, namely location-based cues. In particular, we are interested in the location data provided by those posting on social media and how it can influence the way other users perceive the credibility of news and engage with the information. Prior research has explored geolocation as a potential indicator of credibility, noting that public trust in local news often

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https://doi.org/10.1016/j.ijhcs.2024.103378
Received 6 November 2023; Received in revised form 17 September 2024; Accepted 19 September 2024
Available online 27 September 2024
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surpasses that of national news due to perceptions of greater relevance and lower bias (Knight Foundation and Gallup, 2019).

In addition, prior works have examined the locations of followers (Steve et al., 2014) and potential friend circles (Diakopoulos et al., 2012). However, there still exists an important gap in our understanding of how different proximity of geolocation to both the news subject matter (i.e., event-anchored) and, especially, the audience's own location (i.e., participant-anchored) affects perceived credibility. Similarly, considering different news topics is essential as previous studies show that the topic of the content influences users' credibility perception on social media (Luo et al., 2022). However, previous work has not investigated how news topics interact with location cues, which in turn can affect how these cues are interpreted. To fill these gaps, we formulated the following research questions:

RQ1: How does a news reporter's location (event-anchored vs. participant-anchored) influence readers' perceived credibility, confidence in their judgements, and intention to share the news information on social media?

RQ2: How do different proximity levels (no, same, close-by or far-away location) in event-anchored vs. participant-anchored scenarios affect readers' perceived credibility, confidence in their judgements, and intention to share the news on social media?

RQ3: What is the impact of the topic of the news on readers' perceived credibility, confidence in their judgements, and intention to share the news on social media when considering the location of the reporter of the news?

To answer these questions, we conducted a mixed-method online study in which participants provided evaluations of credibility and their share intention across different news articles posted on X (Twitter) with varying degrees of location information. These news articles contained both true and fake news, and encompassed a range of news topics across Science, Health, and Crime. Our findings show that the proximity of the reporter's location to the participant exerts a significant negative influence on both the perception of the credibility of the news and the intention to share the content. Furthermore, we observed that crime news were generally perceived as less credible compared to health and science news. Finally, we also found a weak positive correlation between the intention to share news and trust in social media platforms.

By investigating location-based heuristic cues at varying levels of granularity through both quantitative and qualitative data analyses, we discuss how such cues can impact user behaviour on social media platforms. Furthermore, we offer insights and recommendations that can inform the design of social media platforms seeking to improve user trust and pro-social behaviours.

2. Related work

In this section, we explore three foundational areas that informed our study. First, we discuss the existing literature on trust in news within the context of online social media. Second, we examine heuristic cues that are commonly used to assess the credibility of online news. Finally, we explore how the presence of location information impacts perceptions of credibility. Together, these areas provide a comprehensive backdrop against which our study is positioned.

2.1. Credibility perception of news on social media

In the modern digital era, online media consumption has become an integral part of our daily lives. People now devote a significant amount of time engaging with online platforms, using them as a means to share their daily activities, experiences, interests, and opinions (Emamjome et al., 2013). This shift offers numerous advantages, particularly in terms of accessing timely information and news effortlessly. At the same time, the increasing amount of user-generated content (UGC), especially those that try to imitate the expression style of professional journalism on online media platforms, has also brought about considerable challenges (Diehl and Lee, 2022). This phenomenon has lead to public concerns including the information credibility, quality, relevance of UGC, and spread of misinformation (Wang and Diakopoulos, 2021; Dailey and Starbird, 2014; McClure Haughey et al., 2020). Given the ease and scale of social media platforms, content can rapidly disseminate and gain traction among large audiences. Previous work has shown that the majority of American users view news on social media as biased, inaccurate, and rife with misinformation (The Financial, 2018). This is a significant societal challenge as it can lead to misperceptions and the formation of decisions based on false beliefs, posing potential threats to both individual well-being and society as a whole (Southwell et al., 2018; Hanitzsch et al., 2018).

Previous work has also investigated the relationship between users' demographics and their ability to discern the credibility of social media news. For instance, a study conducted by Bozdağ and Koçer (2022) showed that younger users exhibited greater scepticism towards social media profiles boasting substantial follower counts in contrast to their older counterparts. Conversely, research focused on privacy and trust on Facebook ascertained that younger adults manifested elevated levels of trust in Facebook news compared to older individuals (Malik et al., 2016). Moreover, the frequency of engagement with social media plays a role in shaping users' perceptions of news credibility. Earlier research suggests that young adults, who often frequent social media platforms, are more inclined to deem news on these platforms as credible (Adeyanju, 2015). These observations are in line with existing literature that has shown a relationship between time spent browsing news websites and a corresponding decline in scepticism towards online news content (Verma et al., 2018).

Beyond demographics, existing studies on online information credibility have revealed that individuals tend to rely on cognitive heuristic cues to process online information quickly and intuitively (Flanagin and Metzger, 2007; Sundar et al., 2007). Instead of rigorously verifying crucial factors like information source credibility or recentness, users often depend on easily accessible and straightforward cues that serve as shortcuts for making rapid judgements about the credibility of online information. Thus, there is a growing need for empirical investigations that delve into the underlying mechanisms of credibility assessment in the online domain and propose strategies that can enhance users' critical appraisal skills and discernment of reliable information sources.

2.2. Heuristic cues for discerning online news credibility

Previous research has explored various models for heuristic processing of media and information. One such model, the Heuristic-Systematic Model (Chen and Chaiken, 1999), identifies two distinct modes of information processing: heuristic and systematic. In heuristic processing, individuals use simple rules or mental shortcuts, known as heuristics, to quickly form judgements and make decisions. When specifically tailored towards understanding media interactions, earlier studies have provided a well-established list of technology-mediated heuristic cues, as exemplified by the MAIN model developed by Sundar (Sundar, 2008), which has also been used in HCI related studies (Lin et al., 2016b; Bhuiyan et al., 2021). This model identifies four major affordances: **M**odality, **A**gency, **I**nteractivity, and **N**avigability which have shown their ability to influence users' cognitive heuristics, subsequently impacting their evaluations of credibility.

One example of **modality** cues is that the utilisation of visual modalities causes individuals to perceive fake news as more credible compared to audial modalities and textual modalities, consequently, increasing the likelihood of them spreading it. This phenomenon aligns with the realism heuristic, which translates to "seeing is believing" (Sundar et al., 2021).

In the context of **agency**, an illustrative example is the bandwagon heuristic cue, whereby individuals are inclined to perceive an opinion as more credible when it is collectively supported by others (Go et al., 2014). For example, Jucks and Thon (2017) determined the effect of

social validation on trusting online health information. They showed that forum users trust social validation by the masses (quantity cue) just as well as validation by an expert (quality cue). However, they did not question how the masses' cue related to the actual correctness of the statement. Likewise, Luo et al. (2022) evaluated the effects of endorsement cues on social media and found that headlines associated with a high number of Facebook likes were more likely to be perceived as credible. In addition, Westerman et al. (2012) examined how the ratio of followers to follows influences the perceived credibility. Their findings suggest that there exists a curvilinear relationship between the number of followers and perceived expertise and trustworthiness, with judgements of credibility being lower for individuals with either too few or too many connections. Moreover, their results showed that having a narrow gap between the number of followers and follows can increase judgements of competence.

The **interactivity** cues enable users to continuously specify their needs and preferences. These cues influence credibility perceptions, such as responsiveness (a more responsive system is perceived as more credible), user-control (a system that allows user control is likely to filter high-quality information, thereby enhancing credibility), and own-ness (a system with personalised features can better make the content reflection of oneself, improving credibility) (Sundar, 2008).

Regarding **navigability** cues, according to Sundar (2008), these depend on factors such as information prominence, and browsing and elaboration. For example, when users can effortlessly locate desired information, intuitively navigate through sections, and access relevant content, their perception of credibility is positively influenced (Fogg et al., 2003).

Our study investigates location-based cues as an additional heuristic in the MAIN model's agency affordance that contains other heuristics like endorsement or bandwagon cues. In our case, we provide location information about reporters of online news on social media, which can influence users' perceptions of online news credibility. This integration considers both physical and digital contexts, showing how environmental factors can influence information access and interaction in online scenarios.

2.3. Credibility perception with the presence of location information

As one of the key elements of news, location can impact the audience profoundly, as news occurring in close proximity to them are more likely to elicit stronger reactions compared to events taking place in distant locations, which may have less direct relevance to their personal experiences (Mudd, 2014). In addition to exploring the aforementioned heuristic cues on users' credibility perceptions of online information, researchers have also investigated the role of geographic location.

Previous work has shown that reporters' physical closeness to an event increases their reports' perceived reliability. For instance, Morris et al. (2012) reported that maintaining a topical focus and geographic closeness between the reporter and tweet topic can increase credibility, suggesting that users tweeting on geographically-specific events should accurately identify their location in their bio or enable location-stamping on their mobile devices. In addition, a study conducted by Aladhadh et al. (2019) also revealed that a reporter's location affects the range of sources contributing information during an event. This geographical factor also has an impact on how credibility is distributed between two distinct locations (local and remote).

When focusing on the proximity of the reporter to the reader, previous research found that the geo-location of readers is significantly correlated with their credibility perception. For example, Steve et al. (2014) found that the geographic location of the followers of a contributor can impact their credibility on certain stories. One suggestion put forth by the reporters is to utilise geolocation as a means to verify the authenticity of individuals and thus identify more reliable sources. Similarly, Diakopoulos et al. (2012) designed an interface to display location information from a potential user's friend circle and stressed this valuable hint to estimate the source's location further contributing to conferring credibility.

Interestingly, some established social psychology theories offer valuable insights into understanding from physical proximity to psychological proximity. One such theory, Social Identity Theory (SIT), offers valuable insights into how individuals identify with specific groups and the subsequent biases that arise (Hogg, 2016). For example, the users have biased credibility and sharing of fake news on social media based on which group they identify themselves with (Turel and Osatuyi, 2021). Another study shows that social media has been found to contribute to the construction of emotional proximity for users, allowing them to interact and connect with others who are physically or emotionally proximate, thus shaping their experiences and responses during crisis events (Huang et al., 2015).

In this paper, we build upon this literature by investigating varying levels of granularity of geolocation and how this affect users' perceptions, especially when the geolocation is local to the participants themselves, while also accounting for a range of different news topics.

2.4. Hypotheses

Based on the review of the literature, we have identified several gaps and areas for further exploration. Prior research has extensively examined the factors influencing the perceived credibility of news, the confidence readers have in their judgements, and their willingness to share news articles.

However, the specific impact of a news reporter's location in relation to the event and the reader remains underexplored. Additionally, there is limited understanding of how these effects might vary across different types of news topics. To address these research gaps, we have formulated the following hypotheses:

H1: When the presented location of a reporter of online news is anchored to the news event's location (event-anchored), news articles are perceived as more credible than when the reporter's location is anchored to the reader's location (participant-anchored) (a), resulting in higher confidence in news judgement (b), and a higher likelihood that the news will be shared (c). Motivation: Credibility assessment relies heavily on personal trust developed through firsthand encounters. Event-centred news gains higher credibility through direct reporting, thereby amplifying trustworthiness and the likelihood of sharing (Viviani and Pasi, 2017).

H2: The closer the presented location of a reporter of online news is to the news event's location, the more credible the news articles will be perceived (a), resulting in higher confidence in news judgement (b), and increasing the likelihood the news will be shared (c). Motivation: Geographic closeness between the reporter and tweet topic can increase credibility (Morris et al., 2012), thus increasing sharing likelihood as readers may prioritise information closer to the source.

H3: The closer the presented location of a reporter of online news is to the reader's location, the more credible the news articles will be perceived (a), resulting in higher confidence in news judgement (b), and increasing the likelihood the news will be shared (c). Motivation: SIT suggests that individuals align with specific groups, influencing their credibility perception and sharing behaviour on social media (Hogg, 2016). Therefore, we hypothesise that physical proximity between the reporter and the reader's location is likely to enhance credibility perception and sharing likelihood.

H4: Science news and health news are perceived as more credible (a), resulting in higher confidence in news judgement (b), and have a greater sharing likelihood (c) than crime news on social media regardless of the location of the reporter of news. Motivation: Crime news is frequently dramatised to attract attention, presenting a distorted image by disproportionately publicising violent events over non-violent ones, which can lead to greater scepticism (Intravia et al., 2017).

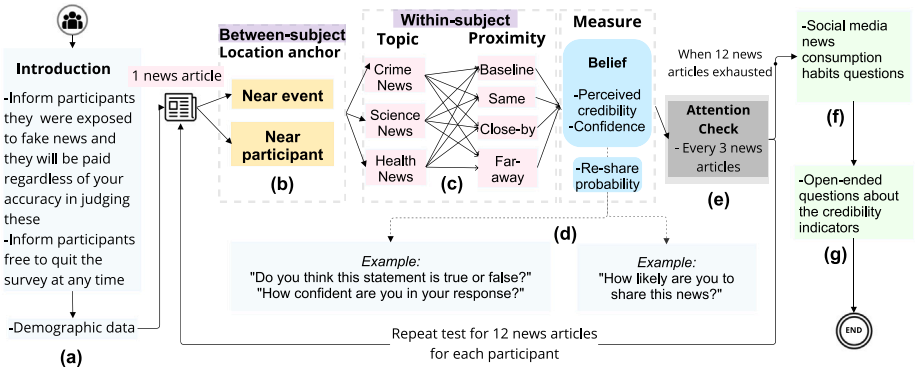

Fig. 1. The experiment flow of our study.

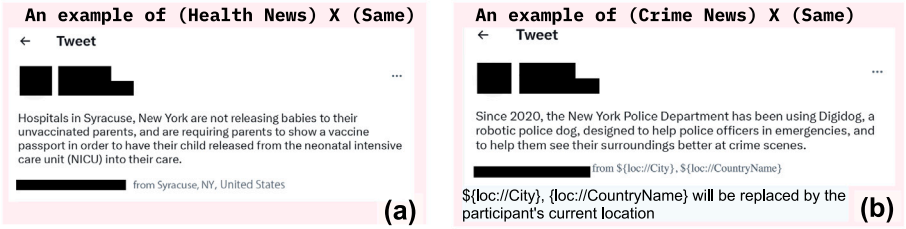

Fig. 2. An example of tweets shown to participants in the event-anchored group (a) and the participant-anchored group (b).

3. Method

3.1. Experimental design

This study employed a 3 (Topic: *crime* vs. *science* vs. *health*; within-subject) × 2 (Location anchor: *event-anchored (EA)* vs. *participant-anchored (PA)*; between-subject) × 4 (Proximity to location anchor: *baseline* vs. *same* vs. *close-by* vs. *far-away*; within-subject) mixed-design online experiment. Fig. 1 shows the experiment flow of this study. We employed a between-subject design for location anchor to examine the impact of different anchoring strategies on credibility assessments and sharing intentions among two groups of participants. This design choice helps mitigate potential carryover effects between conditions, ensuring that the responses to each anchoring strategy are not influenced by previous exposures. We utilised a within-subject design for proximity to location anchor and topic, to control for individual differences comparing participants' responses across different conditions. Regarding proximity to location anchor, baseline was defined as the absence of any location information display. Same location was defined as displaying location information indicating the same city as the anchor. Close-by location was defined as displaying location information indicating a close-by city to the anchor. Far-away location was defined as displaying location information indicating a city far-away from the anchor.

In order to operationalise our study design, we only selected news articles discussing events that occurred in the United States, while targeting participants from the United Kingdom. Using US news events while engaging UK participants minimises local political biases and personal connections to the news, enhancing objectivity in credibility assessments. We chose cities from the neighbouring state of the news event in the close-by condition for participants where the location anchor was the event. Where the location anchor was the participant, we chose the three cities in the Republic of Ireland (Dublin, Cork, Galway) to be presented at random as the location of the author of the content in the close-by condition. We chose the three cities in Australia (Sydney, Melbourne, Brisbane) to be presented at random as the location of the author of the content in the far-away condition for both location anchors. The experiment was conducted utilising the widely adopted online platform, Prolific, which has been extensively employed in previous academic research as a means of recruiting participants for user studies and disseminating surveys (Palan and Schitter, 2018). We focused on locations with cultural and linguistic similarities to the UK. This choice helps minimise confounding variables, allowing us to isolate and examine the effects of physical location on perceptions of news credibility more effectively.

3.2. News selection

According to a survey conducted by The Pew Research Center, a significant number of adults that procure information online demonstrate a keen interest in science and technology (58%) as well as health and medicine (66%) related topics (Kennedy and Funk, 2015). Moreover, crime has consistently remained one of the most frequently covered news topics over the past several decades (Näsi et al., 2021). Hence, in light of these findings, we selected science, health, and crime news as the three topics for our study.

To select our news articles on these three topics, we utilised sources including Snopes.com and PolitiFact, both of which have been recognised by the International Fact-Checking Network (IFCN) to be impartial, equitable, and transparent fact-checking organisations (Jiang and Wilson, 2018). Furthermore, these sources have been extensively utilised in HCI research for fake news selection (Ali et al., 2022; Jiang and Wilson, 2018). Regarding our news selection process, we excluded news that contained: (1) Highly controversial issues that could elicit extreme polarised opinions among our study participants; (2) Esoteric subjects that may leave participants feeling uncertain about making a judgement or overconfident if they happen to have extensive knowledge about an obscure topic; and (3) Topics with claims that were irrefutable or based on commonly-held knowledge (Kenning et al., 2018). Ultimately, a total of 12 articles were selected, consisting of two fake and two true news articles for each topic. We then fabricated tweets for each of these news articles ensuring that the location information is clearly presented. These fabricated tweets were then presented to participants, with measures in place to eliminate potential confounding factors, including blocking out the profile picture, time

of publication and username to prevent the influence of potential confounding factors on users' decision-making processes, such as gender and age-related stereotypes (Wijenayake et al., 2020). We decided to present the news articles as tweets to more closely mimic a real-world scenario where a user would encounter such articles together with the author's location information.

3.3. Procedure

Participants were informed that the study focused on addressing the dissemination of online misinformation. They were asked to judge if the information seen in our set of tweets was accurate or inaccurate. We emphasised that they needed to work through the study attentively without consulting any additional resources and they were informed that they would be compensated regardless of their accuracy. The survey commenced by gathering participants' demographic data (Fig. 1(a)). Then, participants were assigned to one of the location anchors conditions (related to the location of the event in the news article or the location of the participant) as seen in Fig. 1(b) and Fig. 2.

The presentation order of each tweet and the proximity to the author's location were counterbalanced using a Latin Square design (Zheng et al., 2009; Roig-Maimó and Mas-Sansó, 2019) (Fig. 1(c)). We asked participants to judge the credibility of each tweet and how confident they were when making that judgement, as well as their share intention for each tweet (Fig. 1(d)).

After every set of three news evaluations, participants encountered attention-check questions to assess their level of engagement and focus. Our study employed three distinct types of attention-check questions: reverse-worded statements also called trap questions (Sheehan, 2018), logical questions (Saravanos et al., 2021), and a typing task (Fig. 1(e)).

When the participants finished evaluating all news items, they were asked to answer questions regarding their social media consumption, which included participants' general interest in different news categories, and their frequency of reading and sharing news on social media. We also asked if they had concerns about the spread of misinformation and fake news on SNSs, and how effective they think the social media platforms are in addressing these issues (Fig. 1(f)).

At the end of the survey, we asked the participants whether they think adding the geolocation information of the author of the post can help them distinguish false information and the reasons behind their answers. In addition, we inquired about their feelings regarding the credibility of the news and the likelihood of sharing it in various locations' proximity (Fig. 1(g)).

3.4. Participants

We used a power analysis to calculate the sample size of our experiment. Based on the previous studies, we set a medium effect size $f = 0.25$, with a significance level of .05 and power at 0.8, and accounted for all predictors described in Section 3.5. Based on this analysis we recruited a total of 288 participants for our experiment. For participant selection, we applied prescreening criteria to include individuals who live in the UK, have English as their first language, and maintain a minimum approval rate of 95% on the Prolific platform, and ensure that no participant took part in more than one experimental condition.

In the final dataset, the participants' sex was evenly distributed. On average, each participant completed the study in approximately 11.2 (SD = 5.9) minutes. To ensure data quality and consistency, we excluded participants who either completed the study too quickly (less than Mean-1SD) (Domgaard and Park, 2021). Additionally, participants who failed the attention check questions were also excluded from the analysis (N = 9). We proceeded to recruit additional participants to supplement the number of participants we had excluded. All participants were compensated for their time and contributions with a payment of £11.00 per hour.

3.5. Quantitative analysis: measures

Dependent variables:

- **Credibility Judgement**: Participants were asked to rate the veracity of news articles as either true(1) or false(0) (Clayton et al., 2019; Pennycook et al., 2018). Based on the evaluation with set of 12 news articles (a combination of 6 true and 6 false news) of each participant, we calculated the arithmetic mean for each experimental condition. The resulting credibility measures represent the proportion of statements judged to be credible in each condition.
- **Confidence**: Participants were asked to indicate their confidence levels in assessing the credibility of news using a continuous variable with a range from 0 (not confident at all) to 100 (fully confident) (Kuru et al., 2017).
- **Sharing Intention**: Participants also rate their willingness to share news articles. Sharing Intent was measured on a 5-point Likert scale from 1 (Extremely Unlikely) to 5 (Extremely Likely).

Independent variables:

- **Location Anchor (between-subjects)**: A categorical variable with the following levels: (1) Event-anchored (EA): News reporter's location anchored to the event, and (2) Participant-anchored (PA): News reporter's location anchored to the participant.
- **Proximity (within-subjects)**: A categorical variable with the following levels: (1) baseline, (2) same, (3) close-by, and (4) far-away, which were used to represent the level of relationship closeness between the news publisher and the location where the news occurred or between the news publisher and the location where the participant located.
- **Topic (within-subjects)**: A categorical variable with the following levels: (1) science, (2) health and (3) crime, which represent the three different topics in the selected news articles.

In addition, we also investigated the impact of the following predictor variables on the credibility judgement, confidence and sharing intention of our participants. These predictor variables were chosen based on their relevance to the research questions addressed in this study.

- **Age**: Participants' age was collected as a categorical variable, categorised as follows: (1) 18–24 years, (2) 25–34 years, (3) 35–44 years, (4) 45–54 years, (5) 55–64 years, and (6) 65 years and above. For our subsequent modelling and following previous work on investigating age-related differences on the use of SNSs, we categorised the participants into two groups: the "young" group, consisting of individuals aged 44 and younger, and the "older" group, comprising those aged 45 or above (Mohammed et al., 2016).
- **Gender**: Participants' gender was gathered as a categorical variable, categorised as follows: (1) Male, (2) Female, (3) Non-binary, (4) Not disclosed, and (5) Self-defined.
- **Education Level**: Participants' education level was gathered as a categorical variable, categorised as follows: (1) Less than high school, (2) High school diploma or equivalent, (3) Some college or associate degree, (4) Bachelor's degree, (5) Master's degree, (6) Doctoral degree and (7) Not disclosed.
- **Social Media News Read Frequency**: Participants' social media news read frequency per week was collected as a categorical variable, categorised as follows: (1) Never, (2) Once, (3) A few times, (4) Once a day, (5) A couple of times a day, (6) Once an hour and (7) Multiple times an hour.
- **Fake News Concerns**: Participants' concern about the spread of fake news and misinformation on social media was collected as a categorical variable, categorised as follows: (1) Not concerned, (2) Slightly concerned, (3) Moderately concerned, (4) Concerned and (5) Very Concerned.

Table 1
GLMM results with participants credibility judgements (accurate or inaccurate) as the dependent variable.

	EA (R^2 : 0.35)			PA (R^2 : 0.27)		
	Est.	SE	$Pr(>\|z\|)$	Est.	SE	$Pr(>\|z\|)$
(Intercept)	−0.972	0.255	0.000***	−1.029	0.219	0.000***
Topic[H]	0.202	0.082	0.014*	0.290	0.080	0.000***
Topic[S]	0.463	0.081	0.000***	0.470	0.079	0.000***
Proximity[F]	0.029	0.094	0.758	−0.082	0.091	0.366
Proximity[N]	0.009	0.094	0.922	−0.191	0.091	0.037*
Proximity[S]	−0.002	0.094	0.980	−0.190	0.092	0.038*
newsread2	−0.099	0.291	0.733	0.107	0.172	0.535
newsread3	0.176	0.131	0.180	−0.003	0.119	0.982
newsread4	0.182	0.151	0.227	0.049	0.134	0.717
newsread5	0.345	0.129	0.007**	−0.001	0.120	0.996
newsread6	0.201	0.188	0.283	0.101	0.172	0.556
newsread7	0.037	0.474	0.937	−0.340	0.310	0.272
fakeconcern2	−0.239	0.246	0.331	0.367	0.247	0.136
fakeconcern3	−0.353	0.238	0.138	0.012	0.215	0.955
fakeconcern4	−0.249	0.237	0.294	0.178	0.212	0.401
fakeconcern5	−0.288	0.234	0.218	0.083	0.207	0.688
Veracity[T]	1.321	0.069	0.000***	1.130	0.065	0.000***

* < 0.05
** < 0.01
*** < 0.001

- **Effectiveness**: Participants' perceptions of the effectiveness of social media companies in addressing the spread of fake news and misinformation were collected as a categorical variable, categorised as follows: (1) Not effective, (2) Slightly effective, (3) Moderately effective, (4) Effective and (5) Very Effective
- **Veracity**: A binary value representing the truthfulness (1) or falsehood (0) of the news articles.
- **ParticipantID**: A unique identifier assigned to each participant during the survey.

3.6. Qualitative analysis

To systematically analyse the responses of open-ended questions, we employed a deductive thematic analysis approach, following the methodology outlined by Braun and Clarke (2006). We developed a coding framework by identifying key themes that align with our research goals. This framework steered the coding and categorisation of our qualitative data. Through multiple readings, we obtained a comprehensive understanding of the data and initiated the initial coding phase, segmenting longer responses into smaller units when they encompass multiple themes. Two researchers independently analysed the transcripts, coding them over several iterations to distil and summarise the themes. The researchers then collaboratively reviewed the codes to resolve any discrepancies. If the predefined codes did not adequately capture the data, we adapted the coding framework by merging, splitting, modifying, or creating new codes for a clearer representation of the data (Lee et al., 2021a). Moreover, we held frequent meetings with all authors to review the data, discuss memos, and refine emerging themes until consensus was achieved. Ultimately, we structured the codes into a hierarchical framework of themes.

4. Results

The final validated dataset consisted of reported credibility judgements from 288 participants across 12 articles, encompassing both event-anchored (EA) and participant-anchored (PA) conditions. This yielded a total of 3456 measurements. Participants included individuals who were aged between 18 ∼ 24 (9%; $N = 26$), 25 ∼ 34 (28%; $N = 82$), 35 ∼ 44 (24%; $N = 68$), 45 ∼ 54 (14%; $N = 40$), 55 ∼ 64 (18%; $N = 52$) and 65+ (7%; $N = 20$). In terms of educational background, 1% (N = 2) of participants reported with less than a high school degree, 19% (N = 55) with a high school diploma or equivalent, 23% (N = 66) with a college or associate degree, 41% (N = 117) with a Bachelor's degree, 14% (N = 42) with a Master's degree, 2% (N = 5) with a Doctoral degree and one participant opted not to disclose.

In the subsequent sections, we present the outcomes of our quantitative analysis and detail the procedures and findings of our qualitative analysis. We employed Generalised Linear Mixed Models (GLMMs) to compare the effects of individual predictors to different dependent variables. In our model selection process, we follow the procedures recommended by Matuschek et al. (2017). Each model incorporates ParticipantID as a random variable, and we evaluate the fixed effect factors using a likelihood ratio test (LRT) for model comparison. In addition, we checked for the existence of multicollinearity to ensure the validity of the models. The predictors in our model report a variance inflation factor of less than 1.3, which is below the often-used threshold of 5 to 10 to detect multicollinearity (Joseph et al., 2010). Following the benchmarks outlined by Cohen (2013), we measure the effect strength as follows: small (between 0.10 ∼ 0.29), medium (between 0.30 ∼ 0.49), and large (0.50 or greater) effect sizes (Nieminen, 2022).

4.1. Quantitative analysis

4.1.1. Credibility judgements

We employed a binomial GLMM to examine the factors influencing participants' credibility judgements on social media. The final model for the EA group's final model is statistically significant ($\chi^2(16) = 447$, $p < 0.001$) with Conditional $R^2 = 0.35$. Likewise, PA group is statistically significant ($\chi^2(16) = 362$, $p < 0.001$) with Conditional $R^2 = 0.34$. Our results show that the type of anchoring (EA vs. PA) does not have a significant effect on the perceived credibility of news articles on social media, thus rejecting H1a. The model results are shown in Table 1.

Impact of Proximity to Reporter Location on Participant Credibility Judgements: We conducted an estimated marginal means analysis concerning credibility judgements of news articles across the four distinct proximity levels. The results are presented in Fig. 3. In the EA group, no statistically significant differences were observed among the influence of proximity levels on participants' credibility judgements. Thus, H2a is not supported by our data. In contrast, within the PA group, participants had a significantly higher tendency to rate news as false while in the same ($\beta = -0.190$, $p = 0.038$, effect size = 0.19) and near ($\beta = -0.191$, $p = 0.037$, effect size = 0.19) conditions as compared to the baseline condition. Therefore, H3a is supported by our data but indicating an opposite trend.

Impact of News Topic on Participant Credibility Judgements: For both EA and PA groups, we found that the news topic had a significant impact on participants' credibility judgements. A post-hoc Tukey's HSD test (with Bonferroni corrections) showed that Science news exhibits a statistically significant positive effect on credibility judgements compared to both Health (EA: $\beta = 0.46$, $p < 0.001$; PA: $\beta = 0.18$, $p = 0.06$) news and Crime news (EA: $\beta = 0.26$, $p = 0.005$; PA: $\beta = 0.07$, $p < 0.001$). Furthermore, when contrasting Health news with Crime news, Health news (EA: $\beta = 0.20$, $p = 0.004$; PA: $\beta = 0.29$, $p < 0.001$) also exerted a statistically significant positive influence on credibility judgements. The results are presented in Fig. 4. Therefore, our results confirm H4a.

In addition, our results also show that in the EA group, participants who read news multiple times a day are more inclined to perceive news as credible when obtained from social media platforms, compared to those who never acquire news through these platforms. The results also indicate that when news items are factually accurate, participants are more likely to accurately judge them as being true, and vice-versa, in both groups.

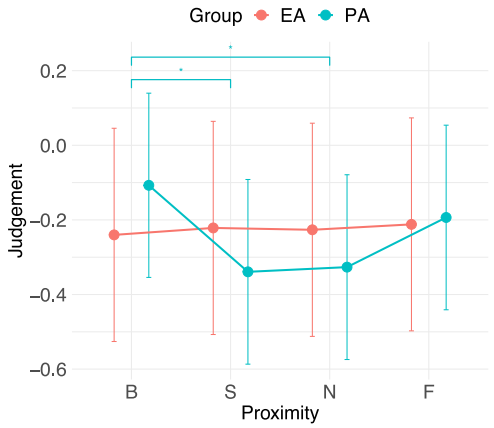

Fig. 3. Credibility judgements (emmeans) across different proximity conditions (error bars represent SD).

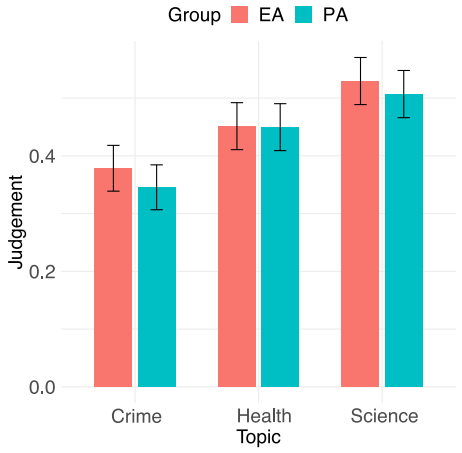

Fig. 4. Credibility judgements across different topics.

4.1.2. Confidence

In order to investigate potential variations in user confidence when evaluating news based on different proximity levels, we also employed a GLMM analysis using reported confidence as the dependent variable. The final model for EA group is statistically significant ($\chi^2(15) = 89,\ p < 0.001$) with Conditional $R^2 = 0.39$. Likewise, the PA group's final model is statistically significant ($\chi^2(15) = 169,\ p < 0.001$) with Conditional $R^2 = 0.43$. Our results show that the type of anchoring (EA vs. PA) does not have a significant effect on the confidence level in judging news articles on social media, thus rejecting H1b. The results from both models are shown in Table 2.

Impact of Proximity to Reporter Location on Participant Confidence Level: We observed statistically significant associations between several predictors and the self-reported initial confidence level of participants. For the EA group, a significant negative association on confidence level was found while the location proximity condition being near ($\beta = -4.203,\ p = 0.002$, effect size = 0.18). However, no significant association was observed when the location proximity condition was the same, thus rejecting H2b.

For the PA group, we observed a significant positive association with confidence level with the location proximity condition being same ($\beta = 3.636,\ p = 0.009$, effect size = 0.15), and with participants who read news from social media once an hour in the past week ($p = 0.017$). To be more specific, in the post-hoc analysis of proximity, we observed participants reported significantly higher confidence levels while the location proximity condition being same compared to those in the baseline ($\beta = 3.63,\ SD = 1.39,\ p = 0.045$). Similarly, participants reported significantly higher confidence levels while the location proximity condition being same compared to those in the near ($\beta = 4.04,\ SD = 1.39,\ p = 0.019$). However, no significant association was observed when the location proximity condition was near, so H3b is only partially confirmed.

Table 2
GLMM results with participants reported confidence level as the dependent variable.

	EA (R^2 : 0.32)			PA (R^2 : 0.32)		
	Est.	SE	$Pr(>\|z\|)$	Est.	SE	$Pr(>\|z\|)$
(Intercept)	72.983	3.584	0.000***	64.461	3.712	0.000***
Topic[H]	3.108	1.168	0.008	6.010	1.207	0.000***
Topic[S]	−3.972	1.168	0.000***	−4.896	1.207	0.000***
Proximity[F]	−1.275	1.349	0.345	2.202	1.394	0.114
Proximity[N]	−4.203	1.349	0.002**	−0.410	1.394	0.769
Proximity[S]	−0.858	1.349	0.525	3.636	1.394	0.009**
Age[Young]	−4.971	2.251	0.029*	−4.462	2.335	0.058
Gender[F]	−4.700	2.273	0.041*	−0.942	2.273	0.679
newsread2	−28.753	8.237	0.000***	−0.369	5.514	0.947
newsread3	−4.864	3.850	0.209	−3.603	3.915	0.359
newsread4	0.757	4.394	0.863	2.361	4.404	0.593
newsread5	−1.728	3.711	0.642	4.602	3.818	0.230
newsread6	0.757	5.404	0.889	13.747	5.701	0.017*
newsread7	−16.538	13.580	0.225	3.489	9.718	0.720
Veracity[T]	−3.745	0.954	0.000***	−7.538	0.986	0.000***

* < 0.05
** < 0.01
*** < 0.001

Confidence level across Topics and Demographics: In the post-hoc analysis, for both groups, our results show that participants are significantly more confident in assessing health news (EA: $[H - C]\ \beta = 3.11,\ SD = 1.17,\ p = 0.002$; $[S - C]\ \beta = -3.972,\ SD = 1.168,\ p = 0.002$; $[S - H]\ \beta = -7.080,\ SD = 1.168,\ p =< 0.001$ PA: $[H - C]\ \beta = 6.010,\ SD = 1.207,\ p =< 0.001$; $[S - C]\ \beta = -4.896,\ SD = 1.207,\ p =< 0.001$; $[S - H]\ \beta = -10.906,\ SD = 1.207,\ p =< 0.001$) compared with the other two news categories and also significantly less confident in rating science news compared with health and crime. Consequently, the results provide partial support for hypothesis H4b, with participants exhibiting greater confidence when judging health news compared to crime news. Conversely, users display lower confidence when judging science news compared to crime news. Additionally, we observed that younger users and female participants in the EA group exhibit lower levels of confidence in their judgements compared to their male and older counterparts.

Confidence level across Judgement: We conducted an analysis of participants' confidence levels when making judgements regarding the veracity of news articles, the result is shown in Fig. 5. To examine potential differences in participants' confidence levels between judgements of truth and falsehood, we performed a Mann–Whitney test, which indicated that participants displaying higher confidence levels when assessing news articles as false when compared to their evaluations of articles categorised as true ($U = 1167874,\ p < 0.001$).

4.1.3. Share intention

Similarly, we conducted GLMM analysis to detect the potential variations in participant news share intention when evaluating news based on different proximity levels. The final model for EA group is statistically significant ($\chi^2(13) = 72,\ p < 0.001$) with Conditional $R^2 = 0.48$. Likewise, the PA group's final model is statistically significant ($\chi^2(13) = 91,\ p < 0.001$) with Conditional $R^2 = 0.43$. Our results show that the type of anchoring (EA vs. PA) has a significant effect on the share intention of news articles on social media, thus confirming H1c. The model results are shown in Table 3.

In the EA group, we did not observe any significant impact of proximity or topics on users' intention to share the news, thus rejecting H2c. However, within the PA group, participants demonstrated a

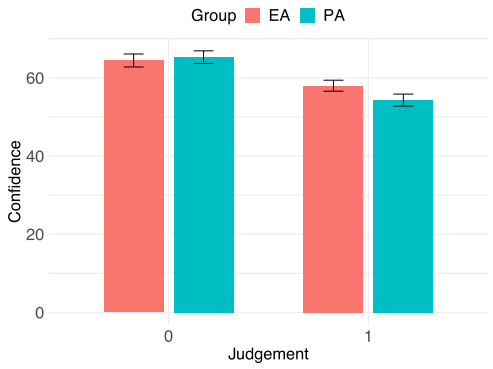

Fig. 5. Confidence by judgement.

Table 3
GLMM results with participants reported sharing intention as the dependent variable.

	EA (R^2 : 0.48)			PA (R^2 : 0.43)		
	Est.	SE	$Pr(>\|z\|)$	Est.	SE	$Pr(>\|z\|)$
(Intercept)	1.675	0.124	0.000***	1.473	0.109	0.000***
Topic[H]	−0.035	0.043	0.414	0.021	0.041	0.609
Topic[S]	0.033	0.043	0.438	0.102	0.041	0.012*
Proximity[F]	0.012	0.049	0.804	−0.064	0.047	0.176
Proximity[N]	−0.050	0.049	0.306	−0.064	0.047	0.176
Proximity[S]	−0.015	0.049	0.760	−0.134	0.047	0.004**
Age[Young]	−0.241	0.116	0.040*	−0.070	0.104	0.504
Gender[F]	0.034	0.114	0.766	0.106	0.100	0.294
Effectiveness2	0.297	0.147	0.046*	0.146	0.110	0.186
Effectiveness3	0.172	0.201	0.393	0.726	0.233	0.002**
Effectiveness4	0.084	0.287	0.771	−0.198	0.592	0.739
Effectiveness5	0.988	0.398	0.014*	−0.614	0.592	0.301
Veracity[T]	0.255	0.035	0.000***	0.260	0.033	0.000***

* < 0.05
** < 0.01
*** < 0.001

higher share intention in science news compared to crime news (β = −0.134, p = 0.004, effect size = 0.15). Therefore, H4c is rejected. In addition, participants in PA group exhibit a significantly lower tendency to share the news when the location proximity is the same condition compared to those in the baseline (β = −0.134, p = 0.004, effect size = 0.15). Therefore, H3c is partially confirmed, but with an opposite trend. Nevertheless, we did uncover evidence regarding the influence of age on the propensity to share news. Younger participants were generally less inclined to share news when compared to their older counterparts(β = −0.241, p = 0.040, effect size = 0.24). However, within the PA group, participants exhibit a significantly lower tendency to share the news when the location proximity is the same condition compared to those in the baseline (β = −0.134, p = 0.004, effect size = 0.15). Participants also demonstrated a higher share intention in science news compared to crime news (β = −0.134, p = 0.004, effect size = 0.15).

In addition, we observed no discernible impact of gender on the intention to share in both groups. With regard to veracity, our results indicate that the truth news articles were more likely to be shared in both groups. Furthermore, the result shows that perceived effectiveness significantly influences the intent to share. To further investigate this relationship, in the next section, we employ correlation analysis specifically examining the association between effectiveness and sharing intentions.

4.1.4. Summary

4.2. Qualitative analysis

We leveraged our qualitative data to complement the quantitative results. We identified the following themes in our analysis Table 4.

4.2.1. Geolocation information provides additional context to news

Proximity Enhancing Credibility and Distance Inducing Scepticism: For both groups, we found some participants believe that geolocation provides more context. The presence of geolocation was seen as an indicator of whether the reporter might possess firsthand knowledge or act as an eyewitness to the events being reported.

> "Adding geolocation information can help provide context to the information being shared, which can aid in identifying false information".
>
> [P139 , PA]

To be more specific, when location proximity demonstrates strong ties related to the news topic – meaning that the geolocation is in the same location as the topic of discussion – most participants declare a higher likelihood of assuming the news is accurate since they thought the poster would be able to get first-hand information.

> "If the geolocation is in or near where the news is happening I'm more likely to share, if the article interests me and I think it will interest others, because the poster is more likely to have first hand experience with what's going on".
>
> [P84 , EA]

Furthermore, participants highlighted that when a news source is geographically distant from the reported event and features contentious content, it tends to elicit scepticism among readers.

> "if the poster is posting something potentially controversial about an incident then the further away physically they are from that incident, the more suspicious I would be of the post".
>
> [P101 , EA]

Type of News Influencing Trust: Additionally, participants emphasised the influence of varying news topics on their credibility perceptions, particularly when the reporter's location appears unrelated to the news.

> "If scientific, it would still be credible but if local/regional based topical news then would assume unreliable".
>
> [P20 , EA]

Community Characteristics and Trust: Likewise, when participants observe that the reporter is from their local community, particularly when they are in rural areas, in conjunction with content related to international news, participants express higher confidence in dismissing the news as implausible and suspect the motivation behind its posting.

> "I come from a town full of poorly educated bigots. I wouldn't trust a word they say".
>
> [P77 , PA]

Verifying Before Sharing: In terms of their intention to share information, users exhibit a pronounced sense of responsibility. While they tend to perceive news as more credible when they observe that the reporter's location aligns with the location of the reported event, they remain inclined to verify the information by cross-checking before sharing it. This inclination is particularly pronounced when issues of safety or relevance are at stake, prompting users to exercise greater caution before disseminating such news.

> "I would share if safety is at risk or news is relevant, but only verifying the news".
>
> [P139 , EA]

Table 4
Summary of our hypotheses and the conclusions from our analysis.

Hypothesis	Outcome
H1: When the presented location of a reporter of online news is anchored to the news event's location (event-anchored), news articles are perceived as more credible than when the reporter's location is anchored to the reader's location (participant-anchored) (a), resulting in higher confidence in news judgement (b), and a higher likelihood that the news will be shared (c).	H1a: Rejected H1b: Rejected H1c: Confirmed
H2: The closer the presented location of a reporter of online news is to the news event's location, the more credible the news articles will be perceived (a), resulting in higher confidence in news judgement (b), and increasing the likelihood the news will be shared (c).	H2a: Rejected H2b: Rejected H2c: Rejected
H3: The closer the presented location of a reporter of online news is to the reader's location, the more credible the news articles will be perceived (a), resulting in higher confidence in news judgement (b), and increasing the likelihood the news will be shared (c).	H3a: Confirmed (–) H3b: Partially Confirmed H3c: Partially Confirmed (–)
H4: Science news and health news are perceived as more credible (a), result in higher confidence in news judgement (b), and have a greater sharing likelihood (c) than crime news on social media regardless of the location of the reporter of news.	H4a: Confirmed H4b: Partially Confirmed H4c: Rejected

Social Circle and Content Relevance Affect Sharing: In addition, the participants also mentioned that compared to the author's geolocation indicator, their intention to share the news on social media hinged upon several other factors, such as their belief in the information's potential to spark interest within their social circles, and their preference in disseminating local news.

> "As above, it's more credible and, depending on the message, I'd be likely to share if I think it of interest to my friends and family".
>
> [P102 , EA]

> "I am more likely to share a news story from my own country if the location of the news is the same place as where it is reported but I don't often share news stories unless they are national/global".
>
> [P55 , EA]

4.2.2. Critical thinking of geolocation on SNSs

Concerned about the Manipulation of Location Data: Participants highlighted that geolocation can be easily manipulated using techniques such as VPNs/ AI. Therefore, these people declare that knowing the location of the author does not necessarily help in determining the authenticity of the information because itself can be fake as well.

> "No, because that doesn't guarantee the author is from that location - for example, they could be remoted on to a machine from that location, or using bots/AI in ways we do not fully understand".
>
> [P4 , EA]

> "Geolocation data may not always be a reliable indicator... geolocation data can be easily manipulated, making it difficult to ensure its accuracy".
>
> [P107 , PA]

Globalisation Moderates the Significance of Location Indicators: As mentioned by the participants, news in today's digital and globalised world can originate and spread from any corner of the globe. Therefore, some participants expressed scepticism about the significance of the location of the person posting the information when it comes to assessing its credibility.

> "Yes and no, if the location is far away or in a different country when reporting on news from a smaller town somewhere else then it's more likely to be fake I think. But, with social media and globalisation of news, reports can come from anywhere so it's not a reliable way to discern what news is fake and what isn't".
>
> [P62 , EA]

Lack of supervision on SNSs Increase Scepticism Notably, certain participants raised the point that the unregulated nature of social media allows anyone to disseminate information without supervision. Consequently, compared to people who might be witnesses of certain news, they exhibit a higher credibility for news originating from traditional news outlets.

> "So if it was my local newspaper online. A news channel or national newspaper (not all national papers) I would most likely share. But if it were another person I would always check where I could and if it is not something I can check I would not share".
>
> [P60 , EA]

4.2.3. Geolocation related to political and cultural bias

Bias Between Rival Nations: Participants pointed out that regarding two politically adversarial countries, they often exhibit a propensity to perceive news reports originating from the opposing nation as inherently biased and untrustworthy. This highlights how geopolitical tensions and animosities can significantly influence the way individuals assess the credibility of news from rival nations.

> "I'd probably be less likely to believe and/or not give benefit of the doubt to a story about America posted from a [Country A] or possibly [Country B] source".
>
> [P123 , EA]

Country-Specific Biases: In addition, participants also raised concerns about the potential political and cultural biases towards some specific countries. They pointed out that sources originating from these countries might be perceived as highly partial or impartial due to ingrained biases prevalent or political stance issues.

> "Yes I think so, a lot of fake news can come from [Country C], [Country D] and [Country E], so I always take stories from those countries with a pinch of salt".
>
> [P90 , EA]

Metropolitan vs. Rural Reporting: Besides the inherent bias towards the country level, participants also mentioned an additional bias concerning rural areas, regardless of whether the news pertains to the location of the event or the author's location. This factor can lead to suspicions about the credibility of the news.

> "But I think there can be a bit of metropolitan/rural split in all countries - most media urban/city focused so think that reporting on issues outside of the main cities can be more basic/less well evidenced".
>
> [P38 , EA]

4.2.4. Impact of contextual factors in assessing credibility

Trust in Established Sources: We found that a number of participants also emphasised the importance of considering other aspects, among these, the reputation of the news source emerged as an important factor, and participants also expressed a higher inclination to trust established and reputable sources.

> "It's more likely to have at least a degree of truth, however I take any news posted on social media with a large pinch of salt and would want to double check it with reputable news sites that I know fact check their stories, e.g. Reuters, The Guardian, BBC, Channel 4, etc".
>
> [P140 , PA]

Assessing Author's Expertise and Bias: Additionally, participants mentioned the significance of verifying news stories by knowing more about the authors, including their political leanings, reputation, etc.

> "It will depend on what I know about the author's political leanings".
>
> [P95 , PA]

> "I think it depends on a few factors: the reputation of the author, who they work for and how partial they are to the subject".
>
> [P129 , PA]

Beyond political leanings, participants may assess the author's expertise on the subject matter. An author with relevant qualifications or experience in a specific field might be perceived as more credible.

> "If the poster can back up their claims with verifiable proof then they have some credibility. I, however, would not share information from anyone who is not a verified expert".
>
> [P139 , PA]

> "I'd be more likely to check a source via the author, other reputable sources, fact-checking sites etc".
>
> [P102 , EA]

Fact-Checking and Source Verification: Furthermore, several participants mentioned that the presence of fact-checking mechanisms can enhance credibility by demonstrating a commitment to accuracy.

> " I'm more interested in checking the source and finding other sources to back it up before I consider sharing or believing".
>
> [P50 , PA]

5. Discussion

In this section, we discuss key factors related to news credibility on social media informed by our findings. Specifically, we discuss the influence of location cues on credibility judgements, topic-specific credibility biases, and the role of trust in sharing behaviour. Throughout these sections, we also highlight relevant design implications to improve news consumption experiences on social networking sites for users, and conclude with our study's limitations and suggestions for future work.

5.1. Effect of location cues on the credibility of online news

In social psychology, theories like **Social Identity Theory** (SIT) propose that an individual identifies with an "in-group", while distancing themselves from "out-groups" they do not relate to. This often results in a bias towards favouring one's own group, known as in-group favouritism (Tajfel and Turner, 2004). Previous work has shown this phenomenon in effect among partisan (Lin et al., 2016a) and fan groups (Jin, 2018) in online communities. Similarly, the **proximity principle** in gestalt psychology also shows that individuals treat objects close together as a coherent group, and this principle has a significant influence on human interactions and relationship formation (Cynthia, 2022). Consequently, it is more probable that individuals will establish relationships with those residing or working in the same city (Cynthia, 2022).

Interestingly, in our study, we found that this in-group (users from the same geographic area) favouritism actually functioned in the opposite direction. Our results show a notable decline in trust among participants towards users from the same geolocation when these users disseminate international news. One plausible reason might be the characteristic of anonymity (blocking the names and avatars) incorporated into our study design, which is defined as "unrecognisability" or "unknowability" according to Klipp (2019). Combined with the phenomena of social media users intending to disconnect their online persona from their offline persona (Ma et al., 2023), the geographical ties among participants may have been insufficient for the identification of others within the same groups, thereby weakening the influence of in-group favouritism. Moreover, the concepts of in-groups and out-groups are fluid as individuals' affiliations can shift depending on context, environment, or over time (Saul, 2023). The transient and dynamic nature of online communities, where membership is often less stable than in real-world social groups, further complicates the application of SIT in such contexts.

5.2. Urban biases, trust and location spoofing

Our findings indicate a more direct explanation for this decline in this trust, namely, the presence of **urban biases**, as outlined in prior literature (Hecht and Stephens, 2014). Participants residing in rural localities questioned the credibility of tweets from people from their local population centre (*same* proximity condition), as they did not believe their fellow-neighbours had the necessary knowledge or education to comment on the issue (e.g., P77, PA). To promote online equality, it is crucial to introduce alternative markers of credibility to mitigate the impact of urban biases. Based on the qualitative findings of our study, participants have suggested several such indicators, including the presence of verified expert badges (e.g., P139, PA), reliance on credible sources (e.g., P140, PA) and a track record of fact-checking websites (e.g., P140, PA). Incorporating these additional markers could help mitigate the urban bias. This would lead to a more balanced and inclusive method for evaluating information on SNSs, ensuring that more rural voices are not marginalised in the broader informational landscape.

Several studies have demonstrated that there is a disproportionate concentration of users per capita in urban areas, illustrated by the fact that there are 5.3 times more geotagged tweets per capita in urban areas compared to rural regions (Malik et al., 2015). This imbalance accentuates the issue of diminished credibility of news posters' tagged in rural areas. Owing to their profound and pervasive implications, biases inherent to social media data necessitate rigorous reevaluation and calibration when using it for analysis (Olteanu et al., 2019).

Our results also showed a weak, yet still positive, correlation between users' mistrust in social media platforms tackling misinformation adequately and their sharing behaviours. This is in line with previous work that has shown that the levels of online news-sharing activity

are strongly positively correlated with mistrust, and inversely, negatively correlated with trust (Park et al., 2020). Moreover, our analysis within the event-anchored group highlights a contrasting tendency: younger users displayed a reduced inclination to share news articles in comparison to older users. This observed behaviour can be partially attributed to the complex interplay between age and trust in news. Several studies conducted in diverse international settings suggest that younger populations tend to have lower levels of trust in news relative to older demographics (Kalogeropoulos et al., 2019). This diminished trust is likely to have influenced their comparatively lower rates of news-sharing, as seen in our study.

Finally, our participants noted that location information can be easily spoofed, becoming another avenue of misinformation. In an effort to alleviate user apprehensions concerning geolocation manipulation and thereby foster increased trust, various studies have proposed a diverse set of mitigation measures. One such method is called IP Address Analysis, wherein known IP addresses associated with VPN services can be blacklisted by social media platforms to ensure the veracity of the location data (Ahler et al., 2019). Additionally, a supplementary layer of verification can be added by cross-referencing the user's time-zone settings with their IP-based geolocation. Another valuable approach incorporates the analysis of user behaviour, particularly with respect to login patterns. For instance, accounts exhibiting logins from disparate geographical locations within temporally constrained intervals are subject to heightened scrutiny and may be flagged as suspicious. Combined with the analysis of followers' geolocation, this approach can be also used to cross-check the accuracy of the geolocation on social media (Diakopoulos et al., 2012). The platforms could alert suspicious geolocation for the users, such transparency mechanisms would likely let users feel more inclined to trust location cues and leverage this information in their credibility judgements.

5.3. News topics and location information

Our findings demonstrate variations in users' credibility perceptions across distinct topics. This is consistent with the findings by Luo et al. (2022), where they found science news had higher credibility perceptions than political and health news. Relevant to our findings, Humprecht (2019) offers valuable insights into the prevalence of online disinformation across different topics and countries. The findings indicate that in the United Kingdom, disinformation campaigns frequently focus on crime news (with an occurrence rate of 0.13) and health news (0.11), which are notably more frequent than Science news (< 0.00). A similar pattern is observed in the United States, where science news (0.01) also exhibits a lower frequency compared to crime news (0.11) and health news (0.29). These patterns reveal an increased prevalence of misinformation in crime and health news, while our participants also had a higher deception bias towards these topics. This further highlights the necessity for targeted interventions and strategies aimed at reducing user prejudice on these topics.

Interestingly, while our quantitative analysis did not reveal any significant interaction effects between news topics and geographical proximity, our qualitative data suggests a nuanced relationship. Specifically, news topics pertaining to countries with known rivalries or that are related to local breaking events, disclosing the reporter's location with a sufficient level of granularity can help the audience form a more informed judgement about the news's credibility, while also considering the reporter's privacy. While we do not assert that a standalone system relying solely on "geolocation" can be established for rumour detection or social media trust, it can serve as a piece of the puzzle and provide an additional signal of credibility.

5.4. Limitations and future work

Our work has several limitations. First, our study deliberately chose cities in the United States, Australia, and Ireland to represent varying degrees of proximity to the location of those disseminating the news. We note that our selection was made with careful consideration and worded the indicators in a politically neutral way, such as taking into account the political context by including both liberal and conservative states in the US. Furthermore, participants were chosen from the United Kingdom to mitigate potential political biases in their news judgements. However, we cannot fully rule out the influence of the partisan inclinations on international news credibility judgement. Since our participant sample was limited to the UK, we chose locations with cultural and linguistic similarities to the UK (e.g., cities in Ireland and Australia). This allowed to isolate and examine the effects of physical location on perceptions of news credibility more effectively. While we acknowledge that these locations might not be "psychologically" distant for some UK participants, this approach ensures that other potential biases are minimised. As such, replication of our study in other cultural contexts is necessary to confirm the generalisability and robustness of these findings.

Second, the news we selected are considered international news for the participants, thus reducing the chance that they had encountered these articles prior to the study. This approach helped mitigating the influence on their credibility judgement. However, conversely, it could also have had a detrimental impact on participants' willingness to share the news articles. Furthermore, it is possible that participants were more sceptical of news than they would be while casually browsing through their social media feeds in their leisure time by being aware that they were participating in a scientific study (Belova et al., 2022). Moreover, it is plausible that the participants' inclination to share the news was influenced by the absence of supplementary information, such as details about the news source, the content of the article associated with the headline, among other factors. In future studies, it would be beneficial to incorporate both international and local news, and also conducting a comparative analysis of the influence of news source indicators and content creators' location indicators to provide additional insights.

Finally, we chose the binary measure for credibility judgement to reduce cognitive load and ambiguity. However, we acknowledge that this approach sacrifices the granularity offered by a Likert scale. We mitigate this limitation by also analysing participants' confidence level when making credibility assessments.

6. Conclusion

With the increasing ubiquity of location-based services and the growing granularity and transparency of location information on SNSs in recent years, understanding how users perceive and interact with news information influenced by this heuristic cue becomes increasingly important for both platform design and user engagement strategies. In our research, we examined the impact of the geographical location indicated in social media posts on user behaviour, including assessments of news credibility, self-confidence in those assessments, and the intent to share the news. Our results revealed that when the news poster's location was the same as the participant's, there was a significant negative effect on how credible they found the news and their willingness to share it, partially due to urban biases. Furthermore, we observed a credibility bias among different news topics, with crime news perceived as less credible when compared to health and science news. We also identified a weak positive correlation between users' views on how effectively social media addresses the dissemination of misinformation and their actual sharing practices. We recommend that social media platforms implement various measures to verify the accuracy of geolocation information, thereby alleviating users' concerns about this specific indicator. Platforms should consider labelling the geolocation

Table 5
News articles used in our study.

Topic	Veracity	Content
Science	Real	In Delton, Wisconsin, a crystal ball was responsible for a house fire that caused damage of up to $250,000.
Science	Fake	A discovery found that eating alligators will help save the wetlands of in New Orleans, Louisiana.
Science	Real	The town of Corcoran, California, has been sinking for more than a decade, going as far down as 11.5 ft in some parts.
Science	Fake	Abandoning the Common Core set of standards for English and mathematics caused a school in Naples, Florida test results to go from mediocre to outstanding.
Crime	Real	Since 2020, the New York Police Department has been using Digidog, a robotic police dog, designed to help police officers in emergencies, and to help them see their surroundings better at crime scenes.
Crime	Fake	If you are in Las Vegas, Nevada, and you get a knock on your door from NV Power, 2020 Census or CVD-19 testers, do not open your door. They are robbing people at gunpoint.
Crime	Real	In Chicago,Illinois, they've had thousands of shootings, thousands since Jan. 1. Thousands of shootings.
Crime	Fake	In Kennesaw, Georgia, human traffickers are putting toxin-laced tissues on gas pumps and door handles, then waiting for potential victims to pass out.
Health	Real	A company in Lenoir, North Carolina has recalled more than 35,000 pounds of ground beef, sold in Kroger stores, for possible contamination with plastic bits.
Health	Fake	Hospitals in Syracuse, New York are not releasing babies to their unvaccinated parents, and are requiring parents to show a vaccine passport in order to have their child released from the neonatal intensive care unit (NICU) into their care.
Health	Real	Last year, San Francisco, California had twice as many drug overdose deaths as COVID-19 related deaths
Health	Fake	A painting depicting children in face masks was created as a mural for Denver International Airport in Denver, Colorado in 1994, proving the COVID-19 pandemic was planned.

indicator with other factors, such as the source and fact-checking indicators for posts that appear questionable, particularly related to crime news. Implementing these measures can bolster user trust in the news content presented on SNSs and promote more prosocial behaviour among users.

CRediT authorship contribution statement

Ying Ma: Writing – original draft, Visualization, Formal analysis, Data curation, Conceptualization. **Zhanna Sarsenbayeva:** Writing – review & editing, Supervision. **Jarrod Knibbe:** Writing – review & editing, Supervision. **Jorge Goncalves:** Writing – review & editing, Supervision.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Appendix A

See Table 5.

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