Chen, Juan; Lin, Yanqing; Tang, Xiyang; Deng, Shengli

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Fostering Netizens to Engage in Rumour-Refuting Messages of Government Social Media: A View of Persuasion Theory

Abstract

An increasing number of government agencies have established their official accounts to disseminate information and publish rumour-refuting messages (RRMs) on social media platforms. However, little is known about what factors facilitate social media users to engage in RRMs posted by government accounts. To bridge this gap, our study borrows the lens of persuasion theory to frame a research model and seeks to unmask the precursors that foster social media users to engage in RRMs. By analysing RRMs published by ten influential government official accounts spanning 9 years, a field study on Sina Weibo finds that the text length of an RRM is associated with a higher probability of liking, commenting on, and sharing the RRM, while the inclusion of links in an RRM is negatively linked to user engagement. The effect of the existence of photos and videos on user engagement in RRMs depends on different engaging behaviours. In addition, the inclusion of emojis in RRMs can help shorten users' psychological distance from the authorities, thereby facilitating user engagement behaviours. Using rhetorical questions is associated with a higher level of user engagement (including liking and sharing) in RRMs by increasing the level of personal relevance. This study offers new insights into online rumour governance and practical suggestions for promoting government social media publicity.

Keywords

Government social media engagement, Rumour-refuting message, Persuasion theory, Psychological distance, Rhetoricals

1. Introduction

The number of social media users has increased substantially over the past years. The total number of active social media users worldwide amounts to 4.62 billion, penetrating 58.4% of the global population (Kepios, 2022). Social media refers to "*online platforms that allow users to generate content, exchange information, and communicate with one another*" (Breland, Quintiliani, Schneider, May, & Pagoto, 2017, p. 1890). Social media plays a role of a hub for online users to share information, connect with each other, and keep informed about trending events (Karami et al., 2020; Zhang & Ghorbani, 2020).

Unfortunately, despite the numerous benefits that social media affords, it has a dark side. The freedom offered by social media also allows rumourmongers to post and spread rumours, typified as "*the information that transmission without officially publicised confirmation*" (Zhu et al., 2019, p. 118), which may lead to significant chaos and unpredictable reactions from the involved individual

(Alkhodair, Ding, Fung, & Liu, 2020). Social media has developed as a hotbed where most rumours regarding hot events and emergencies can propagate rapidly (Luo et al., 2022; Ma & Luo, 2020). Online rumours can cause far-reaching adverse consequences, e.g., threatening society security and stability (Liu & Li, 2020; Zhang & Ghorbani, 2020). Far worse, spreading rumours on social media has reached an unprecedented level (Shen, Lee, Pan, & Lee, 2021), and the prevalence of online rumours has exposed a new challenge for large-scale information diffusion (Giachanou et al., 2021; Wang et al., 2019). As such, how to alleviate the problem of misinformation/rumours and refute rumours on social media platforms has been raised as a critical question to both academia and practitioners (Lee, 2022; Li et al., 2021). Apparently, online rumour governance is unlikely to be accomplished by a few individuals or organisations, but the government is uniquely positioned to manage such issues and halt rumour spread. Concretely, online rumour management is part of the government's responsibility to protect citizens' safety and security from any harm caused by misinformation. Additionally, the government has the authority and resources to investigate the veracity of rumours and further take actions to counteract rumours, e.g., issuing official statements, imposing fines or legal penalties, and coordinating with organisations of relevance to address problems. However, individuals and brands typically have no access to such a level of credibility or resources as the government does. Despite the unique role that the government plays in online rumour management, there is a paucity of studies on online rumour governance from the perspective of government activity.

Government agencies have increasingly established official accounts on social media platforms to release information, facilitate government-netizen interaction, and post RRMs and avoid the spread of misinformation (Guo, Liu, Wu, & Zhang, 2021; Panagiotopoulos, Bigdeli, & Sams, 2014; Zhai, Li, & Chi, 2022; Zhang, Yuan, Zhu, Chen, & Evans, 2022). This trend was exacerbated during the Covid-19 pandemic (e.g., Chen et al., 2020; Luo, Duan, Shang, & Lyu, 2021; Pang, Cai, Jiang, & Chan, 2021). Rumour refutation refers to correcting false information/rumours with accurate information on the relevant general topics and propagating the truths to promptly block the rumour spreading (Hu et al., 2023, p. 3). The success of rumour refutation highly depends on netizens' engagement by voting, commenting on, and sharing RRMs (Guo et al., 2021). The government official account enjoys a natural advantage of a high reputation for guiding public opinions in information dissemination (Nganji & Cockburn, 2020). In this respect, the effectiveness of the government RRMs can be measured by netizens' engagement activities with the information disseminated by government social media accounts (GSMAs) (Li et al., 2021). Specifically, after a GSMA posts RRMs on social media, netizens can respond to them through engaging actions, e.g., liking, commenting on, and sharing (or forwarding /retweeting) the RRMs. The more netizens like, comment on, and share RRMs on social media, the more compellingly the message can reach a broad audience and thus more effectively contain the spread of fake information or rumour online.

Although many studies have investigated user engagement in sharing common social media posts (e.g., Chugh et al., 2019; Li & Xie, 2020) or rumours (e.g., Kim et al., 2021; Shen et al., 2021), little is known about the factors motivating users to *engage in RRMs* in *government settings*. Noteworthily, RRM is disseminated by authorities, significantly distinct from common messages spreading among peers on social media that are typically posted for *informational or entertainment* purposes (see Table 1 for more details). For instance, general social media messages by individuals primarily concern users' personal activities relevant to, e.g., food, hobby, or trips. Meanwhile, social media messages released by organisations are more likely dominated by informational and/or branding purposes. Individual/organisational users may use social media to share information about personal activities/company products (or services) instead of aiming to educate or convince people about a fact. However, the purpose of RRMs released by a GSMA is to expose misinformation/fake news/rumours and persuade the public to believe the truth so that to control and dispel rumours effectively (Panagiotopoulos, Bigdeli, & Sams, 2014; Zhai, Li, & Chi, 2022; Zhang, Yuan, Zhu, Chen, & Evans, 2022). Unfortunately, few studies have been conducted on RRMs in the context of government social media from the perspective of persuasiveness.

Table 1. A comparison between common social media messages and government RRMs

	RRMs	Common social media messages
Publisher	• Authority official accounts	• Organisation accounts • Individual accounts
Purposes	• Educative • Persuasive	• Informational • Entertainment-orientated
Topics	• Serious topics	• Informal, informational, entertainment-oriented topics
Consequences	• Serious and extensive social consequences	• Relatively normal consequences
Beneficiary	• Public welfare	• Personal benefits (e.g., reputation management, brand-customer relationship)

RRM is *persuasive and educative* in nature: i) topic-wise, RRM often concerns *serious topics* that may have significant consequences other than personal or entertainment topics. ii) Content-wise, RRM aims to *refute a piece of rumour information and to convince audiences*. In this vein, we argue that factors affecting user engagement in RRMs would differ from common social media messages orientated by, e.g., informational or entertainment purposes. Considering the unique features of RRMs to refute a rumour and persuade the audience of a fact, this study borrows a novel view of *persuasion theory* to understand the attributes of RRMs in motivating user engagement. Specifically, based on the persuasion theory, we model the roles of structure-related factors that improve argument quality, including text length, inclusion of links, and use of photos and videos of social media posts, in user engagement in RRMs. Notably, argument quality here is conceptualised as the persuasiveness of arguments in the content of social media posts (Bhattacherjee & Sanford, 2006), which is an element of high importance in the recipient's perception and may attract the recipient's attention (Chang, Yu, & Lu, 2015; Coulter & Punj, 2004). Such posts as being full of wrong content, including broken links, attaching irrelevant topics, etc., would undermine the argument quality of the post, leading to recipients'

negative perceptions, thereby reducing user engagement in the post (Chang et al., 2015). Although these factors have been investigated in past studies on the dissemination of social media messages posted by individual netizens or organisations, there is a lack of knowledge on their effect on user engagement with authority-posted messages, especially in the light of RRMs. This concern motivates this study.

This study also takes additional RRM attributes into account, i.e., the use of emojis and rhetorical questions. Being a frequently used component in social media messages (Zhang & Zhang, 2016), emojis enable users to express emotions conveniently but vividly (Amaghlobeli, 2012), which is alluded to trigger psychological proximity (Huang, Kader, & Kim, 2021). Furthermore, rhetorical questions are also often used in persuasion settings, and their effectiveness has been examined in various persuasion settings (Ku & Chen, 2020; Mothersbaugh, Huhmann, & Franke, 2002). Nevertheless, little is known about whether and how user engagement in RRMs is affected by the presence of emojis or rhetorical questions, in particular when they are used in RRMs by GSMAs. In line with past studies (e.g., Chugh et al., 2019; Li et al., 2021; Zhang et al., 2014), our study measures user engagement in RRMs through their activities of liking, commenting on, and sharing the RRMs. Note that these three actions represent different user engagement behaviours with various determinants (Li & Xie, 2020). This study strives to answer the research question: What are the differences in the determinants of user engagement in RRMs in terms of liking, commenting on, and sharing RRMs?

The rest of the study unfolds as follows. First, the related literature review and theoretical foundation are discussed in Section 2. Then, the hypotheses are developed in Section 3, followed by the methodology in Section 4. Section 5 illustrates the empirical results with discussions, and Section 6 concludes the study with theoretical and practical implications, as well as the research limitations.

2. Literature review and theoretical background

2.1 Social media engagement

Social media platforms are important venues for information sharing, allowing users to join others with shared interests and exchange ideas (Bilgihan, Barreda, Okumus, & Nusair, 2016). Users' information-sharing behaviours on social media have a diversity of motivations, including but unlimited to self-expression (Chung et al., 2012), obtaining financial compensation (Zhang et al., 2020), and engendering social influence (Zhang et al., 2018). Nowadays, social media has moved beyond personal usage and has been increasingly adopted by organisations as an important channel for information dissemination and customer relationship management (Lam, Yeung, & Cheng, 2016).

The prosperity of social media has precipitated a paradigm shift in online user behaviour, finding expression in different ways users interact with one another. Specifically, the interactive attribute of social media allows users to transfer their role from passive content receivers to active participants who can not only generate content but also interact with other users. User engagement has a central role in this shift (Bijmolt et al., 2010), which is defined as "*the emotional, cognitive and behavioural*

connection that exists, at any point in time and possibly over time, between a user and a (technologic) [emphasis added] resource" (Attfield, Kazai, & Lalmas, 2011, p. 2). Noteworthily, the significance of user engagement in the success of social media activities has been highlighted by many researchers (e.g., Joo, Lu, & Lee, 2020; Veale et al., 2015). As a result, past studies on user engagement in social media abound.

Online behavioural engagement is typically manifested symbolically in social media through such responding actions as liking, commenting, and sharing. Concretely, liking refers to a favourable evaluative response on the basis of the emotional pleasure derived from the stimulus deriving from social media posts (Kostyk & Huhmann, 2021). In particular, the study in the context of Sina Weibo by Ge and Gretzel (2018, pp. 2084) claimed that "*liking adds value through endorsement, which can be viewed as a form of public agreement and acknowledgement*". Liking content may result in the person endorsing content or other brands and delivering branded messages to others around the user's social network (Basalingappa, Subhas, & Tapariya, 2019; Lee, Kim, & Kim, 2011; Wang, 2019)). Commenting is defined as posting comments in response to a post on social media (Garcia, Moizer, Wilkins, & Haddoud, 2019). By allowing users to comment on a post, social connections are strengthened, and the formation of online virtual communities is possible. On the other hand, as is the next level of engagement where the person endorses the content and propagates it in their network. Sharing content is one of the most important criteria for the success of social networking sites, together with sociability (Brandtzæg, Lüders, & Skjetne, 2010). These are all important indicators to measure user engagement, but their significance is not precisely the same. "Like" enables readers to show enjoyment, appreciation, or endorsement of the content; it is more private because it does not propagate the message. "Like" requires less commitment than "Comment" and "Share". Whereas a single click is sufficient to like a post, commenting on or sharing a post requires additional actions that call for extra commitment and/or cognitive effort (Kim & Yang, 2017). "Comment" focuses more on opinion expression, while "Share"/"Forward"/ "Retweet" is more socially visible and undirected as the shared content is pushed to all the followers without addressing anyone in particular (Kim & Yang, 2017; Li & Xie, 2020). In this vein, like is the lowest level of user engagement behaviour, followed by comment and share, ascendingly (Kim & Yang, 2017).

Past studies have examined three-dimension factors pertinent to an account *per se*, followers, and social media content. First, account-related characteristics, e.g., the number of followers (e.g., Jaakonmäki et al., 2017; Suh et al., 2010) and followees (Chen & Fu, 2016; Suh et al., 2010), account activeness (Chen & Fu, 2016), and age of the account (Blakemore, Bayer, Smith, & Grifo, 2020) are investigated in past research. Second, follower characteristics like self-efficacy, positive attitudes, and perceived enjoyment are found to facilitate knowledge sharing via employee weblogs (Papadopoulos, Stamati, & Nopparuch, 2013), and so do personality traits in individual social media (Deng, Lin, Liu,

Chen, & Li, 2017). Other factors, such as emotional support and informational support received by consumers, contribute to higher consumer involvement, thereby increasing their engagement in social commerce communities (Wang et al., 2020).

In addition to characteristics related to accounts and followers, numerous studies regarding social media engagement focus on the post text in terms of both structure and content. Table 2 presents a comprehensive summary of noteworthy empirical studies published between 2010 and 2023. These studies[1] examine the effect of frequently investigated structure-oriented features of social media posts on various user engagement metrics, such as likes, comments, and shares. These structure-orientated features include uniform resource locators (URLs) (Stieglitz & Dang-Xuan, 2013), hashtags (Li & Xie, 2020; Stieglitz & Dang-Xuan, 2013), and the number of mentioned others via @ function (Li & Xie, 2020; Yang & Counts, 2010), etc. Besides, the current literature also investigates the impact of sentiment embedded in messages on user engagement. For instance, Zhang and Zhang (2016) find that (positive, neutral, or negative) emotions expressed through emojis embedded in tweet messages significantly impact social media user engagement via commenting and retweeting. Notably, user engagement in social media is also a remarkable topic in social media marketing (Grover & Kar, 2020; Ibrahim & Aljarah, 2023; Khan, 2017). For instance, it has been highlighted that social media posts with aesthetic-value photos and entertaining videos can effectively motivate the audience to comment on or share the post (Joo, Choi, & Baek, 2018). The image richness used in brand social media is positively linked to customers' emotional and behavioural engagement, but negatively associated with their cognitive engagement (Zhao, Zhang, Ming, Niu, & Wang, 2023). Likewise, several other content-orientated features, such as post vividness and interactivity (de Vries, Gensler, & Leeflang, 2012), as well as informativeness and message appeal (Robson & Banerjee, 2022), can foster user engagement in brand social media posts as well. However, the impact of different structure-related attributes on user engagement in messages posted by GSMAs remains further addressed.

Table 2. Key structure-related factors affecting user engagement in social media in past studies (2010-2023)

Study	Social media platform	Main structure-related characteristics								Form of engagement behaviours
		Photo	Video	Emoji	Sentiment	Link (URL)	Mentions (@)	Hashtags (#)	Text length	
Organisational level										
Atad *et al*. (2023)	Facebook	×	×						×	Likes, Comments, Shares, Reactions, Total Interactions
Gandhi *et al*. (2023)	Facebook				×				×	Likes, Comments, Shares
Jha & Verma (2023)	Twitter & Facebook	×			×					Likes, Shares
Jost (2023)	Facebook	×	×			×				Interaction
Zhao *et al*. (2023)	Sina Weibo	×			×				×	Likes, Shares, Sentiment, Cognitive Engagement

[1] A literature search was performed on Google Scholar using the inquiry "*social media engagement" AND "user engagement" AND ("post feature" OR "message feature" OR "post characteristic" OR "message characteristic")*. The search was limited to journal and conference publications between 2010 and 2023. Subsequently, the retrieval records were screened by the second author, and a backtracking process was conducted accordingly.

Study	Social media platform	Main structure-related characteristics								Form of engagement behaviours
		Photo	Video	Emoji	Sentiment	Link (URL)	Mentions (@)	Hashtags (#)	Text length	
Gkikas *et al*. (2022)	Facebook							×	×	Likes, Awareness
Guo & Sun (2022)	Facebook	×	×	×		×		×	×	Reactions, Comments, Shares
She *et al.* (2022)	WeChat	×	×		×				×	Likes, Reads
Celuch (2021)	Instagram							×		User engagement
Quijada *et al.* (2021)	Instagram	×	×							Likes, Comments
Renshaw *et al*. (2021)	Twitter	×	×			×	×	×		Retweets
Soares *et al*. (2022)	Facebook	×	×			×				Likes, Comments, Shares
Song *et al*. (2021)	Facebook	×	×			×				Likes, Comments, Shares
Sridevi *et al*. (2021)	Twitter	×	×			×	×	×	×	Retweets
Bonilla *et al*. (2020)	Instagram	×	×				×	×		Likes, Comments
Gabarron *et al.*(2020)	Facebook, Twitter & Instagram	×	×	×						Likes, Comments, Shares
Gruss *et al*. (2020)	Facebook	×	×			×			×	Likes, Shares, Comments
Li & Xie (2020)	Twitter & Instagram	×		×	×		×	×	×	Likes, Retweets
Mao *et al*. (2020)	Facebook	×	×			×			×	User engagement
Shi (2020)	Twitter	×	×			×				Likes, Retweets, Comments
Banerjee & Chua (2019)	Facebook	×	×				×		×	Likes, Shares, Comments
Chugh *et al.* (2019)	Facebook	×	×							Likes, Comments, Shares
Dolan *et al.* (2019)	Facebook				×				×	Consumption, Likes, Shares, Comments
Feng & Jiang (2019)	Sina Weibo	×				×	×		×	Comments
Ji *et al*. (2019)	Facebook	×	×			×	×	×		Likes, Comments, Shares
McShane *et al*. (2019)	Twitter	×	×					×	×	Likes, Shares
Osokin (2019)	Facebook	×	×			×				Likes, Comments, Shares
Soares *et al*. (2019)	Facebook	×	×			×				Likes, Comments, Shares
Sutton *et al*. (2019)	Twitter	×	×			×	×			Retweets
Andrade *et al*. (2018)	Facebook	×	×			×				User engagement
Card *et al*. (2018)	Facebook	×	×		×	×				Engagement
Joo *et al.* (2018)	Facebook	×	×							Likes, Comments, Shares
Lee *et al*. (2018)	Facebook	×	×			×				Likes, Comments
Lee *& Xu* (2018)	Twitter	×	×			×		×		Favourites, Retweets
Srivastava *et al.* (2018)	Facebook	×	×			×				Likes, Shares Comments
Soboleva *et al*. (2017)	Twitter	×	×			×	×	×		Retweets
Strekalova & Krieger (2017)	Facebook	×								Likes, Comments, Shares,
Chen & Fu (2016)	Sina Weibo	×	×							Retweets
Rus & Cameron (2016)	Facebook	×			×	×				Likes, Comments, Shares
Araujo *et al*. (2015)	Twitter	×	×			×		×		Retweets
Carboni & Maxwell (2015)	Facebook	×	×			×			×	Total post engagement
Kim *et al*. (2015)	Facebook	×	×							Likes, Comments, Shares
Tafesse (2015)	Facebook	×	×			×	×	×		Likes, Shares
Sabate *et al*. (2014)	Facebook	×	×			×				Likes, Comments
Chauhan & Pillai (2013)	Facebook	×	×			×				Likes, Comments
Cvijikj & Michahelles (2013)	Facebook	×	×			×				Likes, Comments, Shares
Vries *et al*. (2012)	A social networking site	×	×			×			×	Likes, Comments
Individual level										
Shahbaznezhad *et al.*(2021)	Facebook & Instagram	×	×		×					Likes, Comments
Jaakonmäki *et al.* (2017)	Instagram	×		×						Likes
Zhang & Zhang (2016)	Sina Weibo			×		×	×	×	×	Comments, Retweets
Zhang *et al.* (2014)	Sina Weibo				×	×			×	Retweets, Comments
Stieglitz & Dang-Xuan (2013)	Twitter				×	×		×		Retweets
Suh *et al.* (2010)	Twitter					×	×	×		Retweets

2.2 Government social media and online rumour refutation

Online rumour spreading through social media has become an increasingly severe social issue, adversely affecting social security by, e.g., mongering social panic and engendering social instability (Wang et al., 2021). With limited knowledge on this topic, recent research calls urgent attention to understanding and curbing the spread of online rumours (Shen et al., 2021; Wang et al., 2021). Rumour detection dominates the current literature by investigating how to identify online rumours from the views of machine learning (Li et al., 2022; Zhao et al., 2021; Zhu, 2021), user perceptions (Khan & Idris, 2019; Zannettou, Sirivianos, Blackburn, & Kourtellis, 2019), and post-related features (Chua & Banerjee, 2017). There are also several studies investigating factors that affect the transformation of rumour refutation (Pal, Chua, & Hoe-Lian Goh, 2020; Zeng & Zhu, 2019). However, there is a lack of studies on motivating the spread of messages regarding *rumour refutation,* in particular in terms of the context of government activities. Addressing this issue has the potential to stop the spread of online rumours and release netizens from subsequent harm that the rumours may cause.

Arguably, government plays a critical role in combatting online rumours. One important practical implication of using government social media is rumour management (Pang et al., 2021; Wukich, 2022). In this vein, government agencies can leverage social media to claim a piece of information as fake or true, thereby controlling and quashing rumours (Chen et al., 2020), which is less likely to be fulfilled by individual citizens. As a result, government presence in social media is of great importance. As Li et al. (2018, p. 588) noted, "*government social media is revolutionary and represents a paradigm shift in the communication and interaction between governments and citizens*". Government social media can offer up-to-date information to citizens and allow either government-citizen or citizen-citizen interaction anytime and anywhere via mobile devices, having been increasingly embraced by various government departments (Baradei, Kadry, & Ahmed, 2021). GSMAs can not only share information of relevance to improve public services, e.g., increasing governments' openness and transparency (Bonsón, Torres, Royo, & Flores, 2012), but also have a high potential to refute online rumours (Baradei et al., 2021; Guo, 2021).

GSMAs can publish various information for their citizens. Publishing RRMs appears vital for the government to use the channel of social media to refute rumours. RRM mainly focuses on refuting specific rumours, which often receive a certain exposure to the public and is thus spreading (or starting to spread) among online users. In this respect, RRMs can be considered persuasive messages online. Significantly different from general social media posts that are generally self-concerned, RRM is concerned about public benefits and requests not to do a particular thing, e.g., not believing a rumour.

While past studies have accumulated a vital knowledge basis on the spread of common social media posts, such knowledge may be inapplicable to the context of RRMs, considering several unique attributes of RRMs (see Table 1). Common social media accounts, run by individuals or companies,

typically speak for the account holder, sharing informal and/or informational content. Unlike common social media accounts, GSMAs operated by authorities post content generally concerning serious topics closely connected to public welfare. Their primary purposes include but are not limited to exposing false information and correcting fake news (Panagiotopoulos et al., 2014), more importantly, persuading the public to believe the truth to effectively control and dispel rumours (Zhai et al., 2022; Zhang et al., 2022). Bearing this in mind, we can claim that government social media plays a vital role in refuting online rumours.

2.3 Psychological distance, reciprocal relationship, and personal relevance

Drawn upon Construal Level Theory (CLT), *psychological distance* in social media can be defined as *the degree to which a viewer feels connected with a post publisher* (Liberman, Trope, & Wakslak, 2007). The fundamental assumption of CLT is that people are inclined to think in concrete manners about objects/events that are close to them, and in abstract manners about objects/events that are perceived as distant (Norman, Tjomsland, & Huegel, 2016; Trope & Liberman, 2010). In other words, people's overall representation of a specific object of interest varies in its concreteness, contingent on their perceived psychological distance, which further affects their information processing and responses (Liberman et al., 2007). In this vein, individuals shape psychological construals of abstract for distant objects, representing a psychological distance far from oneself (Breves & Schramm, 2021). In line with previous studies (Liberman et al., 2007; Maglio, Trope, & Liberman, 2013; Norman et al., 2016), there are four interrelated dimensions of psychological distance, dubbed social distance, temporal distance, spatial distance, and hypotheticality. Furthermore, the linkage among the four differentiated distance dimensions is assumed as automatic and effortless in humans' minds (Trope & Liberman, 2010). As exemplified by Norman et al. (2016), when an event is described in a formal manner (indicating social distance), the described event is expected to occur at a great distance (spatial distance) and further in the future (temporal distance). Liberman and Trope (1998) noted that people can merely experience the now and here directly, but not other people, places, realities, the future or the past. Given the differences in terms of either *topic*- or *content*-*wise*, it is plausible that RRMs posted by government agencies tend to be psychologically distant, while common social media messages tend to be psychologically proximal.

CLT and psychological distance have been extensively utilized to explain online user cognition and behaviour (e.g., Kim, Sung, Lee, Choi, & Sung, 2016; Yang, Li, Lin, Jiang, & Huo, 2022; Yang, 2022). For instance, in the context of social commerce, information quality can enhance social psychological distance, which further increases trust in e-commerce (Febrianti & Hidayat, 2022). Yang et al. (2022) find that marketer-generated content (MGC) on social media with more social features can narrow consumers' psychological distance from the MGC, thereby facilitating user engagement in such MGC, and conversely, increase psychological distance when MGC with more achievement features.

Likewise, Hernández-Ortega (2018) asserts that online reviewers' linguistic style and experience-based review affect viewers' social psychological distance, which in turn influences their purchase intentions. Furthermore, there are also some studies investigating the moderating role of psychological distance between post-content features and user perceptions/behavioural intention (e.g., Huang & Ha, 2022; Huang et al., 2021; Zhu, Zhao, & Wang, 2022).

Issues with a lower psychological distance are perceived to be of higher personal relevance, or *the degree to which an issue is relevant to a person* (Guo et al., 2021). For example, during the breakout of Covid-19, individuals would perceive fake news regarding toilet paper shortage in proximal terms (low psychological distance) as more personally relevant than celebrity rumours in distant terms (high psychological distance) (Tan & Hsu, 2023). Psychological distance plays an essential role in transforming individual propensity to believe a piece of information (Kwon, Pellizzaro, Shao, & Chadha, 2022). Exposure to issues of psychological proximity, in turn, leads to stronger persuasion effects (Breves & Schramm, 2021). People would be more likely to respond to or be involved in a cause if it is perceived as close (Breves & Schramm, 2021). In addition, messages aiming to persuade the audience are typically regarded as more effective and more elaboratively processed when more relevant to the audience (Breves & Schramm, 2021). As a result, reducing psychological distance in messages facilitates the engagement behaviours of participants.

Unlike common social media accounts, GSMAs are likely to lack reciprocal relationships with their followers, thereby reducing their followers' perceived personal relevance. Reciprocity is the core pattern of online communities (Ha et al., 2017). In online communities, "*receiving feedback from friends on a post, perhaps similarly to receiving a gift, creates indebtedness and calls for reciprocation*" (Grinberg, Alex Dow, Adamic, & Naaman, 2016, p. 565). Community members are more likely to give feedback to those who have responded to their posts, e.g., by commenting on their posts (Grinberg et al., 2016). Social media affords netizens a chance to express their voice, and interactions between accounts and their followers resemble reciprocal exchanges. As a representation of authority, a GSMA is less likely to respond reciprocally to its followers, eliminating the possibility of establishing such a reciprocal relationship and impeding perceived personal relevance.

In a nutshell, RRMs published by governments may lack personal relevance due to a lack of i) non-interpersonal topics and reciprocal relationships. It is arguably more difficult for GSMAs to create an intimate relationship with their followers than the typical follower-followee relationship between social media peers. Again, the GSMA represents a voice of authority, which may generate a sense of distance and thus make it challenging to develop an intimate relationship. Such a sense of distance may prevent users from engaging in the RRM.

2.4 Persuasion theory and persuasive message

Persuasion theory is a theory that copes with communication elements and their role in forming

and reformating recipients' attitudes and behaviours (Mohsenian Rad & Ghadiry, 2019). The persuader in persuasion theory serves as an ideological and political educator, whereas the persuaded is equal to the educated object. Persuasive messages correspond to ideological and political education content. In this regard, a persuasive message can activate an attitude change that further modifies the behaviours of the public in general (Mohsenian Rad & Ghadiry, 2019). In other words, persuasive messages aim to "*change the mind of the persuadee*" (Hunter, 2016), thereby fostering the persuadee to perform message-consistent behaviour (Hamelin et al., 2020).

The effectiveness of persuasive messages is affected by many factors. First, the information source proves to be one critical factor affecting the persuasive effect. Compared to friends' recommendations, Internet word-of-mouth (WOM) from social media celebrities is more likely to be regarded as advertising (Boerman, Willemsen, & Van Der Aa, 2017). Second, different argumentation methods also affect the effectiveness of persuasion (Hong et al., 2020). Graphical images can be a persuasive device, often more persuasive than verbal argumentation (Bulmer & Buchanan-Oliver, 2006). Furthermore, from the content characteristics, higher completeness and explicitness of an argument significantly enhance its persuasive effect and perceived credibility (O'Keefe, 1997, 1998). In social media posts containing misinformation, the inclusion of persuasive words substantially increases the possibility of disseminating the post (Zhou et al., 2021). The current literature shows that the competence and traits of persuasive message recipients also play a role in their effectiveness (Hibbert, Smith, Davies, & Ireland, 2007).

As the introduction and section 2.2 noted, there are several unique attributes of RRMs differentiated from common social media messages. For instance, consumers generally disseminate information through electronic WOM when they believe the information source is trustworthy (Willemsen, Neijens, & Bronner, 2012). Differently, the information released by GSMAs can all be considered reliable because of their uniquely authoritative position. Therefore, engaging users in disseminating RRMs released by GSMAs via their personal social media platforms may demand other vital motivations. Consequently, the findings concerning common social media may be inapplicable to understanding user engagement in RRMs. Furthermore, although previous studies have discussed different factors, such as the emotional contagion of netizens (Zeng & Zhu, 2019) and post content and contextual factors (Li et al., 2021), in social media rumour refutation, the effect of structure-related factors of RRMs on user engagement from the perspective of persuasiveness remains virtually unexplored. We believe that, by drawing upon the persuasiveness theory, revealing the precursors that motivate online users to engage in RRMs by government agencies may derive new insights.

3. Hypotheses formation

Our study focuses on RRMs content attributes pertinent to argument quality, psychological distance, and personal relevance to understand the factors motivating user engagement.

3.1 Textual and visual cues for improving argument quality

Past studies have investigated a list of post attributes for triggering user engagement in the social media context, including text length, URLs, and use of video(s) and/or photo(s). While popular social media is often associated with the inclusion of pictures with aesthetic value or videos offering entertainment value, RRM typically uses photos and videos as convincing evidence to refute a rumour (see Figure 2). Accordingly, we argue that these attributes reflect the argument quality of RRMs.

The textual content on social media is an important medium to convey information, and the content length largely reflects the amount of information. Algarni (2019) noted that using solid arguments and complete information can produce a positive attitude change. Research on online review helpfulness accentuated that long reviews tend to make a more substantial impact and thus elicit more review helpfulness votes (Zhou & Yang, 2019). For government social media, viewers are generally interested in posts that help to evaluate specific events, change and reshape their attitudes, and convince them with more details. As a viewer scrutinises a post in terms of its content, s/he tends to appreciate the contained details and the effort invested in crafting the post by the content producer (Peng, Yin, Wei, & Zhang, 2014). Likewise, an RRM with longer text presumably includes more details to address information asymmetry, e.g., justifications of individual opinions and assessment of information reliability, etc. In line with previous persuasion research (e.g., Luo, 2002; Peng et al., 2014), content with more arguments is more persuasive. Accordingly, more details in RRMs help viewers justify the described event better and are more persuasive and influential in engaging followers and getting approval (Cunha et al., 2011). Thus, we propose that:

H1. The text length is positively related to user engagement in an RRM in terms of liking, commenting, and sharing the RRM.

Social media posts usually contain an external link that allows viewers to click on and get more information about a topic of relevance. The inclusion of links can enrich the information of social media content and indirectly increase the information volume (Zhou et al., 2019). Incorporating links into messages allows users to bypass the character limit in delivering information that needs to be presented with more details. Previous studies concerning social media engagement have reported that links in a tweet improve its reliability and increase the possibility of being retweeted (Morris, Counts, Roseway, Hoff, & Schwarz, 2012). Including a link in Facebook posts facilitates more comments (Viglia, Pera, & Bigné, 2018). All else being equal, the existence of links in RRMs represents a conduit through which users access more information and supplementary materials to refute a rumour and get deeper insights about particular topics. This could offer additional credibility to RRMs to make them more persuasive. As a result, users would subscribe to the RRM. Thus, we posit that:

H2. The existence of links is positively related to user engagement in an RRM in terms of liking, commenting, and sharing the RRM.

Visual cues of social media posts have attracted significant attention from marketing. The inclusion of photos and videos proves to be an effective way to demonstrate expertise and deliver information in an easy-to-understand format (Li & Xie, 2020; Soboleva et al., 2017). Compared to textual content, photos and videos contain more unstructured information and improve information richness, effectively supplementing the explanation in the text (Strekalova & Krieger, 2017). Specifically, at an organisational level, photos in official Facebook posts are significantly linked with more comments, shares, and likes (Strekalova & Krieger, 2017). In political campaigns and disaster information dissemination, photos and videos are important tools to ensure information completeness and comprehensiveness, attracting more users to respond (Lee & Xu, 2018). Likewise, the inclusion of photos and videos in an RRM improves information richness by offering more visual cues as evidence to support the arguments of the RRM. In this regard, the refutation of the rumour is more persuasive, and users can be more convinced when photos or videos are attached to demonstrate a fact vividly. Thus, we posit that:

H3/4. The number of photos/videos is positively related to user engagement in an RRM in terms of liking, commenting, and sharing the RRM.

3.2 Emojis for reducing psychological distance

Emoji is a graphic symbol or ideogram representing facial expressions, concepts, and ideas, such as celebration, weather, vehicles and buildings, food and drink, animals and plants, or emotions, feelings, and activities (Novak, Smailović, Sluban, & Mozetič, 2015). Using emojis enables the transformation of the expression in the said text into emotional symbols, thereby narrowing the psychological distance between the content publisher and the reviewer (Jones, Wurm, Norville, & Mullins, 2020; Zhang et al., 2021). Previous studies have endorsed that using emojis can shorten psychological distance, thereby improving trust in online peer communications (Zhang et al., 2021) and facilitating higher user engagement in brand social media (McShane, Pancer, Poole, & Deng, 2021). Accordingly, we argue that emojis in RRMs can be particularly useful for eliciting positive responses from netizens to RRMs. Using emojis in RRMs, in all probability, may create intimacy and facilitate friendship formation (Tang & Hew, 2018), thereby reducing psychological distance (Huang et al., 2021). In other words, using emojis in online environments plays an important role in developing intimacy (Zhang et al., 2021), as using emojis may offer a reasonable proxy for affection expression, thus serving as essential building blocks for establishing intimacy (Gesselman, Ta, & Garcia, 2019).

Past studies indicated that using emojis could entice positive effects on both peer and non-peer communication. Emojis can express emotions and serve other functions, e.g., keeping a conversational connection (Kelly & Watts, 2015), adding a tone, and engaging recipients (Cramer, De Juan, & Tetreault, 2016). The connotation attached to the emojis can replace the textual content as if people use contextualisation cues to communicate, helping online community members feel a sense of

psychological connection between themselves (Riordan, 2017). Daniel and Alecka (2020) verify that when social media users insert a context-appropriate emoji into a message, users perceive the statement to be easier to understand and more believable when compared with the same message with no emoji or with a context-inappropriate emoji. Likewise, the presence of emojis in brand-related user-generated content is positively related to consumer engagement (Ko, Kim, & Kim, 2022). Noteworthily, the findings of Luo and Harrison (2021) based on *Sina Weibo* suggest that the addition of emojis to a government social media post can attract more user interactions than a purified text post. Taking together, we posit that:

H5: The presence of emojis is positively related to user engagement in an RRM in terms of liking, commenting, and sharing the RRM.

3.3 Rhetorical questions for increased personal relevance

A question can be termed rhetorical "*if the answer is implicit within the question and this is understood by both speaker and perceiver*" (Swasy & Munch, 1985, pp. 877–878). Rhetorical questions are often used in persuasion, and their effectiveness has been examined in various persuasion settings (Frank, 1990; Mothersbaugh et al., 2002). A rhetorical question is normally used to make the audience accept specific ideas or adopt particular actions (Hong et al., 2020). As rhetorical questions are used in statements, the receiver may infer the communicator is quite confident and expert and does not need to pressure the receiver by asserting (Newcombe & Arnkoff, 1979). Consequently, the rhetorical may lower the receiver's defences, making it easier to get approval and increasing the response possibility (Ahluwalia & Burnkrant, 2004).

A significant merit of using rhetorical questions is to spark greater personal relevance of the discussed topic to the listeners, hence the interest (Lantos, 2014). As Petty et al. (1981) noted, using rhetorical questions may strengthen or hinder message argument elaboration, contingent on the personal relevance of the message to the recipient. That is, rhetorical concentrates attention on message arguments if the message is with low personal relevance to the recipient. In contrast, rhetorical distract the recipient from processing the argument when the message is of high personal relevance. When a social media user hesitates to attend to a message because the topic is of low personal relevance, rhetorical questions help with the message content processing and persuasion (Blankenship & Craig, 2006), which may, in turn, motivate more engagement in the message.

Compared to messages posted by common social media accounts, RRMs posted by GSMAs are usually of lower personal relevance since the former is more about personal activities. In contrast, the latter, operated by authorities, is much more linked to serious topics related to public welfare. The use of rhetorical questions can affect the cognitive response of the message recipients, thereby resulting in greater message persuasion effects due to enhanced message elaboration (Swasy & Munch, 1985). In this vein, for viewers exposed to RRMs that were initially with low personal relevance, the inclusion of

rhetorical questions could increase viewers' elaboration of the RRM by increasing cognitive processing and, therefore, create a relatively strong attitude to the RRM (cf., Petty et al., 1981). Thus, we posit that:

H6: The number of rhetorical questions is positively related to user engagement in an RRM in terms of liking, commenting, and sharing the RRM.

Based on the above-proposed hypotheses, a research framework is established in Figure 1.

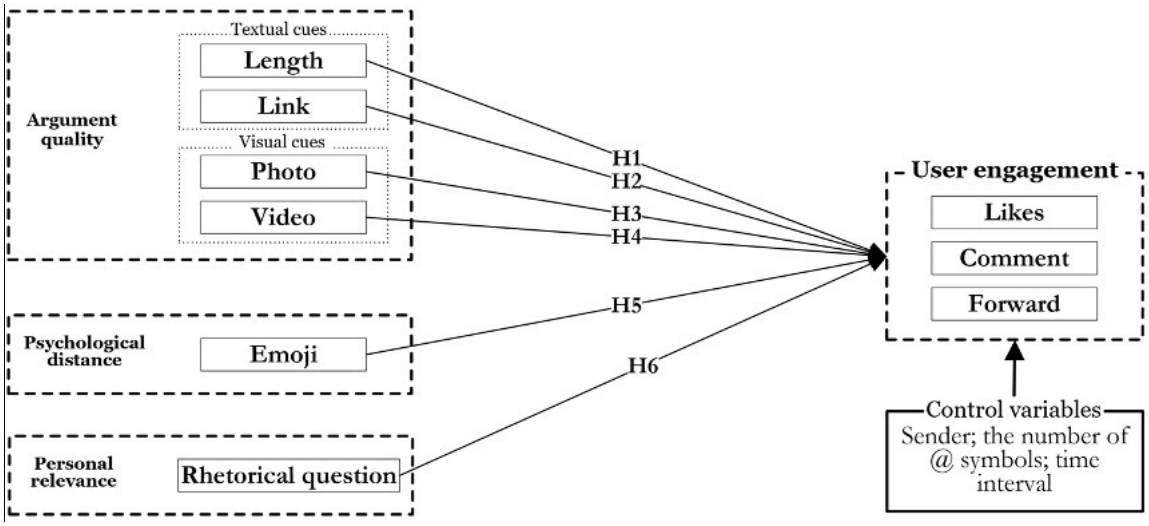

Figure 1. Research framework

4. Methodology

The proposed hypotheses are verified via analysing RRMs on Sina Weibo, with every single RRM posted by GSMAs as the unit of analysis. Note that Sina Weibo, known as Twitter of China, is among the most popular social media in China, with 248 million daily active users as of the third quarter of 2021 (Thomala, 2021). In order to promote online government-netizen interaction, an increasing number of Chinese local government agencies have launched their official Sina Weibo accounts (People's Daily Online Public Opinion Data Center, 2021). It is important to note that GSMAs in China have claimed to not merely be an online platform for releasing information and promoting self-talk; rather, they should function as a channel for the government to address doubts and respond to public concerns, as well as a bridge for interaction and communication between the government and the public (People's Daily Online Public Opinion Data Center, 2021). The most typical user engagement behaviours on Sina Weibo include liking, commenting on, and sharing posts (see Figure 2 for an example layout of the Sina Weibo mobile interface). Our study treats the number of likes, comments, and shares of an RRM as dependent variables. Argument quality, psychological distance, and personal relevance are explanatory variables that are operationalised via coding RRMs for message structure in terms of textual and visual cues.

Figure 2. The layout of the Sina Weibo mobile interface

4.1 Sampling

To generate the sample, we employed a random selection process and chose 10 out of the top 20 influential GSMAs of central government agencies of the "*Government Weibo Influence Ranking*" in China in 2021, as identified by the People's Daily Online Public Opinion Data Center (2021). Concretely, the "*Government Weibo Influence Ranking*" is known to enhance the comprehensive improvement and overall quality of government information dissemination online. Notably, the number of followers alone does not necessarily equate to greater influence, although it is a prerequisite of importance for constituting communication power. Rather, the ranking considers factors such as the level of activity and credibility of the followers of GSMAs, which can offer a more accurate reflection of the actual dissemination of information released by government agencies. In addition to passive indicators of user engagement, such as comments and likes, the evaluation criteria of the ranking focus more on bilateral interaction between followers and GSMAs, that is, the ability of government agencies to actively respond to followers and interact in two directions.

Accordingly, we archived all accessible posts from the selected 10 influential GSMAs on Sina Weibo between November 2011 and December 2020 (for an overview of the selected 10 GSMAs, refer to Table 3). Considering that these GSMAs are conduits of publishing information of variety, only posts

related to rumour refutation were singled out. Specifically, following the selection criteria of Cui (2020), we identified the RRMs published by the 10 GSMAs through the two specific hashtags #辟谣# (#Rumour Refutation#) or #微博辟谣# (#Weibo Rumour Refutation#) using My SQL select function. As a result, our efforts resulted in the final size of 2,262 RRMs.

Table 3. Overview of the ten government accounts of the investigation

Government account (in Chinese)	The Indexes of *Government Weibo Influence Ranking 2021**					Number of followers (million)	Number of posts	Number of RRMs
	Communication	Service	Interaction	Recognition	Total			
1. 中国警方在线	94.65	89.44	84.52	92.52	91.16	31.856	105,043	835
2. 共青团中央	98.25	78.52	86.43	91.15	90.52	16.575	41,960	275
3. 中国长安网	93.59	86.52	83.57	88.54	89.16	15.907	44,551	375
4. 中国消防	94.99	81.57	82.35	90.23	88.83	9.254	58,500	43
5. 中国反邪教	93.25	75.78	79.76	85.33	85.47	4.091	62,348	362
6. 中国气象局	84.68	82.29	72.58	75.39	80.14	4.770	74,062	121
7. 国资小新	81.70	81.46	74.72	76.74	79.26	5.845	45,447	65
8. 战略安全与军控在线	81.71	77.49	75.93	76.08	78.58	0.560	24,987	57
9. 公安部交通管理局	84.15	74.01	75.95	74.10	78.47	7.146	34,961	50
10. 中国地震台网速报	85.90	53.36	75.53	70.17	74.17	11.387	26,520	79

Notes: * For more details regarding the evaluation systems and indexes of *Government Weibo Influence Ranking 2021,* refer to the 2021 Government Weibo Influence Report (People's Daily Online Public Opinion Data Center, 2021).

4.2 Coding scheme

To quantify all the dependent and independent variables, we measured all the related variables of interest. Table 4 reports a brief description of the measurement. As noted above, on Sina Weibo, users can engage in a post by clicking likes, giving comments, or sharing the post. In this study, user engagement in an RRM is measured by the number of i) likes, ii) comments, and iii) shares. Argument quality is measured by textual cues and visual cues, the former of which includes such two indicators as text length and the inclusion of links, whereas visual cues include the number of pictures and the number of videos. The instrument of psychological distance is measured by whether an RRM contains emojis, while personal relevance is measured by the number of rhetorical questions contained in an RRM. Note that Sender 1-10 represents GSMA IDs.

Several control variables that may impact user engagement are included in the study as well. First, we include the number of @ symbols as a control variable since previous studies have acknowledged the significance of @ symbol in affecting different user engagement behaviours in social media posts (e.g., Feng & Jiang, 2019; Li & Xie, 2020; Zhang & Zhang, 2016). In line with past studies (e.g., Deng, Hine, Ji, & Wang, 2023; Leung, Schuckert, & Yeung, 2013; Li & Xie, 2020), the posting time of social media messages is also a factor of relevance to user engagement. Thus, the factor of the time interval between the publishing time and collecting time of RRMs is also taken into account in the study. Additionally, prior studies frequently consider several account-orientated factors when investigating engagement behaviours of social media users, such as the number of followers (e.g., Jaakonmäki et al., 2017; Suh et al., 2010), the number of followings (Chen & Fu, 2016; Suh et al., 2010), account activeness (Ashley & Tuten, 2015), and the age of account (Suh et al., 2010). As such, we include the category factor of account ID indicating the differences among the investigated GSMAs to exclude the

intervention of account-related factors to user engagement. By doing so, the results of interest gained from the present study can be, to a large degree, guaranteed to avoid disturbance from the included control variables.

Table 4. Data coding and measurement

Variable type	Variable name	Description	Source
Dependent variable	Likes	The number of likes contained in an RRM	Srivastava *et al.* (2018)
	Comments	The number of comments contained in an RRM	
	Shares	The number of shares contained in an RRM	
Independent variable	Length	The number of characters contained in an RRM	Zhang *et al.* (2014)
	Link	The existence of links *(if there is no link, it is coded as 0, otherwise, coded as 1)*	Srivastava *et al.* (2018)
	Photo_num	The number of pictures contained in an RRM	
	Video_num	The number of videos contained in an RRM	
	Emoji	The existence of emoji *(if there is no emoji, it is coded as 0, otherwise, coded as 1)*	Li & Xie (2020)
	Rhetorical_question	The number of rhetorical questions contained in an RRM	Ranganath *et al*.(2018)
Control variable	@symbol	The number of @symbol contained in an RRM	Li & Xie (2020)
	Time_interval	The time interval between the publishing time and collection time of an RRM	Srivastava *et al.* (2018)
	Sender	The ID of a government official accounts	

The coding of the variables was conducted manually, considering the dataset was not excessively large. All variables, except for text length and the number of rhetorical questions, could be either directly manageable (e.g., the number of likes, comments, and shares) or easily countable (e.g., the number of pictures, videos, and @symbol, as well as the inclusion of emoji). Relatively, coding of the two variables, i.e., Length and Rhetorical_question, requires more effort. Bearing this in mind, a convenient training dataset comprising 40 RRMs was created from a random selection of samples from the pool consisting of 2,262 RRMs. This pre-coding task was conducted separately by two research assistants, following the methodology of previous studies (e.g., Deng, Tong, Lin, Li, & Liu, 2019).

The inter-coder reliability in coding is estimated. Specifically, when the results of the two coders show poor consistency, reflected in low values of indicators, the results suffer from reliability. An online-utility software, the so-called *Reliability Calculator for two coders* (ReCal2), is applied to examine coding consistency. ReCal2 can easily compute intercoder/interrater reliability coefficients for nominal data coded by two coders.

Table 5. Consistency check and verification

	Consistency check (a)				Consistency verification (b)			
Variable name	Per cent Agreement	Scott's Pi	Cohen's Kappa	Krippendorff's Alpha	Per cent Agreement	Scott's Pi	Cohen's Kappa	Krippendorff's Alpha
Likes	100%	1	1	1	100%	1	1	1
Comment	100%	1	1	1	100%	1	1	1
Share	100%	1	1	1	100%	1	1	1
Photo_num	100%	1	1	1	100%	1	1	1
Video_num	100%	1	1	1	100%	1	1	1
Length	80%	0.794	0.794	0.796	85%	0.845	0.845	0.845
Link	100%	1	1	1	100%	1	1	1
Sender	100%	1	1	1	100%	1	1	1
@symbol	100%	1	1	1	100%	1	1	1
emoji	100%	1	1	1	100%	1	1	1

Rhetorical_question	87.5%	0.485	0.491	0.492		92.5%	0.731	0.732	0.732
Time_interval	100%	1	1	1		100%	1	1	1

The check result of the first round is shown in Table 5a. Three indicators, i.e., Cohen's Kappa, Scott's Pi, and Krippendorff's Alpha, are used to assess the consistency of agreement between coders. Following Fleiss et al. (2013), Cohen's Kappa values between 0.4 and 0.75 are relatively consistent, more than 0.75 are of high consistency, and more than 0.667 are generally viewed as acceptable. According to Landis (1977) and Scott (1955), the values of Scott's Pi below 0.2 are considered poor agreement; between 0.2 and 0.4 as fair agreement; between 0.4 and 0.6 as moderate agreement; between 0.6 and 0.8 as substantial agreement; above 0.8 as almost perfect agreement. Typically, values of Krippendorff's Alpha between 0.67 and 0.8 are considered good, whereas above 0.8 is excellent (Hayes & Krippendorff, 2007; Krippendorff, 2011). Table 5a shows that the number of rhetorical questions needs further proofreading to make it more rigorous. As such, the code was modified as followings: i) creating a more strict distinction between rhetorical questions and interrogative sentences with corresponding examples so that there are standards to follow in the judgment for singling out rhetorical questions. ii) Further stipulating the calculation message range and operation process so that the word accounting operation can be standardised. Consequently, the verification results (see Table 5b) show that Cohen's Kappa values are greater than 0.75 and that Scott's Pi and Krippendorff's Alpha are above 0.7, respectively, indicating decent reliability and consistency in coding results. On this basis, large-scale encoding is performed on the remaining data.

4.3 Data analysis

After extracting features pertaining to RRMs and incorporating these features as precursors of user engagement behaviours, multiple linear regression models (the formula is shown below) are employed in the analysis. We deem multiple linear regression appropriate for the present study because of its advantages of simplicity and usability in coping with the scenario where a dependent variable corresponds to numerous independent variables (Sun, Ma, & Xue, 2018).

$$\sum_{i=1}^{3} log(Y_i + 1) = \sum_{j=1}^{3} \varepsilon_j + \beta_1 x_{text\_length} + \beta_2 x_{existence\_of\_links} + \beta_3 x_{number\_of\_photos} + \beta_4 x_{number\_of\_videos} + \beta_5 x_{existence\_of\_emojis} + \beta_6 x_{number\_of\_rhetoricals} + \beta_7 x_{number\_of\_@} + \beta_8 x_{sender\_ID} + \beta_9 x_{time\_interval}$$

(Where $Y_{1\text{-}3}$ represents the number of likes, comments, and shares, respectively.)

5. Results and discussion

The R language is used to process the sample data. Given that the regression models include both numeric and categorical variables, the variance inflation factor (VIF) is utilised to examine multicollinearity. All the VIFs for all independent variables were below the suggested threshold of 5.0 (Hair, Anderson, Tatham, & Black, 1998), suggesting that multicollinearity is not a severe concern in

this case.

Furthermore, the effect size is a complement of importance for testing null hypothesis significance, such as *p*-values, since it provides a measure of practical significance with regard to the magnitude of the effect and is independent of sample size (Selya, Rose, Dierker, Hedeker, & Mermelstein, 2012). Following Cohen (1988), Cohen's *f2* is widely used and suitable for computing local effect sizes in multiple regression models where both the independent and dependent variables of interest are continuous. Despite the two categorical and ordinal variables, i.e., Link and Emoji, included in the regression models, they can be treated as continuous due to the nature of the variables and the practical meanings they contain (see Table 4) (Anderson, 1984; Winship & Mare, 1984). It is suggested that Cohen's f^2 above 0.02 is considered small, above 0.15 as medium, and above 0.35 as large (Cohen, 1988). As demonstrated in Table 6, the medium or large effect sizes make us conclude that the included predictors in the models are significant variables to explain the dependent variables.

5.1 The impact of argument quality on user engagement

The regression model statistics indicate decent explanatory power. The model explains 22.5%, 40.3%, and 38.1% of variances in the numbers of likes, comments, and shares, respectively. As shown in Table 6, the results show that text length is positively associated with the numbers of commenting on ($\beta = 0.118$, $p < 0.001$) and sharing ($\beta = 0.161$, $p < 0.001$) an RRM, as well as weakly positively linked to liking ($\beta = 0.059$, $p < 0.1$) and RRM. Thus, *H1* is confirmed. An RRM with longer content is highly likely to contain more detailed arguments so that the recipients can get more insights into a particular topic, allowing recipients to justify the related topics better. This makes the points conveyed by the RRM more convincing, thereby more effective in persuasiveness (e.g., Luo, 2002; Peng et al., 2014). With greater persuasiveness in RRMs, users are more likely to agree on the endorsed points of the RRM (Cunha et al., 2011), thereby engaging more in the RRM by liking, commenting on, and sharing it.

The existence of links in RRMs is negatively linked to user engagement of likes ($\beta = -0.070$, $p < 0.05$) and comments ($\beta = -0.058$, $p < 0.05$). However, its influence on share is not significant ($\beta = -0.037$, $p > 0.1$). Therefore, *H2* is rejected. This finding conflicts with past studies that the existence of links positively impacts user attention on Twitter (Morris et al., 2012). The explanation may be that although links can effectively expand the information of an RRM, they may also distract the user's attention and reduce the possibility of responding to the main content of the RRM.

In addition, the number of photos is positively associated with likes ($\beta = 0.076$, $p < 0.05$) and shares ($\beta = 0.061$, $p < 0.01$), but is negatively related to comments ($\beta = -0.061$, $p < 0.01$), partially supporting *H3*. The number of videos is positively linked to the number of likes for an RRM ($\beta = 0.105$, $p < 0.001$), but not to comments ($\beta = 0.036$, $p > 0.1$) and shares ($\beta = 0.010$, $p > 0.1$). Thus, *H4* is partially verified. Our findings are different from past studies in that embedding photos and videos in social media posts can attract more users' responses (Chen & Fu, 2016; Li & Xie, 2020). The possible

explanation is that in RRMs, the refutation of rumours and the restoration of the truth are presented directly in the text. Photos and videos serve as supplementary materials that enrich the content and supplement the explanation (Soboleva et al., 2017). A comment represents a user's opinions after learning about the RRM. It is more related to the RRM main body than the supplementary materials presented in photos/videos. Although photos and videos prove to attract users' attention, too many visual elements easily lead to information overload and interfere with users' reading and understanding of the main content, thereby reducing the possibility of commenting.

Table 6. Multiple linear regression results

Type	Variable	Dependent variable			Hypotheses test
		Model 1 Likes	Model 2 Comments	Model 3 Shares	
Constant term	Constant	$-0.074^{n.s.}$	$\mathbf{-0.349}^{*}$	$\mathbf{-1.105}^{***}$	
Argument quality	Length	$\mathbf{0.059}^{+}$	$\mathbf{0.118}^{***}$	$\mathbf{0.161}^{***}$	*H1* is supported
	Link	$\mathbf{-0.070}^{*}$	$\mathbf{-0.058}^{*}$	$-0.037^{n.s.}$	*H2* is rejected
	Photo_num	$\mathbf{0.076}^{*}$	$\mathbf{-0.060}^{*}$	$\mathbf{0.061}^{**}$	*H3* is partially supported
	Video_num	$\mathbf{0.105}^{***}$	$0.036^{n.s.}$	$0.010^{n.s.}$	*H4* is partially supported
Psychological distance	Emoji	$\mathbf{0.089}^{**}$	$\mathbf{0.060}^{*}$	$\mathbf{0.097}^{***}$	*H5* is supported
Personal relevance	Rhetorical_question	$\mathbf{0.055}^{+}$	$0.125^{n.s.}$	$\mathbf{0.119}^{***}$	*H6* is partially supported
Sender	Factor (sender)2	-0.459^{+}	-1.226^{***}	$-0.256^{n.s.}$	
	Factor (sender)3	$-0.358^{n.s.}$	-0.475^{*}	0.404^{+}	
	Factor (sender)4	$0.134^{n.s.}$	0.796^{***}	1.309^{***}	
	Factor (sender)5	-0.525^{*}	$-0.173^{n.s.}$	0.504^{**}	
	Factor (sender)6	$0.124^{n.s.}$	$-0.043^{n.s.}$	0.682^{*}	
	Factor (sender)7	$0.283^{n.s.}$	$0.204^{n.s.}$	1.091^{***}	
	Factor (sender)8	$0.016^{n.s.}$	$0.132^{n.s.}$	1.156^{***}	
	Factor (sender)9	1.639^{***}	1.516^{***}	2.133^{***}	
	Factor (sender)10	$0.340^{n.s.}$	0.538^{***}	1.717^{***}	
Mention sign	@symbol	$\mathbf{-0.127}^{***}$	$\mathbf{-0.069}^{*}$	$-0.043^{n.s.}$	
Time interval	Lag (time_interval)	$-0.020^{n.s.}$	$0.020^{n.s.}$	$-0.013^{n.s.}$	
Model statistics					
Adjusted R^2		22.5%	40.3%	38.1%	
Cohen's f^2		0.290	0.675	0.616	
[Effect size]		[Medium]	[Large]	[Large]	

Notes: $^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$; $^{+}p < 0.1$; $^{n.s.}p > 0.1$.

Sharing represents the share of content with all followers. Users will hope that the messages they share are authentic and reliable and can be supported and recognised by their followers (Chevalier & Mayzlin, 2006). In this case, RRMs with sufficient arguments and detailed content to refute rumours are more likely to be favoured by users, consistent with most past research (Algarni, 2019). However, in the current era of the explosive growth of information, people mostly use fragmented time to be concerned about RRMs. Too much supplementary information cannot gain popularity among users due to information overload or short of competence to deal with too much information in a short time.

5.2 The impact of psychological distance on user engagement

The inclusion of emojis in RRMs is positively linked to user engagement in terms of liking (β = 0.089, $p < 0.01$), commenting on (β = 0.060, $p < 0.05$) and sharing (β = 0.097, $p < 0.001$) the RRM, supporting *H5*. This finding is consistent with previous studies subscribing that using emojis in social media posts contributes to more likes (Jaakonmäki et al., 2017) and comments (Zhang & Zhang, 2016),

but inconsistent with the past conclusion that messages with emojis are less likely to be shared (Li & Xie, 2020; Zhang & Zhang, 2016). On the one hand, inserting a context-appropriate emoji into a message can improve information processing fluency and help users understand the content better (Daniel & Camp, 2020). On the other hand, RRMs released by GSMAs are more serious than ordinary social media posts. Using emojis in RRMs allows for expressing affection and establishing user intimacy with the authorities, in particular in light of when the seriousness of topics in RRMs contrasts strongly with the sentiment attached to emojis. Using emojis in network environments is highly important for cultivating the perception of intimacy (Zhang et al., 2021). In online communities where users communicate mainly based on text and voice, emoticons allow the recipients to perceive more affection expressed by the sender, contributing to more psychological connections between them (Gesselman et al., 2019). Under this situation, including emojis in RRMs can largely decrease the psychological distance between the government and users, motivating government-netizen interactions. It is noteworthy to mention that while several studies (Jaakonmäki et al., 2017; Zhang & Zhang, 2016) have subscribed that using emojis can enhance social media engagement by reducing psychological distance in one-to-one interpersonal communication settings, this study extends these findings to the realm of one-to-multiple communication settings on social media, specifically focusing on GSMAs' posting of RRMs.

5.3 The impact of personal relevance on user engagement

Rhetorical questions contained in RRMs are positively related to user engagement in terms of the increased number of likes ($\beta = 0.055$, $p < 0.1$) and shares ($\beta = 0.119$, $p < 0.001$), but, interestingly, not comments ($\beta = 0.125$, $p > 0.1$). H6 is partially confirmed. One direct advantage of using rhetorical questions in a message is to trigger greater personal relevance of the related topic to the receiver (Lantos, 2014). By doing so, the use of rhetorical questions benefits from attracting more interest and responses from receivers. Moreover, rhetorical questions can lower the viewer's defences and enhance the viewer's trust in the message content (Ahluwalia & Burnkrant, 2004). Thereby, including rhetorical questions in the message helps get viewers' agreement on the subscribed points, positively impacting their liking and sharing behaviours.

On the other hand, compared to common social media posts, RRMs published by authorities are obviously of less personal relevance. Using rhetorical questions can enhance RRM argument elaboration by affecting cognitive response and fostering the recipient to focus more on processing the argument; this is also consistent with Petty et al. (1981). The enhanced RRM elaboration further facilitates the persuasive effect of the RRM. Echoing previous findings that using rhetorical questions in advertising can effectively improve the persuasiveness of information and improve the possibility of gaining user recognition (Ahluwalia & Burnkrant, 2004), we can conclude that using rhetorical questions in RRMs leads to a higher level of persuasion of the RRM, thereby making users more

agreeable on the RRMs, reflecting on users liking and sharing the posts that they have subscribed. Unlikely, commenting on a post means texting and outputting the user's opinions, which allows interactive discussions to respond to each other about particular issues. Although rhetorical questions in messages can work effectively in persuasion to foster the recipients to accept the delivered standpoints (Hong et al., 2020), users generate content and output their viewpoints beyond just agreement on the delivered views. Thus, using rhetorical questions may not significantly motivate recipients to comment on the RRM.

6. Conclusion

6.1 Theoretical implications

While the detection of online rumours dominates the current literature, the present study concentrates on rumour refutation (Giachanou et al., 2021; Luo et al., 2020; Zhu, 2021). Our study contributes to several theoretical insights. First, this study is conducive to enriching the current literature regarding rumour refutation in the context of government social media. While a majority of the existing literature has articulated factors that affect user engagement in individual (e.g., Jaakonmäki et al., 2017; Shahbaznezhad et al., 2021) and brand social media (e.g., de Vries et al., 2012; Robson & Banerjee, 2022), studies focusing on the research setting of GSMAs still leaves to be desired. Furthermore, because of the distinct features of GSMAs compared to ordinary individual/organisational social media accounts, previous findings concerning factors that affect user engagement in social media may be inapplicable within the government social media context. By anchoring at RRMs, investigating factors that facilitate or hinder social media users from engaging in rumour refutation helps to broaden the current knowledge in social media research.

Second, to the best of our knowledge, this study is among the first to understand precursors of user engagement behaviours in RRMs on government social media by integrating persuasion theory. Concretely, by answering the research question, this study offers a new view—*persuasion theory*—for understanding what factors facilitate users to engage in RRMs in the context of government social media. The current literature on social media engagement focuses more on user engagement in the social media context at either individual or organisational levels. However, research on RRMs characteristics is quite limited. To bridge this gap, our study borrows the lens of persuasion theory, takes the RRMs published by GSMAs as specific cases, and expands the understanding of the impacts of RRM content characteristics on user engagement. This represents the first attempt to investigate determinants in fostering user engagement behaviours to respond to rumour refutation by authorities, which offers a novel view for acquiring a profound understanding of the precursors of RRMs dissemination. Our study also contributes to answering the recent call for more research to understand the social media engagement between government agencies and the public (e.g., Pang et al., 2021; Wukich, 2022).

Third, our findings are conducive to deepening the understanding of different engagement

behaviours on social media. Different engaging behaviours are affected by different determinants, and even the same factor has different effects on user engagement behaviours. This study offers plausive explanations of the inconsistency of the impact of photos and videos on user engagement concerning the different motivations for different behaviours. The findings also support that different content-editing strategies should be applied to trigger different response behaviours.

6.2 Practical implications

Our findings also offer several practical implications. First, the findings of this study provide helpful insights for relevant policy design to manage and intervene in rumour spread and refutation during the various public health and social crises. Government agencies should justify what kind of user engagement behaviour they would like to achieve before publishing RRMs on social media. This is because there exists a difference in persuasion effect on different user engagement behaviours even for the same antecedent.

Second, this study offers a valuable guide for government social media to establish RRMs. When refuting rumours with social media channels, it is recommended to enrich text content, supplement with an appropriate amount of images and videos, and reduce the use of links. After a critical incident, due to asymmetric information, people will speculate about the event's truth, eager to get the full story of the matter from the authoritative information publisher. A vague or overly concise RRM will make users think that the government only made a perfunctory effort, easily provoking public discontent and declining government credibility. A convincing RRM that dispels rumours should have rigorous logic and sufficient arguments and explain the truth through progressive process layers. When the event is more complicated, and the facts are too challenging to express through text fully, relevant images and videos can be attached to support. It is essential to note that too many photos and videos may interfere with users' access to the core content; links are easy to distract users and should be used less.

Third, proper strategies for reducing psychological distance and increasing personal relevance should be taken into account to engage the audience when refuting rumours. For instance, emojis and rhetorical questions should be used appropriately. Increasing participants' personal relevance via applying rhetoricals and reducing the psychological distance by using emojis can benefit their engagement in RRMs. Emojis can be embedded in an appropriate place for RRMs to attract user engagement. This finding endorses that RRMs in a somewhat informal manner (e.g., containing befitting emojis) rather than a serious way of writing can be better disseminated. In addition, some declarative sentences can be converted into rhetorical questions. Government account operators can also consider other ways to decrease the psychological distance of followers, e.g., increasing interactions by giving feedback to participants' comments, since previous studies have manifested that interactions between an organisation account and followers on social media contribute to shorting viewers' psychological distance from the organisation (Xue, Liang, Xie, & Wang, 2020).

6.3 Research limitation

This study still has a few limitations. First, this study only considers RRMs on one social media platform in China, i.e., *Sina Weibo*. Although *Sina Weibo* is one of the most popular social media platforms and has large-scale active users, its usage in other cultural contexts outside China is limited. Future studies are recommended to expand the understanding of factors affecting RRMs by taking different social media platforms and cultural backgrounds into account. Also, comparative studies across various social media platforms or cultural foundations are conducive to supplementing the generalisation of the present study's findings. Second, our study treats the government account ID as a category variable in the analysis due to the data limitation, which can be subdivided into various account-related variables, e.g., followers, account activeness, and account age. Such segmentation helps to discuss the effect of account features on user responses and get insights for government-netizen relationship management and authority credibility improvement. Third, factors concerning followers' characteristics are also promising to enrich the understanding of user engagement in government social media. Fourth, post-content-related elements, such as sentiment, also deserve further investigation in future research. Fifth, this present study does not take the recommendation algorithm embedded in Sina Weibo into account, which might affect user engagement in the viewed posts because the recommendation system enables one to determine what kind of messages are displayed to whom. Thus, Future research to address this issue is desired. Sixth, this study measured the text length with manual calculations; automated calculations using text mining type software are recommended. Furthermore, most of the current literature has discussed the influence of emojis on social media engagement, in particular from the perspective of psychological distance, in one-to-one interpersonal communication settings; more future studies are recommended to explore further the impact of emoticons/emojis on psychological distance in one-to-multiple communication settings. Besides, the sample size of the current study is relatively small; a large-scale study is recommended accordingly.

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