The role of knowledge, trust, and emotions in spreading online rumours

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The Coronavirus (COVID-19) global pandemic has brought about severe social, economic, and political implications and challenges in addition to unprecedented health threats and harm. A typical phenomenon associated with emergencies and crises is the spreading of related rumours. Social networks have become a popular arena for spreading and sharing rumours in various contexts, including during the COVID-19 pandemic. The current study analysed the circumstances under which people might spread such rumours and the psychological mechanism behind this behaviour. We examined three potential factors that might influence the spreading of pandemic-related online rumours: the participants’ thoughts and beliefs about the rumour (cognitive component), users’ trust in the information to which they are exposed by the media (trust component), and the emotional response, owing to media exposure, to information regarding the epidemic (emotional component). Research findings indicate that, as we hypothesised, there is a correlation between the cognitive component and the behavioural component. In addition to direct influence, we also identified, as predicted, a mediated route of influence through the trust component. Contrary to our hypothesis, we did not find that the emotional component was a mediator between the cognitive and behavioural components.

Keywords: online rumours; COVID-19; social media; trust; tripartite model of attitude; Israel

# **Introduction**

The Coronavirus (COVID-19) global pandemic has had severe social, economic, and political implications and has caused unprecedented health threats and harm. A typical phenomenon associated with emergencies and crises, especially large-scale, national, and international events, is the spreading of related rumours (Simon *et al*. 2016). Social networks, with their ever-growing presence in people’s lives, have become a highly popular arena for spreading and sharing rumours in various contexts (Simon *et al*. 2016, Jang and Baek 2019), including during the COVID-19 pandemic (Seah and Weimann 2020).

The current study analysed the circumstances under which people might spread such rumours and the psychological mechanism behind this behaviour. We examined three potential factors that might influence the spreading of pandemic-related online rumours: the participants’ thoughts and beliefs about the rumour (cognitive component), users’ trust in the information to which they are exposed by the media (trust component), and people’s emotional response, owing to media exposure, to information regarding the epidemic (emotional component). Because rumours that spread over social networks tend to reach a large audience in a short time (Zanette 2002, Centola 2010, Chen *et al*. 2018), and because dramatic events might be particularly vulnerable to the viral spreading of disinformation, fake news, or even verified information that was meant to be kept secret, it is crucial to strengthen the understanding of the mechanisms behind the spread of rumours in general and of online rumours in particular.

# **Theoretical background**

## Rumours and online rumours

Online platforms such as social media might enable researchers to monitor misinformation and dispel rumours. Communication technologies have democratised certain aspects of the production and reproduction of information. As a result, the rate at which rumours and misinformation can spread has increased significantly. With the development of the internet and online platforms, rumour spreading has become easier and quicker (Centola 2010). Joshi *et al*. (2020) suggest that epidemiological monitoring on online platforms includes extracting, aggregating, and analysing textual data in real time.

A rumour is a piece of unverified information of uncertain origin, usually spread by word of mouth. Knapp (1944) identified three essential characteristics of rumours: (a) They are transmitted by word of mouth, (b) they provide information about a person, an event, or a situation, and (c) they express and gratify a community’s emotional needs. Rosnow (1988) suggests that rumours fulfil cognitive needs by allowing the public to make sense of an ambiguous situation and that they assist in coping with emotions such as fear and anxiety.

Scholars have developed models to explain the rumour-spreading process borrowed from epidemic models (Sudbury 1985). Recent rumour-spreading models were inspired by empirical discoveries on network topology (*e.g.*, Nekovee et al. 2007). The social network approach highlights the effect of a complex network structure on rumour spreading. Social network models for spreading rumours, such as small-world networks, dominate rumour modelling (Zanette 2002).

During crises such as natural disasters, terrorist attacks, and epidemics, people increasingly rely on social media to obtain information and guidance. Emergency responders, the media, and the public all use social media to disseminate, search for, and curate crisis-related information and make sense of uncertain events as they unfold (Sutton *et al*. 2014, Vieweg *et al*. 2010). In such instances, rumours serve as ‘improvised news’ created by collective anxiety, uncertainty, and stress and the need for orientation (Shibutani 1966). The downside is that under such circumstances, false rumours can spread rapidly across social media platforms. Moreover, some of these rumours can have serious detrimental outcomes for public safety.

Epidemic-related rumours are particularly time sensitive (Nsoesie and Oladeji 2020, Roberts *et al*. 2017). Zhou (2003) explored why rumours were rife during the outbreak of severe acute respiratory syndrome (SARS) in 2002 to 2004 and concluded that people’s scientific and cultural literacy affected their trust in rumours and the circulation of rumours. Cognitive needs also contribute to the rapid spread of rumours. For example, Fu and Liu (2013) studied the spread of rumours about the Avian Influenza A (H7N9) virus in 2013. They found that the speedy dissemination of rumours resulted from a delay in or lack of official information released about epidemic prevention and control as well as from information redundancy and a rapid shift in matters of public concern. Jang and Baek (2019) delved into Korean netizens’ online social behaviours amid the 2015 Middle East respiratory syndrome (MERS) outbreak and found that when the public no longer trusted official information, they turned to online news media, social connections, and social media.

In addition, some researchers have begun probing new media’s influence on rumour circulation. Researchers have studied message forwarding on various platforms, including Twitter (Kim 2018, Suh *et al*. 2010); Facebook (Kim and Yang 2017); WhatsApp (Malka *et al*. 2015, Simon *et al*. 2016); Sina Weibo, the Chinese counterpart of Twitter (Sun and Li 2012); and WeChat (Chen *et al*. 2018). In these platforms, information recipients wield the most significant influence on message forwarding, in terms of the interest they express in information, entertainment needs, and emotional needs (Bae 2017, Lee and Ma 2012) as well as social interaction needs and the reciprocity principle (Chen *et al*. 2018). Message forwarding also features information dissemination, making it crucial to pinpointing factors that affect the spread of rumours. The following are some of the factors that have been proposed to predict message forwarding and the hypotheses drawn from them for the present study.

## The tripartite model of attitude

In the current study, to learn about the psychological mechanism behind spreading rumours, we used the tripartite model of attitude (Breckler 1984, Rosenberg and Hovland 1960). This model defines an attitude as a system of beliefs, feelings, and behavioural tendencies concerning a given object while distinguishing between cognitive, affective, and behavioural components of attitude, which represent various aspects of human experience (Eagly and Chaiken 1993, Ajzen and Fishbein 1975, Rosenberg and Hovland 1960). First, the cognitive component contains the encoding of attributes, beliefs, and judgments about a specific object (Svenningsson *et al*. 2021). Second, the affective component of feelings, sensations, and impulses arises because of those thoughts and beliefs. Third, the behavioural component refers to the individual’s willingness to behave positively or negatively toward the attitude object (Ajzen and Fishbein 1975).

This model supports research showing that each component is acquired differently and stored separately in memory (Breckler 1984, Olson and Kendrick 2008). Thus, for example, the cognitive component can be taught by appropriate education, the affective component can be formulated by classical conditioning (*i.e.*, creating a consistent connection between a specific emotional response and the attitude object), and the behavioural component can be developed as a result of operant conditioning (*i.e.*, a change in behaviour as a result of reinforcement received in response to previous acts) (Kim and Estrada-Hernandez 2015).

Maio *et al*. ‏(2010) explain the relationship between the three components of attitudes: people tend to believe new information based on their attitudes’ initial affect-based or cognition-based nature. If an attitude is purely affect-based, people may be less influenced by cognitive reasoning. When an attitude is based on strong beliefs (the cognitive component), the emotional evaluation of the value of an object will have less effect on the attitude. If there is a match with the initial attitude, there will be a chance for attitude change, and the direction of that change will be indicated.

Although the tripartite model of attitudes is a recognised approach to measuring attitudes in the research literature, it has attracted considerable criticism, which primarily focuses on the relationship between the cognitive and affective components and the behavioural component (Farley and Stasson 2003, LaPiere 1934, Wicker 1969). Some studies have shown a disparity between the actual behaviour and the attitude (cognitive and affective) expressed toward that behaviour (Kraus 1995). Nevertheless, it has been found that certain conditions strengthen the relationship between the cognitive and affective components and the behavioural component; for example, when the attitude concerns a specific behaviour (Armitage and Conner 2001, Wallace *et al*. 2005) and when the attitude is unyielding (Glasman and Albarracín 2006), the relationship between the cognitive and affective components and the behavioural component will be stronger. Another issue pertains to the relationship between the cognitive and affective components in shaping behavioural tendencies.

## Trust in information

Users’ trust in the information to which they are exposed by the media, and in its sources, is another variable that may affect their decision-making processes and their willingness to read, share, and spread rumours (Rosnow *et al*. 1986, Hertzum *et al*. 2002, Denize and Young 2007, Williams 2012, Ognyanova 2019, Utkarsh *et al*. 2019). These studies may be perceived as a natural evolution of a more general stream of research that has examined the effect of media trust on media consumption (Tsfati and Cappella 2003, Williams 2012, Ognyanova 2019). Similar studies have investigated the interrelations between different levels of media trust—mostly trust in the information itself, trust in the journalists who deliver it, and trust in the organisations behind the journalists—and have found these levels of trust to be deeply connected (Williams 2012, Lucassen and Schraagen 2012, Blobaum 2016, Ognyanova 2019). Metzger and Flanagin (2013) have discussed the unique challenges of the digital age in assessing online information’s credibility and the ability to trust it. Among these challenges are the abundant number of sources, many of which are unfamiliar, and the absence of conventional gatekeeping mechanisms to filter the information. However, Metzger and Flanagin assess that most users utilise common cognitive heuristics to judge and evaluate the credibility of online information.

Rosnow *et al*. (1986) have investigated how trust in rumours affects people’s reactions to them. The authors reinforce the convention that trusting a rumour will increase the chances of spreading it further. Chua and Banerje (2018) have examined this convention among medical doctors and have found similar results.

The question of trust in information and its sources becomes crucial during a national and global crisis and has therefore been studied extensively (Benin et al. 2006, Siegrist and Zingg 2014, Fu *et al*. 2016, Henderson *et al*. 2020). Wang *et al*. (2020) have examined how trust in COVID-19–related information from social media and official sources affects the public’s well-being. They found a significant difference in people’s responses to social media compared with their reaction to information from official sources. In both cases, trust in the information led to a meaningful reaction, but whereas information from social media increased negative feelings, trusted official information led to an increase in positive feelings.

Fu et al. (2016) have shown the importance of trust in health care information when parents make decisions regarding giving vaccines to their children. Johnson (2019) has also examined the relevance of trust in health communication contexts. Her study found that trust is a significant predictor of patients’ behaviour when seeking health information. In addition, Branden *et al*. (1995) have stressed the importance of trust in governmental agencies in contexts of health risk assessment.

Based on existing literature as described, this study’s research hypotheses were as follows:

1. A positive correlation would be found between participants’ thoughts and beliefs about a rumour and about sharing it (cognitive component) and participants’ willingness to share and transform the information (behavioural component). Thus, the more thoughts and beliefs participants had about a rumour and about sharing it (higher cognitive component), the greater the chances would be that they would share and transform the information.
2. The correlation between participants’ thoughts and beliefs about a rumour and about sharing it (cognitive component) and their willingness to share and transform the information (behavioural component) would be mediated by the feelings that arose in them as a result of receiving the rumours (emotional component). Thus, as the participants had more thoughts and beliefs about a rumour, they would have more feelings about it and would be more willing to share and transform the information.
3. The correlation between participants’ thoughts and beliefs about a rumour and about sharing it (cognitive component) and their willingness to share and transform the information (behavioural component) would be mediated by their confidence in the information, based on their level of trust in the information sources as well as on their perceived ability to independently check the reliability of the information transmitted to them (trust component). Thus, the more thoughts and beliefs participants had about a rumour and about sharing it, the more attention they would give to the question of their trust in it. The more they felt they could trust the information, the more willing they would be to share and transform it further.

# **Method**

## Participants

Questionnaires were distributed to a,A total of 503 valid questionnaires were collected, from which 92 were removed owing to participants’ reports that they were never exposed to COVID-19 rumours (85% valid questionnaires). The maximum standard error was 4.5%. The sample size was estimated using G\*Power software (Faul *et al*. 2009), based on a medium effect size to obtain 90% power to detect significant differences. Respondents were balanced with respect to gender (51% were female and 49% male). Fifty percent of respondents were younger than 39 years and 81% were younger than 60 years. Regarding academic qualifications, 42.5% of respondents had a bachelor’s degree and 14% had a master’s or doctoral degree.

## Materials

All participants answered a questionnaire measuring the following variables.

### Attitude toward rumour transformation

To assess participants’ attitude toward rumour transformation, we included 16 items (α = .83) using a Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), based on the scales used by Park *et al*. (2009),  Lee and Ma (2012), Tong (2014), Zhou (2018), and Chen *et al*. (2018),  with some minor adjustments. Instructions asked participants to indicate to what extent they agreed or disagreed with the 16 statements regarding rumour transformation.

To examine whether there were clusters or subscales within these 16 items, factor analysis (a principal-component analysis method) was applied. Because we assumed independence across the components, varimax orthogonal rotation was used. The analysis revealed four components (based on the criterion of e.v < 1). After rotation, the first component was the ‘emotional component’ (three items; α = .86). This component explained 33.08% of the variance. The second component, the ‘cognitive component,’ explained 12.75% of the variance. The third component, the ‘behavioural component’ (three items; α = .94), explained 10.55% of the variance. The fourth component, the ‘trust component’ (five items; α = .69) explained 8.07% of the variance. Thus, all four components explained 64.07% of the variance. Finally, two items were eliminated because of low loading coefficients (see Table 2).

*[Table 2 near here]*

Based on the findings of the factor analysis, we computed three subvariables:

1. Emotional component: The feelings that arose in the participants resulting from receiving the rumours (five items [α = .86], *e.g.*, ‘Such information arouses/increases my feelings of anxiety’).
2. Cognitive component: The participants’ thoughts and beliefs about relevant information and about sharing it (five items [α = .85], *e.g.*, ‘Sharing such information is a method of self-expression’).
3. Behavioural component: Participants’ willingness to share and transform the information received (three items [α = .94], *e.g.*, ‘I am willing to not only read this information but also share it’).
4. Trust component: Participants’ confidence in the information, based on their level of trust in the information sources and their perceived ability to independently check the reliability of the information transmitted to them (five items [α = .69], *e.g.*, ‘I will compare and check the information I got on WhatsApp about the Coronavirus plague with other sources of information’).

For descriptive statistics of the variables, see Table 3.

*[Table 3 near here]*

## Procedure

The sample of respondents was obtained from an online Midgam Project web panel. The Midgam Project specialises in providing infrastructure services for internet research. For validity in internet questionnaires, it includes a panel of more than 30,000 subjects representing every geographic and demographic sector in Israel, and it uses the stratified sampling method based on data published by the Central Bureau of Statistics (Central Bureau of Statistics Israel 2019) to determine quotas by age and gender. Participants signed up and were paid $1.2 for their participation. At the time of data collection, the pandemic was at a low stage. The questionnaires were handed out to WhatsApp users who had been exposed to rumours.

# **Results**

As shown in Table 4, all correlations among the components were significant (*p* < .001) except the correlation between the emotional component and the trust component (*p* > .05). However, the correlation between the cognitive component and the behavioural component (Hypothesis 1) was the strongest (*r* = .64). Thus, as the participants had more thoughts and beliefs about a rumour and sharing it (higher cognitive component), they were more likely to share and transform the information.

*[Table 4 near here]*

## Mediating model

To examine the mediating role of the emotional component and the trust component in the correlations between the cognitive and behavioural components (Hypotheses \_\_\_), we used Hayes’ (2018) PROCESS bootstrapping command with 5,000 iterations (Model 4). The analysis treated the cognitive component as a predicting variable, the emotional component and the trust component as the mediators, and the behavioural factor as the dependent variable.

The 95% confidence interval (CI) for the direct effect between the cognitive component and the behavioural component with 5,000 resamples did not include 0 (95% CI, 0.717–0.901). The CI for the indirect effect of the cognitive component on the behavioural component through the emotional component included 0 (95% CI, –0.019 to 0.032) with 5,000 resamples, but the indirect effect of the cognitive component on the behavioural component through the trust component with 5,000 resamples did not (95% CI, 0.005–0.051) (F[3, 496] = 122.84; *p* < .001). In other words, the model indicated a direct effect of the cognitive component on the behavioural component and an indirect effect between the cognitive component and the behavioural component through the trust component. However, the model did not indicate an indirect effect between the cognitive component and the behavioural component through the emotional component (see Figure).

*[Figure about here]*

# **Discussion**

The rapid development of online technology has made social networks effective and universally available in recent years, especially on mobile phones. As a result, information spreading has become faster than ever—much faster than any traditional fact-checking process, posing unprecedented challenges in information reliability assurance.

The current study examined the psychological mechanisms behind the spreading of online rumours during a global pandemic. The study examined the effect of the cognitive component regarding the rumours and the act of sharing them and of the emotional component regarding the information itself, as well as the effect of trust in the information on people’s intention to share online rumours with others (the behavioural component).

The study’s findings indicate that, as we hypothesised, there is a positive correlation between the cognitive component and the behavioural component. The stronger people’s attitudes and beliefs are toward information and toward spreading it, the better the chances that they will do so. In addition to the direct influence, we also identified, as predicted, a mediated route of influence: the stronger the cognitive component is, the more attention participants will give to the question of their trust in the information, and the more they feel they can trust the information, the greater the chances that they will further spread it. Although the positive correlation between trust and the sharing of rumours is consistent with the findings of existing literature (Rosnow *et al*. 1986, Chua and Banerje 2018), the current study examined trust as a mediated rather than as a predicting variable. Future studies should be dedicated to further investigating the nature of the relationship between the cognitive component regarding rumours and the level of trust people might have in them, as well as to the effect these relationships might have on people’s relevant behaviour.

Contrary to our hypothesis, this study did not identify the emotional component as a mediator between the cognitive and the behavioural components. This finding is especially interesting given the assumption that emotions are critical in shaping our information-related behaviours (So *et al*. 2015). Indeed, decision-making can be influenced by both emotional and logical pathways (Gordon and Arian 2001). One possible explanation for the lack of connection between emotion and behaviour (making the cognitive component more dominant, in this case) lies in the nature of the unprecedented worldwide COVID-19 pandemic crisis that was accompanied by plenty of highly essential information and by detailed formal guidelines to citizens (at least in the Israeli case study, as in most other Western countries). Future studies should be dedicated to deepening the understanding of the circumstances under which the emotional component becomes almost irrelevant in predicting people’s behaviours during critical times and events.

The findings of this study might assist decision-makers amid a major emergency. In the quest to control the spread of information, especially regarding rumours that might affect people’s behaviour in dramatic ways, focusing on the cognitive component might be more effective than focusing on the emotional one. In other words, influencing what people think and believe about spreading rumours might be much more important than focusing on the emotional reactions of those who are exposed to the rumours and might spread them to many other people.

This study has limitations. It focused on a single case study during a worldwide pandemic, and therefore, the ability to draw more general conclusions with regard to other societies is limited. Being that the COVID-19 pandemic is such a unique event, studies about different aspects of human behaviour during the pandemic might also be relevant to such rare occasions only and therefore should be interpreted with discretion.

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Table 2. Loadings of the ‘attitude toward rumour transformation’ variables on the components after rotation

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Component** | | | |
| **Variable** | **Emotional** | **Cognitive** | **Behavioural** | **Trust** |
| Such information makes me feel insecure | .812 |  |  |  |
| Such information arouses/increases my feelings of anxiety | .901 |  |  |  |
| Such information scares me | .894 |  |  |  |
| Sharing such information is a method of self-expression |  | .543 |  |  |
| Sharing such information allows others to get to know me better |  | .591 |  |  |
| When I share such information, I hope others will think I am a valuable person |  | .594 |  |  |
| This information allows me to communicate and interact with family and friends |  | .560 |  |  |
| This information allows me to communicate effectively with others |  | .570 |  |  |
| I am willing to not only read this information but also share it |  |  | .860 |  |
| Want to share this information |  |  | .893 |  |
| I will continue to share such information in the future as well |  |  | .863 |  |
| After receiving unreliable information, I discovered very quickly the rebuttal of the news by the authoritative organisations (government, media, and WhatsApp) |  |  |  | .684 |
| I can get information about rebuttal of unreliable information by the authorities from various sources |  |  |  | .721 |
| I believe the authorities’ information that refutes unreliable information is true |  |  |  | .676 |
| I will compare and check the information I found on WhatsApp about the Coronavirus plague with other sources of information |  |  |  | .487 |
| I will judge the reliability of this information by cross-referencing it with other information I already have |  |  |  | .441 |

Table 3. Descriptive statistics of the variables

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Minimum | Maximum | Mean | SD |
| Attitude toward rumour transformation | 1 | 4.63 | 3.02 | 0.59 |
| Emotional component | 1 | 5 | 2.66 | 1.01 |
| Cognitive component | 1 | 5 | 2.86 | 0.87 |
| Behavioural component | 1 | 5 | 3.05 | 1.12 |
| Trust component | 1 | 5 | 3.53 | 0.66 |

Table 4. Correlation matrix between research variables

|  |  |  |  |
| --- | --- | --- | --- |
| Component | Cognitive | Behavioural | Trust |
| Emotional | .27\* | .19\* | .02 |
| Cognitive |  | .64\* | .21\* |
| Behavioural |  |  | .25\* |

\*p < .001