Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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How does information overload about COVID-19 vaccines influence individuals' vaccination intentions? The roles of cyberchondria, perceived risk, and vaccine skepticism

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ABSTRACT

This research proposes and tests an integrated model to explain how information overload influence vaccine skepticism and vaccination intention. In addition, this research investigates the effectiveness of using a celebrity endorsement strategy in promoting vaccination and compares its effectiveness with other endorsement types. A survey study (Study 1) was conducted to examine the mechanism underlying the impact of the COVID-19 vaccine information overload on vaccine skepticism that, subsequently, affects vaccination intention. It also examined the moderating role of celebrity endorsement trustworthiness. The results indicate that information overload positively influenced vaccine skepticism through cyberchondria and perceived risk of the vaccine, which subsequently reduces vaccination intention. The negative effect of vaccine skepticism on vaccination intention was weakened by the celebrity endorsement that was considered trustworthy. A follow-up experimental study (Study 2) was performed to compare the effectiveness of celebrity endorsement with other endorsement types (i.e., government official and medical expert endorsements). The results showed that the celebrity endorsement was more effective in mitigating the negative effect of vaccine skepticism on vaccination intention compared to government official and medical expert. The findings provide practical insights into how governments can minimize people's vaccine skeptical views and increase their vaccination intentions.

1. Introduction

Vaccinations are one of the most beneficial ways to address global pandemics and reduce or even eliminate several deadly diseases (LaCour & Davis, 2020). Despite the health benefits of vaccinations, vaccine skepticism, defined as an individual's mistrust or doubt in vaccines especially in regard to their efficacy as well as their risks and side effects (Reiss & Offit, 2020), is always widespread (Brewer & Hallman, 2006). Skepticism about vaccines pose a challenge to the success of vaccination programs (Salmon, Dudley, Glanz, & Omer, 2015), including COVID-19 vaccinations (Dror et al., 2020; LaCour & Davis, 2020; Reiss & Offit, 2020). One recent survey showed that the percentage of people willing to be vaccinated against COVID-19 in 79 of 117 countries were less than 70%, making it difficult to achieve herd immunity (Baragona, 2021) and completely eliminate COVID-19 outbreaks (Aschwanden, 2021). Given the importance of changes in vaccination rates on public health, it is important to investigate the antecedents of vaccine skepticism.

During the current COVID-19 pandemic, there has been an unprecedented rapid change in the use of digital media (Beaunoyer, Dupéré, & Guitton, 2020; Guitton, 2020). People have come to rely heavily upon social media during the lockdown for information seeking and sharing as well as communicating with others. Information sources on social media played major roles in impacting individuals' behaviors during the COVID-19 pandemic, including vaccination intention (Laato, Islam, Islam, & Whelan, 2020). Social media could become a double-edged sword that leads to the dark side of social media usage, such as information overload (Bontcheva, Gorrell, & Wessels, 2013; Dai, Ali, & Wang, 2020; Sasaki, Kawai, & Kitamura, 2016). With the extensive amount of information circulating on social media, it is difficult for people to verify every piece of information. People only skim or even miss important information so that the information received is not comprehensive, which is likely to trigger their negative emotions,

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cognitions, and responses (e.g., Cao & Sun, 2018; Laato, Islam, Islam, & Whelan, 2020).

Information overload on social media during the pandemic has been categorized as a form of "infodemic", which refers to an extensive amount of information including fake and/or uncontrolled information about the COVID-19 vaccines that moves faster than the virus outbreak itself (Fiorillo & Gorwood, 2020). Information overload can be overwhelming and trigger people's doubts about vaccines and vaccination programs (Cheung, 2021; Nazaroff, 2021). It has attracted the attention of health care organizations and researchers. For example, this topic has become a priority of global pandemic-related research by the World Health Organization (WHO) (2020). Academic research has also identified that information overload is a key determinant of various people's behavioral intentions during a pandemic, such as hygiene care intention (Farooq, Laato, Islam, & Isoaho, 2021), unusual purchase actions (Laato, Islam, Farooq, & Dhir, 2020), self-isolation intention (Farooq, Laato, & Islam, 2020), and unverified information sharing (Laato, Islam, Islam, & Whelan, 2020). However, despite the fact that people may become skeptical and delay or refuse to be vaccinated because of receiving too much vaccine information from social media (Betsch & Sachse, 2012; Wheeler & Buttenheim, 2013), there is little empirical evidence that vaccine skepticism is a result of information overload. Prior research on vaccine skepticism overlooked information overload as a key determinant in influencing people's skeptical views and actions toward vaccines (see Table 1). Therefore, the first objective of our research is to empirically investigate whether and how information overload influences people's vaccine skepticism which subsequently affects their COVID-19 vaccination intentions. Grounded in the dual-process theory (Agarwal & Malhotra, 2005; van Gelder, de Vries, & van der Pligt, 2009), this research proposes an integrated model to explain how affective and cognitive aspects of information processing (i.e., cyberchondria and perceived risk of the vaccine) mediate the relationship between information overload and vaccine skepticism, which subsequently affected vaccination intention.

Furthermore, several strategies such as medical reminders, financial incentives, and home-delivered vaccinations were implemented to promote COVID-19 vaccine uptake (Centers for Disease Control and Prevention, 2021). A new and innovative strategy of promoting vaccination is utilizing celebrity endorsement (Du-Lieu & Grassi, 2020). Celebrities are defined as individuals who are well-known due to their popularity on media or performance in arts or sports, but not typically for scientific or political work (Kamiński, Szymańska, & Nowak, 2020). In some countries, such as Indonesia, celebrities took precedence over others to be vaccinated (Widianto & Lamb, 2021). Despite the increasing use of celebrity endorsements to promote vaccinations, little empirical evidence exists to prove that such endorsements are effective in influencing people's views of vaccines (Ives, 2021). As such, it leads to a public debate on the effectiveness of celebrity endorsements since public health is not their area of expertise. Epidemiologists and psychologists argue that celebrity endorsements do not overcome the doubts about COVID-19 vaccines (Ives, 2021). A recent study investigates the effects of public figure endorsements (i.e., government official and medical expert) in influencing people's perceptions of COVID-19 vaccine, but it did not consider the role of celebrity endorsement (Bokemper, Huber, Gerber, James, & Omer, 2021). Kamiński et al. (2020) showed that celebrities' posts about COVID-19 information attracted more public attention compared to those from other public figures (e.g., government institutions and medical experts). The second objective of this research aims to empirically test the impact of the celebrity endorsement strategy in promoting vaccination as well as compare celebrity endorsement's effectiveness with other public figure endorsements.

This research conducted a survey study to investigate the underlying mechanism of the effect of information overload on vaccine skepticism which in turn affects vaccination intention and the moderating role of celebrity endorsement in attenuating the negative effect of vaccine skepticism on vaccination intention (Study 1). An experimental study followed that compared the effectiveness of celebrity endorsement with other endorsement types (i.e., government official and medical expert endorsements) (Study 2).

In response to the need for research on how virtual space affects human behavior in the context of the COVID-19 pandemic (Guitton, 2020), this research contributes to the extant literature in several ways. First, our work extends the infodemic literature in the COVID-19 pandemic context. Previous studies have overlooked information overload as a determinant related to how people's skeptical attitudes and responses to vaccines are shaped (e.g., Bryden, Browne, Rockloff, & Unsworth, 2018; LaCour & Davis, 2020). This study enhances our understanding of the role of information overload in leading to vaccine skepticism. Second, our work reveals information processing routes in regard to how people form their views on vaccines. We demonstrate that vaccine skepticism can be generated by information overload through affective aspect (i.e., cyberchondria) and cognitive aspect (i.e., perceived risk of the vaccines) of information processing. This research shows that the dual-process theory is an appropriate lens by which to explain the relationship between information overload and vaccine skepticism. Third, our work provides fresh insights into vaccination promotion strategies by investigating the moderating role of celebrity endorsement trustworthiness in the relationship between vaccine skepticism and vaccination intention. We also explored the effectiveness of celebrity endorsements compared to endorsements of government officials and medical experts in mitigating the negative effect of vaccine skepticism on vaccination intention. Thus, this research provides empirical evidence about the effect of celebrity endorsements in the vaccination context. The findings show that celebrity endorsements are helpful when attempting to spread key information related to vaccines for the success of a vaccination program.

Table 1
Prior empirical studies investigated the determinants of vaccine/vaccination skepticism.

Study	Context	Determinants
Allam, Schulz, and Nakamoto (2014)	General	Selection and sorting criteria of search engine (Normal vs. Pro Sites vs. Con Sites)
Bryden et al. (2018)	General	Complementary and alternative medicine (CAM) use
Caso, Capasso, Fabbricatore, and Conner (2021)	Child Vaccination	Risk perception, Trust in healthcare institutions, Trust in science, Religious morality
Debus and Tosun (2021)	COVID-19	Political ideology extremism
Engin and Vezzoni (2020)	COVID-19	Education, Age, General trust, Institutional trust, Religiosity, and Political orientation
Hornsey, Harris, and Fielding (2018)	General	Conspiracy theories, Reactance, Disgust sensitivity toward blood and needles, Individualistic/ hierarchical worldviews
LaCour and Davis (2020)	General	Event frequency processing (e.g., negative vaccine reactions)
Rutjens, Sutton, and van der Lee (2018)	General Measles, Mumps, and Rubella (MMR) Human Papilloma Virus (HPV)	Moral purity, Religious identity, Religious orthodoxy, Scientific literacy
Rutjens and van der Lee (2020)	General	Religiosity, Spirituality, Scientific literacy, Conspiracy thinking, Societal impact concerns

2. Literature review and hypotheses development

2.1. Information overload

Information overload is a concept that has been widely recognized and studied in several disciplines, such as communication (Ji, Ha, &

Sypher, 2014), marketing (Zhang, Zhao, & Gupta, 2018), organization management (Yin, Ou, Davison, & Wu, 2018), psychology (Swar, Hameed, & Reychav, 2017), public administration (Lee, Lee, & Lee-Geiller, 2020), and sociology (Guo, Lu, Kuang, & Wang, 2020). The rapid development of the internet had allowed people to exchange data and information quickly, causing the problem of information overload. Information overload is defined as the extent to which the amount of information becomes a pressure rather than helpful resources for receivers (Bawden & Robinson, 2015).

The rapid growth of users on social media has dramatically increased the volume of information found on these platforms (Holton & Chyi, 2012). This increase has resulted in users reaching their limitations of information processing capacity quickly (Lee, Son, & Kim, 2016). During the COVID-19 pandemic, people faced lockdown measures implemented by their governments and, as such, relied heavily on social media to get COVID-19 information. While information from all over the world is constantly updated on these platforms, people often receive an extensive amount of information and sometimes without knowing its authenticity, which caused information overload or infodemic (Fiorillo & Gorwood, 2020). The abundance of information coupled with a lack of understanding of the information's authenticity can sometimes cause users to form their beliefs based on something that cannot be verified. Thus, they can easily generate negative thoughts and reactions to not being able to verify the information (Ndumu, 2020).

2.2. Dual-process theory

The dual-process theory proposes that individuals' decision-making and reasoning usually depends on two types of information processing. How people generate their attitudes to make decisions cannot be accurately explained by the affective/irrational or cognitive/rational aspect alone. Focusing only on either aspect leaves meaningful variance unexplained (Agarwal & Malhotra, 2005; van Gelder et al., 2009). People's attitudes and judgments are directed by two different and complementary brain systems (Evans, 2008; Strack & Deutsch, 2004). Although the terms in the dual-process theory proposed are different among prior research studies, they reflect the fundamental view that individuals' attitudes and behaviors are guided by two types of information processing: affective (i.e., emotional) and cognitive processes (i.e., rational) (Greene, Sommerville, Nystrom, Darley, & Cohen, 2001; Schwartz, 2015; Sierra & Hyman, 2006; Strack & Deutsch, 2004). Affective processing is often described as heuristic processing, which is rapid, characterized by intuitive associations, and often occurs unconsciously, whereas cognitive processing is often described as systematic processing, which is slower, deliberate, and usually requires attention (Kahneman, 2003, 2011; Weber & Johnson, 2009). This theory has been applied by previous studies to explain that individuals' attitudes and purchasing behaviors are formed through cognitive and affective processes (e.g., Akhtar, Siddiqu, Akhtar, Usman, & Ahmad, 2020; Finucane & Holup, 2006; Taute, Peterson, & Sierra, 2013). On the basis of the dual-process theory, this research proposes that information overload influences vaccine skepticism via a dual process, which consists of an affective (e.g., cyberchondria) and a cognitive process (e.g., perceived risk of the vaccine). Fig. 1 shows the conceptual model.

2.3. The mediating roles of cyberchondria and perceived risk of the vaccine

People can easily access health and medical information on the internet, which not only provides benefits, but also creates potential harm. Anxiety about health can be formed due to excessive searches for health and medical information (Zheng, Sin, Kim, & Theng, 2021). This phenomenon is known as cyberchondria, a combination of 'cyber' (i.e., from cyberspace) and 'hypochondria' (excessive anxiety about a health condition) (Hart & Bjorgvinsson, 2010; Starcevic & Berle, 2013; 2015) and can be defined as anxious thoughts and feelings about health-related to excessive searches for medical information on internet. It is triggered by the urge to find further reading on medical or health topics, such as the COVID-19 pandemic (Farooq et al., 2020; Laato, Islam, Islam, & Whelan, 2020; Zheng et al., 2021).

The large amount of information on social media regarding the COVID-19 vaccines makes it difficult for users to evaluate the credibility of this information (Morahan-Martin, 2004). Instead of getting answers through interactions on social media, individuals are even more burdened with existing information (Eichenberg & Schott, 2019), especially, if they find conflicting information as such information simply causes them to conduct further searches for more concrete evidence (Laato, Islam, Farooq, & Dhir, 2020). The excessive affordability of the unfiltered medical information on the internet and social media can increase individuals' anxiety (Uzun & Zencir, 2021). Health anxiety is positively related to the amount of information searched for online (Eastin & Gunisler, 2006). Individuals' health anxiety increase when excessive amounts of unverified information and unclear relationships exist between the objects of information. That is, information overload leads to cyberchondria (Laato et al., 2020a, 2020b; White & Horvitz, 2009).

In addition, previous research investigating COVID-19 has linked cyberchondria with various individuals' pandemic prevention-related actions, such as COVID-19 concerns and safety behaviors (Jokić-Begić, Korajlija, & Mikac, 2020), self-isolation and making unusual purchases (Laato, Islam, Farooq, & Dhir, 2020), and unverified information sharing (Laato, Islam, Islam, & Whelan, 2020). Extending this literature to the context of the COVID-19 vaccines, we propose that cyberchondria leads to other consequences (e.g., vaccine skepticism). With the

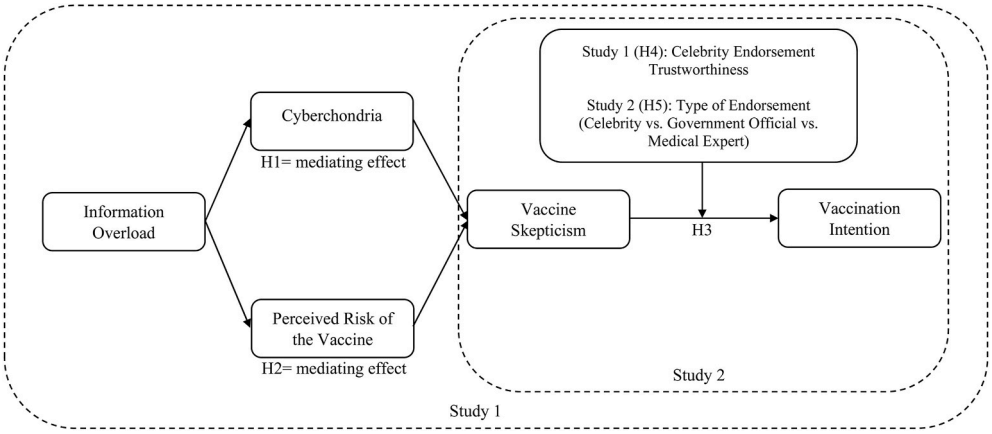

Fig. 1. Overall conceptual model.

extensive amount of information on social media, it is difficult to distinguish between real and fake news. Exposure to misinformation can lead to wrong concepts of health and cause anxiety about the COVID-19 vaccines (Laato, Islam, Islam, & Whelan, 2020). Thus, it is likely that cyberchondria raises individuals' doubts and trigger a skeptical view of vaccines. Thus, we hypothesize:

Hypothesis 1. Cyberchondria mediates the relationship between information overload related to the COVID-19 vaccines and vaccine skepticism.

The concept of risk (i.e., an expected loss) is an uncertainty in individuals' decision-making processes (Bauer, 1960). The higher the expectations and probability of loss, the greater the risk individuals perceive (Stone & Winter 1985). In the context of vaccinations, the perceived risk of the vaccine can be defined as individuals' perceptions about the risk of the possible negative effects of the vaccine if they get vaccinated.

Individuals' skepticism toward vaccines is highly dependent on the amount and type of information available about the vaccines (Guess, Nyhan, O'Keeffe, & Reifler, 2020). However, with the development of the internet, the information received by individuals always exceeds what they can process (Anderson & de Palma, 2012; Hwang, Lee, & Kim, 2014). Previous research has identified that information overload is a determinant of several negative consequences. It not only has an impact on individuals' emotions (e.g., fatigue, frustration) (Dai et al., 2020; Wirth, Maier, Laumer, & Weitzel, 2015), but also has an impact on individuals' cognitions (Lee, Lindsey, & Kim, 2017). The amount of information that individuals receive about the COVID-19 vaccines causes the perception of information overload, which, in turn, affects the individuals' perceptions of the vaccines and can lead to adverse judgments (Herbig & Kramer, 1994), such as higher perceived risks. For instance, Karlsson et al. (2021) indicated that one's intention to receive a COVID-19 vaccine was driven by the degree to which the individual trusted the vaccine as being safe. However, when people read an extensive amount of information about vaccines, especially misinformation or negative content about vaccines, they tend to question the safety of the vaccines and consider them high risk (Betsch, Renkewitz, Betsch, & Ulshöfer, 2010). The perceived risk of the vaccines then triggers people's negative attitudes toward them (e.g., vaccine skepticism) (Nan & Madden, 2012). Momplaisir et al. (2021) also indicated that the perceived risk of COVID-19 vaccine has increased due to the short time from the vaccine's discovery to its availability and the lack of data on the vaccines' side effects. Thus, perceived risk of the vaccine leads to the increase of vaccine skepticism.

Based on the aforementioned discussion, it is expected that information overload related to the COVID-19 vaccines would be positively related to the perceived risk of the vaccine and may also have implications for individuals' attitudes for making decisions about getting vaccinated. Thus, information overload may cause individuals to think that the vaccines still have a latent risk due to their uncertain safety, thereby increasing the perceived risk, which subsequently has a positive effect on vaccine skepticism. We hypothesize that:

Hypothesis 2. The perceived risk of the vaccine mediates the relationship between information overload related to the COVID-19 vaccines and vaccine skepticism.

2.4. The effect of vaccine skepticism on vaccination intention

Vaccination intention is defined as an individual's intention to get vaccinated (van Keulen et al., 2013). Researchers have argued that vaccination intention is affected by people's skeptical attitudes either toward the disease or the vaccine itself. For instance, doubt about the threat of a disease is the cause of the low intention of hospital nurses to be vaccinated in cases of the influenza pandemic (Maridor, Ruch, Bangerter, & Emery, 2017). Latkin et al. (2021) argued that skepticism toward the pandemic is a strong predictor that can negatively influence vaccine intention. In addition, in the context of vaccine skepticism, previous systematic reviews of immigrants and refugees have indicated that doubts about the safety and effectiveness of vaccines are the main obstacles to vaccination uptake (Wilson et al., 2018). Riesen et al. (2018) suggested that vaccine skepticism is a determinant of vaccination intention and can affect decisions to get the human papillomavirus (HIV) vaccine. Similarly, Rosso et al. (2019) showed that unfavorable attitudes toward vaccines, such as skepticism resulting from a lack of knowledge about vaccines, have a negative impact on the vaccination intention. Vaccine skepticism is one of the reasons for lower levels of vaccination compliance rates in pandemics, which, in turn, makes herd immunity hard to achieve (Heller, 2016). Therefore, we propose the following hypothesis:

Hypothesis 3. Vaccine skepticism negatively influences vaccination intention.

2.5. The moderating role of celebrity endorsement trustworthiness

A celebrity endorsement is basically a publicly recognized person's opinion that is associated with a brand/product for promotional purposes and influences the target audience (McCracken, 1989). Celebrities' opinions can either be explicit (open ratification, such as "I support this vaccine") or implicit (expression of views, such as "I think this vaccine is safe and effective") (Seno & Lukas, 2007). A trustworthy celebrity endorsement is believed to associate the public's positive impression of the celebrity with a brand or product and lead to behavioral intention on the part of the public (Hoffman & Tan, 2015). Trustworthiness is an important component of an endorsement (Wang & Scheinbaum, 2018) and refers to the level of honesty and objectivity of the celebrity that viewers can accept (Chung & Cho, 2017). A high level of trustworthiness of a celebrity endorsement increases the persuasive level of the message (Amos, Holmes, & Strutton, 2008; Martensen, Brockenhuus-Schack, & Zahid, 2018).

People with a lack of knowledge about vaccines tend to be skeptical and have lower vaccination intentions (Latkin et al., 2021), but their attitudes can be changed once they are convinced by others or provided with convincing evidence (Albayrak, Aksoy, & Caber, 2013). Those individuals who do not have a thorough understanding of health or medical topics often rely on celebrity advice and/or endorsements which influence their behavioral intentions (Hoffman & Tan, 2015; Sillence & Martin, 2020; Ueda, Mori, Matsubayashi, & Sawada, 2017). With a trusted endorsement from a popular figure, such as a celebrity, the negative effect of skepticism on vaccination intention can be reduced. Thus, we hypothesize:

Hypothesis 4. Celebrity endorsement trustworthiness moderates the effect of vaccine skepticism on vaccination intention. Celebrity endorsement trustworthiness weakens the negative effect of vaccine skepticism on vaccination intention.

2.6. Effectiveness of celebrity endorsement in comparison with other public figure endorsements

Celebrities have more followers on social media than government institutions/politicians and medical experts/institutions. Thus, their influential power might be greater than other public figures. Kamiński et al. (2020) showed that celebrities are more effective in engaging people than government officials and medical experts. Because celebrities are considered third parties, they can depoliticize important communications about major health and/or social problems (Jackson & Darrow, 2005). As such, it would prove to be more effective to include celebrities to spread key messages, such as to endorse vaccination programs.

Hypothesis 5. Celebrity endorsements of vaccination are more

effective than other types of endorsements (i.e., government officials, medical experts) in reducing the negative effect of vaccine skepticism on vaccination intention.

3. Study 1

The objective of this study was to investigate the relationship between information overload and vaccine skepticism and discover how information overload leads to vaccine skepticism, affecting vaccination intention. We used the dual-process theory to explore two factors (i.e., cyberchondria, perceived risk of the vaccine) that mediated the relationship between information overload and vaccine skepticism, which subsequently affected vaccination intention. Furthermore, we tested the moderating effect of celebrity endorsement trustworthiness, which reduced the negative effect of vaccine skepticism on vaccination intention. We collected data from active social media users in Indonesia, which is one of the most severely affected countries in Asia by COVID-19 and is currently accelerating a mass vaccination program (Widianto, 2021).

3.1. Method

3.1.1. Data collection and sample

The study used a convenience sampling method and recruited social media users who had read or followed news about the COVID-19 vaccines in Indonesia. The respondents were randomly chosen from those who posted information related to the COVID-19 vaccines on social media (i.e., Twitter). An online survey invitation was sent to 1000 respondents via a direct message in February 2021. To be eligible to participate in the study, the respondents had to meet three criteria to ensure that they had read or followed news about the vaccines in the past three months, were not medical personnel or volunteer, and had not been vaccinated. If the respondents met all the requirements in a screening question survey, then they were invited to complete the formal survey.

The research procedure followed the ethical standards of the institutional and/or national research committee and with the 2013 Helsinki declaration. Respondents were informed in advance about the survey process and the participation in the survey study was voluntary. All the responses collected were anonymous and confidential. They could withdraw from the survey at any time during the study. In addition, it was informed that the survey would collect respondents' demographics (e.g., gender, age, education, average time of social media per day, average time of social media use per day for COVID-19).

Finally, this study obtained 318 respondents (31.80% response rate). Of these respondents, 310 were valid. As shown in Table 2, the majority of the respondents were female (54.52%) and 72.90% of the respondents were between 18- and 35- years old. The sample represented the population of social media users in Indonesia in the age group between 18 and 35 (Kemp, 2021). In addition, 51.93% of the respondents had bachelor's degrees and 44.84% of the respondents used social media more than 3 h per day.

Table 2
Respondents' demographic profiles.

Demographics	Category	Frequency	Percentage
Gender	Female	169	54.52
	Male	141	45.48
Age	<18 years old	7	2.26
	18–25 years old	134	43.23
	26–35 years old	92	29.67
	36–45 years old	46	14.84
	>45 years old	31	10.00
Education	High school or below	107	34.52
	Undergraduate degree	161	51.93
	Graduate degree	42	13.55
Average time of social media use per day	<30 min	7	2.26
	30 min - 1 h	28	9.03
	>1–1.5 h	25	8.06
	>1.5–2 h	47	15.16
	>2–2.5 h	31	10.00
	>2.5–3 h	33	10.65
	>3 h	139	44.84
Average time of social media use per day for COVID-19	≤15 min	114	36.77
	16–30 min	113	36.45
	31–45 min	36	11.61
	46–60 min	21	6.78
	>60 min	26	8.39

3.1.2. Measurement

This study adapted previous validated measurement items from prior studies for all constructs and used 7-point Likert scales (1 = strongly disagree/7 = strongly agree) (see the Appendix). First, measurement items were modified and translated from English into Indonesian using the back-translation technique to fit the research context. Then, an independent, face-to-face pretest was conducted by inviting nine Indonesian social media users to review and revise the wording of the text to confirm that the words in each item were fully embedded in the Indonesian context. After that, a pilot test of measurement items and constructs was conducted to test the reliability, convergent validity, and discriminant validity before conducting a formal survey. This study adapted three items from Laato, Islam, Farooq, and Dhir (2020), four items from Jokić-Begić, Mikac, Čuržik, and Jokić (2019), and three items from Szymkowiak, Gaczek, Jeganathan, and Kulawik (2020) to measure information overload, cyberchondria, and the perceived risk of the vaccine, respectively. Three measurement items of vaccine skepticism were adapted from Johnson, Limbu, Jayachandran, and Reddy (2019). This study adapted two items from Jozkowski and Geshnizjani (2014) and four items from Song, Luximon, and Luo (2020) to measure vaccination intention and celebrity endorsement trustworthiness, respectively.

3.1.3. Common method bias (CMB)

This study followed the recommendations of the previous literature by implementing preventive and post-detection procedures to avoid CMB problems. For preventive procedures, this study hid construct names, randomized the order of measurement items, and ensured the anonymity of respondents to reduce respondents' concerns that could cause them to fill out survey artificially or dishonestly (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). For the post-detection procedure, this study conducted the Harman single-factor test with exploratory factor analysis (EFA) to assess CMB. The results showed that the first factor explained 44.01% of the variance, which did not exceed the recommended threshold of 50% (Podsakoff et al., 2003). In addition, this study conducted a full collinearity test based on the variance inflation factor (VIF) in SmartPLS 3.0 and the VIF values were between 1.37 and 2.61 less than the recommended threshold of 3.3 (Kock, 2015). Both results indicated that there was no evidence of the presence of CMB in this study.

3.2. Results

3.2.1. Measurement model

This study used SmartPLS 3.0 software to perform confirmatory factor analysis (CFA) to evaluate the measurement model. First, the factor loading of each measurement item and the average variance extracted (AVE) of each construct were examined to confirm the convergent validity of the constructs. All factor loadings were greater than 0.7, except CYCON4, which was deleted due to its low factor loading. In addition, the AVE of each construct was greater than 0.5. These results confirmed the convergent validity (Hair, Hult, Ringle, & Sarstedt, 2017). Second, this study used two methods to check discriminate validity. The first method indicated that the square root of

the AVE value of each construct was greater than the inter-correlation between this construct and other constructs. The second method showed that the heterotrait-monotrait (HTMT) ratio (ranging from 0.05 to 0.85) of all constructs in the model (Hair et al., 2017) was less than the threshold of 0.90. Thus, this study confirmed discriminant validity between constructs. Third, this study indicated that the composite reliability of all constructs was greater than 0.7 and confirmed the internal consistency of each construct. See Tables 3 and 4.

3.2.2. Hypothesis testing

A bootstrapping analysis with 5000 subsamples at the 5% significance level with SmartPLS 3.0 was carried out to test the structural model. The squared multiple correlations (R^2) in this study were all above the threshold of 10% (Hair et al., 2017). The research model accounted for 20% of the variance of cyberchondria ($R^2 = 0.20$), 19% of the variance of the perceived risk of the vaccine ($R^2 = 0.19$), 59% of the variance of vaccine skepticism ($R^2 = 0.59$), and 37% of the variance of vaccination intention ($R^2 = 0.37$). The predictive relevance of the model was tested by examining whether the Q^2 value is greater than zero (Hair et al., 2017). The results showed the Q^2 values of cyberchondria, the perceived risk of the vaccine, vaccine skepticism, and vaccination intention were 0.14, 0.13, 0.45, and 0.34, respectively. Furthermore, the results also showed that the SRMR value was 0.06, less than 0.08, indicating a satisfactory and substantial model (Hair et al., 2017).

The results indicated that information overload significantly and positively affected cyberchondria ($\beta = 0.45$, $p < 0.001$, CI = (0.35, 0.54)) and the perceived risk of the vaccine ($\beta = 0.44$, $p < 0.001$, CI = (0.31, 0.53)). Cyberchondria ($\beta = 0.50$, $p < 0.001$, CI = (0.40, 0.59)) and the perceived risk of the vaccine ($\beta = 0.33$, $p < 0.001$, CI = (0.23, 0.43)) had significant and positive effects on vaccine skepticism. More importantly, the results revealed that the indirect effects of information overload on vaccine skepticism through cyberchondria ($\beta = 0.22$, $p < 0.001$, CI = (0.17, 0.29)) and the perceived risk of the vaccine ($\beta = 0.14$, $p < 0.001$, CI = (0.10, 0.21)) were significant. The results supported H1 and H2. The direct effect of information overload on vaccine skepticism was not significant ($\beta = 0.05$, $p > 0.05$, CI = (−0.05, 0.13)), indicated that cyberchondria and the perceived risk of the vaccine fully mediates the relationship between information overload and vaccine skepticism. The results also showed that vaccine skepticism significantly and negatively affected vaccination intention ($\beta = -0.37$, $p < 0.001$, CI = (−0.49, −0.27)), supporting H3. Moreover, the moderating effects of celebrity endorsement trustworthiness on the effect of vaccine skepticism on vaccination intention were positive and significant (($\beta = 0.11$, $p < 0.01$, CI = (0.03, 0.18)). The results show that the negative effect of vaccine skepticism on vaccination intention diminishes as celebrity endorsement trustworthiness increases. Thus, H4 was supported. See Fig. 2 for details.

4. Study 2

Findings in Study 1 presented initial evidence for the moderating role of celebrity endorsements on people's responses to vaccination programs. A follow-up study was conducted to compare the effectiveness of celebrity endorsements with other public figures' endorsements (e.g., government official, medical expert) in mitigating the negative effect of vaccine skepticism on vaccination intention.

4.1. Method

Study 2 was an experimental study that manipulated the type of endorsement (celebrity vs. government official vs. medical expert). The participants were recruited on Twitter using a convenience sampling method.[1] The same requirements used in Study 1 applied to participants in Study 2. To be eligible to participate in the study, the respondents had to meet three criteria to ensure that they had read or followed news about the vaccines in the past three months, were not medical personnel or volunteers, and had not been vaccinated. The same research procedure in accordance with the ethical standards of the institutional and/or national research committee and with the 2013 Helsinki declaration in Study 1 was used. A total of 163 individuals participated in this study (62.96% were male, $M_{age} = 29.48$). They were randomly assigned to one of the three endorsement vignettes.

First, the participants answered the same three screening questions as found in Study 1 and rated three items aimed to assess their levels of vaccine skepticism. Then, the participants read either a statement from a celebrity (Ariel Noah, vocalist of pop-rock band NOAH), government official (Ma'ruf Amin, Vice President of Indonesia), or medical expert (Dr. Daeng M. Faqih, Chairman of the Executive Board of the Indonesian Doctors Association) that s/he believed the vaccine was safe and effective, asked people not to think negatively about the COVID-19 vaccines, and invited all Indonesians to work together for the success of the vaccination program so that herd immunity could be reached to prevent transmission of COVID-19. Following this statement, the participants responded to questions related to their vaccination intentions. The measurement items in Study 1 were used in this study to assess vaccine skepticism ($\alpha = 0.84$) and vaccination intention ($\alpha = 0.96$). Public figure type was checked by asking the participants which public figure provided an endorsement for the COVID-19 vaccines in the vignette. Demographic information was collected at the end of the study.

4.2. Results

The chi square (χ^2) test was performed to verify the scenario as it should be and the manipulation check was confirmed. 90.74%, 90.57%, 91.07% of participants correctly answered manipulation check questions in the celebrity, government official, and medical expert conditions ($\chi^2 = 244.25$, $p < 0.001$), respectively.

PROCESS model 1 was used to examine the moderating role of type of endorsement (celebrity = −1; government official = 0; medical expert = 1) in the relationship between vaccine skepticism and vaccination intention. As shown in Table 5, the results indicated that the interaction effect of vaccine skepticism and type of endorsement on vaccination intention was significant ($\beta = -0.17$, $p < 0.05$, CI = (−0.34, −0.01)). The results supported H5. Fig. 3 showed that vaccination intention decreased rapidly as vaccine skepticism increased in the medical expert endorsement condition. In the government official endorsement condition, vaccination intention decreased moderately as vaccine skepticism increased. However, in the celebrity endorsement condition, vaccination intention decreased slowly as vaccine skepticism increased. The results of conditional effect analysis indicated that the negative effect of vaccine skepticism on vaccination intention was weaker when a celebrity endorsed the vaccine ($\beta = -0.50$, $p < 0.001$, CI = (−0.72, −0.27)), compared to a government official ($\beta = -0.67$, $p < 0.001$, CI = (−0.81, −0.52)) and medical expert ($\beta = -0.84$, $p < 0.001$, CI = (−1.05, −0.62)).

5. General discussion

This research investigated the role of information overload in regard to affecting people's views of the COVID-19 vaccines and their vaccination intentions. Drawing on the dual-process theory, the results indicated that information overload had significant and negative effects

[1] Data collection was carried out in April 2021 at which time Indonesia only had one type of COVID-19 vaccine, i.e. Sinovac, available for the mass vaccination program.

Table 3
Measurement items, loading score, reliability and validity constructs.

Construct	Item	Factor Loading	Measurement Error	SMC	AVE	CR
Information overload	IFOL1	0.86	0.26	0.74	0.73	0.89
	IFOL2	0.91	0.18	0.82		
	IFOL3	0.79	0.38	0.62		
Cyberchondria	CYCON1	0.78	0.40	0.61	0.71	0.88
	CYCON2	0.87	0.24	0.76		
	CYCON3	0.88	0.23	0.77		
Perceived risk of the vaccine	PRV1	0.75	0.43	0.57	0.72	0.88
	PRV2	0.89	0.22	0.78		
	PRV3	0.90	0.20	0.81		
Vaccine skepticism	VS1	0.93	0.14	0.86	0.78	0.92
	VS2	0.82	0.33	0.67		
	VS3	0.91	0.18	0.82		
Vaccination intention	VI1	0.98	0.04	0.96	0.96	0.98
	VI2	0.98	0.04	0.96		
Celebrity endorsement trustworthiness	CET1	0.96	0.08	0.93	0.92	0.98
	CET2	0.96	0.09	0.91		
	CET3	0.97	0.07	0.93		
	CET4	0.96	0.08	0.92		

Note: SMC = Squared Multiple Correlation, AVE = Average Variance Extracted, CR = Composite Reliability.

Table 4
Means, standard deviation, correlation, and heterotrait-monotrait (HTMT) results.

Construct	Mean	Std. Deviation	IFOL	CYCON	PRV	VS	VI	CET
IFOL	4.36	1.45	**0.85**	0.55	0.52	0.49	0.17	0.11
CYCON	3.71	1.34	0.45	**0.84**	0.70	0.85	0.60	0.53
PRV	4.34	1.29	0.44	0.58	**0.85**	0.75	0.42	0.35
VS	4.44	1.56	0.42	0.71	0.64	**0.88**	0.57	0.55
VI	4.40	1.98	−0.16	−0.53	−0.38	−0.52	**0.98**	0.53
CET	4.29	1.77	−0.10	−0.47	−0.32	−0.51	0.51	**0.96**

Note.
1. IFOL = Information Overload, CYCON = Cyberchondria, PRV = Perceived Risk of the Vaccine, VS = Vaccine Skepticism, VI = Vaccination Intention; CET = Celebrity Endorsement Trustworthiness.
2. Bold numbers indicate square root of AVEs.
3. Pearson correlation are shown below the bold numbers.
4. HTMT ratio are shown above the bold numbers.

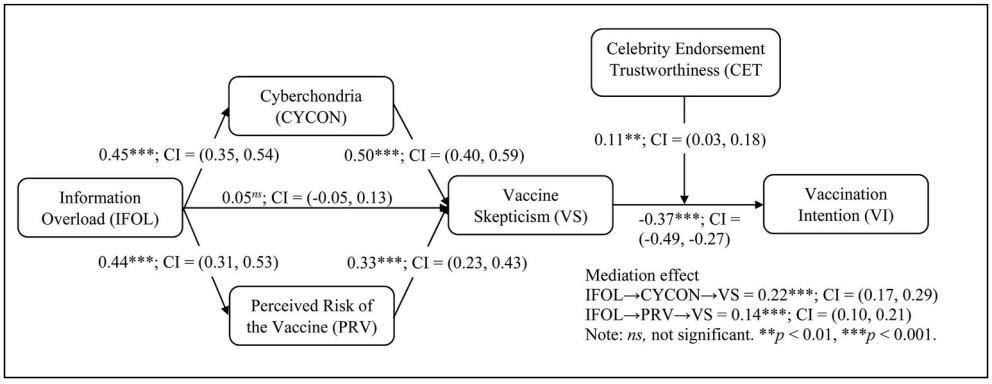

Fig. 2. Results of study 1.

on vaccination intention via cyberchondria and the perceived risk of the vaccine. Getting an extensive amount of information about vaccines generated cyberchondria and the perceived risk of the vaccine, which subsequently increased vaccine skepticism. This study showed that cyberchondria as the affective aspect and the perceived risk of the vaccine as the cognitive aspect played mediating roles in the relationship between information overload and vaccine skepticism. Moreover, the findings indicated that celebrity endorsement trustworthiness weakened the negative effect of vaccine skepticism on vaccination intention. The higher the level of celebrity endorsement trustworthiness, the lower the negative effect of vaccine skepticism on vaccination intention.

The findings also revealed that the effect of vaccine skepticism on vaccination intention varied among endorsements from a celebrity, government official, and medical expert (Study 2). A higher level of vaccine skepticism generated lower vaccination intention, regardless of the endorsement type. However, the negative effect of vaccine skepticism on vaccination intention in the celebrity endorsement condition was considerably lower than in the government official and medical expert conditions. Celebrities possess higher popularity than government officials and medical experts (Kamiński et al., 2020). People tend to be favorable toward endorsements from the celebrities with whom

Table 5
Moderating effect test (Study 2).

Model	Customer forgiveness		
	β	t	95% CI
Constant	7.39	23.74***	(6.78, 8.00)
Vaccine skepticism	−0.67	−9.31***	(-0.81, −0.52)
Type of endorsement	0.67	1.84†	(-0.05, 1.38)
Interaction term	−0.17	−2.04*	(-0.34, −0.01)
Conditional effect			
Type of endorsement	Value	SE	95% CI
Celebrity	−0.50	0.11	(-0.72, −0.27)
Government official	−0.67	0.07	(-0.81, −0.52)
Medical expert	−0.84	0.11	(-1.05, −0.62)

Note: †$p < 0.1$, *$p < 0.05$, ***$p < 0.001$.

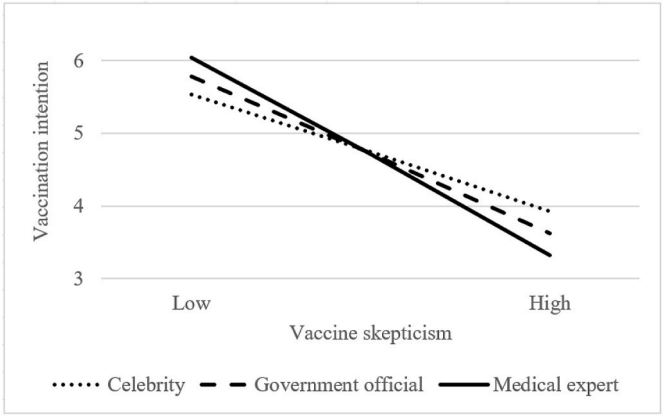

Fig. 3. The moderating effect of type of endorsement on the relationship between vaccine skepticism and vaccination intention.

they are familiar and like (Du-Lieu & Grassi, 2020). Therefore, these celebrities tend to be able to influence the community, especially their followers. Subsequently, celebrity endorsements result in reducing the negative effect of vaccine skepticism on vaccination intention. On the other hand, medical experts with lower popularity were less effective because people were unfamiliar with them.

In addition, the negative effect of vaccine skepticism on vaccination intention in the celebrity endorsement condition was lower than in the government official condition. It is likely that celebrities are considered a neutral role and similar to ordinary people. People think that endorsements from government officials are bureaucratic tasks with political motivations behind them. Thus, the negative effect of vaccine skepticism on vaccination intention in the government official condition was less effective. These results are in line with prior research that argued that, when major health or social problems arises, the use of a third party to convey key messages is important to neutralize, depoliticize, and transmit the messages to people regardless of their political parties or positions (Jackson & Darrow, 2005). In addition, the declining trust in the government may also be one of the reasons that government official endorsements are less effective than celebrity endorsements. Future research may need to investigate whether different levels of trust in the government will impact government official endorsements.

5.1. Theoretical contributions

This research makes three theoretical contributions and further research is needed to confirm whether the theoretical implications of this research can be generalized to contexts beyond COVID-19. First, although some research on vaccines has examined factors that influence people's skeptical views and actions toward vaccines (e.g., Bryden et al., 2018; LaCour & Davis, 2020), prior studies have not considered the information overload effect as a form of infodemic. In response to the World Health Organization, which identified infodemic as a research priority in the COVID-19 pandemic, this research examined the effect of information overload on people's attitudes and behavioral intentions in the context of the COVID-19 vaccines. Prior studies have investigated the effect of information overload on people's actions in the COVID-19 pandemic, such as doing self-isolation and sharing unverified information (Farooq et al., 2020, 2021; Laato et al., 2020a, 2020b); however, considering the nature of information overload as a predictor of various negative consequences (Dai et al., 2020; Guo et al., 2020; Lee et al., 2020; Wirth et al., 2015), people who are inundated with a lot of unverified and/or uncontrollable information can generate unfavorable attitudes, which will affect their intentions and future actions. Thus, we proposed a perspective on the role of information overload in relation to COVID-19 vaccines that influences vaccine skepticism, which, in turn, undermines people's vaccination intentions. This research provides evidence that information overload indirectly affects vaccine skepticism via the affective and cognitive aspects of information processing, which further reduce vaccination intention.

Second, this research contributes to the dual-process theory literature, which refers to two types of information processing in forming individuals' judgments and behaviors (Agarwal & Malhotra, 2005; Greene et al., 2001; Schwartz, 2015; Sierra & Hyman, 2006; Strack & Deutsch, 2004; van Gelder et al., 2009). This theory has been confirmed by previous empirical studies in various contexts, including in the health context. Instead of focusing on the theory to explain people's healthy behaviors (e.g., Hamilton, Gibbs, Keech, & Hagger, 2020; Strobach, Englert, Jekauc, & Pfeffer, 2020; Thoma, Weiss-Cohen, Filkuková, & Ayton, 2021; Tomljenovic & Bubic, 2021), this research demonstrated the information processing routes in regard to how people form their views on vaccines. The findings showed that people's vaccine skepticism is formed by cyberchondria (affective aspect) and the perceived risk of the vaccine (cognitive aspect) due to information overload in the COVID-19 pandemic context. These results make our work an important extension of the dual-process theory literature as it reveals the value of the theory in explaining how people become skeptical to vaccines due to information overload on social media.

Third, this research brings attention to the factors that suppress the negative effect of vaccine skepticism on vaccination intention. Although previous research has investigated the effect of vaccine skepticism on vaccination intention (Latkin et al., 2021; Maridor et al., 2017; Rosso et al., 2019; van Keulen et al., 2013), little is known about the role of celebrity endorsements in vaccination intention with the exception of Alatas, Chandrasekhar, Mobius, Olken, and Paladines (2019). They revealed that celebrity endorsements play an important role in spreading key information about vaccines to influence people's beliefs about vaccination. Our research advances the existing body of research by demonstrating the role of celebrity endorsements (e.g., trustworthiness) in mitigating the negative effect of vaccine skepticism on vaccination intention, especially in the COVID-19 pandemic context. In addition, the findings related to the interaction effect between vaccine skepticism and type of endorsement identified the effective type of endorsement to mitigate the negative effect of vaccine skepticism on vaccination intention for the success of vaccination programs. We, thus, believe that this research can provide further insights into the role of celebrity endorsements in vaccination promotion contexts.

5.2. Practical contributions

The findings of this research provide several practical implications for the success of vaccination programs, especially in the COVID-19 pandemic. It was found that information overload triggered cyberchondria and increased the perceived risk of the vaccine, which produces vaccine skepticism and then reduces people's vaccination intentions. Therefore, for the success of the mass vaccination program carried out by the government to achieve herd immunity, it is important

to ensure people get accurate information about the COVID-19 vaccine. Nudging people to think more about information source so as to think more critically about the information and consider the extent to which they will trust it (Kim & Dennis, 2019). Instead of searching for information on social media, governments can encourage and guide people to consume COVID-19 content that comes from trusted sources, such as government health/medical institutions, so that the information obtained by people is more accurate and manageable. Governments can also dissuade people from disseminating information that has not been verified and does not come from trusted sources in order to minimize fake news and the misinformation that circulates on social media. Furthermore, making the news or ads about vaccines shorter is also an appropriate way of preventing information overload (Kelly, Kerr, & Drennan, 2010), which will help reduce negative views on vaccines and increase people's vaccination intentions.

Social media providers can take measures to reduce information overload which generates negative affection (cyberchondria) and cognition (perceived risk). For example, they can create a separate or special section for vaccine information on their platforms to allow users to determine the amount of vaccine information they see. In addition, they can collaborate with the government and/or health agencies to provide reliable information and educate social media users about the benefits of getting vaccinated regardless of the side effects or unexpected cases caused by the vaccine injection. Such actions can prevent social media users from being flooded with unverified information and reduce negative affections, such as cyberchondria, and negative cognition, such as higher perceived risks of the vaccine, thereby reducing skepticism about vaccines. After the COVID-19 outbreak, Facebook launched a COVID-19 information center and Twitter added a new tab providing the latest news. Our findings seem to suggest that these initiatives could possibly reduce cyberchondria and the perceived risk of the vaccine, which subsequently could decrease vaccine skepticism.

Moreover, the moderating effect of celebrity endorsements should be focused on. People's trust in the vaccine endorsement given by a celebrity can counteract the negative effect of vaccine skepticism on vaccination intention. Celebrities' health-related actions can influence people's behaviors (Hoffman & Tan, 2015; Sillence & Martin, 2020; Ueda et al., 2017). Among different types of endorsements, using celebrities to deliver an important message is the right choice because of their popularity and neutrality (Jackson & Darrow, 2005). Governments, medical associations, and health organizations can leverage the influence of celebrities to disseminate evidence-based advice and educate people regarding the importance of being vaccinated. For example, the simplest thing that can be done is by asking celebrities to post their positive experiences after being vaccinated. Governments can also create ads or short videos for education purposes that include endorsements from celebrities. These actions may counteract people's skeptical views of vaccines and increase their vaccination intentions.

5.3. Limitations and further research

This research has several limitations. First, it only focused on the effect of information overload as a form infodemic on people's vaccine skepticism in the context of the COVID-19 pandemic, which is a unique and sudden global disrupting event. As the contributions of this research may be limited in scope in regard to strengthening the findings related to the observed effect on people's skeptical attitudes, we encourage future research to consider frameworks in other non-pandemic disease contexts (e.g., HPV vaccine) or settings (e.g., green marketing).

Second, this research collected cross-sectional data in a country that is facing a surge in COVID-19 cases. In countries more impacted by active COVID-19 cases, vaccinations are carried out in a hurry due to the high level of urgency. Such urgency makes the circulation of information regarding vaccines higher than in other countries that are less impacted by active COVID-19 cases. As such, different results may be obtained if vaccinations are carried out slowly as in countries with fewer COVID-19 surges due to lower levels of urgency. It would be better for future research to include a wider sample of countries with different levels of pandemic severity to enhance the generalizability of this research.

Third, this research collected data from a situation in which a new vaccine was created and the government wanted to implement it quickly. However, the vaccination program is a long-term program that cannot be accomplished in a short time period. The results may be time-dependent, so longitudinal studies on this topic may be quite fruitful. For example, information overload may have less impact over time, as more people take vaccines. Those individuals who have not taken vaccines may perceive vaccinations as common and will not be easily influenced by the information circulating. They may also rely on testimonies from their close relatives.

Fourth, we did not consider the influence of democracy in the proposed model. People in the democratic countries have freedom of expression, can easily obtain information and make decisions, including vaccination decisions. However, the level of democracy in each country varies. Given that countries with a lower level of democracy can control and reduce the circulation of information on social media using online censorship (Paltemaa, Vuori, Mattlin, & Katajisto, 2020), an interesting question arises whether information overload can have less impact on individuals living in these countries. In addition, governments with a lower level of democracy may also be able to require their citizens to take vaccinations and penalize for those who refuse to take the vaccine. Therefore, future research may investigate the impact of level of democracy in the research model.

Fifth, this research confirmed the moderating role of the effectiveness of celebrity endorsement in the proposed model. Thus, it deserves future research to explore the effect of celebrity type on vaccination promotion. Previous research in promotion management has found effects of celebrity types such as traditional celebrity vs. social media influencers (Jin, Muqaddam, & Ryu, 2019) or sport vs. entertainment celebrity (Hung, Chan, & Tse, 2011) on promotion effectiveness. Future research may also investigate the effect of different celebrity types in the proposed model. Moreover, based on the social influence theory individuals' behavioral intentions can be influenced by friends, family, and relatives (Kelman, 1958). Future research may consider social influence in the model as it fits the research context.

Credit author statement

Andrea Honora: Conceptualization, Investigation, Formal analysis, Writing – original draft, **Kai-Yu Wang**: Conceptualization, Methodology, Writing – review & editing, **Wen-Hai Chih**: Conceptualization, Methodology, Supervision, Writing – review & editing

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Appendix

Measurement items

Information overload (adapted from** Laato, Islam, Farooq, & Dhir, 2020**)

I am often distracted by excessive amount of information about the COVID-19 vaccine on social media. (M = 4.24, SD = 1.68).

I find that I am overwhelmed by the amount of information that I process about the COVID-19 vaccine on a daily basis from social media. (M = 4.16, SD = 1.77).

I received too much information regarding the COVID-19 vaccine to form a coherent picture of the bad and/or good side effects of the vaccine. (M = 4.67, SD = 1.64).

Cyberchondria (adapted from Jokić-Begić et al., 2019)

I feel confused after reading information about the COVID-19 vaccine. (M = 3.80, SD = 1.87).

I feel frightened after reading information about the COVID-19 vaccine. (M = 3.57, SD = 1.93).

I feel frustrated after reading information about the COVID-19 vaccine. (M = 3.61, SD = 1.96).

Once I start reading information about the COVID-19 vaccine online, it is hard for me to stop. (M = 3.86, SD = 1.59).

Perceived risk of the vaccine (adapted from Szymkowiak et al., 2020)

It is very easy to experience side-effects from the COVID-19 vaccine. (M = 4.41, SD = 1.43).

Getting a COVID-19 vaccine prematurely is a high risk. (M = 4.21, SD = 1.59).

COVID-19 vaccine can easily affect your current health condition. (M = 4.40, SD = 1.53).

Vaccine skepticism (adapted from Johnson et al., 2019)

I doubt whether the COVID-19 vaccine is actually effective and safe. (M = 4.53, SD = 1.87).

There is good reason to be critical of those who say the COVID-19 vaccine is effective and safe. (M = 4.55, SD = 1.68).

Claims about the COVID-19 vaccine cannot be trusted. (M = 4.23, SD = 1.74).

Vaccinated intention (adapted from Jozkowski & Geshnizjani, 2014)

My going to a hospital/clinic to ask for the COVID-19 vaccine in the next 6 months is … (M = 4.39, SD = 2.03).

I will go to a hospital/clinic to ask for the COVID-19 vaccine in the next 6 months. (M = 4.42, SD = 2.01).

Celebrity endorsement trustworthiness (adapted from Song et al., 2020)

I would trust celebrity endorsement about the COVID-19 vaccine. (M = 4.45, SD = 1.85).

I would rely on celebrity endorsement about the COVID-19 vaccine. (M = 4.22, SD = 1.87).

Celebrity endorsement about the COVID-19 vaccine can be trusted. (M = 4.23, SD = 1.88).

Celebrity endorsement about the COVID-19 vaccine appears to be honest. (M = 4.26, SD = 1.78).

References

Agarwal, J., & Malhotra, N. K. (2005). An integrated model of attitude and affect: Theoretical foundation and an empirical investigation. *Journal of Business Research, 58*(4), 483–493.

Akhtar, N., Siddiqi, U. I., Akhtar, M. N., Usman, M., & Ahmad, W. (2020). Modeling attitude ambivalence and behavioral outcomes from hotel reviews. *International Journal of Contemporary Hospitality Management, 32*(9), 2831–2855.

Alatas, V., Chandrasekhar, A. G., Mobius, M., Olken, B. A., & Paladines, C. (2019). When celebrities speak: A nationwide twitter experiment promoting vaccination in Indonesia. Retrieved from https://escholarship.org/uc/item/2fz5n43s. (Accessed 3 June 2021).

Albayrak, T., Aksoy, Ş., & Caber, M. (2013). The effect of environmental concern and skepticism on green purchase behavior. *Marketing Intelligence & Planning, 31*(1), 27–39.

Allam, A., Schulz, P. J., & Nakamoto, K. (2014). The impact of search engine selection and sorting criteria on vaccination beliefs and attitudes: Two experiments manipulating Google output. *Journal of Medical Internet Research, 16*(4), Article e100.

Amos, C., Holmes, G., & Strutton, D. (2008). Exploring the relationship between celebrity endorser effects and advertising effectiveness: A quantitative synthesis of effect size. *International Journal of Advertising, 27*(2), 209–234.

Anderson, S. P., & de Palma, A. (2012). Competition for attention in the information (overload) age. *The RAND Journal of Economics, 43*(1), 1–25.

Aschwanden, C. (2021). Five reasons why COVID herd immunity is probably impossible. *Nature, 591*, 520–522.

Baragona, S. (2021). Worldwide vaccine hesitancy poses risk to ending pandemic. Retrieved from https://www.voanews.com/covid-19-pandemic/worldwide-vaccine-hesitancy-poses-risk-ending-pandemic. (Accessed 30 May 2021).

Bauer, R. A. (1960). Consumer behavior as risk taking. In R. Hancock (Ed.), *Dynamic marketing for a changing world: Proceedings of 43rd Conference* (pp. 389–398). American Marketing Association.

Bawden, D., & Robinson, L. (2015). *Introduction to information science*. Facet Publishing.

Beaunoyer, E., Dupéré, S., & Guitton, M. J. (2020). COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies. *Computers in Human Behavior, 111*, 106424.

Betsch, C., Renkewitz, F., Betsch, T., & Ulshöfer, C. (2010). The influence of vaccine-critical websites on perceiving vaccination risks. *Journal of Health Psychology, 15*(3), 446–455.

Betsch, C., & Sachse, K. (2012). Dr. Jekyll or mr. Hyde? (How) the internet influences vaccination decisions: Recent evidence and tentative guidelines for online vaccine communication. *Vaccine, 30*(25), 3723–3726.

Bokemper, S. E., Huber, G. A., Gerber, A. S., James, E. K., & Omer, S. B. (2021). Timing of COVID-19 vaccine approval and endorsement by public figures. *Vaccine, 39*(5), 825–829.

Bontcheva, K., Gorrell, G., & Wessels, B. (2013). Social media and information overload: Survey results. Retrieved from http://arxiv.org/abs/1306.0813.pdf. (Accessed 30 May 2021).

Brewer, N. T., & Hallman, W. K. (2006). Subjective and objective risk as predictors of influenza vaccination during the vaccine shortage of 2004-2005. *Clinical Infectious Diseases, 43*(11), 1379–1386.

Bryden, G. M., Browne, M., Rockloff, M., & Unsworth, C. (2018). Anti-vaccination and pro-CAM attitudes both reflect magical beliefs about health. *Vaccine, 36*(9), 1227–1234.

Cao, X., & Sun, J. (2018). Exploring the effect of overload on the discontinuous intention of social media users: An S-O-R perspective. *Computers in Human Behavior, 81*, 10–18.

Caso, D., Capasso, M., Fabbricatore, R., & Conner, M. (2021). Understanding the psychosocial determinants of Italian parents' intentions not to vaccinate their children: An extended theory of planned behavior model. *Psychology and Health*, 1–21. https://doi.org/10.1080/08870446.2021.1936522. Advance online publication.

Centers for Disease Control and Prevention. (2021). 12 COVID-19 vaccination strategies for your community. Retrieved from https://www.cdc.gov/vaccines/covid-19/vaccinate-with-confidence/community.html. (Accessed 13 October 2021).

Cheung, E. (2021). Hong Kong vaccines: Information overload, lack of context provoking 'unnecessary' fears of Sinovac jabs, experts say. Retrieved from https://www.scmp.com/news/hong-kong/health-environment/article/3124918/hong-kong-vaccines-too-much-information-too?module=perpetual_scroll&pgtype=article&campaign=3124918. (Accessed 30 June 2021).

Chung, S., & Cho, H. (2017). Fostering parasocial relationships with celebrities on social media: Implications for celebrity endorsement. *Psychology and Marketing, 34*(4), 481–495.

Dai, B., Ali, A., & Wang, H. (2020). Exploring information avoidance intention of social media users: A cognition–affect–conation perspective. *Internet Research, 30*(5), 1455–1478.

Debus, M., & Tosun, J. (2021). Political ideology and vaccination willingness: Implications for policy design. *Policy Sciences, 54*(3), 477–491. https://doi.org/10.1007/s11077-021-09428-0

Dror, A. A., Eisenbach, N., Taiber, S., Morozov, N. G., Mizrachi, M., Zigron, A., et al. (2020). Vaccine hesitancy: The next challenge in the fight against COVID-19. *European Journal of Epidemiology, 35*(8), 775–779.

Du-Lieu, L., & Grassi, A. (2020). COVID vaccine: Celebrity endorsements work – even if people don't like it. Retrieved from https://theconversation.com/covid-vaccine-celebrity-endorsements-work-even-if-people-dont-like-it-151130. (Accessed 3 June 2021).

Eastin, M. S., & Gunisler, N. M. (2006). Worried and wired: Effects of health anxiety on information-seeking and health care utilization behaviors. *CyberPsychology and Behavior, 9*(4), 494–498.

Eichenberg, C., & Schott, M. (2019). Use of web-based health services in individuals with and without symptoms of hypochondria: Survey study. *Journal of Medical Internet Research, 21*(6), Article e10980.

Engin, C., & Vezzoni, C. (2020). Who's skeptical of vaccines? Prevalence and determinants of anti-vaccination attitudes in Italy. *Population Review, 59*(2), 156–179.

Evans, J. S. B. T. (2008). Dual-processing accounts of reasoning, judgment, and social cognition. *Annual Review of Psychology, 59*(1), 255–278.

Farooq, A., Laato, S., & Islam, A. K. M. N. (2020). Impact of online information on self-isolation intention during the COVID-19 pandemic: Cross-sectional study. *Journal of Medical Internet Research, 22*(5), Article e19128.

Farooq, A., Laato, S., Islam, A. K. M. N., & Isoaho, J. (2021). Understanding the impact of information sources on COVID-19 related preventive measures in Finland. *Technology in Society, 65*, 101573.

Finucane, M. L., & Holup, J. L. (2006). Risk as value: Combining affect and analysis in risk judgments. *Journal of Risk Research, 9*(2), 141–164.

Fiorillo, A., & Gorwood, P. (2020). The consequences of the COVID-19 pandemic on mental health and implications for clinical practice. *European Psychiatry, 63*(1), e32.

van Gelder, J. L., de Vries, R. E., & van der Pligt, J. (2009). Evaluating a dual-process model of risk: Affect and cognition as determinants of risky choice. *Journal of Behavioral Decision Making, 22*(1), 45–61.

Greene, J. D., Sommerville, R. B., Nystrom, L. E., Darley, J. M., & Cohen, J. (2001). An fMRI investigation of emotional engagement in moral judgement. *Science, 293*, 2105–2108.

Guess, A. M., Nyhan, B., O'Keeffe, Z., & Reifler, J. (2020). The sources and correlates of exposure to vaccine-related (mis)information online. *Vaccine, 38*(49), 7799–7805.

Guitton, M. J. (2020). Cyberpsychology research and COVID-19. *Computers in Human Behavior, 111*, 106357.
Guo, Y., Lu, Z., Kuang, H., & Wang, C. (2020). Information avoidance behavior on social network sites: Information irrelevance, overload, and the moderating role of time pressure. *International Journal of Information Management, 52*, 102067.
Hair, J. F., Jr., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Sage Publications.
Hamilton, K., Gibbs, I., Keech, J. J., & Hagger, M. S. (2020). Reasoned and implicit processes in heavy episodic drinking: An integrated dual-process model. *British Journal of Health Psychology, 25*(1), 189–209.
Hart, J., & Bjorgvinsson, T. (2010). Health anxiety and hypochondriasis: Description and treatment issues highlighted through a case illustration. *Bulletin of the Menninger Clinic, 74*, 122–140.
Heller, J. (2016). Commentary: Trust in institutions, science and self-the case of vaccines. *Narrative Inquiry in Bioethics, 6*(3), 199–203.
Herbig, P. A., & Kramer, H. (1994). The effect of information overload on the innovation choice process. *Journal of Consumer Marketing, 11*(2), 45–54.
Hoffman, S. J., & Tan, C. (2015). Biological, psychological and social processes that explain celebrities' influence on patients' health-related behaviors. *Archives of Public Health, 73*(1), 3.
Holton, A. E., & Chyi, H. I. (2012). News and the overloaded consumer: Factors influencing information overload among news consumers. *Cyberpsychology, Behavior, and Social Networking, 15*(11), 619–624.
Hornsey, M. J., Harris, E. A., & Fielding, K. S. (2018). The psychological roots of anti-vaccination attitudes: A 24-nation investigation. *Health Psychology, 37*(4), 307–315.
Hung, K., Chan, K. W., & Tse, C. H. (2011). Assessing celebrity endorsement effects in China. *Journal of Advertising Research, 51*(4), 608–623.
Hwang, I. J., Lee, B. G., & Kim, K. Y. (2014). Information asymmetry, social networking site word of mouth, and mobility effects on social commerce in Korea. *Cyberpsychology, Behavior, and Social Networking, 17*(2), 117–124.
Ives, M. (2021). Celebrities are endorsing covid vaccines. Does it help?. Retrieved from https://www.nytimes.com/2021/05/01/health/vaccinated-celebrities.html. (Accessed 2 June 2021).
Jackson, D. J., & Darrow, T. I. A. (2005). The influence of celebrity endorsements on young adults' political opinions. *Harvard International Journal of Press/Politics, 10*(3), 80–98.
Ji, Q., Ha, L., & Sypher, U. (2014). The role of news media use and demographic characteristics in the possibility of information overload prediction. *International Journal of Communication, 8*, 699–714.
Jin, S. V., Muqaddam, A., & Ryu, E. (2019). Instafamous and social media influencer marketing. *Marketing Intelligence & Planning, 37*(5), 567–579.
Johnson, D., Limbu, Y. B., Jayachandran, C., & Reddy, P. R. (2019). Climbing the down escalator: When customer-to-customer interaction may not be helping service firms. *European Journal of Marketing, 53*(11), 2348–2372.
Jokić-Begić, N., Korajlija, A. L., & Mikac, U. (2020). Cyberchondria in the age of COVID-19. *PLoS One, 15*(12), Article e0243704.
Jokić-Begić, N., Mikac, U., Čuržik, D., & Jokić, C. S. (2019). The development and validation of the short cyberchondria scale (SCS). *Journal of Psychopathology and Behavioral Assessment, 41*(12), 662–676.
Jozkowski, K. N., & Geshnizjani, A. (2014). Using a reasoned action approach to examine US college women's intention to get the HPV vaccine. *Health Education Journal, 75*(1), 14–26.
Kahneman, D. (2003). Maps of bounded rationality: Psychology for behavioral economics. *The American Economic Review, 93*(5), 1449–1475.
Kahneman, D. (2011). *Thinking, fast and slow*. Macmillan.
Kamiński, M., Szymańska, C., & Nowak, J. K. (2020). Whose tweets on COVID-19 gain the most attention: Celebrities, political, or scientific authorities? *Cyberpsychology, Behavior, and Social Networking, 24*(2), 123–128.
Karlsson, L. C., Soveri, A., Lewandowsky, S., Karlsson, L., Karsslon, H., Nolvi, S., et al. (2021). Fearing the disease or the vaccine: The case of COVID-19. *Personality and Individual Differences, 172*, 110590.
Kelly, L., Kerr, G., & Drennan, J. (2010). Avoidance of advertising in social networking sites. *Journal of Interactive Advertising, 10*(2), 16–27.
Kelman, H. C. (1958). Compliance, identification, and internalization three processes of attitude change. *Journal of Conflict Resolution, 2*(1), 51–60.
Kemp, S. (2021). Digital 2021: Indonesia. Retrieved from https://datareportal.com/reports/digital-2021-indonesia#:~:text=There%20were%2017.0%20million%20social,total%20populatin%20in%20January%202021/. (Accessed 12 March 2021).
van Keulen, H. M., Otten, W., Ruiter, R. A. C., Fekkes, M., van Steenbergen, J., Dusseldorp, E., et al. (2013). Determinants of HPV vaccination intentions among Dutch girls and their mothers: A cross-sectional study. *BMC Public Health, 13*, 111.
Kim, A., & Dennis, A. R. (2019). Says who? The effects of presentation format and sources rating on fake news in social media. *MIS Quarterly, 43*(3), 1025–1040.
Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. *International Journal of e-Collaboration, 11*(4), 1–10.
Laato, S., Islam, A. K. M. N., Farooq, A., & Dhir, A. (2020). Unusual purchasing behavior during the early stages of the COVID-19 pandemic: The stimulus-organism-response approach. *Journal of Retailing and Consumer Services, 57*, 102224.
Laato, S., Islam, A. K. M. N., Islam, M. N., & Whelan, E. (2020). What drives unverified information sharing and cyberchondria during the COVID-19 pandemic? *European Journal of Information Systems, 29*(3), 288–305.
LaCour, M., & Davis, T. (2020). Vaccine skepticism reflects basic cognitive differences in mortality-related event frequency estimation. *Vaccine, 38*(21), 3790–3799.
Latkin, C., Dayton, L. A., Yi, G., Konstantopoulos, A., Park, J., Maulsby, C., et al. (2021). COVID-19 vaccine intentions in the United States, a social-ecological framework. *Vaccine, 39*(16), 2288–2294.
Lee, T., Lee, B. K., & Lee-Geiller, S. (2020). The effects of information literacy on trust in government websites: Evidence from an online experiment. *International Journal of Information Management, 52*, 102098.
Lee, S. K., Lindsey, N. J., & Kim, K. S. (2017). The effects of news consumption via social media and news information overload on perceptions of journalistic norms and practices. *Computers in Human Behavior, 75*, 254–263.
Lee, A. R., Son, S. M., & Kim, K. K. (2016). Information and communication technology overload and social networking service fatigue: A stress perspective. *Computers in Human Behavior, 55*, 51–61.
Maridor, M., Ruch, S., Bangerter, A., & Emery, V. (2017). Skepticism toward emerging infectious diseases and influenza vaccination intentions in nurses. *Journal of Health Communication, 22*(5), 386–394.
Martensen, A., Brockenhuus-Schack, S., & Zahid, A. L. (2018). How citizen influencers persuade their followers. *Journal of Fashion Marketing and Management: International Journal, 22*(3), 335–353.
McCracken, G. (1989). Who is the celebrity endorser? Cultural foundations of the endorsement process. *Journal of Consumer Research, 16*(3), 310–321.
Momplaisir, F., Haynes, N., Nkwihoreze, H., Nelson, M., Werner, R. M., & Jemmott, J. (2021). Understanding drivers of coronavirus disease 2019 vaccine hesitancy among blacks. *Clinical Infectious Diseases, 73*(10), 1784–1789.
Morahan-Martin, J. M. (2004). How internet users find, evaluate, and use online health information: A cross-cultural review. *CyberPsychology and Behavior, 7*(5), 497–510.
Nan, X., & Madden, K. (2012). HPV vaccine information in the blogosphere: How positive and negative blogs influence vaccine-related risk perceptions, attitudes, and behavioral intentions. *Health Communication, 27*(8), 829–836.
Nazaroff, D. (2021). May cause side effects: How social media could be affecting COVID vaccine hesitancy. Retrieved from https://newsroom.unsw.edu.au/news/science-tech/may-cause-side-effects-how-social-media-could-be-affecting-covid-vaccine-hesitancy. (Accessed 30 June 2021) Accessed.
Ndumu, A. (2020). Toward a new understanding of immigrant information behavior. *Journal of Documentation, 76*(4), 869–891.
Paltemaa, L., Vuori, J. A., Mattlin, M., & Katajisto, J. (2020). Meta-information censorhip and the creation of the chinanet bubble. *Information, Communication & Society, 23*(14), 2064–2080.
Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879–903.
Reiss, D. R., & Offit, P. A. (2020). Improving vaccine policy making: A dose of reality. *Vaccine, 38*(10), 2273–2274.
Riesen, M., Konstantinoudis, G., Lang, P., Low, N., Hatz, C., Maeusezahl, M., et al. (2018). Exploring variation in human papillomavirus vaccination uptake in Switzerland: A multilevel spatial analysis of a national vaccination coverage survey. *BMJ Open, 8*(5). https://doi.org/10.1136/bmjopen-2017-021006
Rosso, A., Massimi, A., De Vito, C., Adamo, G., Baccolini, V., Marzuillo, C., et al. (2019). Knowledge and attitudes on pediatric vaccinations and intention to vaccinate in a sample of pregnant women from the City of Rome. *Vaccine, 37*, 1954–1963.
Rutjens, B. T., Sutton, R. M., & van der Lee, R. (2018). Not all skepticism is equal: Exploring the ideological antecedents of science acceptance and rejection. *Personality and Social Psychology Bulletin, 44*(3), 384–405.
Rutjens, B. T., & van der Lee, R. (2020). Spiritual skepticism? Heterogeneous science skepticism in The Netherlands. *Public Understanding of Science, 29*(3), 335–352.
Salmon, D. A., Dudley, M. Z., Glanz, J. M., & Omer, S. B. (2015). Vaccine hesitancy: Causes, consequences, and a call to action. *American Journal of Preventive Medicine, 49*(6 Suppl 4), S391–S398.
Sasaki, Y., Kawai, D., & Kitamura, S. (2016). Unfriend or ignore tweets? A time series analysis on Japanese twitter users suffering from information overload. *Computers in Human Behavior, 64*, 914–922.
Schwartz, M. S. (2015). Ethical decision-making theory: An integrated approach. *Journal of Business Ethics, 139*(4), 755–776.
Seno, D., & Lukas, B. A. (2007). The equity effect of product endorsement by celebrities: A conceptual framework from a co-branding perspective. *European Journal of Marketing, 41*(1/2), 121–134.
Sierra, J. J., & Hyman, M. R. (2006). A dual-process model of cheating intentions. *Journal of Marketing Education, 28*(3), 193–204.
Sillence, E., & Martin, R. (2020). Talking about decisions: The facilitating effect of a celebrity health announcement on the communication of online personal experiences around decision-making. *Health Communication, 35*(12), 1447–1454.
Song, Y., Luximon, Y., & Luo, J. (2020). A moderated mediation analysis of the effect of lettering case and color temperature on trustworthiness perceptions and investment decisions. *International Journal of Bank Marketing, 38*(4), 987–1005.
Starcevic, V., & Berle, D. (2013). Cyberchondria: Towards a better understanding of excessive health-related internet use. *Expert Review of Neurotherapeutics, 13*(2), 205–213.
Starcevic, V., & Berle, D. (2015). Cyberchondria: An old phenomenon in a new guise? In E. Aboujaoude, & V. Starcevic (Eds.), *Mental health in the digital age: Grave dangers, great promise* (pp. 106–117). Oxford University Press.
Stone, R., & Winter, F. (1985). Risk in buyer behavior contexts: A clarification. Retrieved from https://www.ideals.illinois.edu/bitstream/handle/2142/28843/riskinbuyerbehav1216ston.pdf?sequence=1&isAllowed=y. (Accessed 25 May 2021).
Strack, F., & Deutsch, R. (2004). Reflective and impulsive determinants of social behavior. *Personality and Social Psychological Review, 8*, 220–247.
Strobach, T., Englert, C., Jekauc, D., & Pfeffer, I. (2020). Predicting adoption and maintenance of physical activity in the context of dual-process theories. *Performance Enhancement & Health, 8*(1), 100162.

Swar, B., Hameed, T., & Reychav, I. (2017). Information overload, psychological ill-being, and behavioral intention to continue online healthcare information search. *Computers in Human Behavior, 70*, 416–425.
Szymkowiak, A., Gaczek, P., Jeganathan, K., & Kulawik, P. (2020). The impact of emotions on shopping behavior during epidemic. What a business can do to protect customers. *Journal of Consumer Behaviour, 20*(1), 48–60.
Taute, H. A., Peterson, J., & Sierra, J. J. (2013). Perceived needs and emotional responses to brands: A dual-process view. *Journal of Brand Management, 21*(1), 23–42.
Thoma, V., Weiss-Cohen, L., Filkuková, P., & Ayton, P. (2021). Cognitive predictors of precautionary behavior during the COVID-19 pandemic. *Frontiers in Psychology, 12*, 589800.
Tomljenovic, H., & Bubic, A. (2021). Cognitive and emotional factors in health behaviour: Dual-process reasoning, cognitive styles and optimism as predictors of healthy lifestyle, healthy behaviours and medical adherence. *Current Psychology, 40*(7), 3256–3264.
Ueda, M., Mori, K., Matsubayashi, T., & Sawada, Y. (2017). Tweeting celebrity suicides: Users' reaction to prominent suicide deaths on Twitter and subsequent increases in actual suicides. *Social Science & Medicine, 189*, 158–166.
Uzun, S. U., & Zencir, M. (2021). Reliability and validity study of the Turkish version of cyberchondria severity scale. *Current Psychology, 40*, 65–71.
Wang, S. W., & Scheinbaum, A. C. (2018). Enhancing brand credibility via celebrity endorsement. *Journal of Advertising Research, 58*(1), 16–32.
Weber, E. U., & Johnson, E. J. (2009). Mindful judgment and decision making. *Annual Review of Psychology, 60*, 53–85.
Wheeler, M., & Buttenheim, A. M. (2013). Parental vaccine concerns, information source, and choice of alternative immunization schedules. *Human Vaccines & Immunotherapeutics, 9*(8), 1782–1789.
White, R. W., & Horvitz, E. (2009). Cyberchondria: Studies of the escalation of medical concerns in web search. *ACM Transactions on Information Systems, 27*(4), 1–37.
Widianto, S. (2021). Indonesia orders 20 million COVID-19 vaccine doses for private inoculations. Retrieved from https://www.reuters.com/article/us-health-coronavirus-indonesia-vaccine-idUSKBN2B70LV. (Accessed 2 June 2021).
Widianto, S., & Lamb, K. (2021). Instagram influencers are a vaccine priority in wary Indonesia. Retrieved from https://www.reuters.com/business/media-telecom/instagram-influencers-are-vaccine-priority-wary-indonesia-2021-01-14/. (Accessed 2 June 2021).
Wilson, L., Rubens-Augustson, T., Murphy, M., Jardine, C., Crowcroft, N., Hui, C., et al. (2018). Barriers to immunization among newcomers: A systematic review. *Vaccine, 36*(8), 1055–1062.
Wirth, J., Maier, C., Laumer, S., & Weitzel, T. (2015). Drivers and consequences of frustration when using social networking services: A quantitative analysis of Facebook users. In *Paper presented in Twenty-first Americas Conference on information systems* (Puerto Rico).
World Health Organization (WHO). (2020). A coordinated global research roadmap: 2019 novel coronavirus. Retrieved from https://www.who.int/blueprint/priority-diseases/key-action/Coronavirus_Roadmap_V9.pdf. (Accessed 2 June 2021).
Yin, P., Ou, C. X. J., Davison, R. M., & Wu, J. (2018). Coping with mobile technology overload in the workplace. *Internet Research, 28*(5), 1189–1212.
Zhang, H., Zhao, L., & Gupta, S. (2018). The role of online product recommendations on customer decision making and loyalty in social shopping communities. *International Journal of Information Management, 38*(1), 150–166.
Zheng, H., Sin, S. C. J., Kim, H. K., & Theng, Y. L. (2021). Cyberchondria: A systematic review. *Internet Research, 31*(2), 677–698.

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