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Avoiding real news, believing in fake news? Investigating pathways from information overload to misbelief

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Abstract
This study sought to examine the potential role of news avoidance in belief in COVID-19 misinformation. Using two-wave panel survey data in Singapore, we found that information overload is associated with news fatigue as well as with difficulty in analyzing information. News fatigue and analysis paralysis also subsequently led to news avoidance, which increased belief in COVID-19 misinformation. However, this link is present only among those who are frequently exposed to misinformation about COVID-19.

Keywords
COVID-19, fake news, information overload, misinformation, news avoidance

Introduction

Fake news has become a serious global concern that in the midst of the COVID-19 pandemic, the World Health Organization also declared an "infodemic" over the spread of fake news about the disease (Thomas, 2020). Inaccurate claims about the origin of the virus, home remedies to kill the virus, as well as about COVID-19 vaccination went viral on social media during the pandemic. A number of factors has been examined that may help explain why some individuals believe in misinformation, such as repeated exposure to the misinformation (Fazio et al., 2015; Pennycook et al., 2018) and confirmation bias, or when the fake news aligns with an individual's pre-existing beliefs (Cha et al., 2020;

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Ling, 2020). An important factor that some studies have explored is information overload (Bawden and Robinson, 2020). For example, Apuke and Omar (2021) found in a study involving social media users in Nigeria that information overload was related to frequency of sharing fake news related to COVID-19. Lazer et al. (2017) also argued that information overload, coupled with limited individual attention, may prevent adequate assessment of information on social media, which may contribute to misinformation. However, the pathway between information overload and believing in wrong information has not been sufficiently explored.

What many studies have examined and established is how experiencing information overload can increase news avoidance (Goyanes et al., 2021; Song et al., 2016), especially during the COVID-19 pandemic, when people across countries were exposed to a wealth of information about the COVID-19 (De Bruin et al., 2021; Ytre-Arne and Moe, 2021). News plays an important role in keeping the public informed about various issues and occurrences. By being informed, citizens can hopefully make better decisions, from whether they should bring an umbrella today to whether they should support a political party. This is why news is considered integral to a functioning democracy—people need regular access to accurate and reliable information to be able to responsibly participate in public affairs (Schudson, 2008). And yet, as fake news rose to buzzword status, news organizations in many parts of the world are seeing continuous decline in readership. While part of it comes from intense competition, part of it also comes from an increasing number of people actively avoiding the news.

Studies have documented several reasons for news avoidance, from readers being turned off by negativity in the news to readers finding most news stories to be not relevant to their daily concerns (Pentina and Tarafdar, 2014). A recurring explanation, however, is information overload. News outlets no longer compete with one another for audience attention, but also with non-news outlets, such as social media platforms and messaging apps, that have become significant sources of information for an increasing number of people (Newman, 2019). But while studies have explored the antecedents of news avoidance, comparatively less scholarly attention has focused on the consequences of avoiding the news.

Investigating consequences for news avoidance is particularly important in contexts where access to accurate information is critical, such as during the COVID-19 pandemic. Covered round the clock by news organizations around the world, the global health crisis also became a hotbed for misinformation. Against the backdrop of an abundant supply of COVID-19–related information and misinformation, a survey in the United Kingdom found that the initial increase in news consumption during the earlier stages of the COVID-19 outbreak was followed by a "significant increase in news avoidance" (Kalogeropoulos et al., 2020: para. 1). Similar findings were documented in other countries, such as in the Netherlands (De Bruin et al., 2021) and Norway (Ytre-Arne and Moe, 2021). What happens when individuals actively avoid the news about a timely and highly relevant topic that has also been the subject of a flurry of fake news and other types of misinformation?

One potential but still unexplored possibility is that individuals who experience information overload and actively avoid real news might fall prey to misinformation instead, especially in a period when the supply of both accurate and inaccurate information about

a rapidly evolving crisis is high. Information overload is particularly relevant to the small city-state of Singapore, which has universal internet access and high levels of internet and social media use (Statista, 2019). The Singapore Government also turned to social media platforms, such as the messaging app WhatsApp, on top of traditional news media, to update residents about number of COVID-19 cases and new regulations (Tandoc and Lee, 2020). While Singapore has a very small traditional news media market, dominated by one company that controls all newspapers and another company that controls all broadcast channels—both of which have strong ties with the government—Singapore residents also easily get their news from international sources, such as the BBC (Tandoc, 2021). Building on the growing body of work on information overload and news avoidance (e.g. Edgerly et al., 2017; Holton and Chyi, 2012; Park, 2019; Skovsgaard and Andersen, 2020; Song et al., 2016; Van Den Bulck, 2006), especially during the COVID-19 pandemic (De Bruin et al., 2021; Ytre-Arne and Moe, 2021), and using a two-wave national survey conducted in Singapore, a small nation that recorded among the highest number of COVID-19 cases in Asia, this current study revisits the link between information overload and news avoidance during the pandemic, and how this link may also affect belief in misinformation about COVID-19.

Literature review

Information overload

Humans are said to be cognitive misers. Our capacity to process stimuli is limited, so our "basic tendency is to default to processing mechanisms of low computational expense" (Stanovich, 2018: 424). Such limited capacity becomes salient in the context of information abundance, which can make individuals feel overloaded with information, or what others referred to as *information overload.* This situation occurs "when information-processing demands on the individual exceed their capacity to process the information, rendering them unable to process all informational inputs" (Pentina and Tarafdar, 2014). Studies have explored potential causes of information overload, particularly in the context of news. For example, Pentina and Tarafdar (2014: 213) identified the following reasons for information overload in the context of online news: "the sheer number and variety of news sources, the limited time available to process them, and the increasingly un-organized and non-verified content that is available from peer-produced and peer-curated sources such as blogs and social networks."

Information overload is related to how individuals navigate the presence of multiple choices. While having options is often a positive experience, the presence of too many options at some point can become cognitively challenging for individuals. Edgerly (2017: 362) argued: "When presented with many options, individuals find it hard to actively compare and evaluate attributes across options and, as a result, will take themselves out of the decision-making process." The negative impact of being confronted by an overload of choices, or what Scheibehenne et al. (2010: 409) referred to as the "choice overload hypothesis," has been investigated across different contexts. For example, D'Angelo and Toma (2017) found that online daters who had chosen their respective dates from a set of 24 potential partners reported feeling less satisfied with their choice

after a week compared with those who had chosen their dates from a set of only six options. Choosing places to travel or making decisions on online shopping were also found to be hampered by the presence of too many choices (Chen et al., 2009; Park and Jang, 2013).

News consumption is also marked by making choices on what to read or watch. Thus, studies have also examined information overload within the specific context of news. Song et al. (2016) proposed a theoretical model to examine the consequences of news overload. Through an online survey of 1200 adults in South Korea, they found that the higher the level of perceived news overload an individual reports, the more likely the individual to also suffer from analysis paralysis and news-related fatigue (Song et al., 2016). Analysis paralysis refers to the "inability to make decisions" in the midst of too much information (White and Dorman, 2000: 160); Song et al. (2016) operationalized this in their model as an individual's self-reported difficulty in processing information. News fatigue, on the other hand, refers to "the subjective, self-evaluated feeling of being tired of news consumption" (Song et al., 2016: 1179). They found that news overload led to news fatigue, but not to analysis paralysis; they also found that news fatigue is correlated with analysis paralysis (Song et al., 2016). However, the study focused on general news and not on a specific news topic, which could explain why it did not find a link between news overload and news paralysis. This current study thus adopts the theoretical model earlier proposed by Song et al. (2016) and examines it in the specific context of COVID-19–related news. Indeed, studies conducted during the COVID-19 pandemic have documented experiences of information overload due to the sheer volume of COVID-19–related information. For example, interviews with media consumers in Norway revealed how some experienced feeling that information about COVID-19 was "just too much" and that they found difficult to keep up (Ytre-Arne and Moe, 2021: 1748). Thus, guided by previous research on information overload during the COVID-19 pandemic (De Bruin et al., 2021; Ytre-Arne and Moe, 2021) and the framework earlier proposed by Song et al. (2016), we are focusing on COVID-19–related news and hypothesize that:

H1. COVID-19 news overload will lead to a) analysis paralysis and b) news fatigue.

News avoidance

Information avoidance refers to "any behavior intended to prevent or delay the acquisition of available but potentially unwanted information" (Sweeny et al., 2010: 341). Of course, individuals might be unable to attend to information because of structural reasons, such as lack of access or even not knowing that information is available. Thus, Golman et al. (2017) also referred to *active* information avoidance, or when an individual knows that information is available and has access to the information but still decides to avoid that information.

Information avoidance has also been studied in the context of news consumption, although Skovsgaard and Andersen (2020) correctly pointed out a lack of consensus in defining and operationalizing news avoidance. They observed that: "Despite increasing attention to the concept, scholars are far from reaching consensus on the extent of news

avoidance" (Skovsgaard and Andersen, 2020: 460). An earlier iteration was "newscast avoidance" which was coined in the context of political activists shunning daily television newscasts because they are dissatisfied with the political developments being reported (Grupp, 1970). In a study of television news exposure of secondary school students in Belgium, Van den Bulck (2006) proposed four types of television news exposure that also brings in the element of intentionality: intentional news selection, unintentional news selection, intentional news avoidance, and unintentional news avoidance. While the unintentional news avoider "watches the news rarely, not because they do not want to but because structural factors pull them away from the news," the intentional news avoider "does not like the news and consciously seeks to avoid watching it" (Van Den Bulck, 2006: 248). This distinction between intentional and unintentional news avoidance is important: "Understanding the underlying causes for these different types of news avoidance is crucial for understanding that they demand solutions at different levels" (Skovsgaard and Andersen, 2020: 460).

This current study focuses on active or intentional news avoidance, consistent with Song et al. (2016) who had found that the consequences of information overload—analysis paralysis and news fatigue—lead individuals to actively avoid the news. We are extending work in this area by focusing on a specific news context, which is the COVID-19 outbreak, instead of operationalizing news avoidance as a general news usage pattern (Skovsgaard and Andersen, 2020). In proposing their model, Song et al. (2016: 1176) had also argued that individuals who cannot cope with information overload "are likely to avoid receiving more news," hinting a potential direct link between information overload and news avoidance. Another study in South Korea also found that information overload directly led to news avoidance even in the context of social media (Park, 2019). This is also consistent with what other studies during the pandemic found, that information overload is linked with news avoidance (De Bruin et al., 2021; Ytre-Arne and Moe, 2021). Therefore, focusing on Singapore, we also hypothesize that:

H2. Analysis paralysis will lead to news avoidance.

H3. News fatigue will lead to news avoidance

H4. Information overload will lead to news avoidance.

Consequences of news avoidance

Studies exploring news consumption as well as news avoidance are grounded on the assumption that exposure and attention to news exert important effects on the individual and the society at large. For example, numerous studies have focused on the impact of news consumption across various platforms on political knowledge across different age groups, finding that news consumption, in general, leads to higher political knowledge (Moeller and De Vreese, 2015; e.g. Beam et al., 2016; Ran et al., 2016; Park and Kaye, 2019), except for the use of social media for news (e.g. David et al., 2019). But what about the impact of active news avoidance?

Studies on news avoidance have examined its effects on news curation and political participation. Song et al. (2016) found that those who actively avoid the news were more

likely to engage in news curation, which refers to using news aggregators to select and limit the news stories they receive. Edgerly et al. (2017) also found that news avoiders tend to have the lowest levels of political participation. However, does avoiding the news, which contains factual reports, lead to belief in misinformation? A survey of students, faculty, and staff members in two universities in Bangladesh during the COVID-19 pandemic found that information overload was positively related to sharing of unverified information (Laato et al., 2020). Sharing an article, however, may not necessarily mean believing in the article (Tandoc et al., 2020). Therefore, this current study builds on these previous studies and examines whether news avoidance is also positively related to believing in COVID-19 misinformation. While studies have distinguished between misinformation and disinformation by defining the former as inadvertent dissemination of inaccurate information and the latter as the intentional creation and propagation of falsehoods (Tandoc et al., 2017; Wardle, 2017), we are using the general term of misinformation, since it is beyond the scope of our study to scrutinize the intention behind the dissemination of falsehoods during the COVID-19 pandemic. Fake news refers to a specific type of misinformation that uses the format and language of real news, but since in this study we showed participants summaries of fake news narratives, instead of the whole fake news story, we use the more general term *misinformation*. Thus, we also predict that:

H5. News avoidance will lead to belief in misinformation about COVID-19.

News outlets in Singapore, just like in many other countries, devoted much of their day-to-day coverage to reporting about the developments related to the COVID-19 pandemic. However, avoiding the news may not necessarily mean avoiding all information about COVID-19 altogether, including both accurate and inaccurate information about the pandemic. For example, interviews with young adults in Singapore at the earlier stages of the pandemic showed that while some participants said they actively avoided news related to the pandemic, they still heard about it from interpersonal discussions with friends and family, in person as well as online, like in their family groupchats, where some received inaccurate information forwarded by their parents (Tandoc et al., 2020). Such finding is consistent with the conceptualization of information avoidance as not referring to a successful complete avoidance of a particular information, but to very low levels of exposure due to intentional avoidance and potentially unintentional exposure (Skovsgaard and Andersen, 2020). When individuals actively avoid news about COVID-19, and yet still potentially get exposed to other types of information about COVID-19, what kinds of information these might be? Some may be getting exposed to misinformation instead, which may lead them to develop misbeliefs (see Drummond et al., 2020; Pennycook et al., 2018). We argue, therefore, that news avoidance may lead to belief in misinformation, but only among those who frequently get exposed to misinformation. Since this plausible moderated effect has not been explored, we propose the following question:

RQ1. Does exposure to misinformation moderate the link between news avoidance and belief in misinformation?

Method

Participants and procedures

This study is based on a two-wave panel survey involving Singaporean participants, aged 21 and above, recruited from an online panel managed by international survey company Qualtrics. Out of 827 respondents who had initiated the survey, 767 completed the Wave 1 survey in March 2020. The Wave 2 survey was conducted about a month later in April 2020, and 540 participants completed the survey (retention rate of 70.4%).

The participants' age ranged from 21 to 76 (M_{W1} = 44.26, SD = 12.31; M_{W2} = 44.91, SD = 12.26) and slightly more than half were male (Wave 1, 52.0%; Wave 2, 54.6%). The majority were ethnic Chinese (Wave 1, 84.5%; Wave 2, 86.3%), followed by Malay (Wave 1, 8.3%; Wave 2, 8.0%); this means our sample slightly overrepresents Chinese Singaporeans, which accounts for 75.9% of the population based on government census data (Singapore, 2020). For both waves, the median education attainment was university graduate, and the median monthly household income was in the range of SGD 6000–7999 (equivalent to USD 4211–5615). The survey was administered in English and took about 15 min to complete (see Table 1 for other demographic statistics and descriptive statistics for measures).

Measures

Information overload. While Song et al. (2016) assessed perceived overload focusing on news, our current study includes general information besides news. This is in consideration of the fact that information about COVID-19 did not only come from news sources, as the Singapore Government was also proactive in disseminating information to the public through its WhatsApp alert service and online sites (Ministry of Communications and Information, 2020). The news industry in Singapore is also relatively small, dominated by only two media companies. Therefore, we decided to measure information—and not just news—overload. We adapted eight items from the information overload scale from Jensen et al. (2014) and the Health Information National Trends Survey (HINTS) questionnaire in the United States to assess feelings about the overwhelming amount of information on COVID-19. We slightly modified the statements to contextualize them. On a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree), participants reported their level of agreement with statements, including "There is not enough time to do all of the things recommended to prevent the COVID-19"; "No one could actually do all of the COVID-19 recommendations that are given"; "I forget most of the COVID-19 information right after I hear it"; and "It has gotten to the point where I don't even care to hear new information about the COVID-19." The scale is reliable (α = 0.87 at Wave 1, α = 0.89 at Wave 2) (Table 2).

Analysis paralysis. The participants also reported using a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree) to what extent they agreed or disagreed with each of these three statements assessing perceived inability to appraise the COVID-19 situation described in the news, which we also adapted from previous studies (Song et al., 2016;

Table 1. Sample profile and descriptive statistics.

	Wave 1 (n = 767)	Wave 2 (n = 540)
	M (SD) or %	M (SD) or %
Age	44.26 (12.31)	44.91 (12.26)
Gender (Male)	52%	54.6%
Ethnicity (Chinese)	84.5%	86.3%
Malay	8.3%	8.0%
Indian	4.8%	4.1%
Eurasian	0.7%	0.6%
Other	1.7%	1.1%
Education (Upper secondary or less)	12.3%	12.4%
Junior college, pre-university, polytechnic	30.2%	29.4%
University	45.9%	47.4%
Graduate/professional degree	11.6%	10.7%
Income (SGD) (below 3999)	19.6%	17.6%
4000–7999	35.5%	35.9%
8000–11999	24.6%	25.6%
12000 and above	20.4%	20.9%
Exposure to misinformation	1.97 (0.86)	2.12 (0.93)
News overload	2.73 (0.74)	2.83 (0.81)
Analysis paralysis	2.35 (0.91)	2.44 (0.96)
News fatigue	2.46 (1.02)	2.63 (1.06)
News avoidance	1.97 (0.98)	2.10 (0.92)
Belief in misinformation	2.23 (0.87)	2.09 (0.79)

Note. No significant differences were found across Wave 1 and Wave 2, except for exposure to misinformation, t (539) = –4.58, $p < .01$; news overload, t (539) = –2.87, $p < .01$; and belief in misinformation, t (539) = –3.50, $p < .01$. Wave 2 sample scored slightly higher in exposure to misinformation and news overload than Wave 1 sample, while Wave 1 sample scored higher belief in misinformation than Wave 2 sample.

Stanley and Clipsham, 1997): "I find it difficult to understand COVID-19 even after reading the news;" "I have a hard time in understanding news stories about COVID-19;" and "I feel like I still do not get the complete picture even after reading the news about COVID-19." The scale is also reliable ($\alpha = 0.83$ at Wave 1, $\alpha = 0.84$ at Wave 2).

News fatigue. To assess the subjective feelings of being tired of news consumption, we used three items adopted from Oppenheim (1997) and also used by Song et al. (2016). On a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree), participants reported their agreement with each of these three statements: "I feel tired of receiving and processing information about COVID-19;" "I feel exhausted due to too much news about COVID-19;" and "I am tired of hearing about COVID-19." The scale is likewise reliable ($\alpha = 0.89$ at Wave 1, $\alpha = 0.91$ at Wave 2).

Table 2. Bivariate correlations between study variables.

	1	2	3	4	5	6	7	8	9	10
1. Overload_W1	1									
2. Paralysis_W1	0.519***	1								
3. Fatigue_W1	0.574***	0.405***	1							
4. Avoidance_W1	0.436***	0.412***	0.732***	1						
5. Exposure_W1	0.197***	0.214***	0.147***	0.177***	1					
6. Belief_W1	0.225***	0.237***	0.142***	0.165***	0.426***	1				
7. Overload_W2	0.614***	0.456**	0.422**	0.308**	0.189**	0.240**	1			
8. Paralysis_W2	0.509***	0.798***	0.440***	0.494***	0.204***	0.224***	0.544***	1		
9. Fatigue_W2	0.493***	0.391***	0.540***	0.505***	0.071	0.110**	0.508***	0.501***	1	
10. Avoidance_W2	0.424***	0.432***	0.469***	0.454***	0.180***	0.170***	0.422***	0.532***	0.735***	1
11. Exposure_W2	0.110**	0.126**	0.075	0.112**	0.472***	0.254***	0.208***	0.197***	0.018	0.118**
12. Belief_W2	0.216***	0.217***	0.174***	0.192***	0.401***	0.613***	0.264***	0.292***	0.140***	0.204***

Note: Displayed values are Pearson correlation coefficients. Overload_W1/W2 = information overload at Wave 1 or 2; Paralysis_W1/W2 = analysis paralysis at Wave 1 or 2; Fatigue_W1/W2 = news fatigue at Wave 1 or 2; Avoidance_W1/W2 = news avoidance at Wave 1 or 2; Exposure_W1/W2 = exposure to misinformation at Wave 1 or 2; Belief_W1/W2 = belief in misinformation at Wave 1 or 2. $^{**}p < 0.01$. $^{***}p < 0.001$.

News avoidance. Recent studies measured news avoidance in different ways, such as by measuring usage of different news sources (e.g. Edgerly et al., 2017). However, Van den Bulck (2006: 236) argued, in the specific context of television news use, that "watching a program is not necessarily an expression of preference and not watching is not always an expression of avoidance." Thus, other studies measure news avoidance by specifically asking the extent to which individuals actively avoid the news (e.g. Song et al., 2016). For our study, we adapted one item derived from prior research on information avoidance (Howell and Shepperd, 2016; Miles et al., 2008) to specifically focus on news about COVID-19. On a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree), participants reported their agreement with the following statement: "I intentionally avoid news about COVID-19."

Exposure to misinformation. Participants were presented with inaccurate claims about the COVID-19 outbreak that went viral in Singapore. They were asked to report how often they heard or came across each claim on a 5-point scale (1 = never; 5 = a lot of times). We selected three misinformation claims that circulated in Singapore during the data collection period (between Wave 1 and Wave 2) and were debunked as false by the Singapore Government (Ministry of Communications and Information, 2020): (1) Woodlands MRT was closed for disinfection due to a suspected case of COVID-19 infection; (2) Gargling with salt water can protect you from COVID-19; and (3) Scientists have confirmed that the COVID-19 virus originated from a biowarfare lab located in Wuhan. Responses were averaged to create an index of exposure to misinformation ($\alpha = 0.67$ at Wave 1, $\alpha = 0.68$ at Wave 2).

Belief in misinformation. Participants were presented with the same set of inaccurate claims about the COVID-19 outbreak and asked to indicate to what extent they think each claim is true or false on a 5-point scale (1= definitely false; 5 = definitely true). We averaged responses to create an index of belief in misinformation, so that a higher score means stronger belief in misinformation about COVID-19 ($\alpha = 0.67$ at Wave 1, $\alpha = 0.69$ at Wave 2). A possibility is that for some participants, being exposed to the misinformation claim via the Wave 1 questionnaire may have influenced their belief in it in Wave 2. Therefore, in our analysis, we also controlled for Wave 1 exposure in our model.

Results

We performed structural equation modeling (SEM; AMOS 25), an approach that accounts for measurement errors by using latent variables (Aiken et al., 1994). All constructs, except exposure, news avoidance, and belief in misinformation, were treated as latent variables with respective measurements. We used the full information maximum likelihood (FIML) method to address missing data in Wave 2 (Graham, 2009). The robustness check using the balanced samples of those who completed both waves found largely consistent results as those found when using the imputed data employing FIML estimation.

For information overload, news fatigue and analysis paralysis, Wave 1 data were used, consistent with the model proposed by Song et al. (2016). However, to establish time order between news avoidance and its antecedents, we used news avoidance and belief in

misinformation measured at Wave 2. For information overload with 8 items, we employed item parceling (random algorithm) to reduce theoretically unimportant noise (Matsunaga, 2008). In the structural model testing, we controlled for age, gender, education, and income. Taking advantage of our panel data, we also controlled for news avoidance, exposure to misinformation, and belief in misinformation assessed at Wave 1 in the structural model.

Measurement model

To validate the measurement model, we ran confirmatory factor analysis (CFA) with all latent factors in the proposed model. According to Hu and Bentler (1999), a good model has a root mean square error of approximation (RMSEA) $\leqslant$0.06, a comparative fit index (CFI) $\geqslant$0.95, and a standardized root mean square residual (SRMR) $<$0.08. The final CFA model fitted satisfactorily (χ^2/df = 4.13, CFI = 0.98, RMSEA = 0.06, SRMR = 0.03). Standardized loadings of indicators were all above 0.60, ranging from 0.70 to 0.92 (Kline, 2011). The composite reliabilities (CRs) of latent variables ranged from 0.83 to 0.89 ($>$0.7) and the average variance extracted (AVE) values of the latent factors ranged from 0.63 to 0.73 ($>$0.5) (Hair et al., 2010). Also, the square root of each construct AVE was greater than its correlation with other latent factors (Hair et al., 2010). Thus, the CFA model had sufficient reliability, convergent and discriminant validity.

Structural model

The structural model, which incorporates all our hypotheses, has a good model fit adequately explaining the patterns of association between model constructs (χ^2/df = 2.86, CFI = 0.951, RMSEA = 0.049; SRMR = 0.075) (Hu and Bentler, 1999).

H1 expected that information overload will lead to a) analysis paralysis and b) news fatigue. As shown in Figure 1, the findings showed that consistent with our prediction, information overload was significantly associated with both analysis paralysis ($\beta = 0.48$, $p < .001$) and news fatigue ($\beta = 0.58$, $p < .001$). Thus, H1 is supported.

H2 predicted that analysis paralysis will lead to news avoidance. Similarly, H3 predicted that news fatigue with lead to news avoidance. Controlling for news avoidance at Wave 1, analysis paralysis ($\beta = 0.17$, $p < .001$) and news fatigue ($\beta = 0.14$, $p = .008$) at Wave 1 both increased news avoidance at Wave 2; this allows us to account for time order, where analysis paralysis and news fatigue were measured at an earlier timepoint, consistent with our prediction that they will subsequently lead to news avoidance. Thus, both H2 and H3 are supported. We also found that news fatigue was marginally associated with analysis paralysis ($\beta = 0.087$, $p = .066$).

H4 predicted a direct link between information overload and news avoidance. The model also found that as predicted, information overload at Wave 1 increased news avoidance at Wave 2 ($\beta = 0.20$, $p < .001$). Thus, H4 is also supported.

H5 predicted that news avoidance will lead to belief in misinformation. Controlling for belief at Wave 1 and exposure to misinformation at both waves, the analysis found that as predicted, news avoidance was positively associated with belief in misinformation ($\beta = 0.067$, $p = .036$). Thus, H5 is supported. We also found that news paralysis ($p = .76$) and news fatigue ($p = .19$) did not directly impact belief in misinformation at Wave 2.

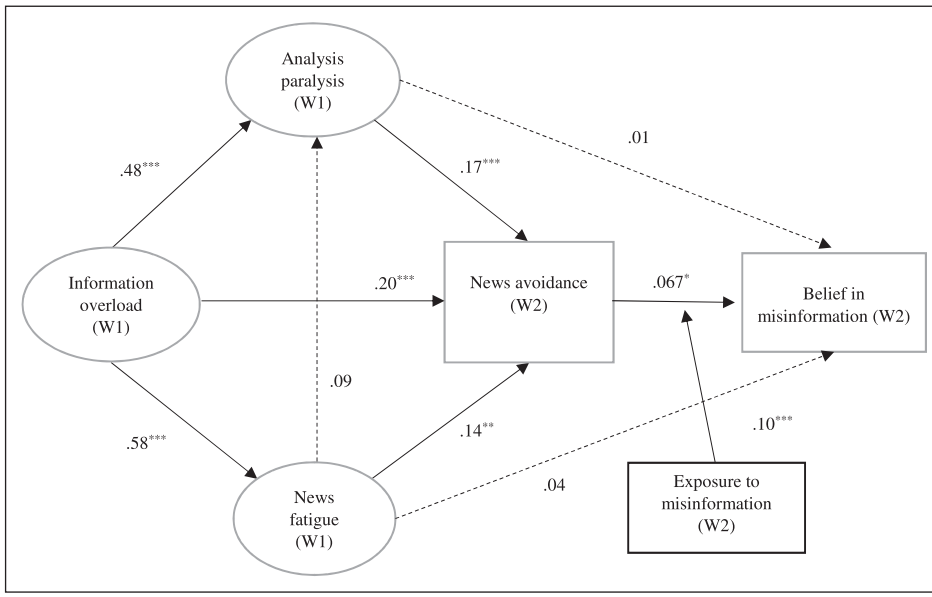

Figure 1. A conceptual model of misbelief formation. Note: Displayed values are standardized coefficients. Controlled for age, gender, education, income, ethnicity, news avoidance at Wave 1, exposure to misinformation at Wave 1, and belief in misinformation at Wave 1. * denotes $p < .05$, ** $p < .01$, *** $p < .001$.

Finally, RQ1 asked about the moderating effect of exposure to misinformation on the relationship between news avoidance and belief in misinformation in Wave 2. While we predicted that the link between news avoidance and belief in misinformation will be significant only among those who get exposed to fake news, there is no literature on this moderating effect. Thus, we raised a question, instead. We ran another structural model by adding the interaction term between exposure to misinformation and news avoidance (mean centered). This model had an acceptable model fit (χ^2/df = 2.79, CFI = 0.947, RMSEA = 0.048; SRMR = 0.074). There was a significant interaction between misinformation exposure and news avoidance on belief in misinformation ($\beta = 0.10$, $p < .001$). As presented in Figure 2, news avoidance increased belief in misinformation only among those who were more frequently exposed to the misinformation at Wave 2: (a) high exposure group, B = 0.11, 95% CI [0.06, 0.16], (b) average group, B = 0.056, 95% CI [0.01, 0.10] and (c) low exposure group, B = 0.001, 95% CI [−0.06, 0.06].

Discussion and conclusion

Using two-wave panel data that allows time-ordering of variables, we examined the potential role of information overload and news avoidance in explaining misbelief formation. This was carried out within the context of the COVID-19 pandemic in Singapore. This current study found that information overload was associated with news fatigue as

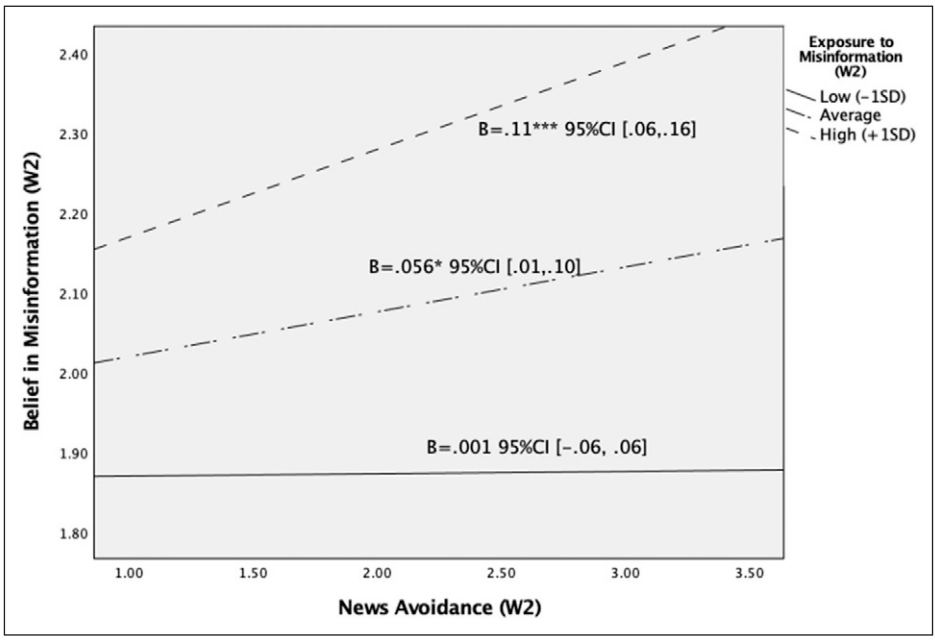

Figure 2. Effect of news avoidance on belief in misinformation by exposure level. Controlled for exposure to and belief in misinformation at Wave 1, * denotes $p < .05$, ***$p < .001$.

well as with difficulty in analyzing and processing related information. News fatigue and analysis paralysis also subsequently led to news avoidance, which made individuals more likely to believe in misinformation. However, we also found that this link is only present among those who are frequently exposed to misinformation. In other words, news avoidance can lead to higher propensity to believe in misinformation among those who are frequently exposed to misinformation.

The growing academic literature on news avoidance stems from the normative assumption that exposure and attention to news are important processes in a functioning democracy (Edgerly et al., 2017; Pentina and Tarafdar, 2014). We argue that this is more so in this era of misinformation. Individuals can fully and responsibly participate in social and political processes if they are sufficiently and correctly informed about issues and events related to public interest. In the context of a global health crisis, such as what the world witnessed with the COVID-19 pandemic, it is also important for individuals to know about important and accurate information that they can use to protect themselves and their loved ones. However, studies have documented that some individuals actively avoid the news (Edgerly et al., 2017; Pentina and Tarafdar, 2014). While the nature of news is partly to blame, such as its tendency to focus on negative stories, many studies have focused on the role of information overload (Pentina and Tarafdar, 2014). Exposed to an abundant supply of information, some individuals might feel overwhelmed, leading them to actively avoid news instead. This current study finds support for this hypothesis

even in the context of COVID-19–related news, consistent with the literature on general news avoidance (Edgerly et al., 2017; Holton and Chyi, 2012; Van Den Bulck, 2006).

Specifically, we find support for the earlier theoretical model proposed by Song et al. (2016), which they tested in an online cross-sectional survey in South Korea. Our study based on a two-wave panel survey found that information overload triggered news fatigue, which then led to news avoidance, consistent with what Song et al. (2016) had found. Our analysis also found a significant link from information overload to analysis paralysis to news avoidance, which Song et al. (2016) had hypothesized but did not find to be a statistically significant pathway. More importantly, we found a significant direct cross-lagged effect of information overload on subsequent news avoidance. These collectively emphasize the critical role of information overload in triggering news avoidance and demonstrate two important psychological mechanisms of such negative effect.

This current study also sought to expand this theoretical model as well as research on news avoidance by examining its negative consequences. While previous studies focused on exploring the effect of news avoidance on using news aggregation services, employing social media filtering of news, as well as engaging in various form of political participation (Edgerly et al., 2017; Park, 2019; Pentina and Tarafdar, 2014; Song et al., 2016), our study explored the impact of news avoidance on belief in misinformation (Apuke and Omar, 2021; Laato et al., 2020). If news is about informing readers, are news avoiders less informed, if not misinformed? This is a timely and relevant question, given the rise of misinformation that competes with real journalism not just for audience attention but also for social legitimacy (Tandoc et al., 2017; Mourão and Robertson, 2019; Cabañes, 2020). Therefore, we explored the impact of news avoidance on belief in misinformation.

We found that those who actively avoid the news about COVID-19 were more likely to believe in pieces of COVID-19 misinformation that went viral in Singapore—but only among those who are frequently exposed to misinformation. Our findings thus contribute to a growing body of work on the adverse effects of news avoidance (e.g. Edgerly et al., 2017; Song et al., 2016) by demonstrating its link to belief in misinformation. Our focus on this moderating effect, however, is exploratory; studies that examined the effects of news avoidance in the context of fake news only examined its direct impact on the frequency of sharing unverified information, not on the extent to which one believes in misinformation (Apuke and Omar, 2021; Laato et al., 2020). In our study, we specifically measured news avoidance—that is, news about COVID-19—instead of general information avoidance. Thus, it may be plausible that individuals who actively avoided *news* about COVID-19 may have still been exposed to other types of information about it, such as pieces of fake news online. Our study found that news avoidance leads to misbeliefs but only among those frequently exposed to misinformation.

Future studies can build on the expanded model we have tested here to go beyond beliefs and examine the effects of news avoidance on misinformed behaviors as well. Future studies can also explore the underlying mechanisms that can explain the impact of news avoidance on belief in misinformation. For instance, when people actively avoid real news, do they then pay more attention to non-news sources to compensate for what they might be missing, thereby inadvertently exposing themselves to unreliable information? Alternatively, when people actively avoid the news in this age of misinformation,

do they then potentially miss on the opportunity of being exposed to fact-checks conducted by, or disseminated through, news outlets?

The findings of this study must be understood within the context of several limitations. First, we examined our proposed expanded model of the antecedents and consequences of news avoidance within the specific issue of COVID-19. While it is a timely and globally relevant issue, news avoidance has also been conceptualized as a type of general news behavior; for example, Skovsgaard and Andersen (2020: 463) defined news avoidance as "low news consumption over a continuous period of time caused either by a dislike for news (intentional) or a higher preference for other content (unintentional)." Thus, future studies should also test whether our expanded model also holds in the long-term and with regards to a general news behavior, not just on a specific issue. For example, an individual might shun health-related news but might religiously follow business news. Second, our expanded model builds on an earlier model proposed by Song et al. (2016) and focuses on information overload as a predictor of news avoidance; future studies might expand these models by also accounting for other factors that lead to news avoidance, such as perceiving news to be too negative or irrelevant. Third, we relied on a two-wave panel survey, which allowed us to measure our predictor variables at an earlier time than our dependent variables; and yet the survey method also relies heavily on the ability and willingness of respondents to accurately report their attitudes, beliefs, and behavior. Fourth, we believe that it is important to continue exploring the consequences of news avoidance in terms of what people know—news is a source of accurate information, and if they actively avoid the news, how does it affect what they know about the world around them? We tried to address this question by examining impact on belief in misinformation, but future studies can also examine impact on other forms of learning from the news, such as on subjective knowledge and even knowledge miscalibration. Finally, our study was conducted within the context of Singapore, a small but technologically advanced nation, as well as during the earlier stages of the COVID-19 pandemic. While these contexts allowed us to keep our investigation focused, future studies should revisit the patterns we have uncovered here across different socio-political and temporal contexts. Still, despite these limitations, we hope that our findings can contribute to expanding and deepening what we know about the causes and effects of news avoidance as well as the role it plays in the process of misinformation.

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References

Aiken LS, Stein JA and Bentler PM (1994) Structural equation analyses of clinical subpopulation differences and comparative treatment outcomes: Characterizing the daily lives of drug addicts. *Journal of Consulting and Clinical Psychology* 62: 488–499.

Apuke OD and Omar B (2021) Social media affordances and information abundance: Enabling fake news sharing during the COVID-19 health crisis. *Health Informatics Journal* 27(3): 14604582211021470.

Bawden D and Robinson L (2020) Information overload: an introduction. In: *Oxford Research Encyclopedia of Politics*. Oxford, UK: Oxford University Press. DOI: 10.1093/acrefore/9780190228637.013.1360. (accessed 2020-06-30).

Beam MA, Hutchens MJ and Hmielowski JD (2016) Clicking vs. sharing: the relationship between online news behaviors and political knowledge. *Computers in Human Behavior* 59: 215–220.

Cabañes JVA (2020) Digital disinformation and the imaginative dimension of communication. *Journalism & Mass Communication Quarterly* 97(2): 435–452. DOI: 10.1177/1077699020913799.

Cha M, Gao W and Li C-T (2020) Detecting fake news in social media: an Asia-Pacific perspective. *Commun. ACM* 63(4): 68–71.

Chen Y-C, Shang R-A and Kao C-Y (2009) The effects of information overload on consumers' subjective state towards buying decision in the internet shopping environment. *Electronic Commerce Research and Applications* 8(1): 48–58.

D'Angelo JD and Toma CL (2017) There are plenty of fish in the sea: the effects of choice overload and reversibility on online daters' satisfaction with selected partners. *Media Psychology* 20(1): 1–27.

David CC, San Pascual MRS and Torres MES (2019) Reliance on Facebook for news and its influence on political engagement. *PloS one* 14(3): e0212263–e0212263.

de Bruin K, de Haan Y, Vliegenthart R, et al. (2021) News avoidance during the Covid-19 crisis: understanding information overload. *Digital Journalism* 9(9): 1286–1302.

Drummond C, Siegrist M and Árvai J (2020) Limited effects of exposure to fake news about climate change. *Environmental Research Communications* 2(8): 081003.

Edgerly S (2017) Seeking out and avoiding the news media: young adults' proposed strategies for obtaining current events information. *Mass Communication and Society* 20(3): 358–377.

Edgerly S, Vraga EK, Bode L, et al. (2017) New media, new relationship to participation? A closer look at youth news repertoires and political participation. *Journalism & Mass Communication Quarterly* 95(1): 192–212.

Fazio LK, Brashier NM, Payne BK, et al. (2015) Knowledge does not protect against illusory truth. *Journal of Experimental Psychology: General* 144(5): 993–1002.

Golman R, Hagmann D and Loewenstein G (2017) Information Avoidance. *Journal of Economic Literature* 55(1): 96–135.

Goyanes M, Ardèvol-Abreu A and Gil de Zúñiga H (2021) Antecedents of news avoidance: competing effects of political interest, news overload, trust in news media, and "news finds me" perception. *Digital Journalism*. DOI: 10.1080/21670811.2021.1990097.

Graham JW (2009) Missing data analysis: making it work in the real world. *Annual Review of Psychology* 60: 549–576.

Grupp FW Jr (1970) Newscast avoidance among political activists. *The Public Opinion Quarterly* 34(2): 262–266.

Hair JF, Black W, Babin B, et al. (2010) *Multivariate Data Analysis*. 7th edition. Upper Saddle River, NJ: Prentice Hall.

Holton AE and Chyi HI (2012) News and the overloaded consumer: factors influencing information overload among news consumers. *Cyberpsychology, Behavior & Social Networking* 15(11): 619–624.

Howell JL and Shepperd JA (2016) Establishing an information avoidance scale. *Psychological Assessment* 28(12): 1695–1708.

Hu LT and Bentler PM (1999) Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal* 6(1): 1–55.

Jensen JD, Carcioppolo N, King AJ, et al. (2014) The cancer information overload (CIO) scale: establishing predictive and discriminant validity. *Patient Education and Counselling* 94(1): 90–96.

Kalogeropoulos A, Fletcher R and Nielsen RK (2020) *Initial Surge in News Use Around Coronavirus in the UK Has Been Followed by Significant Increase in News Avoidance*. Rochester, NY: SSRN. (accessed on 6 June 2020).

Kline RB (2011) *Principles and Practice of Structural Equation Modeling*. 3rd edition. New York, NY: Guilford Press.

Laato S, Islam AKMN, Islam MN, et al. (2020) What drives unverified information sharing and cyberchondria during the COVID-19 pandemic? *European Journal of Information Systems* 29(3): 288–305.

Lazer D, Baum M, Grinberg N, et al. (2017) *Combating Fake News: An Agenda for Research and Action*. MA: Shorenstein Center on Media, Politics and Public Policy.

Ling R (2020) Confirmation bias in the era of mobile news consumption: the social and psychological dimensions. *Digital Journalism* 8(5): 596–604.

Matsunaga M (2008) Item parceling in structural equation modeling: a primer. *Communication Methods and Measures* 2(4): 260–293.

Miles A, Voorwinden S, Chapman S, et al. (2008) Psychologic predictors of cancer information avoidance among older adults: the role of cancer fear and fatalism. *Cancer Epidemiology and Prevention Biomarkers* 17(8): 1872–1879.

Ministry of Communications and Information (2020) *Clarifications: Misinformation, Rumours Regarding COVID-19*. Singapore: Ministry of Communications and Information.

Moeller J and de Vreese C (2015) Spiral of political learning: the reciprocal relationship of news media use and political knowledge among adolescents. *Communication Research* 46(8): 1078–1094.

Mourão RR and Robertson CT (2019) Fake news as discursive integration: an analysis of sites that publish false, misleading, hyperpartisan and sensational information. *Journalism Studies* 20(14): 2077–2095.

Newman N (2019) Executive Summary and Key Findings of the 2019 Report. Oxford, UK: Digital News Report (accessed on 1 November 2019).

Oppenheim C (1997) Managers' use and handling of information. *International Journal of Information Management* 17: 239–248.

Park CS (2019) Does too much news on social media discourage news seeking? Mediating role of news efficacy between perceived news overload and news avoidance on social media. *Social Media + Society* 5(3): 2056305119872956.

Park CS and Kaye BK (2019) Mediating roles of news curation and news elaboration in the relationship between social media use for news and political knowledge. *Journal of Broadcasting & Electronic Media* 63(3): 455–473.

Park J-Y and Jang S (2013) Confused by too many choices? Choice overload in tourism. *Tourism Management* 35: 1–12.

Pennycook G, Cannon TD and Rand DG (2018) Prior exposure increases perceived accuracy of fake news. *Journal of Experimental Psychology: General* 147(12): 1865–1880.

Pentina I and Tarafdar M (2014) From "information" to "knowing": Exploring the role of social media in contemporary news consumption. *Computers in Human Behavior* 35: 211–223.

Ran W, Yamamoto M and Xu S (2016) Media multitasking during political news consumption: a relationship with factual and subjective political knowledge. *Computers in Human Behavior* 56: 352–359.

Scheibehenne B, Greifeneder R and Todd PM (2010) Can there ever be too many options? A meta-analytic review of choice overload. *Journal of Consumer Research* 37(3): 409–425.

Schudson M (2008) *Why Democracies Need an Unlovable Press*. Cambridge, UK: Polity Press.

Singapore (2020) *Population in Brief 2020. Reportno. Report Number, Date. Place Published*. Institution.

Skovsgaard M and Andersen K (2020) Conceptualizing news avoidance: towards a shared understanding of different causes and potential solutions. *Journalism Studies* 21(4): 459–476.

Song H, Jung J and Kim Y (2016) Perceived news overload and its cognitive and attitudinal consequences for news usage in South Korea. *Journalism & Mass Communication Quarterly* 94(4): 1172–1190.

Stanley AJ and Clipsham PS (1997) Information overload—Myth or reality? *IEE Colloquium (Digest)* 97(340): 1–4.

Stanovich KE (2018) Miserliness in human cognition: the interaction of detection, override and mindware. *Thinking & Reasoning* 24(4): 423–444.

Statista (2019). *Internet User Penetration in Singapore from 2017 to 2023*. Hamburg, Germany: Statista. Available at: https://www.statista.com/statistics/975069/internet-penetration-rate-in-singapore/

Sweeny K, Melnyk D, Miller W, et al. (2010) Information avoidance: who, what, when, and why. *Review of General Psychology* 14(4): 340–353.

Tandoc E (2021) *Singapore*. Reuters Institute Digital News Report (accessed on 5 July 2021).

Tandoc E, Huang A, Duffy A, et al. (2020) To share is to receive: news as social currency for social media reciprocity. *Journal of Applied Journalism & Media Studies* 9(1): 3–20.

Tandoc E and Lee JCB (2020) *When Viruses and Misinformation Spread: How Young Singaporeans Navigated Uncertainty in the Early Stages of the COVID-19 Outbreak*. 24(3): 778-796. New Media & Society. DOI: 10.1177/1461444820968212.

Tandoc E, Lim ZW and Ling R (2017) Defining "fake news:" A typology of scholarly definitions. *Digital Journalism* 6(2): 137–153.

Thomas Z (2020) *WHO Says Fake Coronavirus Claims Causing 'Infodemic*. London, UK: BBC. (accessed on 22 March 2020).

Van den Bulck J (2006) Television news avoidance: exploratory results from a one-year follow-up study. *Journal of Broadcasting & Electronic Media* 50(2): 231–252.

Wardle C (2017) *Fake News. It's Complicated*. https://firstdraftnews.org/articles/fake-news-complicated/ (accessed on 1 April 2017).

White M and Dorman SM (2000) Confronting information overload. *Journal of School Health* 70(4): 160.

Ytre-Arne B and Moe H (2021) Doomscrolling, monitoring and avoiding: news use in COVID-19 pandemic lockdown. *Journalism Studies* 22(13): 1739–1755.

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