AN INFODEMIC ON TOP OF AN EPIDEMIC?

An experimental study of the effects of source and content of information regarding an epidemic on feelings of security and response of citizens

Abstract:
Accurate information regarding an epidemic is vital for the feeling of security of people. However, during previous epidemics, besides accurate information, misinformation was spread. Feelings of uncertainty caused by the outbreak of the epidemic make people search for as much information as possible while paying less attention to the quality of the information and mistaking misinformation for accurate information. Using a survey experiment, this research investigated how source and content of information influence intended behaviour and transmission by people, as well as their feelings of security. Respondents read a scenario in which information about an epidemic was presented to them. The different vignettes differed from each other on the authority of the source and the level of included threat-related information Results showed that the authority of the source positively influenced either the intended change in behaviour, intended transmission and feelings of security. The inclusion of more threat-related information did not have a significant effect on any of those.

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Proem

The process of my thesis was characterized by the still ongoing COVID-19 crisis, a global pandemic. I was fascinated by the vast amount of information that was shared online and instructed people to do all kind of things to keep themselves secure from the disease or the panic accompanying it. While a substantial part of the information was well intended and accurate, other parts were ridiculous (like encouraging people to hoard toilet paper) or even harmful (promoting dangerous and not-working medicines). This got me thinking, and eventually let to the topic of this research.

This research would not have taken shape, if it were not for some specific people. First of all, I would like to thank dr. Honorata Mazepus, who was extremely helpful, supportive and quick to adjust to the circumstances given the lockdown situation. I also would thank the second reader, Dr. James Shires, who justly pointed me at some ethical aspects which came with this research, among other things.

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Introduction

Motive

The year 2020 had only just begun when the world saw the rise of a new, and yet unknown virus which did not only spread a disease, but also caused chaos and panic all over the globe. While medics and virologists searched diligently for medicines and potential vaccinations, public administrators and policy makers tried to keep society secure and sustained for the problems which were caused by the virus. As with all new and unknown phenomena, the virus and the measurements against it were accompanied by countless rumours and, sometimes conflicting, theories (Mian & Khan, 2020). The cause of these rumours are feelings of anxiety and uncertainty that make people try to get as much information as possible while paying less attention to the quality or source of the information (Wiederhold, 2020). This way, it may only result in more chaos and less feelings of security in the end. Therefore, it is very important to look into what kind of information during an epidemic could create more feelings of security.

Problem outline: information, a threat to security feelings?

A great danger to the feeling of security when it comes to information, is the existence of misinformation. Fake news, misinformation and disinformation have been hot topics for quite some time already. The spread of false information is a serious threat the world is facing. The World Economic Forum already ranked the spread of misinformation online as one of the 10 most significant issues facing the world in 2013 (Lewandowsky, Ecker, & Cook, 2017; Del Vicarioa, et al., 2016). Today, seven years later, we have seen how misinformation has been used to influence behaviour of people and play a significant role during important events, such as elections (Lewandowsky, Ecker, & Cook, 2017). Therefore, it is safe to say that misinformation in a democracy is highly problematic, as well-informed people are the premise of a functioning democracy (Bakir & McStay, 2018; Kuklinski, Quirk, Jerit, Schwieder, & Rich, 2000). Misinformed people may make decisions which are not in their best interest and can have unpropitious consequences (Lewandowsky, Ecker, & Cook, 2017). Misinformation can therefore be a real threat to democracy. Feelings of (in)security and misinformation have another interactive relationship as well, as Bar-Tal and Jacobsen (1998) found. They describe that lesser feelings of security are not only the result of misinformation, but also the cause: "Individuals often freeze their security beliefs by rejecting alternative threatening information and by absorbing whatever is consistent with their held security beliefs. Individuals may therefore not find it easy to change or adjust their security beliefs, even in view of new critical information" (Bar-Tal & Jacobson, 1998, p. 62). Therefore, it can be concluded that people even actively search for misinformation and alternative truths to strengthen their, possible false, beliefs of security. Algorithms as used by Google and Facebook contribute even more to confirming peoples beliefs by showing people information in line with information these people have already searched for (Sumpter, 2018; Bakir & McStay, 2018).
In the end, this self-reinforcing relationship between misinformation and feelings of (in)security may lead to even more disastrous results: "There is evidence that the presence of misinformation causes people to stop believing in facts altogether" (Lewandowsky, Ecker, & Cook, 2017, p. 7). So, if misinformation circulates, uncorrected, in closed communities, the democratic ideal of people who seek consensus through speaking rationally in a public sphere gets further out of sight. The logical result would be highly polarised societies, decreased both confidence as well as trust in government's legitimacy, and inappropriate democratic decisions taken based on affective misinformation (Bakir & McStay, 2018).

When it comes to (mis)information in the setting of an epidemic, it becomes clear that especially misleading theories concerning medical facts can be really problematic (Pennycook, McPhetres, Zhang, & Rand, 2020; Chou, Oh, & Klein, 2018) and have been a growing problem for years (Jolly & Lamberty, 2020). This does not contribute to the feelings of security at all, on the contrary, misinformation during an epidemic only adds confusion to an already palpable sense of fear (Bellingcat Investigative team, 2020; Kask, 2020). More concrete, and quite recent, during the 2014 Ebola outbreak, unfunded myths on social media created hostility towards health workers, which made

it more difficult to control the epidemic (Chou, Oh, & Klein, 2018). In fact, one in four citizens of Congo believed the statement that Ebola did not exist, while Ebola was present in Congo at that time (Vinck, Pham, Bindu, Bedford, & Nilles, 2019). In the United States, at the time of the HPV vaccine, lower vaccination rates were found in states where misinformation and conspiracies were more prevalent on Twitter (Dunn, et al., 2017). Even more recent, misinformation concerning the COVID-19 outbreak lead to widespread discrimination and xenophobia against Chinese people, even though the claims concerning misinformation were debunked promptly by the authorities (Shimizu, 2020). Misinformation during the COVID-19 has been eroding public trust and undermining health officials in ways that could elongate and even outlast the pandemic (Fisher M. , 2020).

The growing ecosystem of misinformation and public distrust around the COVID-19 outbreak has led the World Health Organization to warn for a so called "infodemic" (Richtel, 2020). An infodemic is defined as "an over-abundance of information – some accurate and some not – that makes it hard for people to find trustworthy sources and reliable guidance when they need it" (World Health Organization, 2020). An infodemic can therefore be understood as a global epidemic of information, in which some information can be considered misinformation and rumours, (Zarocostas, 2020). An infodemic has the potential to be just as dangerous for societies as the outbreak itself (Jolly & Lamberty, 2020). For these reasons, and many more, misinformation regarding epidemics are a real threat to nation-states and their societies.

Even though people increasingly find ways to inform themselves and therefore are trying to maintain feelings of security, government is in an increasing way responsible for the safety and protection of their citizens (Parker, Persson, & Widmalm, 2019). "So, as well as acting to combat the spread of COVID-19, governments should also act to stop misinformation and conspiracy theories relating to the virus" (Jolly & Lamberty, 2020). Therefore, governments, who are traditionally tasked to maintain the democracy and security in society, have to find a way to, besides that, tackle this threat of misinformation by providing accurate information which creates feelings of security among people. Consequently, in the face of an epidemic, it is vital for governments to be transparent and relay clear, honest information to the public (Mian & Khan, 2020). The questions that arise are how and whether or not the source, being the government, will matter enough? Vasu et al. (2018) studied the likelihood of people believing the information conveyed, but there is not enough knowledge concerning how the presence of (mis)information is cognitively processed by individuals in terms of security.

Question and objective of this research

The above problem outline shows there is reason for more investigation of the interaction between (mis)information regarding epidemics and how it affects feelings of security. In this research, (mis)information regarding epidemics will be investigated looking at whether people are willing to further transmit the information, whether they are willing to change their behaviour and what this means for their feelings of security. Combining these concepts with the issue stated above, leads to the following research question:

> *To what extend is the perception of security and the response of citizens to an epidemic influenced by the source and content of information online concerning the epidemic?*

To be able to answer this research question, four sub questions need to be answered. These sub questions can be divided into theoretical and empirical questions. The literature will provide the answers to question one and two, while questions three and four will be empirically answered through an experimental survey. The sub questions are:

1. What is misinformation, misinformation on epidemics and why does this pose a threat?
2. What are feelings of security, and how are those influenced by (mis)information?
3. To what extend do people transmit information on an epidemic they have read?
4. To what extend do people change their behaviour because of information they have read?

This research focuses on the feelings of security people have after they have read information regarding an epidemic, as well as how they respond to this information. The feelings of security and the responses to this information, regarding a hypothetical epidemic caused by a completely fictional virus, will be tested experimentally. By investigating how people respond to different conditions, the possibility will arise to have an overview of the influence of factors to information, like source and content.

Relevance

The academic relevance of this study can be found in the lack of studies done on the relationship between (mis)information, the response to (mis)information and the perception of security as the relationship between misinformation, response of the government and the perception of security has not been studied yet. Misinformation is a hot topic in academics. Research has been done on how misinformation relates to uncertainty and anxieties (Douglas, Sutton, & Cichocka, 2017; Jolley & Douglas, 2014), but not directly to the perception of security.
Apart from contributing to study on the relation of (mis)information and perception of security and how people respond to misinformation, this research combines the three concepts to the topic of response to misinformation on epidemics. "There is very little research that explores ways to improve the development and delivery of instructing information in times of crises" (Coombs, 2009, p. 106) of which an epidemic is an example. This research will therefore add to the body of knowledge around the theme of response to misinformation on epidemics, which will in all probability become a very relevant research topic in upcoming years, since the current COVID-19 crisis will be thoroughly researched and evaluated.

The relevance of this research is not limited to academics but also has a societal side to it. The phenomenon of misinformation and its influence is a problem we are facing today and will probably continue to face in the future, possibly even in an increasing way. Since the connectivity in the world is increasing, it is easier for people to help themselves to all sorts of information and misinformation (Bakir & McStay, 2018). Since it is the task of the government to keep the citizens safe, this research will be valuable to governments (Parker, Persson, & Widmalm, 2019). When crises happen, government officials should focus on the delivery of timely information (Liu, Fraustino, & Jin, 2015), especially during crises which concern healthcare they should make sure that information is available online in real-time for the effective dissemination of crisis information (Park & Avery, 2018). Therefore, this research, which looks into conditions which influence feelings of security when it comes to online information during an epidemic, could help governments in providing ways to supply accurate information in the right way to their citizens. The provision of accurate information to citizens will contribute to preventing chaos and insecurity due to possible misinformation (Stone, 2012). Besides the fact that the research could help the government contribute to safety, it might also create awareness among citizens on the topic of misinformation in general, and specifically on the topic of epidemics. Misinformation regarding epidemics touches on another core value within society besides safety, namely health. At the time of writing of this research, the COVID-19 outbreak, as mentioned earlier, is very present in society. As described, this epidemic is, similar to previous epidemics, accompanied by all kinds of information and misinformation regarding this epidemic. Results of this research could possibly contribute to improving information flows in this current crisis and any similar crises in the future, which could help policymakers avoid introducing harmful policies, improve public understanding of the ongoing epidemic and the measures against it, and, most importantly, save lives.

Reading guide

The next chapter concerns the three theoretical concepts used to answer the research question. After separately discussing the concepts of misinformation regarding epidemics and perception of security, the link between the concepts will be described. Following the description of the link between the concepts, several hypotheses about that link are formulated. After that, the methodology and the used research design in this research will be illustrated. Important factors such as validity, reliability and the way of data conduction are discussed. Resolving from the methodology the experimental survey used

to conduct data is presented in the appendix. Subsequently, preparatory to the test results of the hypotheses, the sample characteristics, the manipulation checks, covariates and used scales are explained. When all these analyses have been presented, the results are discussed and elucidated on the basis of the literature presented earlier in the theoretical framework. At this point the limitations of this research are presented. This is done to put the results of this research into perspective. At last, the conclusion to this research formulates the most notable findings of this research, an answer to the main question, as well as both practical recommendations and opportunities for eventual future research.

Theoretical framework

To answer the research question as formulated in the previous chapter, it is important to look at the concepts used in this research. The two main concepts in this research are;

1) Conditions of online (mis)information provision during crises
    - The crisis researched: epidemics
    - The biggest threat to information provision: misinformation
    - (Mis)information regarding epidemics
2) Perception of security

In order to research the relationship of the two main concepts, it is important to define both of them. Firstly, information provision during crises is defined. After that, two primary conditions of this first concept are illustrated. Secondly, the concept perception of security is presented.

Conditions of online information provision during crises

Before the conditions of online information provision during crisis can be set, it is important to look at how this concept is built. The key to this concept is the word information. Information can be defined as the characteristics of the output of a process, these being informative about the process and the input (Losee, 1997). Information provision during crises is therefore understood as the provision of information, as defined by Losee (1997) on the topic of and during a crisis. Epidemics are an example of a crisis (Quick & Feldman, 2014) that is used in this research. During crisis that present immediate danger, it is very important for the people affected by the crisis to have quick access to relevant and trustworthy information provision (Huang, Starbird, Orand, Stanek, & Pedersen, 2015; Oh, Agrawal, & Rao, 2013). The rise of the internet radically changed the way people access information and communicate (Alfonso & Suzanne, 2008). It has enabled citizens to be a part of crises events as never before. The online platforms, such as social media, have created a place to exchange information in the wake of crises events (Huang, Starbird, Orand, Stanek, & Pedersen, 2015). Therefore several authors even argue that the internet and social media are rapidly becoming the primary place to look for information during a crisis (Graham, Avery, & Park, 2015; Austin, Fisher Liu, & Jin, 2012; Jin, Liu, & Austin, 2014). Furthermore, the internet is used extensively for health information (Baker, Wagner, Singer, & Bundorf, 2003; Wathen & Burkell, 2002) and during crises that present immediate danger, people look quick, trustworthy information to safeguard themselves (Oh, Agrawal, & Rao, 2013). The use of the Internet for health information combined with the critical nature of the information that users seek and the limited time available, makes it vulnerable for the threat of misinformation (Oh, Agrawal, & Rao, 2013) and presents the distress for credibility assessment (Jadad, Haynes, Hunt, & Browman, 2000; Winker, et al., 2000).With the growing popularity of the internet not only the accessibility of information but also the speed of information sharing increased (Huang, Starbird, Orand, Stanek, & Pedersen, 2015). These developments are extremely useful during a crisis and its ever-changing conditions, but they also have a downside to them. Increasing accessibility and speed of sharing result in a more dynamic communication system "where information changes hands at record speed and local issues can become global in a matter of seconds", make people more susceptible of the biggest threat to information provision: misinformation (Huang, Starbird, Orand, Stanek, & Pedersen, 2015; Alfonso & Suzanne, 2008). Misinformation will be further defined and discussed later on. Younger audiences (under the age of 35) prefer online media over traditional media in times of crises (Park & Avery, 2018; Kapp, 2013). Meanwhile, Park and Avery (2018) found that younger generations have higher levels of distrust and scrutiny, when it comes to online media. A possible explanation for this would be that younger people, have developed this attitude by their heavily engaged use of social media (Park & Avery, 2018). Besides that, older people fail more often at Source Monitoring and are therefore more vulnerable to manipulation, (Mitchell, Johnson, & Mather, 2003). Given the fact that the internet, and especially social media, are the fruitful environment for the spread of misinformation (Del Vicarioa, et al., 2016), it is first of all important to examine how people decide what information they deem to be accurate, as credible sources become harder to distinguish from less credible sources (Andie, 1997).

When it comes to further assessing the credibility of online information, the main two conditions are: the source and content of the information (Eastin, 2001). People take account of source characteristics while making both predictive and evaluative judgments of quality and authority (Rieh, 2002). They evaluate unfamiliar information online by looking at the source of the message to judge its credibility. This practice comes with a risk, as anyone could disseminate online (mis)information under any name (Eastin, 2001; Rieh & Becklin, 1998). This source-theory is confirmed by Nyhan and Reifler (2010) who point out that statements of facts by an authoritarian source are not reflective of how citizens typically receive information (Nyhan & Reifler, 2010, p. 304). People usually find corrective information in news reports, newspapers and talk shows, in which both sides of an argument are posed against each other, which may suggest it concerns opinions instead of facts (Nyhan & Reifler, 2010). In such practices, people are likely to resist or reject arguments and evidence contradicting their opinions (Bar-Tal & Jacobson, 1998). Those practices are therefore "significantly more ambiguous than receiving a correct answer from an omniscient source" (Nyhan & Reifler, 2010, p. 304). Besides mistaking the source for being genuine, one of the reasons why people may take misinformation for truth is found in people deeming the content of the information plausible (Mercier, 2017, p. 115). As both the source and the content of information found online is used by people to assess the credibility of the information, both these conditions are further specified below and investigated in this research experiment.

Source: authority is key

On the topic of information source, people give higher authority to information online from academic institutions and government institutions than to other organisations or individual authors (Rieh, 2002). The influence of the authority of a source has been researched a lot. A well-known example is the Milgram experiment (1974). This experiment was developed to test the power of authority. Up to 65 percent of the people who took part in the experiment did what they were told and delivered a shock of 450 volts to another person, not knowing that the shock was not present, just because someone with authority told them to. The Milgram experiment points out that people, to some extent, blindly follow people with authority, without questioning whether they agree with the content. Later authors critique the experiment. Haslam and Reicher (2012) for example, argue people do not just follow passively and unthinkingly. They state willingness to follow authorities is conditional on identification with the authority in question and an associated belief that the authority is right. Yet, those studies present another reason why it is very important for people and organizations with authority, such as the government, to present correct information (Benjamin Jr & Simpson, 2009), as people may still follow the authority, without questioning the content. Mercier (2017) and Petersen (2020) add to the point that people are not gullible to just follow a demagogue. People look for information and authorities which fit their beliefs. When searching for the optimal leader to solve conflict-related problems of coordination, people tend to seek out candidates who are willing to violate normative expectations. even when taking into consideration that under some circumstances such personalities can be considered unappealing (Bang Petersen, 2020). From all above can be concluded that the way people asses the source and authority behind the information can be more decisive than the content of the information, and that they may act upon information, just because of the authority of the source.

Content: a threat makes it more concrete

Content is, next to source, a condition to take into consideration on the topic of information provision. When it comes to the content of information, people tend to select and share content related to a specific narrative and to ignore the rest (Del Vicarioa, et al., 2016). On the topic of transmitting information, people are far less discerning about which information they would share online, compared to which information they would rate as accurate (Pennycook, McPhetres, Zhang, & Rand, 2020). Pennycook et al. (2020) proved this, by showing a series of news headlines about COVID-19 to two groups of people. Half of the headlines were true, and half were false; the respondents were not told which were right and vice versa. On average in the first group, 47% of the accurate headlines and 43% of the inaccurate headlines were considered worth sharing. The other group was asked to rate the accuracy of a single headline unrelated to COVID-19 before performing the same task. This seemed to make them more discerning, because they went on to say they would consider sharing 50% of the true

reports and 40% of the false headlines. This is bad, as while people may not belief the misinformation themselves, they might transmit it to others who do believe it but would not have gotten it otherwise. On the topic of transmitting information, Blaine and Boyer (2018) found in four studies that people are very sensitive to threat detection and are therefore more likely to transmit information containing threats than other information. They discovered people privileged threat-related information over other positive or neutral items, but also over other negative material. "Adding explicit information to the effect that the dangers described were unlikely, (…) even adding potentially more relevant positive information about the products, left the threat related information items as more likely to survive cultural transmission than any other material" (Blaine & Boyer, 2018, p. 73). This is an interesting study in various ways, as it shows people preferably share threat-related information over any other information, and besides that, do not seem to care whether or not the information they share is unlikely to happen compared to other available information. The perceptions of accuracy and social media sharing are not two versions of the same judgment (Pennycook & Rand, 2020). This concept of people preferring to share threat-related information over other information resembles one of the characteristics of news. Because of its professional values, news tends to emphasize conflict and dissention (Schudson, 1995). To put it bluntly, in a bid to increase viewership, major media organisations are creating dramatic headlines, whilst healthcare professionals are still learning about the virus, which only serves to fuel panic amongst the general public (Mian & Khan, 2020). Following the theories of Del Vicarioa, et al. (2016), Pennycook et al. (2020) and Blaine and Boyer (2018), threatening headlines covering an epidemic, even while they may not be deemed very plausible, will be eagerly shared further by the people, creating panic and lesser the feelings of security (Mian & Khan, 2020). On the contrary, Rieh and Hilligoss (2008) found that credibility judgments are socially directed. If the use of information had the potential to affect others, people are more likely to take credibility issues seriously (Rieh & Hilligoss, 2008).

To sum up, during crises the internet and social media are the primary place for people to find their information. People asses the credibility of the information they find online by judging the source and the content of the information. According to the literature, the authority of the source alone can be enough to make people attune their actions. Concerning content, several studies showed people are more likely to share threat-related information, compared to information which does not present that threat, even though they might not even think that the threat-related information is accurate. The authority of source and threat related information are investigated in this research.

Epidemics

The crisis investigated in this research is an epidemic, therefore it is necessary to understand what an epidemic is. According to the World Health Organisation (WHO) an epidemic can be defined as follows: "*The occurrence in a community or region of cases of an illness, specific health-related behaviour, or other health-related events clearly in excess of normal expectancy. The community or region and the period in which the cases occur are specified precisely. The number of cases indicating the presence of an epidemic varies according to the agent, size, and type of population exposed, previous experience or lack of exposure to the disease, and time and place of occurrence*" (World Health Organization, 2020). An epidemic can evolve into a pandemic, such as the COVID-19 virus. A pandemic is defined as an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people (Last, Harris, Thuriaux, & Spasoff, 2001). A pandemic can therefore be defined as an epidemic occurring worldwide (Kelly, 2011, p. 540). Governments can only control their own country which makes a pandemic more complicated since it does not take borders into consideration while spreading. This research focusses on epidemics only. This research therefore provides a starting point for future research on information regarding pandemics.

Misinformation

In the introduction of this research the concept of misinformation has already been discussed and how it has been an additional danger in times of crises, specifically epidemics. As misinformation is a very big threat to the provision of information during epidemics, therefore this concept will be further specified.

Even though misinformation seems to be a hot topic nowadays, Vasu et al. (2018) mention that the concept of misinformation is not new. It only seems to pose a greater challenge today, as the velocity of information has increased drastically since messages can be spread internationally within seconds (Vasu, et al., 2018). Misinformation is a concept linked to the overarching concept of fake news; false news stories that are packaged and published as if they are accurate (DiFranzo & Gloria-Garcia, 2017). Vasu et al. (2018) breakdown this overarching concept of fake news by explaining the differences between the concept of misinformation and related comparable concepts:

Disinformation	Falsehoods and rumours knowingly distributed to undermine national security, which can be part of state-sponsored disinformation campaigns
Misinformation	Falsehoods and rumours propagated as part of a political agenda by a domestic group/the relativization/differing interpretation of facts based on ideological bias
Misinformation	Falsehoods and rumours propagated without a broad political aim, either with or without malicious intent that achieves viral status
Entertainment	Falsehoods used in parody, satire, or seemingly humorous pieces
Falsehoods distributed for financial gain	-

(Vasu, et al., 2018, p. 5).

Looking at the table and its concepts, several points can be noted. Most noticeable is how two different definitions are both called *misinformation*. This is quite confusing and does not help defining misinformation. The main difference between misinformation and disinformation is that disinformation seems to come from outside the nation and misinformation from within the nation-state (Vasu, et al., 2018). In the case of misinformation, which concerns shaping national opinion or affecting the resilience of a polity by actors within a state, there is no external actor involved. Wu et al. (2016) make a slightly different distinction between (unintentional) misinformation and (intentional) disinformation:

Unintentionally-Spread Misinformation:	Some misinformation is created and forwarded spontaneously. People tend to help spread such information due to their trust of their friends and influencers in a social network and want to inform their friends of the underlying issue.
Intentionally Spread Misinformation:	Some rumours and fake news are created and spread intentionally by malicious users to cause public anxiety, mislead people and deceive social network users for improper profit. This kind of misinformation is also called disinformation.

(Wu, Morstatter, Hu, & Liu, 2016, p. 3)

The explanation of the unintentional spread of misinformation adds to the definition of misinformation by Vasu et al. (2018). While the intention may vary, misinformation causes distress and various kinds of destructive effect among social network users either way, especially when timely intervention is absent (Wu, Morstatter, Hu, & Liu, 2016).

A core feature of misinformation is that it is widely circulated online (Bounegru, Gray, Venturini, & Mauri, 2017; Del Vicarioa, et al., 2016), which coincides with social media channels becoming an important forum for disseminating health information (Wu, Morstatter, Hu, & Liu, 2016). The increased spread of misinformation is not the fault of social networks' newsfeed algorithm, but of the

users themselves making the choices (DiFranzo & Gloria-Garcia, 2017). Misinformation online has contributed to spreading conspiracy theories and creating unnecessary fears (Wu, Morstatter, Hu, & Liu, 2016). Conspiracy theories are a notorious example of misinformation (Pennycook, McPhetres, Zhang, & Rand, 2020) which can be defined as follows: explanations for significant events that place responsibility on secret and malevolent forces (Douglas K. M., Sutton, Jolley, & Wood, 2015). An important characteristic of conspiracy theories, and misinformation in general, is that they are formulated in a way that is able to tolerate a certain level of uncertainty (Del Vicarioa, et al., 2016). This is notable, as uncertainty is an important factor when it comes to insecurity. More on that later.

In this research misinformation is understood as a combination of both definitions of misinformation by Vasu et al. (2018). Therefore, the definition reflects both the intentional and unintentional spread as defined by Wu et al. (2016). The definition used will be as follows: "Intentional or unintentional falsehoods and rumours propagated with or without a political agenda or malicious intent". Misinformation can arise on all kinds of subjects. This research only focusses on (mis)information on the topic of epidemics.

(Mis)information regarding epidemics

The importance of accurate information regarding and during epidemics can be found in the danger of misinformation. Therefore, (mis)information regarding epidemics is discussed next.

Misinformation regarding epidemics is defined as: Intentional or unintentional falsehoods and rumours about epidemics propagated either with or without a political or malicious intent. Some scholars state that every health related claim of fact that is currently false due to a lack of scientific evidence can be defined as health misinformation (Chou, Oh, & Klein, 2018). In the beginning of an epidemic, there is usually a lack of scientifically tested information, and the information available is often unclear and disputed. A difference with regular misinformation is that information during an outbreak is not only aimed at keeping people informed, it is also making sure people act appropriately (Zarocostas, 2020). Appropriate acting can for instance mean not turning to ineffective -and possible dangerous- remedies, overreact (hoarding goods) or underreact (Pennycook, McPhetres, Zhang, & Rand, 2020). Due to the lack of complete information at hand, fear may be installed among the public and impact people's behaviour, This could affect the course of the epidemic (Nerghes, Kerkhof, & Hellsten, 2018) as the dangers of misinformation lay in potentially undermining progress in medicine and health care (Chou, Oh, & Klein, 2018). Furthermore, the spread of false information drowns out credible sources which in turn results in further public confusion, ultimately leading to greater spread~~,~~ and inefficient mitigation of virus transmission (Mian & Khan, 2020). Misinformation regarding epidemics therefore tackles two core values of a society: health and safety. During an epidemic, high quality information and the truth is a matter of life and death (Pennycook, McPhetres, Zhang, & Rand, 2020) as the influence of these false arguments can be so infectious that it can influence governmental policy (Mian & Khan, 2020).

Because of the eminent dangers of misinformation regarding epidemics, scholars conclude that misinformation on health subjects in general requires a "proactive approach for understanding its prevalence and potential influence rather than labelling misinformation as a fad or wishing it away" (Chou, Oh, & Klein, 2018; Pennycook, McPhetres, Zhang, & Rand, 2020). Especially, since misinformation can do damage over a way longer period than one would possibly think, as the effects of conspiracy theories, rumours, and misinformation spread during the early years of the HIV epidemic are still visible to this day (Mian & Khan, 2020).

Taking all the information concerning misinformation regarding epidemics into account; it becomes clear why the urgency of accurate information provision during crises is so high.

Perception of security

The second main concept in this research is the perception of security. There is no much used or clear definition of perception of security in literature, which is applicable in this research. Comparable concepts such as 'perceived security' or 'experienced security' do not correctly fit the aim of the research, as those concepts are used in studies in which respondents are asked to rate the security of physical environments, rather than describing their feelings concerning certain information.
Even the concept of just security itself is rather unclear, or as Bubandt (2005) puts it: "Security, far from being a stable or universally homogenous concept, is contextually and historically linked to shifting ontologies of uncertainty" (Bubandt, 2005, p. 291). He further explains how there cannot be such a concept as universal as 'human security', as the concept of security relates to "the political history of the local ontological ways in which danger, risk and (in)security are defined" (Bubandt, 2005, p. 276); security is both multi-scalar and multi-thematic, which makes it difficult to define. Furthermore, the relationship between security and insecurity stands clear: the discourse of security constantly reproduces insecurity, otherwise it would lose meaning (Bubandt, 2005, p. 280) (Burke, 2002, p. 20). Concluding, security can be defined as the absence of insecurity and danger.
Baldwin (1997), recognizes the complexity of defining security, but points out it is necessary to have a determined definition to research security properly, not only for academic use, but for use in regular day-to-day life as well: "If one has no concept of security, one cannot know whether one is threatened with losing it or not" (Baldwin, 1997, p. 8).

While Buzan (1983) says: "The word itself implies an absolute condition -something is either secure or insecure- and does not lend itself to the idea of a graded spectrum like that which fills the space between hot and cold" (Buzan, 1983, p. 18), Baldwin (1997) argues that "absolute security is unattainable" (Baldwin, 1997, p. 15) and that when one wants to attain a certain objective, one always thinks in matters of degree. In non-academic day-to-day language it is usual to speak of different degrees of security. Furthermore, for research purposes different degrees of security create more possibilities for comparative analyses and thus more insight in the hard to catch concept of security (Baldwin, 1997).

Apart from all those comments on a concept of security, the most used definition used in science is that by Wolfers (1952): Security can be seen as "the absence of threats to acquired values" (Wolfers, 1952, p. 485), which has been rewritten by Ullman (1983) to the "low probability of damage to acquired values". In this research the acquired values at stake would be safety, health and certainty, as misinformation during an epidemic threatens people's individual safety, health and certainty.
This definition clearly shows how security exists by the premise of insecurity, like Bubandt (2005) and Burke (2002) pointed out. Furthermore, this definition is still very ambiguous and general. The general concept needs to be specified to the context it is used in to be applicable for politics of scientific usage (Wolfers, 1952, p. 483). Baldwin (1997) states that while the specifications *security for whom* and *which values* suffice, but that further specifications could be necessary to use the concept. He mentions possible specifications concerning the degree of security, the kinds of threats, the means for coping with such threats, the costs of doing so, and the relevant time period, but makes the note that it is dependent on the research task which dimensions are needed and how broad or narrow they have to be specified. In this case, the threat would be misinformation regarding epidemics.

Needing the concept of insecurity to come to a definition of security, Stone (2012) mentions how *uncertainty* is a factor for a feeling of insecurity: "Uncertainty about what is about to happen, or how bad situations which have happened are" (Stone, 2012, p. 131). Stone (2012) continues that these feelings of insecurity can do actually more damage than that one is afraid of (Stone, 2012, p. 133). Feelings of uncertainty is part of the psychologic vision as described by Stone (2012). This is closely linked to the concept of subjective safety. "Subjective safety reflects the perception of social safety and encompasses fear or anxieties caused by real or assumed threats" (Ruijsbroek, 2017, p. 27). In this view the ideas of security and safety are different from one person to another.

West (2008) and Bar-Tal & Jacobson (1998) described the psychology behind security. The very first thing West (2008) makes clear is that "People tend to believe they are less vulnerable to risks than

others" (West, 2008, p. 36). Bar-Tal & Jacobsen (1998) studied how security beliefs come forth from how people experience security and insecurity: "Security or insecurity are products of the belief formation process. Beliefs about security are formed individually by leaders and followers and they represent a subjective reflection of their reality. Individuals form beliefs about security or insecurity and therefore they differ in the strength and contents of their security beliefs" (Bar-Tal & Jacobson, 1998). They make clear how beliefs of security come forth from an interaction between a person and environmental factors, and not solely by one of them. As already mentioned in the introduction of this paper, Bar-Tal and Jacobson (1998) describe that the strong emotional meaning of security makes people hang on to their security, so far that "individuals, in their attempt to fulfil their wish for safety and minimise dangers, may selectively collect information about security, and avoid information that, in their opinion, endangers it" (Bar-Tal & Jacobson, 1998, p. 62). This is a very interesting point, given the topic of this research; people select the information they take in, picking out the information which fits their beliefs of security.

Interesting for this research is the psychological relationship between misinformation and feelings of security. Douglas, Sutton and Chichocka (2017) describe that people turn to misinformation and conspiracy theories because they feel anxious (Grzesiak-Feldman, 2013) and uncertain (Van Prooijen & Jostmann, 2013). Besides that, people believe misinformation grants them access to secret information which may help them, and that it somehow increases their safety (Douglas, Sutton, & Cichocka, 2017). As it gives people a powerful feeling knowing things other people might not know (Douglas, Sutton, & Cichocka, 2017), people believe and share misinformation and conspiracy theories, also on the topic of epidemics.
Over time trading in misinformation and conspiracies tends to worsen a person's feelings of fear or helplessness (Jolley & Douglas, 2014) (Douglas K. M., Sutton, Jolley, & Wood, 2015). Even though people turn to misinformation due to emotions linked to insecurity, reading and sharing misinformation makes those emotions of insecurity even worse.

Stone (2012, p. 133) agrees on the psychologic aspect of "Security is ultimately a feeling" and mentioned the importance of uncertainty when it comes to a perception of security. Therefore, actions and policies which are aimed to enlarge on increase security feelings, and thus security, need to reason from that psychologic view of security: "Policies and rhetoric that might work in a political or a scientific sense to reduce the likelihood of dangers aren't necessarily effective at quelling anxieties and creating psychological security. To be effective, policies meant to create security must create it in the psychological sense" (Stone, 2012, p. 133). "Policies can't achieve security in the psychological sense without taking the psyche seriously and granting legitimacy to human perception and emotion" (Stone, 2012, p. 136). To illustrate the differences between a rational view on security and the view policymakers should have, Stone (2012) created this table:

Rationality Model	Polis Model
Insecurity can be measured and calculated.	Insecurity is a psychological feeling. People can imagine how bad events will affect them and think in images rather than numbers.
Security is related to objective threats and consequences of bad events.	People experience some kinds of insecurity independent of the probability or objective consequences of bad events.
The expected value formula reduces the severity of low probability events.	Expected value is an abstract measure, divorced from how people experience the consequences of bad events.
To increase security, policy makers must prevent or reduce the likelihood of bad events.	Policy makers can increase security through psychological reassurance, without changing polices and even when policy fails to prevent bad events.
Responding to a very low probability threat as if it were certain is irrational.	Using extreme caution for high-impact/ low-probability events is sensible; leaders can create psychological security by acting as if they were certain and responding decisively.
The expected value formula is rational, scientific, and has universal validity.	Balancing risks and harms is a matter of political and moral choice.
Estimating risk is a scientific process.	Risk estimates can be biased by vested interests.
Catastrophes with equal expected values are equally important.	Interpretations of causal stories and equity influence the political acceptability of risks.

(Stone, 2012, p. 139)

According to Stone (2012), information during epidemics should therefore be based on the *Polis model*, rather than the *Rationality model*, as security, insecurity and the underlying concept of uncertainty are psychological feelings. These feelings of insecurity, uncertainty and anxiety are according to several authors (Douglas, Sutton, & Cichocka, 2017; Grzesiak-Feldman, 2013; Van Prooijen & Jostmann, 2013) reasons why people turn to misinformation and conspiracy theories.

Hypotheses

When combing the two main concepts of this research, as defined in the literature above, the following hypotheses are formulated to help answering the main question of this research.

Rieh (2002), Haslam & Reicher (2012) and Bang Petersen (2020) explained just the authority some sources have can convince and incite people. This led to the following hypothesis:

> **H1**: *Information which comes from a source with more authority will lead to more willingness to change behaviour, than information that does not come from such a source.*

To compare the factors of source and content, this research will test as well to what extent the inclusion of threat-related information has an influence intended behaviour. This led to the following hypothesis:

> **H2:** *Information which includes more threats will lead to more willingness to change behaviour.*

As Blaine and Boyer (2018) found that threat-related information is more likely to be shared compared to information that does not include threats, this research will test whether or not the inclusion of a clear threat will lead to more intended transmission of the information. This led to the following hypothesis:

> **H3**: *Information which includes more threats will lead to more intended transmission.*

To compare the factors of source and content, this research will test as well to what extent the authority of the source has an influence on the intended transmission. This led to the following hypothesis:

> **H4:** *Information which comes from a source with more authority will lead to more intended transmission, than information that does not come from such a source.*

Lastly, we want to see what the factors of source and content of (mis)information do with the security feelings of people. To test that, three hypotheses are formulated. The first one, builds on the idea of Stone (2012) that leaders communicate with, reassure, people about the epidemic. This led to the following hypothesis:

> **H5**: *I information which comes from a source with more authority will lead to more feelings of security, than information that does not come from such a source.*

As Stone (2012) explained that people can imagine how bad events will affect them, the concept of more threat-related information may come with the trade-off that people may feel less secure, as threats are more clearly presented to them and they are suddenly aware of the threat (Schneier, 2008). Therefore, the sixth hypothesis reads:

> **H6**: *Information which includes more threats will lead to less feelings of security.*

The last hypothesis follows on the previous one. It combines the concepts of threat-related information and the authority of the source and assumes the authority of the source is enough to take away the eventual decrease in feelings of security. This led to the following hypothesis:

> **H7**: *Information which includes more threats but comes from a source with more authority will lead to more feelings of security than information which includes more threats but does not come from a source with less authority.*

Methodology

Research approach

The main question in this research is *to what extend is the perception of security and the response of citizens to an epidemic influenced by the source and content of information online concerning the epidemic?* The motivation and theoretical context have already been discussed in the previous chapters, so now it is time to look at the methods and research design used in this research.

Quantitative research

To answer the research question and test the hypothesis above, this research is deductive (Bryman, 2016, p. 22) and explanatory. In this research a quantitative approach is chosen, as quantitative research consists of experimental methods and quantitative measures to test hypothetical generalizations (Hoepfl, 1997, pp. 47-48) and measures and analyses causal relationships between variables (Denzin & Lincoln, 2008). The main question in this research suggests a causal relationship and the literature provide hypotheses which can be tested. Therefore, a quantitative experimental method fits this research.

Research design

This research uses an experimental research design to conduct research data. Experimental research is used to assess impact of new reforms or policies (Bryman, 2016, p. 44) which is exactly what this research is about, as it aims to analyse the influence of different factors of (mis)information on feelings of security. Experimental data has an advantage since the researchers have a high control on the recruitment of respondents and the measurement of the variables. Through this advantage, experimental researchers are able to measure causal effects (McDermott, 2002). Within experimental research designs it is important to make a distinction between laboratory and field experiments. Laboratory experiments take place in a laboratory or another constructed setting, while field experiments, just like this experiment, take place in real-life settings (Bryman, 2016). This experiment is a hybrid between laboratory and field experiments; a (online)survey experiment, in which the manipulation is embedded in a questionnaire (Bouwman & Grimmelikhuijsen, 2016). People will take part in this experiment with the comfort of their own computer and their own home, or another voluntarily chosen setting. Field experiments are more likely to conduct data on the topics which interest social researchers (Bryman, 2016). Besides that, a survey experiment offers more control than field experiments in terms of manipulation design (Bouwman & Grimmelikhuijsen, 2016).

An experiment, laboratory as well as field, should have at least the following four factors: manipulation, experimental groups of treatment and a control group, randomly assigned subjects and a systematic method of measuring outcomes (Bouwman & Grimmelikhuijsen, 2016). This experimental survey research makes use of manipulation. To use manipulation, experimental participants need to be divided into separate groups, presenting them with different types of the independent variable. One of these separate groups will be a control group. It is important for all groups that people are at random assigned to the different groups to make sure that the influence of the independent variable is not caused by any other factor than the manipulation (Bryman, 2016). By only manipulating the independent variable, a crucial element in experimental design, standardization, is met (McDermott, 2011). Further, experiments can be between-subjects or within-subjects. In a between-subjects design, the subjects are assigned randomly to either a control or one of the treatment conditions. In a within-subjects design, all subjects receive the control and one or more treatment conditions (Morton & Williams, 2010, pp. 86-87).

This survey experiment

A survey experiment can be explained as follows: An individual decision-making experiment embedded in a survey" (Morton & Williams, 2010, p. 279). Survey experiments can be employed over the internet or paper based (Morton & Williams, 2010). Due to the COVID-19 virus outbreak and the corresponding response measures, only survey experiments on the internet were used.
Manipulation is used in this research by showing different randomly assigned groups of respondents,

different government responding strategies to misinformation. It is necessary to manipulate the independent variable, the authority of the source and the threat-related information, in order to measure its influence on the dependent variable, the perception of security (Bryman, 2016). This research has a between-subjects design. The randomly assigned groups of respondents either have had the control conditions, or one of the treatment conditions, but never both (Morton & Williams, 2010).

Reliability and validity

Good quality research can be defined through validity and reliability since those two factors contribute to the objectivity of research. The objectivity of research can be defined as whether the research is doing the research object justice (Boeije, 2016). Validity and reliability are concerned with the rigour of the research. Rigour refers to the quality of the studies and the extent to which the researchers worked to enhance it (Heale & Twycross, 2015).

Validity

Validity can be defined as the extent to which a concept is accurately measured in a quantitative study (Heale & Twycross, 2015). Or, as stated by Joppe (2000, p. 1): “Does the research instrument allow you to hit "the bull’s eye" of your research object?” All experimental studies should be concerned with internal and external validity (Onwuegbuzie, 2000). This research therefore focusses on the two main forms of validity; internal and external validity (Bryman, 2016).

The measure to which causal conclusions between the dependent and independent variable can be made through this research is the internal validity (Lillis, 2006). Quantitative researchers focus on the robustness of the analysis that links concepts together to increase internal validity (Lillis, 2006). To make sure the causality between the independent and dependent variable is thoroughly measured, this experimental research will use a control group. By using a control group in this research, it could be argued that the experimental research is valid (Bryman, 2016). Making use of a control group and a random assignment of subjects to the experimental and control groups, enable us to eliminate rival explanations (Bryman, 2016). On the topic of internal validity, another advantage is found in using experimental designs over non-experimental designs. Experimental designs offer the opportunity to test the hypothesized causal effects (McDermott, 2011).

Even though a study can have a high internal validity, it does not automatically mean the study is generalizable (Onwuegbuzie, 2000). External validity concerns the generalizability of the research to theory as well as practice (Lillis, 2006). Johnson and Christensen (2000) add to that by saying the research should be generalizable across populations, settings and times. As experimental results may not necessarily be generalizable from sample to population (Morton & Williams, 2010) some may debate the generatability. Therefore, it is usual to assess the external validity of experiments on the generalizability to theory (Bouwman & Grimmelikhuijsen, 2016).
To assess external validity of experiments there are three criteria; the degree of resemblance between participants and the people who are normally confronted with the treatments, whether the context in which actors operate resembles the context of interest, and third, if the treatment resembles a treatment of interest in the real world (Bouwman & Grimmelikhuijsen, 2016). These three criteria can be summarized to the question; to what extent is the task presented to the respondents realistic to them (Bouwman & Grimmelikhuijsen, 2016)? In this research the task of reading (mis)information regarding epidemics can be considered a very realistic task to the respondents, as by the time this research took place the COVID-19 pandemic was very present in society and citizens were confronted with all kinds of both misinformation accurate information regarding epidemics online.

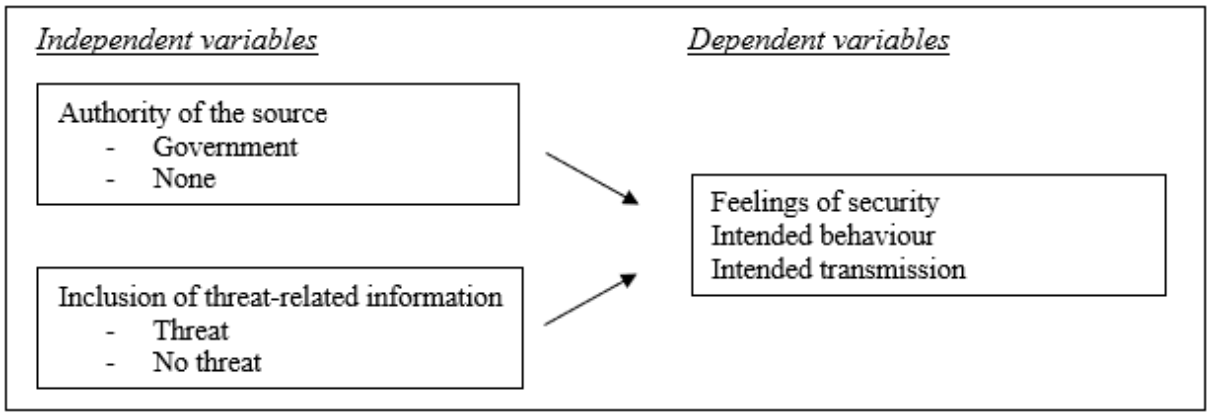
Reliability

Reliability is concerned with the extent to which the results of a research are repeatable (Bryman, 2016, p. 41). In other words, reliability is the consistency of measurements (Heale & Twycross, 2015). This consistence, also called stability, can be determined through a test-retest method. This means the experimental survey should be conducted at two several moments in time (Charles, 1995). Even though the stability would increase the reliability, it was due to limited time not possible to use the

test-retest method. This experimental research design does have clear procedures, which makes the repeatability, and thus the reliability, of this research rather high.

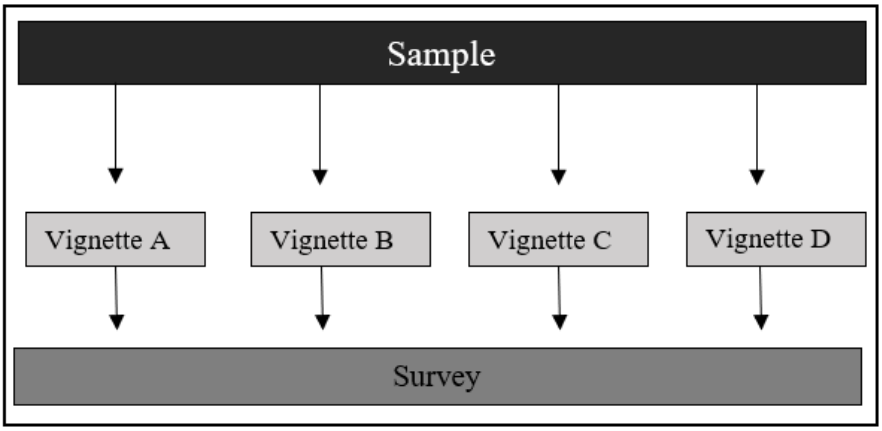
Conceptual model and variables

For better understanding of the variables used in this experimental research this diagram shows a simplified overview of the relationship of the variables.



Independent variables

This research embedded an experiment in a survey, in which respondents are presented hypothetical piece of misinformation on a fictional. In this experiment, respondents were assigned to one of the conditions in which they read a vignette with a particular piece of information concerning the epidemic followed by the survey questions. The vignettes consist of texts that are presented to the respondents, manipulating different levels of the independent variables (Evans, et al., 2015).
The image below shows how the sample is divided into different randomly assigned groups of respondents, which are all presented a particular vignette, different to the other three.



In this experiment, four vignettes of consisting of online information were used to measure the effects on the dependent variables feelings of security, intended behaviour and intended transmission. Respondents who are presented vignette A form the control group. The information they get to read is not manipulated. This made it necessary to later measure the other conditions in relation to the control condition (Bryman, 2016).The information is presented to come from a forwarded WhatsApp message.
Vignette B includes the same piece of information. The information is presented to come from the government.
Vignette C includes the same piece of information; however, the danger of the disease is more emphasized. The information is presented to come from a forwarded WhatsApp message.
Vignette D includes the same piece of information; however, the danger of the disease is more emphasized. The information is presented to come from the government.

Hypothetical scenario
In this research, a hypothetical scenario was used to create the setting of an epidemic, in which the respondents would read information concerning that epidemic online. As this research points at the dangers of the spread of misinformation, it would be very inappropriate and unethical to spread manipulate information concerning a real epidemic for the purpose of this research. Furthermore, this way no respondent could have more knowledge concerning the epidemic than others beforehand. Before the respondents were randomly assigned into the different conditions, they all got to read the same information.

Imagine it's the summer of the year 2030, there are rumours about a new disease. This disease is called Nemato-cera, and the symptoms include headache and fever. Other than that, there is not much known yet, concerning this new disease.

After that, the respondents got randomly assigned to the four different vignettes, all representing information, concerning the disease, which one could have found online. The information in the box below, is an example of the information which formed vignette A, the control condition. The other conditions deviated on the source, included the fact the disease could lead to paralysis, or both these deviations.

Through WhatsApp you get the forwarded the following information:

The disease Nemato-cera is spread by mosquitos and has been reported in the Netherlands. One can prevent getting the disease by putting up mosquito nets around their bed. Although it can be very hot during the summer, it would be smart to wear thick clothes, as mosquitos find those more difficult to sting through. As mosquitos are attracted to the perfume and deodorant, it is better not to wear those.

Although the scenario and disease are hypothetical, they resemble reality, so that respondents would take it seriously and that findings from this research are applicable for real situations. The measures mentioned in the piece of information the respondents got to read, for example, are real measures as prescribed and propagated by the Dutch government against the disease Malaria. As both the disease and the measures are hypothetical, the information presented to the respondents in this experiment could be qualified as either accurate information or misinformation. However, for this research it does not matter whether the information in the experiment would be accurate or not, as this research focusses on the conditions which may have influence on the response and feelings of security.

Dependent variables
The survey in this study consisted of ten questions in total, although four questions were split into four sub-questions each. Three of those overarching questions measured the dependent variables; feelings of security, intended behaviour and intended transmission. These questions consisted of a 7-point Likert scale, ranging from 1 (fully disagree) to 7 (fully agree) in which option 4 gave respondents a neutral option. Using this scale respondents were asked to answer these sub-questions concerning their feelings of security, and how likely they deemed it they would change their behaviour or transmit the information, based on what they just read. By combining the answers to these sub-questions, the abstract concepts of feelings of security, intended behaviour and intended transmission could be made more palpable.
The full survey (in Dutch, as it was spread that way) can be found in the appendix.

Data collection

In this study primary source empirical data will be used. The distribution of this survey was done by using the survey tool Qualtrics.

The population in this research consists of adult Dutch citizens. The sample will feature at least 120 adult Dutch citizens, which means 30 per group. There are no other conditions to the sample other than nationality and age. The condition nationality because of the national character of the concept of government. The condition age is there because of the legal consent of respondents.
In this study there has been made use of different kinds of *non-probability sampling* (Bryman, 2016, p. 187): first of all *convenience sampling* will be used, as this way of sampling proves to be useful in relative short periods of time. A drawback of convenience sampling is that it is near impossible to generalize the findings. In this research the drawbacks of convenience sampling are mitigated by sharing the survey on purpose with different kinds of Facebook groups. Furthermore, respondents will be asked to share the survey with others they know, following the principles of *snowball sampling* (Bryman, 2016, p. 188).

At both the beginning and the end of the survey, respondents were assured the scenario they were presented was hypothetical. After all the survey questions were done, respondents could, if they wanted to, share their thoughts concerning the experiment and the survey, but they mentioned nothing notable. The survey ended with thanking the respondents for their time and their interest in participating in the research.

Data analysis

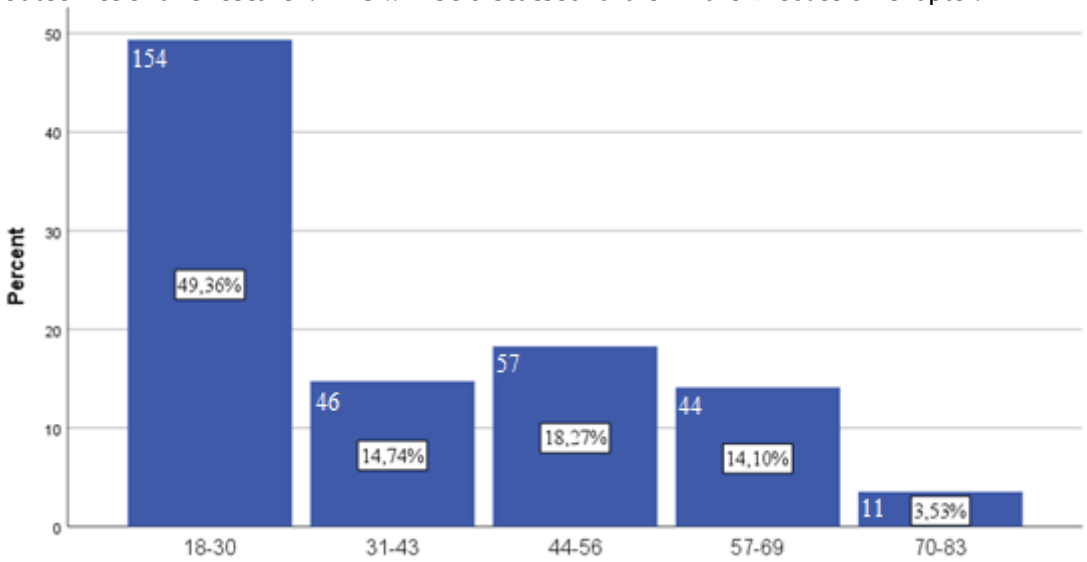
The data obtained by the surveys has been analysed in data analysis program SPSS. In this program multiple tests have been conducted and analysed to find out whether or not the hypotheses could be supported. The tests that have been done were several one-way between groups analyses of variance (ANOVA),Welch ANOVA's and corresponding post-hoc tests to evaluate the mean differences among the respondents who have read different vignettes (Gravetter & Wallnau, 2013). Next chapter will provide the outcomes of the conducted tests.

Analyses

Sample characteristics

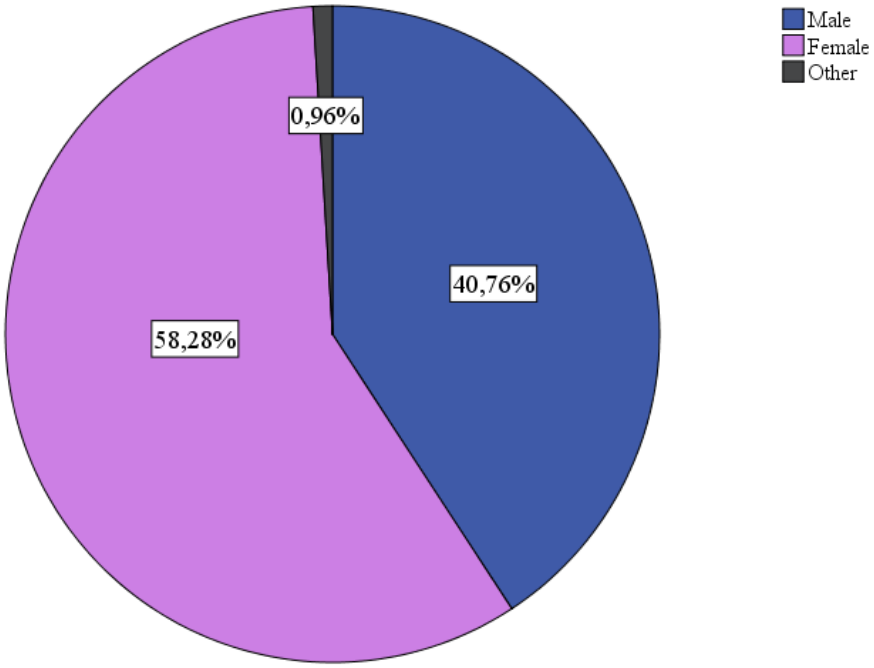
Before discussing the analysis of this research, it is important to have a look at the sample of this research. The survey has been distributed through various channels to obtain the highest response rate and have a people from different backgrounds fill in the survey. After eleven days the survey was closed. By then, the sample included 367 respondents. However, 47 of them did not complete the survey so they had to be excluded. Another three respondents failed to answer the control question correctly. These respondents were excluded as well, as it is not certain they did actually read the text or questions in the survey. That left a total sample with N = 317, which was used for analysis.

The last few questions in the survey concerned the background of the respondent. The answers to these questions about the demographics help to get a better view of the sample used in this research. To start with, the age of the participant, who answered this question (N =312), ranged from 18 to 83, with an average of M = 37.81, SD = 16.88. When the respondents are sorted in five different age categories, which all cover an equal amount of ages, it comes clear that the youngest category (18-30 years) is overrepresented with respect to the other four categories, as can be seen in the diagram below. This overrepresentation of one category may cause a bias based on age when it comes to the outcomes of this research. This will be discussed further in the *Discussion* chapter.



Percentages of the respondents in the five different age categories. The numbers in the upper left corner of the bars is the number of respondents in that category.

314 respondents, missing three, answered the question concerning the gender they would describe themselves with. 128 (40.76%) respondents described themselves as male, 183 (58.28%) described themselves as female and 3 (0.96%) described themselves as other. For the whole population of the Netherlands there are more females than males, but those the percentages are closer to each other (50.35% female and 49.65% male, as of 12 December 2019, source: CBS). Therefore, this may cause a bias based on gender when it comes to the outcomes of this research. This will be discussed further in the *Discussion* chapter.



The percentages of males, females and others in the sample

313 respondents, missing four, answered the question concerning the most recent obtained level of education. As pictured in the table below, almost three quarters of the respondents, 229, (72.2%) answered to be in the two highest levels of education, while only 5 (2.6%) answered to be in the lowest two levels of education. As highly educated citizens are overrepresented in the sample compared to lower educated citizens, the outcomes of this research are possibly biased on level of education. This will be discussed further in the *Discussion* chapter. Furthermore, because of the low frequency of respondents in the first three categories, it has not been possible to test whether or not there is a difference between the different levels of education when it comes to the main theme of this research; the perception of security and response to information during a pandemic.

	Level of education	Frequency	Percentage	Valid percentage
Valid	Basisonderwijs	1	,3	,3
	LBO/VMBO/MAVO	4	1,3	1,3
	MBO (MTS/MEAO)	29	9,1	9,3
	HAVO/VWO (MMS/HBS/Gymnasium)	50	15,8	16,0
	HBO (HTS/HEAO)	67	21,1	21,4
	WO (Universiteit/Post-HBO)	162	51,1	51,8
	Total	313	98,7	100,0
Missing		4	1,3	
Total		317	100,0	

Frequencies and the percentages of the different levels of education in the sample

Covariates

In this research three covariates were distinguished, which could have an influence on the dependent variable. These three covariates have been explained in the previous chapter. As this research looks into the significance of the source of the information, when it comes to how people perceive security, and intend behaviour and transmission, it is necessary to make sure how people rate the government. Therefore, the survey asked the respondents to rate how much they trust the government on a scale ranging from 1 (least trust) to 7 (most trust). The mean of this government trust was 5.69 (N=314) and a standard deviation of 0.93. The respondents answered to have a bit more trust in the RIVM (the Dutch institute which covers virus outbreaks): a mean 5.79 and a standard deviation of 0.95. The last covariate concerned whether or not the respondents recognize misinformation to be a problem. The respondents (N=314) rated misinformation a 5.96 on a scale from 1 (no problem at all) to 7 (a very serious problem), with a standard deviation of 1.13.
So, it is safe to say that the respondents on average do trust the government and the RIVM, and acknowledge misinformation is a real problem. Now these covariate assumptions have been verified, it is possible to look at the questions this research aims to answer.

Manipulation checks

In a survey experiment it is possible to verify whether the manipulations in the experiments were effective. In this research this has been tested by computing two factorial between groups analyses of variance.

The authority of the source

In the vignettes B and D, the information about the disease came from the website of the Dutch government, while in the vignettes A and C the information was forwarded on WhatsApp.
A factorial between groups analysis of variance (ANOVA) was used to compare how respondents rated the authority of the source based on what vignette they were presented.

The main effect of the vignette the respondents was presented on how they rated the authority of the source was statistically significant, $F(1, 312) = 114.65$, $p = <0.01$, with respondents who were presented the government as source, vignettes B and D, ($M = 4.80$, $SD = 1.48$) reporting significantly higher authority of the source than respondents who were presented the information as forwarded on WhatsApp, vignettes A and C, ($M = 2.99$, $SD = 1.55$). η^2 for this effect was 0.269.

The level of included threat

In the vignettes C and D, the information about the disease included a higher level of threat (in this case the disease could lead to paralysis) than vignettes A and B. A factorial between groups analysis of variance (ANOVA) was used to compare how respondents rated the level of threat based on what vignette they were presented.

The main effect of the vignette the respondents was presented on how they rated the level of threat was statistically significant, $F(1, 312) = 126.76$, $p = <0.01$, with respondents who were presented the higher level of threat, vignettes C and D, ($M = 5.69$, $SD = 1.24$) reporting significantly higher level of threat than respondents who were presented the information without the inclusion of paralysis being a , vignettes A and B, ($M = 4.22$, $SD = 1.06$). η^2 for this effect was 0.289.

There was no interaction between the authority of the source and the level of threat.

The table below shows the overview of the significance of the manipulation checks. As both manipulation checks showed statistically significance, it can be concluded both manipulations were valid.

The authority of the source	$F(1, 312) = 114.65$, $p = <0.01$, $\eta^2 = 0.269$
The level of included threat	$F(1, 312) = 126.76$, $p = <0.01$, $\eta^2 = 0.289$

Significance of the manipulation checks

The table below shows the means scores of the conditions on the manipulation checks for each of the vignettes, which were obtained conducting separate one-way ANOVAs. The bold mean scores are

those that should be the higher scores, as those got the manipulation treatment. As one can see from the table, the scores in bold are indeed higher than the others. The tables of the post hoc tests for both the manipulation checks can be found in the appendices.

	Vignette A	Vignette B	Vignette C	Vignette D
Authority source	*M=2.84*	***M=4.78***	*M=3.10*	***M=4.83***
Threat in text	*M=4.24*	*M=4.21*	***M=5.68***	***M=5.70***

Mean scores of the conditions on manipulation checks

Used scales

In this research three scales have been used. The first scale, concerning the perceived security is created by putting together the following questions: *This information makes me feel certain, this information makes me feel safe, this information is accurate,* and *This information is trustworthy*. Cronbach's alpha for this 4-item scale about perceived security was 0.80, which makes it adequate for research purposes.

The second scale, concerning intended behaviour, was created by putting together the questions: *I would consider the actions mentioned in this text, I would consider hanging a mosquito net around my bed, I would consider wearing thick clothes,* and *I would consider not using perfume or deodorant*. Cronbach's alpha for this 4-item scale about intended behaviour was 0.84, which makes it adequate for research purposes.

Interesting remarks when it comes to intended behaviour; respondents answered to be most willing to hang a mosquito net around their bed (5.81 mean on 1-7 scale). Wearing thick clothes (4.21) and not using perfume or deodorant (4.97) were less attracting precautionary measures. Probably because these measures would come with a bigger trade-off for the respondents during a hot summer.

The third and last scale, concerning the intended transmission, was created by putting together the questions: *I would share this information with my friends and family, I would talk about this text with people close to me, I would forward this text online to people I know,* and *I would share this information on social media*. Cronbach's alpha for this 4-item scale about intended transmission was 0.80, which makes it adequate for research purposes. Closer examination of the scale item-total statistics indicated that alpha would increase to 0.82 if item 2 (*I would talk about this text with people close to me)* were removed. Apparently, talking about the text holds a lower threshold than sharing it online. Although alpha would increase if the item were to be removed, all subsequent analyses are based on the responses to all four items, as I reasoned talking is just as much transmission of information as sharing it online. Besides that, both alphas are adequate enough for research purposes.

Interesting remarks when it comes to intended transmission; while it seems that talking about the text with people close (5.66 mean on 1-7 scale) holds a low threshold, sharing the information on social media is way less favourable (2.16). Sharing this information with friends and family (4.18) and forwarding it to people they know (3.74) are options that score in between, when it comes to the respondents. It seems that the respondents prefer more direct ways to communicate, and people that are closer to them. This could be explained by the relative high recognition (5.96) of misinformation as a problem; respondents might be aware they could share misinformation.

Now the scales which have been used in testing the hypotheses have been explained, it is time to look at the actual hypotheses testing.

Hypotheses testing

To test the hypotheses which were formulated based on the literature a one-way between groups analysis of variance (ANOVA) was used.

Hypotheses 1 and 2:

The first hypothesis which was tested read as follows: *information which comes from a source with more authority will lead to more willingness to change behaviour*.

The second hypothesis which was tested read: *information which includes more threats will lead to more willingness to change behaviour*.
To test these two hypotheses, a factorial between groups analysis of variance (ANOVA) was computed, to investigate the impact that the authority of a source had on willingness to change behaviour, and to investigate the impact that the presence of threat had on willingness to change behaviour.

Inspection of the skewness, and the kurtosis indicated that the data of all the four conditions assumption of normality was supposed for each of the four conditions. However, the Shapiro-Wilk test was significant for all four conditions, which suggests the normality assumption was violated. As the Shapiro-Wilk test has a reputation of being over-sensitive (Tabachnick & Fidell, 2007) and the skewness, kurtosis, histogram and both the normal Q-Q Plot and the Detrended Normal Q-Q plot gave enough reason to believe the four conditions were normally distributed, the analysis of variance (ANOVA) was computed.

Levene's statistic was significant, $F(3, 312) = 5.663$, $p = 0.001$, and thus the assumption of homogeneity of variance was violated.

The main effect of source authority on the intended behaviour was statistically significant, $F(1, 312) = 35.284$, $p = <0.01$, with respondents who were presented the government as source ($M = 5.43$, $SD = 0.91$) achieving significantly higher scores of intended behaviour than respondents who were presented the information as forwarded on WhatsApp ($M = 4.67$, $SD = 1.33$). Partial eta-squared (η^2) for this effect was 0.102.
Therefore, hypothesis 1 is supported.

The main effect of additional threat information on intended behaviour was not statistically significant, $F(1, 312) = 2.171$, $p = 0.142$. Partial eta-squared (η^2) for this effect was 0.007.
Therefore, hypothesis 2 is supported.

There was no statistically significant interaction between the authority of the source and threat-related information, $F(1, 312) = 1.010$, $p = 0.316$. Partial eta-squared (η^2) for this effect was 0.003.

Hypotheses 3 and 4:
The third hypothesis which was tested read: *information which includes more threats will lead to more intended transmission.*
The fourth hypothesis to be tested read: *information which comes from a source with more authority will lead to more intended transmission*.
To test these two hypotheses, a factorial between groups analysis of variance (ANOVA) was computed, to investigate the impact that the presence of threat had on intention of transmission, and to investigate the impact that the authority of a source had on the intention of transmission.

Inspection of the skewness, and the kurtosis indicated that the data of all the four conditions assumption of normality was supposed for each of the four conditions. However, again the Shapiro-Wilk test was significant, for this time three of the four for conditions, which suggests the normality assumption was violated. Again, the skewness, kurtosis, histogram and both the normal Q-Q Plot and the Detrended Normal Q-Q plot gave enough reason to believe all four conditions were normally distributed, and the analysis of variance (ANOVA) was computed.

Levene's statistic was non-significant, $F(3, 312) = 2.422$, $p = 0.066$, and thus the assumption of homogeneity of variance was not violated.

The main effect of additional threat information on intended transmission was not statistically significant, $F(1, 312) = 2.382$, $p = 0.124$. Partial eta-squared (η^2) for this effect was 0.008.
Therefore, hypothesis 3 is not supported.

The main effect of source authority on the intended transmission was statistically significant, $F(1, 312) = 48.455$, $p = <0.01$, with respondents who were presented the government as source ($M = 4.33$, $SD = 1.08$) achieving significantly higher scores of intended transmission than respondents who were presented the information as forwarded on WhatsApp ($M = 3.54$, $SD = 1.26$). Partial eta-squared (η^2) for this effect was 0.102.
Therefore, hypothesis 4 is supported.

There was no statistically significant interaction between the authority of the source and threat-related information, $F(1, 312) = 0.081$, $p = 0.776$. Partial eta-squared (η^2) for this effect was < 0.001.

Hypotheses 5, 6 and 7:
The fifth hypothesis which was tested read: *information which comes from a source with more authority will lead to more feelings of security.*
The sixth hypothesis which was tested read: *information which includes more threats will lead to less feelings of security.*
The seventh, and last, hypothesis which was tested read: *information which includes more threats, but comes from a source with more authority, will lead to more feelings of security than information which comes from a source with less authority.*
To test these three hypotheses, a factorial between groups analysis of variance (ANOVA) was computed, to investigate the impact that the presence of threat had on feelings of security, and to investigate the impact that the authority of a source had on feelings of security.

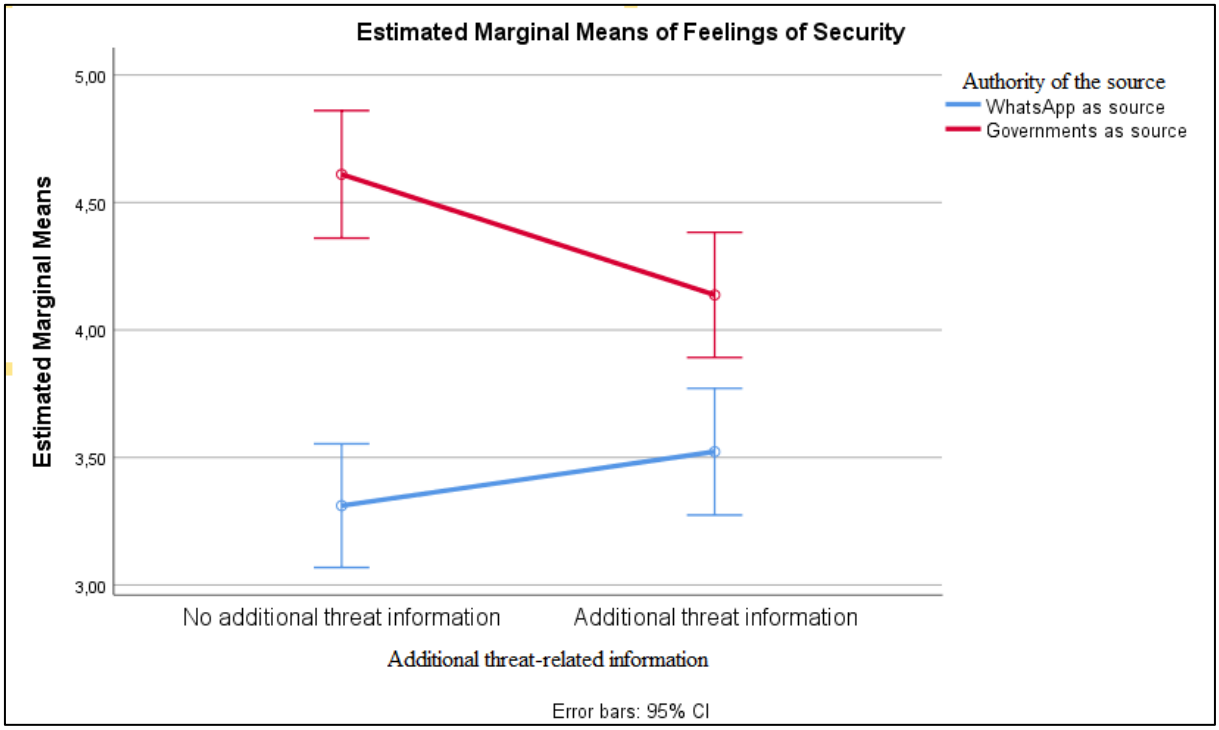
Inspection of the skewness, kurtosis and Shapiro-Wilk statistics indicated that the assumption of normality was supposed for each of the four conditions.

Levene's statistic was non-significant, $F(3, 313) = 1.340$, $p = 0.261$, and thus the assumption of homogeneity of variance was not violated.

The main effect of source authority on the feelings of security was statistically significant, $F(1, 313) = 58.299$, $p = <0.01$, with respondents who were presented the government as source ($M = 4.37$, $SD = 1.05$) achieving significantly higher scores of security feelings than respondents who were presented the information as forwarded on WhatsApp ($M = 3.41$, $SD = 1.20$). Partial eta-squared (η^2) for this effect was 0.157.

The main effect of additional threat information on feelings of security was not statistically significant, $F(1, 313) = 1.087$, $p = 0.298$. Partial eta-squared (η^2) for this effect was 0.003.

Furthermore, there was a statistically significant interaction which indicated that the effects of the authority of a source on feelings of security depend on additional threat information, $F(1, 313) = 7.449$, $p = 0.007$. The nature of this interaction is illustrated in the figure below. Partial eta-squared (η^2) for this effect was 0.023.



Hypothesis	Supported by findings
1. Information which comes from a source with more authority will lead to more willingness to change behaviour	✓
2. Information which includes more threats will lead to more willingness to change behaviour	X
3. Information which includes more threats will lead to more intended transmission	X
4. Information which comes from a source with more authority will lead to more intended transmission	✓
5. Information which comes from a source with more authority will lead to more feelings of security	✓
6. Information which includes more threats will lead to less feelings of security	X/✓
7. Information which includes more threats, but comes from a source with more authority, will lead to more feelings of security than information which comes from a source with less authority	✓

An overview of the tested hypotheses and whether they are supported by the findings

Other results

In the literature was mentioned that older people are worse at monitoring the source of information, and that younger people have higher levels of distrust and scrutiny towards online information.

However, investigation of the data, using an ANOVA, learned the only significant differences influenced by age concerned the intended transmission $F(4,307) = 5.28$, $\eta^2 = 0.064$.

Post hoc analyses with Tukey's HSD and Games-Howell (using an α of 0.05) revealed that the respondents in the age category 57-59 (M= 4.60, SD= 0.94) had significantly higher score for intended transmission than respondents in the age categories 18-30 (M= 3.77, SD= 1.25), 31-43 (M= 3.80, SD= 1.31) and 44-56 (M= 3.81, SD= 1.19). The N (11) for the last category 70-83 (M= 4.61, SD=1.17) was too low to compare with the other categories.

Discussion and conclusion

This chapter consists of two different, but interdependent parts. Firstly, the discussion will start by reviewing the results of this research, by comparing the outcomes to the relevant literature and the formulated hypotheses. Furthermore, the limitations of this research, of which some have been brought up before, will be discussed. Both these proceedings are necessary to have a better understanding of the significance of the results of this research, in what perspective they should be seen and how they should be interpreted.

When all the above is done, the section 'conclusion' of this chapter will continue by formulating the conclusion of this research. This conclusion lists the main findings of this research and an answer to the main research question of this research. This chapter ends with some final remarks based on this research and suggestions for possible future research opportunities.

Discussion

On the basis of the hypotheses which were derived from literature, the results of this study are evaluated. To begin with, the research found support for hypothesis 1, as information which came from a source with more authority, in this case the government, did lead to more willingness to change behaviour. This is in line with the literature as described in the theoretical framework; people give higher authority to information online from government institutions than to other organisations or individual authors (Rieh, 2002) and people do follow the instructions from authority (Glaeser & Sunstein, 2014), if they acknowledge that authority (Haslam & Reicher, 2012) over other sources (Rieh, 2002; Rieh & Becklin, 1998). This shows that people are more receptive to and more willing to follow up information that comes from a source with authority. This is valuable information for governments, as it shows people are willing to act upon the information they provide, as long as they make clear the government is the sender.

No significant effect on more willingness to change behaviour when there was more threat related information was found, so there was not enough support for hypothesis 2. As explained, there was no real support in literature there would be an influence at all. However, Eastin (2001) mentioned that both source and content are main conditions for people to assess information. Following the results from this research, it can be concluded that the authority of the source has more influence than the level of presented threat when it comes to making people act upon information.

Neither was a significant effect found to support hypothesis 3; 'information which includes more threats will lead to more intended transmission'. In contrast to the findings of Pennycook et al. (2020) and Blaine and Boyer (2018) a higher level of threat did not influence the intention to transmit the information. The theory by Rieh and Hilligoss (2008), that people are more likely to take credibility issues seriously when it could affect others, could be an explanation. Another possible explanation could be found in the fact the respondents in general recognized misinformation as a real problem (5.96 on a 1-7 scale), so they might have been hesitant sharing untrue information. Further research should be done to test this last assumption; are people who recognize misinformation as a problem more wary to share information with others? Other researches could also vary more in levels of threat, to find a robust conclusion concerning how the amount of threat influences the intended transmission of information.

There was a significant effect found for hypothesis 4; 'information which came from a source with more formality will lead to more intended transmission'. Just like hypothesis 2, this hypothesis was mostly there to compare the conditions of authority of the source and the inclusion of threat related information. This research found the intended transmission increases when the information originates from a source with more authority. As the information which was presented to the respondents in this research did not call for further transmission, eventual transmission of the information cannot be seen as acting upon the information. Therefore, this outcome differs from the outcome found to hypothesis 1. This finding could be explained by the theory by Rieh (2002) that people take the government as an authoritative source, combined with the theory by Rieh and Hilligoss (2008), which explains that

people think about how it could affect others. People believe the information, as it comes from the government, and want others to be aware of the information too. However, further research should try to replicate and build on this finding as it is necessary to fully understand how the authority of a source leads to more intended transmission.

Information which came from a source with more authority also leads to more feelings of security, reported the respondents. Therefore, hypothesis 5 was supported as well. This finding ties in to the idea that security is psychological and ultimately a feeling. Remarkable is the fact that the respondents had not heard about the disease before they read the information, and yet they felt secure, even while there was not a solution for the new danger presented. This can be explained by the polis model by Stone (2012): policy makers can increase security through psychological reassurance, without changing policies and even when policy fails to prevent bad events. Thus, even when respondents are told about a new disease, which according to Schneier (2008) should scare them, and the government does not tell they have any policies to counter this new disease, they report significantly more feelings of security when they are told about it by the government. Further research could look further into this relation between the authority of a source and the feelings of security.

Hypothesis 6; information which includes more threats will lead to less feelings of security', was partly supported by the findings in this research; while there was no significant difference in feelings of security between the two groups of respondents who read the information as if it was sent to them on WhatsApp, there was a significant difference in feelings of security between the two groups of respondents who read the information as if it came from the government. Those that were presented both the conditions of a source with authority and inclusion of threat, reported significantly lower feelings of security than those who were only presented the condition of the source with more authority. As this difference is not present between the groups who got the information forwarded on WhatsApp, it is assumable people take the included threat way more seriously when it comes from a source with more authority. This ties into the theories such as Rieh's (1998) about to what extent people recognize the authority of a source. However, this an interesting finding and should definitely be investigated more in further research. One could for example look further into the extent to which people take threats seriously related to the kind of source.

Penultimately, significant difference was found between respondents who were presented more threat-related information and those who were presented more threat-related information, but from a source with more authority. Hypothesis 7; 'information which includes more threats, but comes from a source with more formality, will lead to more feelings of security than information which comes from a source with less formality', was supported. The authority of the source leads to more feelings of security, even when it comes to threat-related information. This is an interesting finding in combination with the previous finding; as it was found people seem to take a threat more seriously when it is presented to them by a source with more authority. However, now it is found people feel still more secure, when the message is brought to them by a source with more authority. This proves once more the influence of the authority of a source.

Lastly, older people were significantly more intended to transmit the information they had read, compared to younger people. This is partly in line with the theories by Park and Avery (2018), who mentioned that younger people have higher levels of distrust and scrutiny towards online information, and Mitchell, Johnson and Mather (2003) who mentioned that older people are worse at monitoring sources of information. However, these theories differentiated young and old by the age of 35, while this research found significant differences between the age category 57-69 and younger categories. Furthermore, there were only significant differences between age categories when it came to intended transmission, thus not when it came to intended behaviour or feelings of security. Therefore, it may be a bit exaggerated to conclude older people have lower levels of scrutiny towards online information, based on this research.

Overall, information from a source with more authority leads to more intended behaviour, intended transmission and more feelings of security, which is good news for governments. The literature

presents some side notes to this finding though; as Eastin (2001) and Rieh and Becklin (1998) pointed out, anyone can pretend to be anyone online, and thus the government of another source with authority. Furthermore, the finding that people are very receptive to information of the government puts extra pressure on the government; it could disastrous if they were to disseminate misinformation by accident (Benjamin Jr & Simpson, 2009). Therefore, it remains necessary for both to be wary for misinformation; the government needs to be sure they do not spread it by mistake, while people have to make sure the government is actually the sender when it says so.

Limitations of this research

For better understanding and interpretation of the results of this research, it is necessary to recognize the limitations of this research. A first limitation concerns the generalisability of the results, concerning the interaction of selection and treatment (Bryman, 2016, p. 48). As mentioned already in the chapter 'analyses', there were overrepresentations of some sort among the respondents when it came to differentiations in age, level of education and the gender respondents would describe themselves with. The generalisability of this research could be enlarged if it would be replicated, but then with overrepresentations the other way around on these differentiations in the sample. While this research focussed especially on Dutch citizens, the results of this research could be generalised even more, or compared, if this research would be replicated in other countries as well. Furthermore, the findings in this research were based on a hypothetical scenario. To minimize this threat to external validity, the disease and the measures in the scenario were based on a real disease and its' measures.

A second limitation concerns the internal validity. As the topic of epidemics, and how people react to them, and misinformation could be controversial or sensitive, there may be a social desirability bias (Wolter & Herold, 2018; Fisher R. J., 1993). Respondents are often unwillingly accurate on sensitive topics for ego defensive or impression management reasons (Fisher R. J., 1993). This phenomenon is called social desirability bias and cause survey data to be not valid (Wolter & Herold, 2018). However, there are ways to avoid this social desirability bias, which have been practised in this research. Firstly, there was no involvement of an interviewer during the data collection as the respondents took part in this experiment with the comfort of their own computer and their own home (Grimm, 2010). Secondly, anonymity of participants was ensured (Stuart & Grimes, 2009). Even though these two methods help avoid or reduce a social desirability bias, the possibility exists that to some extent there may still be a social desirability bias.

A last, and maybe the biggest, limitation of this research concerns the timeframe in which this research was carried out. While McDermott (2011) describes how the *history* of the research could be a threat to the internal validity, as events outside the research could influence respondents, Bryman (2016) explains *interaction of history and treatment* is also a threat to the external validity and thus the generalizability; the particular timing of a research may influence the results. During the time this research took place the world was under the spell of the COVID-19 pandemic. While this was the direct motivation for the theme of this research, these circumstances could have had an influence on the respondents. In the best case, the topicality of the subject of the research just attracted the respondents and they left all their pre-existing ideas about epidemics behind while taking the survey. In the worst case, respondents applied their already existing feelings and thoughts about the real pandemic which was going on to the hypothetical scenario in the experiment of this research. In that case it would be a threat to both the internal- and the external validity. Therefore, replication of this research at some other point in time would be at place for the generalisability of the outcomes of this research.

Conclusion

To conclude this research, the main findings of this research are formulated and the central research question, *to what extend is the perception of security and the response of citizens to an epidemic influenced by the source and content of information online concerning the epidemic*, is answered.

This research found that the authority of a source positively influences the response of citizens to an epidemic. Respondents reported higher levels of willingness to change their behavior and higher levels of willingness to further transmit the information regarding the epidemic when it came from a source with more authority. Vice versa, when the authority of the source was more ambiguous, respondents reported lower levels for both willingness to change behavior and willingness to further transmit the information they had read.

On the contrary, including more threat-related information to the information regarding the epidemic did not lead to a substantial change in either the both willingness to change behavior and willingness to further transmit the information they had read. It can therefore be concluded that the authority of a source has more influence than the inclusion of threat related information on the response of citizens.

The same can be concluded when it comes to the influence on feelings of security; information that came from a source with more authority lead to more feelings of security. The inclusion of threat-related information did not lead to significant lower feelings of security, except for when it was brought by a source with more authority. However, people still reported to have higher levels of security than those who got the same threat-related information but from a source with less authority.

Recommendations and opportunities for eventual future research

As indicated a few times before, further research is necessary for more understanding and a better overview concerning the results found in this research. First of all, the limits of this research should be explored by conducting this very same research using a more heterogenous sample, in other countries and at a different time, that is to say, not during an ongoing pandemic. Furthermore, studies which would look further into the extent to which people take threats seriously relative to the kind of source could explore this relation even better. This could be done by making respondents read the same threat-related information but presented by sources which vary in authority and possible other, relevant, features. Further research is also needed for the concept feelings of security, especially when it comes to taking in (mis)information, and the factors that influence this concept. In this research it has been found that the authority of a source influences this concept, but there are probably more factors of influence. As the literature provided several theories about how feelings of security and taking in (mis)information influence each other back and forth, more knowledge concerning factors of influence will prove to be essential in the years to come, as the amount of misinformation in society may increase even more.

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Appendix

Vignettes

Below the four vignettes as presented to the respondents. Each respondent got to read randomly only one of the four vignettes. After respondents confirmed they had read the information, they were taken to the survey.

Vignette A

Via WhatsApp word je de volgende informatie doorgestuurd:

De ziekte Nemato-cera wordt verspreid door muggen en is in Nederland gesignaleerd. Men kan voorkomen ziek te worden door muggennetten/ klamboes rond het bed te hangen. Ook al kan het in de zomer warm zijn, is het slim om dikke kleren te dragen, want daar prikken muggen moeilijker doorheen. Omdat muggen worden aangetrokken door parfum en deodorant, is het beter deze producten niet te gebruiken.

Vignette B

Op de site van Rijksoverheid vind je de volgende informatie:

De overheid meldt het volgende: De ziekte Nemato-cera wordt verspreid door muggen en is in Nederland gesignaleerd. Men kan voorkomen ziek te worden door muggennetten/ klamboes rond het bed te hangen. Ook al kan het in de zomer warm zijn, is het slim om dikke kleren te dragen, want daar prikken muggen moeilijker doorheen. Omdat muggen worden aangetrokken door parfum en deodorant, is het beter deze producten niet te gebruiken.

Vignette C

Via WhatsApp word je de volgende informatie doorgestuurd:

De ziekte Nemato-cera wordt verspreid door muggen en is in Nederland gesignaleerd. De ziekte is heel gevaarlijk; het kan leiden tot verlamming. Men kan voorkomen ziek te worden door muggennetten/ klamboes rond het bed te hangen. Ook al kan het in de zomer warm zijn, is het slim om dikke kleren te dragen, want daar prikken muggen moeilijker doorheen. Omdat muggen worden aangetrokken door parfum en deodorant, is het beter deze producten niet te gebruiken.

Vignette D

Op de site van Rijksoverheid vind je de volgende informatie:

De ziekte Nemato-cera wordt verspreid door muggen en is in Nederland gesignaleerd. De ziekte is heel gevaarlijk; het kan leiden tot verlamming. Men kan voorkomen ziek te worden door muggennetten/ klamboes rond het bed te hangen. Ook al kan het in de zomer warm zijn, is het slim om dikke kleren te dragen, want daar prikken muggen moeilijker doorheen. Omdat muggen worden aangetrokken door parfum en deodorant, is het beter deze producten niet te gebruiken.

Survey

Beste respondent,

Allereerst wil ik je graag bedanken voor je medewerking in dit onderzoek! Dit onderzoek gaat in op hoe burgers omgaan met informatie in verschillende contexten en wordt uitgevoerd als onderdeel van de master Crisis and Securitymanagement van de Universiteit Leiden.

Zometeen krijg je om te beginnen een denkbeeldig, maar realistisch, scenario te lezen. Lees dat aandachtig. Hierna krijg je een aantal vragen over dit scenario. Deze vragen gaan over jouw mening, er zijn dus geen goede of foute antwoorden. Tenslotte volgen er paar algemene vragen. In totaal duurt deze enquête 5 tot 10 minuten.

Er zal in de enquête niet gevraagd worden naar persoonlijk informatie (zoals bijvoorbeeld je naam) en je antwoorden worden anoniem verwerkt en opgeslagen. Deelname in dit onderzoek is volledig vrijwillig en er zijn geen risico's of voordelen aan het deelnemen. Voor verdere vragen over het onderzoek ben ik te bereiken op o.j.r.middeldorp@umail.leidenuniv.nl.
Ik wil je graag nogmaals bedanken voor je tijd, aandacht en deelname!

Ik bevestig dat ik de voorwaarden van het onderzoek en de verwerking heb gelezen. Daarnaast bevestig ik dat ik minimaal 18 jaar ben, en de Nederlandse identiteit heb.

0 Akkoord (1)
0 Niet akkoord (2)

If the respondent answered 'Niet akkoord' the survey ended there.

After that introduction, the respondent was presented this text:

Stel je voor dat in de zomer van het jaar 2030 er geruchten zijn over een nieuwe ziekte. Deze ziekte wordt Nemato-cera genoemd en de symptomen zijn hoofdpijn en koorts. Verder is er nog niet veel bekend over deze nieuwe ziekte.

- Klik hier wanneer je de tekst hebt gelezen

After the respondent had confirmed he/she had read this text, the respondent was presented one of the four different vignettes.

When the respondent had confirmed he/she had read the information (of which the vignette existed), the survey started. The survey questions were the same for all respondents.
The questions are written down in the next few pages.

1 Op basis van de gelezen informatie, geef aan op een schaal van 1 tot 7 in hoeverre je het eens bent met de volgende stellingen

	1) Helemaal oneens (1)	2) Oneens (2)	3) Beetje oneens (3)	4) Neutraal (4)	5) Beetje mee eens (5)	6) Mee eens (6)	7) Helemaal mee eens (7)
De informatie zou me een zeker gevoel geven (1)	0	0	0	0	0	0	0
De informatie zou me een veilig gevoel geven (2)	0	0	0	0	0	0	0
De informatie zou waarschijnlijk juist zijn (3)	0	0	0	0	0	0	0
De informatie zou waarschijnlijk betrouwbaar zijn (4)	0	0	0	0	0	0	0

2 Wat was de naam van de ziekte?

- ○ Malaria (1)
- ○ Nemato-cera (2)
- ○ Mozquita (3)
- ○ Ebola (4)

3 Op basis van de gelezen informatie, geef aan op een schaal van 1 tot 7 in hoeverre je het eens bent met de volgende stellingen

	1) Helemaal oneens (1)	2) Oneens (2)	3) Beetje oneens (3)	4) Neutraal (4)	5) Beetje mee eens (5)	6) Mee eens (6)	7) Helemaal mee eens (7)
Ik zou de maatregelen in de tekst overwegen (1)	0	0	0	0	0	0	0
Ik zou een muggennet/klamboe overwegen (2)	0	0	0	0	0	0	0
Ik zou het dragen van dikke kleren overwegen (3)	0	0	0	0	0	0	0
Ik zou het niet dragen van parfum en deodorant overwegen (4)	0	0	0	0	0	0	0

4 Op basis van de gelezen informatie, geef aan op een schaal van 1 tot 7 in hoeverre je het eens bent met de volgende stellingen

	1) Helemaal oneens (1)	2) Oneens (2)	3) Beetje oneens (3)	4) Neutraal (4)	5) Beetje mee eens (5)	6) Mee eens (6)	7) Helemaal mee eens (7)
Ik zou de tekst delen met vrienden en familie (1)	0	0	0	0	0	0	0
Ik zou met bekenden praten over de tekst (2)	0	0	0	0	0	0	0
Ik zou deze tekst doorsturen naar mensen die ik ken (3)	0	0	0	0	0	0	0
Ik zou deze tekst delen op sociale media (4)	0	0	0	0	0	0	0

5 Geef aan op een schaal van 1 tot 7 hoe formeel de bron van informatie was:

	1) Heel informeel (1)	2) Informeel (2)	3) Een beetje informeel (3)	4) Neutraal (4)	5) Een beetje formeel (5)	6) Formeel (6)	7) Heel formeel (7)
De bron van de informatie was: (1)	0	0	0	0	0	0	0

6 Geef aan op een schaal van 1 tot 7 hoe gevaarlijk de ziekte is volgens de informatie:

	1) Heel ongevaarlijk (1)	2) Ongevaarlijk (2)	3) Best ongevaarlijk (3)	4) Niet gevaarlijk/ niet ongevaarlijk (4)	5) Best gevaarlijk (5)	6) Gevaarlijk (6)	7) Heel gevaarlijk (7)
De ziekte was volgens de informatie: (1)	0	0	0	0	0	0	0

7 Geef aan op een schaal van 1 tot 7 in hoeverre je het over het algemeen eens bent met de volgende stellingen

	1) Helemaal oneens (1)	2) Oneens (2)	3) Beetje oneens (3)	4) Neutraal (4)	5) Beetje mee eens (5)	6) Mee eens (6)	7) Helemaal mee eens (7)
Ik vertrouw de Nederlandse overheid (1)	0	0	0	0	0	0	0
Ik vertrouw op het Rijksinstituut voor Volksgezondheid en Milieu (RIVM) (2)	0	0	0	0	0	0	0
Ik denk dat misinformatie/ fake news een probleem is (3)	0	0	0	0	0	0	0

8 Ik omschrijf mezelf als

- o Man (1)
- o Vrouw (2)
- o Anders (3)

9 Mijn leeftijd is

_____

10 Mijn laatst afgeronde opleiding is

- o Basisonderwijs (1)
- o LBO/VMBO/MAVO (2)
- o MBO (MTS/MEAO) (3)
- o HAVO/VWO (MMS/HBS/Gymnasium) (4)
- o HBO (HTS/HEAO) (5)
- o WO (Universiteit/Post-HBO) (6)

Results Post Hoc tests:

The mean difference is significant at the 0.05 level

Dependent variable: on a scale from 1 to 7 the authority of the source of the information was:

	(I) Vignette	(J) Vignette?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Tukey HSD	Vignette A	Vignette B	-1,939*	,243	,000	-2,57	-1,31
		Vignette C	-,265	,242	,692	-,89	,36
		Vignette D	-1,988*	,240	,000	-2,61	-1,37
	Vignette B	Vignette A	1,939*	,243	,000	1,31	2,57
		Vignette C	1,674*	,245	,000	1,04	2,31
		Vignette D	-,049	,243	,997	-,68	,58
	Vignette C	Vignette A	,265	,242	,692	-,36	,89
		Vignette B	-1,674*	,245	,000	-2,31	-1,04
		Vignette D	-1,722*	,242	,000	-2,35	-1,10
	Vignette D	Vignette A	1,988*	,240	,000	1,37	2,61
		Vignette B	,049	,243	,997	-,58	,68
		Vignette C	1,722*	,242	,000	1,10	2,35

	I) Vignette	(J) Vignette?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Games-Howell	Vignette A	Vignette B	-1,939*	,234	,000	-2,55	-1,33
		Vignette C	-,265	,248	,708	-,91	,38
		Vignette D	-1,988*	,227	,000	-2,58	-1,40
	Vignette B	Vignette A	1,939*	,234	,000	1,33	2,55
		Vignette C	1,674*	,258	,000	1,00	2,34
		Vignette D	-,049	,238	,997	-,67	,57
	Vignette C	Vignette A	,265	,248	,708	-,38	,91
		Vignette B	-1,674*	,258	,000	-2,34	-1,00
		Vignette D	-1,722*	,251	,000	-2,37	-1,07
	Vignette D	Vignette A	1,988*	,227	,000	1,40	2,58
		Vignette B	,049	,238	,997	-,57	,67
		Vignette C	1,722*	,251	,000	1,07	2,37

Dependent variable: on a scale from 1 to 7 how dangerous was the disease according to the information?

	(I) Vignette	(J) Vignette	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Tukey HSD	Vignette A	Vignette B	,027	,185	,999	-,45	,51
		Vignette C	-1,442*	,184	,000	-1,92	-,97
		Vignette D	-1,463*	,183	,000	-1,93	-,99
	Vignette B	Vignette A	-,027	,185	,999	-,51	,45
		Vignette C	-1,469*	,186	,000	-1,95	-,99
		Vignette D	-1,489*	,185	,000	-1,97	-1,01
	Vignette C	Vignette A	1,442*	,184	,000	,97	1,92
		Vignette B	1,469*	,186	,000	,99	1,95
		Vignette D	-,021	,184	1,000	-,50	,45
	Vignette D	Vignette A	1,463*	,183	,000	,99	1,93
		Vignette B	1,489*	,185	,000	1,01	1,97
		Vignette C	,021	,184	1,000	-,45	,50

	(I) Vignette	(J) Vignette	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Games-Howell	Vignette A	Vignette B	,027	,169	,999	-,41	,47
		Vignette C	-1,442*	,203	,000	-1,97	-,91
		Vignette D	-1,463*	,175	,000	-1,92	-1,01
	Vignette B	Vignette A	-,027	,169	,999	-,47	,41
		Vignette C	-1,469*	,194	,000	-1,97	-,97
		Vignette D	-1,489*	,164	,000	-1,91	-1,06
	Vignette C	Vignette A	1,442*	,203	,000	,91	1,97
		Vignette B	1,469*	,194	,000	,97	1,97
		Vignette D	-,021	,199	1,000	-,54	,50
	Vignette D	Vignette A	1,463*	,175	,000	1,01	1,92
		Vignette B	1,489*	,164	,000	1,06	1,91
		Vignette C	,021	,199	1,000	-,50	,54