Health crisis communication during a global pandemic

A media analysis about how German media reported on Covid-19 measures and how German policymakers, healthcare professionals and scientists communicate to the public during two lockdowns

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Abstract

Purpose: The sudden outbreak of the Covid-19 virus caused a significant impact on people's well-being. Since news media is mostly informing the public about the restrictions, the way of communication of media, policymakers, scientists and healthcare professionals influences citizen's perception and behavior. Therefore, this research analyzes how German newspaper articles frame the communication about Covid-19 measures and which message style and frame type policymakers, scientists, and healthcare professionals use, when being quoted. The frame types conflict, responsibility, human-interest, economic consequences and moral were chosen as well as the narrative (emotional and storytelling) and non-narrative (facts based and logical) message style in order to understand the purpose of communication.

Method: 200 articles were chosen in the time period of the first lockdown (March 2020 to June 2020) and of the second lockdown (October 2021 until April 2021). The objective of this analysis was twofold. One, the communication between policymakers, healthcare professionals and scientists was compared with each other. Second, the differences in communication of media, policymakers, healthcare professionals and scientists during the two time periods were analyzed.

Results: The results show that the responsibility frame is used most and the moral frame least by media. Additionally, policymakers also use the responsibility frame most when being quoted, as well as scientists. Healthcare professionals use the responsibility frame as much as the human-interest frame. In general, the non-narrative message style is used more and mostly used in combination with the loss frame. Additionally, the non-narrative message style is used more often during the second lockdown as well as the loss frame.

Conclusion: The findings show that policymakers and scientists focus on communicating from a logical, responsible and facts-based approach, whereas healthcare professionals take the human-interest perspective when communicating about the measures. Also, media predominantly focuses on emphasizing the severeness of the pandemic.

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1. Introduction

The Covid-19 pandemic poses a threat to human health all over the world. It became officially declared as a pandemic in January 2020. Since then, approximately 118.500.000 million people globally got infected with Covid-19 of which 2.600.000 million people died (World Health Organization, 2021). To tackle the virus, scientists all over the world were funded to analyze the disease and its spreading. Based on their research, governments implemented restrictions, such as keeping distance and wearing masks. Further, many countries declared a lockdown to reduce the social contact between people (Contreras et al., 2020). Since the pandemic started, countries dealt differently to reduce their numbers of infections and were overwhelmed by its rapid spreading. Due to the fact that the virus caused a second and third wave of increased infections, the lockdown and the regulations are still in place.

The lockdowns have brought along multiple downsides for individuals, such as limited freedom of movement, and reduced number of social contacts. Having fewer social contacts, working or studying from home and a completely different daily life as before, can lead to depression or other mental health issues (Le & Nguyen, 2021). In these times, individuals are confronted with the possible loss of their occupation. For example, German hospitality is closed for already six months now and owners, as well as employees, are afraid of their subsistence (Harms et al., 2021). Accordingly, the government tries to keep people motivated to stick to the regulations to come to an end of the lockdown. These regulations are mainly communicated by the media. Hence, media play an important role in informing and motivating citizens by covering this topic. Hereby, media not only represent the new regulations, but also include speeches of the government, scientists or healthcare professionals (Scopelliti et al., 2021).

During a pandemic, policymakers, scientists and healthcare professionals are necessary for public health since they understand the disease and are responsible for taking extraordinary measures to reduce the number of infections. Policymakers and the healthcare sector use mass media and social networks to spread messages which urge citizens to adhere to the restrictions to prevent the society from the virus (Gantiva et al., 2021). According to Mhedily and Fares (2020), the government's role is to "develop and direct public health policies to address the role of media portals in propagating information in times of pandemics" (p.419). Their challenge is to carefully balance public health with individual

rights to privacy and freedom. As stated by Hyland-Wood et al. (2021), the cause of the difference in how countries handle the situation is the method of governmental intervention and how individuals perceive and respond to them. The most efficient communication strategy "involves clear messages, delivers via appropriate platforms, tailors for diverse audiences, and is shared by trusted people" (p. 1). They also argue that an effective communication strategy with long-term success "depends on developing and maintaining public trust" (p. 1). Trust in experts about the topic is crucial for compliance with public health measures during a pandemic like the Covid-19 outbreak (Battiston et al., 2021). A lack of trust can result for instance in uncertainty about the sufficiency of the measures to lower the number of infections (Dedeoglu & Bogan, 2021). Hence, the role of trust in scientists and healthcare professionals become more relevant and present in society caused by the need for research about the virus and a vaccine. According to Vardavas et al. (2021), to build trust, "timely and accurate communication is essential to enhance public engagement" (p. 7).

Since the health sector is predominantly dependent on the government's legislative actions, public engagement is crucial to flatten the exponential growth of infections. Therefore, the role of science in society became more relevant and important to people. On the one hand, people are uncertain and threatened by the pandemic, which leads to more trust and reliance on scientists and experts. But on the other hand, people might respond with skepticism or distrust (Battiston et al., 2021).

Mass media, for instance social media and newspapers, play an important role in informing the general public, as they reflect and influence public opinions through their selection of topics and applied frames. Frames shape the perspective of the audience, e.g., when applying the human-interest frame, the topic is presented from a human or emotional angle (Semetko & Valkenburg, 2000). Society consumes these on a daily basis to get the newest information around the world (McCombs & Valenzuela, 2021). In times of a pandemic, citizens are predominantly interested in the newest information about the current numbers of infections or new restrictions decided by the government. Mass communication channels are important in order to increase awareness and knowledge about health perceived risks (Slaughter, 2019). Thus, they play a crucial role in raising social awareness, promoting truthful information as well as improving psychological well-being, especially during a pandemic (Mhedily & Fares, 2020). Effective health communication can facilitate trust in organizations and increase public confidence.

Nevertheless, its effectiveness is heavily reliant on transparency to ensure trust and healthy relationships with the public (Lee & Li, 2021). Hence, the media has a great interest in reporting about Covid-19.

Due to the fact that the news covers currently mainly Covid-19 related topics, it is relevant to consider the message styles and frames used when interacting with the public. Therefore, the study tries to determine "How German media report on Covid-19 measures and what message style and frame type German policymakers, scientists and healthcare professionals use when they communicate to the public?" Since there are two time periods, a first and a second lockdown, one sub question is "How does the communication of the media and stakeholder change during the two lockdowns?". Additionally, when comparing the stakeholders' message style and frame types, it might also be interesting to look at their arguments and which sentiment is used the most by whom. The aim of this research is twofold, first to analyze the message styles and frames used by scientists, healthcare professionals and government when communicating to the public about the Covid-19 restrictions, and second to analyze the frames used by the media regarding the Covid-19 measures. Both are done by means of a media analysis. The news media provide a valuable lens to understand public discourse by the frames used. News frames are a conceptual tool used by media to transfer, interpret, and evaluate information. It both reflects and shapes public conversations regarding emerging situations (Mallet et al., 2017), like the Covid-19 pandemic.

There are already studies about the most effective way to use frames and message styles in news media, therefore, the purpose of this study is new in regard to the situation during the pandemic. Because this topic is so recent, the previous studies are often hypothetical and compared with a similar crisis to get as notable results as possible. The added value of this research is that the lockdown and the restrictions are present and relevant for today's society. However, one novel element of this research is the analysis of the quotes from policymakers, healthcare professionals and scientists. Analyzing the direct communication of the Covid-19 measurement regarding applied frames and message styles has not been done so far and contributes to the literature about effective health communication during a pandemic.

The remainder of this thesis is as followed, next, the theoretical framework and the method will be explained. Afterwards, the media analysis and results are presented. Finally, a discussion leads to the conclusion of this topic where the research question is answered.

2. Theoretical framework

2.1 The roles of healthcare professionals, scientists, media and the government

Healthcare professionals, scientists, media and the government play an important role in explaining and motivating the Covid-19 related restrictions. Due to the fact that this specific variant of the SARS virus has not been researched at the beginning of the pandemic, the role of healthcare professionals is rather unique. Doctors or other healthcare professionals have become particularly important, as they are involved in the care of Covid-19 patients and focus on prioritizing the prevention and control of infections (Rozyk-Myrta et al., 2021). Since healthcare professionals are "in the front line in the fight against Covid-19" (Rozyk-Myrta et al., 2021, p.1), the world could not end the pandemic without them. Additionally, they face the severity of the virus at patients and the healthcare system almost every day, thus the attention on the role of healthcare professionals has increased in society (Rozyk-Myrta et al., 2021).

Next, the role of scientists regarding policymaking is explained by the study of van der Werf-Kulichova et al. (2017). They found that scientists expressed their concerns about the misuse of science in policy debates, and therefore, according to the authors, scientists should have an active role in policymaking, instead of having an informative role. Furthermore, scientists feel socially responsible to participate in policymaking debates to ensure that scientific evidence is heard and used for social goals or public health correctly (van der Werf-Kulichova, 2017). In a global health crisis scientist in policymaking are key factors, since policymakers need their insights in e.g., the development of vaccines, new treatments, or interventions for defeating Covid-19 (Antonakis, 2021).

Additionally, the role of media has also increased in importance during the pandemic. As stated by Miles and Morse (2007) the key functions of news media are to "inform and educate" (p. 366). Since news media informs about the pandemic and which restrictions are imposed to tackle the virus, citizens often draw on news media, thus are influenced by the way how media report on the Covid-19 crisis. Additionally, media use frames to shape the publics' perception to give the situation a certain meaning (Miles & Morse, 2007). Media around the world focuses on the topic of the Covid-19 outbreak, including not only health and medical consequences, but also political and economic discussions.

To coordinate the communication about the restrictions to defeat Covid-19, especially political leaders play a crucial role (Antonakis, 2021). It is the government's responsibility to implement public health strategies to stop the spreading. These strategies include the closure of national and/or intra-national borders, as well as museums, schools, and events with a large number of people, and hygiene-related measures, such as wearing a mask, washing hands regularly, and keeping one-and-a-half-meter distance to others (de Moura Villela et al., 2021). The government not only needs to adapt their health-related messages for sub-populations that may struggle to adhere to measures, such as specific age groups, they also need to ensure that people understand the severity and importance of the disease to motivate them to adhere to the restrictions (de Moura Villela et al., 2021).

The government bases its decisions about health-related restrictions on the most up-to-date scientific evidence they receive from healthcare professionals, which became especially present during the Covid-19 pandemic (Abu-Akel et al., 2021). Hence, policymakers are conveying scientific facts for the general public, which entails that they are in charge to inform the public properly about the virus and the current measures. In other words, the government is responsible for making the pandemic comprehensible for individuals as well as maintaining public health. Therefore, it is interesting to look at the interplay between policymakers and scientists, for instance, how policymakers communicate about scientific findings or scientific evidence to the general public. Additionally, the communication style might differ between policymakers and scientists, which could influence the public's perception on the virus.

Although the aforementioned studies are quite recent, this research is relevant for the roles of government, scientists, media and healthcare professionals, because the direct communication of

policymakers, healthcare professionals and scientists show with which approach they communicate to the public and the indirect presentation of the media displays from which perspective media selects and represents the Covid-19 restrictions.

2.2 Frames

News media informs citizens about the latest information about the pandemic. News media use framing, which means that they emphasize aspects of a topic, thus "put people in mind of very different considerations when they contemplate the matter and form opinions about it" (Price et al., 1997, p. 485). Also, the definition of Tankard (2001) illustrates frames clearly: "A frame is a central organizing idea for news content that supplies a context and suggests what the issue is through the use of selection, emphasis, exclusion, and elaboration" (pp. 100-101). Similarly, frames are defined by Entman (1993) as emphasizing pieces of information and heighten them in salience. Salience is defined as making a piece of information more noticeable, meaningful, and memorable to the audience. Accordingly, frames guide the readers' thinking and influence their behavior and decision-making processes. This has the effect that the media considers the importance of the news and decides what the public perceives as necessary. Hereby, the media directs the thinking of people in a certain area (Entman, 1993). In line with this definition is the conceptualization of Price et al. (1997), which entails that news frames affect audience decision-making about matters of public policy in a way that some ideas, feelings, and values are more in focus and present among society than others. There are many different types of frames, one of the most relevant studies about them is the study of Semetko and Valkenburg (2000).

They identified five types of frames that are often used by the media: Conflict frame, human-interest frame, economic consequences frame, morality frame, and responsibility frame. Conflict frames focus on conflicts between individuals, groups, or institutions to draw attention from the public. The human-interest frame adds "a human face or an emotional angle" to the presentation of an event or issue (p. 95). An economic consequences frame is used when reporting an event or issue causing economic consequences to an individual, group, or region. The morality frame presents the event or issue from a

religious or moral point of view and the responsibility frame displays an issue in a manner to blame for its cause or solution either the government, an individual, or a group (Semetko & Valkenburg, 2000).

In health news often a sensational, personalized, and emotional language is used, since it may affect the public's perception of the problem (Sesen et al., 2019), which is currently the Covid-19 crisis. The study of Sesen et al. (2019) applied the frames analyzed by Semetko and Valkenburg (2000) to health crises. They found that the most common frame used is the responsibility frame and the least used is the moral frame. However, responsibility is mostly used in crises with victims, where conflict and human-interest frames were also used at high rates (Sesen et al., 2019).

Next to these types of frames, the study of Gantiva et al. (2021) should also be acknowledged, since it includes generic frames. There are 2 types of generic frames, gain-frames and loss-frames. Gantiva et al. (2021), expected that "gain-frames were more effective to motivate low-risk behaviors (i.e., hand washing) while loss-frames were more effective to motivate high-risk behaviors like staying at home." (p. 2). Gain-frames are referred to as achieving a positive behavior change due to the frame, whereas loss-frames are frames where negativity of a certain behavior is in focus in order to change the behavior of a person, e.g., presenting the high risk of HIV when having unprotected sex (Gantiva et al., 2021). Applying the generic frames on the current Covid-19 situation, health messages including gain frames are most effective when people's behavior is positively influenced by the achievement of staying healthy, e.g., people will stay healthy if they adhere to the measures. Thus, gain frames generate motivation with the focus on self-care behaviors and are perceived as stronger messages (Gantiva et al., 2021). On the other hand, loss frames are most effective for risk awareness, e.g., people will get sick if they do not adhere to the measures (Gantiva et al., 2021). Although the study of Gantiva et al. (2021) is quite recent and analyzes the frames on health communication, this research focuses on the use of loss and gain frames of policymakers, scientists and healthcare professionals when they are being quoted by the media in regard to the current Covid-19 restrictions.

It is expected that during the first lockdown mostly responsibility, conflict, and human-interest framing is used, and less moral and economic consequences framing. Because the second lockdown is much longer than the first, morality and economic consequences frames are more used here, since the focus on long-term consequences for individuals and the economy increases. However, for both periods,

responsibility, conflict and human-interest frames are predominantly used by policymakers, scientists and healthcare professionals. Generally, it is expected that there is clearer communication about the measures since policymakers became more used to implementing restrictions.

2.3 Message styles

By implementing the restrictions regarding Covid-19, it is essential to consider the variety and complexity of ethical challenges during public communication. As reported by Guttman and Lev (2021), there are ethical issues concerning communicating about the pandemic, of which four will be explained. First, when informing the public about the risk of the disease, the gravity of it should be clear so that the people stick to the measures. Here it is important to not exaggerate the situation to prevent a negative psychological impact. Second, blaming and stigmatizing a specific nation or population for the disease leads to prejudice, discrimination, harassment, and also violence. Third, hygiene-related measures such as washing one's hands or using alcohol-based sanitizers should be communicated appropriately to ensure that also people who cannot wash their hands or do not have alcohol-based sanitizers, know what to do to protect themselves. Lastly, wearing face masks to reduce the spreading of the virus, is a disruptive practice for most people in daily life. Especially, for children and hearing-impaired individuals wearing masks or communicating with people who are wearing them may be very difficult (Guttman & Lev, 2021). These are necessary issues to consider when communicating restrictions to the public countrywide because the restrictions should adequately address every single individual since they limit also privacy and human rights.

To do so, the right message style can be a decisive factor. Message styles are used to facilitate influencing people's behavior, including people's thinking, communicating, perception of what is relevant and their intention to take action (Rimer & Kreuter, 2006). Rimer and Kreuter's (2006) study focused on tailored health communication to enhance motivation to process health information, which may also be used by healthcare professionals or the government to communicate about the Covid-19 measures. They named four tailoring ways:

> (a) match content to an individual's information needs and interests, (b) frame health information in a context that is meaningful to the person, (c) use design and production elements to capture the individual's attention, and provide information in the amount, type, and (d) through channels of delivery preferred by the individual, thus potentially reducing barriers to exposure of individuals to communication interventions. (p. 188).

By matching the content to an individual's interest, readers are driven to gain more information, process it, and including it into their decision-making to improve public health. The more meaningful the topic for the person is, the more relevance it has for them to pay closer attention to it (Rimer & Kreuter, 2006). These tailoring ways could increase attention about the virus and how to contain its spreading, and also lead to behavior change, e.g., that people who were first doubting the restrictions may be persuaded to follow the measures after this approach of messaging (Rimer & Kreuter, 2006).

During the pandemic, a key factor of health crisis communication is to persuade the public to adhere to the measures to reduce the number of infections. Hence, a persuasive and appealing message style is needed. Shen et al. (2015) focused on narratives and non-narratives in health crisis communication messages to analyze their effects on disease prevention. They defined narratives as engaging with the public through storytelling and emotional appeals. Additionally, narratives are both entertaining and informative as information is given by using anecdotes or personal stories with plots (Shen et al., 2015). On the other hand, non-narratives are based on arguments, facts, and numbers which are presented logically and informative (Shen et al., 2015).

It is expected that mostly narrative messages will be used at the beginning of the lockdown (March 2020), due to the sudden outbreak of Covid-19. During the second lockdown, however, non-narrative messages were mostly used, since policymakers, scientists and healthcare professionals do have more information about the long-term consequences of the pandemic, thus they predominantly report statistical and factual information. In combination with the gain and loss frames, it is expected that policymakers, healthcare professionals and scientists use predominantly the gain frame together with the non-narrative message style in order to motivate citizens to adhere to the measures by neutrally giving them facts and information about the restrictions with a positive outcome.

The research contributes to the literature of message styles, since message styles are not yet analyzed in a context of quotes from policymakers, scientists and healthcare professionals in regard to informing about Covid-19 restrictions in media. In addition, this study also analyzes the combination of gain and loss frames and message styles in direct quotes.

3. Method

The aim of this research is to analyze how government and scientists use frames and message styles and how they are presented by the media. A quantitative media analysis provides an investigation in news media by analyzing its content on different media sources such as articles, radio, television, speeches and much more (Krippendorff, 2019). This research is based on analyzing newspaper articles to gather valuable insight into the communication methods of German scientists, healthcare professionals and the German government. The newspaper articles display how Covid-19 measures are reported by media and how policymakers, scientists and healthcare professionals use message styles and frames to communicate to the public about the Covid-19 restrictions. The following section explains the method that was chosen for this research. First, an explanation of the corpus will be given. Second, the codebook and its reliability are described.

3.1 Corpus

The corpus for the analysis was collected by means of the Nexis Uni Database. When searching the term "Covid-19" more than 10,000 articles were found. The search was filtered by using several criteria. First, only German newspaper articles were selected. This criterion is based on the fact that Germany has the largest population of Europe (Statista, 2021). Additionally, Germany managed the Covid-19 pandemic better than other countries in Europe and it is one of the largest countries in Europe. Second, it was narrowed down by selecting articles during the first lockdown, from March 2020 to June 2020. Here the outbreak of the disease started, and the first lockdown was called in. Next, the time period of

October 2021 until April 2021 was selected, since this is period represents the second lockdown and the second and third wave of infections among the German society. Selecting these timeframes serves to compare the used frames and messages styles between the first and the second lockdown.

After applying these criteria, a total of 1,071 articles could be found on Nexis Uni during the first lockdown. For the second lockdown a total of 5,031 articles were found. For the second lockdown much more articles were found in total, since the discussion about the vaccination was less present during the first lockdown. Out of these 6,102 articles, 200 were chosen based on their relevancy as the total corpus to conduct the media analysis. Relevant articles include policymakers, scientists or healthcare professionals as source and their content is mainly about the Covid-19 measures. Additionally, the corpus was selected by looking for interviews with policymakers, scientists or healthcare professionals or press conferences which are mainly about the Covid-19 measures. Articles which are focusing on the restrictions in other countries, the vaccine or where the Covid-19 measures were mentioned but not further discussed were outsourced. Generally, the Nexis Uni Database includes larger newspapers, for instance Süddeutsche Zeitung or Bild, but also more regional newspapers such as Schwarzwälder Bote or Solinger Morgenpost. Both types of newspaper articles were included in this study.

3.2 Codebook

The articles were coded by deductive and inductive coding, which means that the codes were derived from a preexisting framework. First, codes were included to identify the article, such as source, publication date and article type (see Table 1). Here the unit of analysis was the whole article. Second, codes related to the relevant stakeholders mentioned in the article, included policymakers, healthcare professionals, scientists, general public, the Robert-Koch-Institute, media and other (see Table 1). The stakeholder codes were applied on each paragraph about Covid-19 measures. The Robert-Koch institute was included as stakeholder, since the institution is relevant for policymaking as well as for science. Therefore, it is its own code, but stands rather in connection to science than to policymaking. In order to categorize the articles in sentiments, the codes positive, neutral, ambiguous and negative were added

to the codebook (see Table 1). Here the unit of analysis was also each paragraph about Covid-19 measures. The code "frame type" was based on the literature by Semetko and Valkenburg (2000), hence the subcodes are conflict frame, human interest frame, responsibility frame, morality frame and economic consequences frame (see Table 1). For every paragraph about Covid-19 measures one type of frame was coded. To classify the context of the paragraphs, the code "argument" was used. It included Covid-19 measures, economic, education, ethical, public health and trust (see Table 1). The code message style is based on the output of the meta-analysis of Shen et al. (2015). Here, the subcodes are "narrative" and "non-narrative", where "narrative" relates to units of analysis which tell a tell a story and appeal to the readers emotions, whereas "non-narrative" relates to units of analysis predominantly about facts, numbers and evidence (see Table 1). The unit of analysis was each paragraph. Additionally, the theory about gain and loss frames from Gantiva et al. (2021) was used, which contains that gain frames focus on the positive outcome and loss frames on a negative outcome when behaving in a certain way (see Table 1). The codes for message style and gain/loss frame were only applied on the paragraphs that include a citation from one of the stakeholders.

Table 1:

Codebook

Code	Sub-code	Definition	Example
1. Source		Publisher of the article	Süddeutsche Zeitung, die Welt, etc.
2. Publication date	2.1 First lockdown	Time period from March 2020 to June 2020	
	2.2 Second lockdown	Time period from October 2020 to April 2021	
3. Article type	3.1 Newspaper article		
	3.2 Press release		
	3.3 Interview		
	3.4 Podcast		
4. Stakeholder source	4.1 Policymakers	Plans and strategies that the government, politicians, healthcare experts, and other professionals introduce are developed by policymakers. They are responsible for utilizing the research evidence to form or amend policies	
	4.2 Healthcare professionals	any member of the medical, pharmacy or nursing professions or any other person who is trained to work in any field of physical or mental health	
	4.3 Scientists	a person who is studying or has expert knowledge of one or more of the natural or physical sciences	
	4.4 General public	Refers to the population or society	
	4.5 Robert- Koch Institute	Institute which delivers evidence and information for policymaking	
	4.6 Media	the means of communication, as radio and television, newspapers, magazines, and the internet, that reach or influence people widely	
	4.7 Other		
5. Sentiment	5.1 Positive	Positive information related to Covid-19 measures	With the vaccine the lockdown will be over soon. “I am sure, we’ll defeat this virus this." (Merkel, 2021)
	5.2 Ambiguous	Both positive and negative information related to Covid-19 measures	"I am sure that we can manage this virus, if every citizen is aware of his/her task. This virus is serious, so take it seriously. Such

			challenge wasn't present since World War II where solidarity needs to be in focus of our actions." (Merkel, 2020)
	5.3 Neutral	Neither positive nor negative information related to Covid-19 measures	Some countries should not be visited and therefore, quarantine rules were imposed (Süddeutsche Zeitung, 2020).
	5.4 Negative	Negative information related to Covid-19 measures	Germany's economy is heavily hit by the Covid-19 crisis. Thousands of companies lose their orders or employees (Spiegel online, 2020).
6. Frame type	6.1 Conflict	focus on conflicts to draw attention from the public	Markus Söder warns of an "openingsrush". The Covid-19 strategy needs to include the infectious mutation of the virus (Freies Wort, 2021).
	6.2 Human-interest	adds "a human face or an emotional angle" to the presentation of an event or issue	„the German healthcare system is only functioning so well, because of the volunteers who help healthcare professionals. But still, also with this help, the personnel are working so hard that they are at their ends. Because of this, many volunteers go back into their usual jobs." (Ute Teichert, 2020)
	6.3 Responsibility	displays an issue in a manner to blame for its cause or solution and about taking the responsibility	"How fast the virus is developing, depends on the behavior of citizens. It depends on if they adhere to the measures." (Karl Lauterbach, 2020)
	6.4 Moral	from a religious or moral point of view and about human rights	A prohibition for travelling would be an extensive cut into the freedom of people (Süddeutsche, 2021).
	6.5 Economic consequences	causing economically consequences to an individual, group or region	Germany's economy is heavily hit by the Covid-19 crisis. Thousands of companies lose their orders or employees (Spiegel online, 2020).
7. Argument	7.1 Covid-19 measurement		
	7.2 Economic		
	7.3 Education		
	7.4 Ethical		
	7.5 Public health		

		7.6 Trust		
8.	Message style	8.1 Narrative	engaging with the public through storytelling and emotional appeals	"our hospitals are overwhelmed if too many patients are taken into hospital in a short time. We have to slow the virus down." (Merkel, 2020)
		8.2 Non-narrative	based on arguments, facts, and numbers which are presented logically and informative	„No shaking hands, wash your hands often and thoroughly, keep one-and-a-half-meter distance from each other and if possible then do not visit elderly people, because they are more vulnerable." (Merkel, 2020).
9.	Gain/Loss frame	9.1 Gain frame	When a message focuses on a positive outcome/benefit	"If we adhere to the measures, the spread of infections will decrease."
		9.2 Loss frame	When a message focuses on the costs/loss	"If we do not adhere to the measures, more and more people will die."

3.3 Analysis

In order to evaluate the chosen articles and get relevant data for answering the research question the articles were coded by using Atlas.ti. "Coding [...] is the process by which segments of data are identified as relating to a more general idea" (Boeije, 2010, p. 95). Coding qualitative data helps structuring data, finding patterns and interpreting results.

To ensure the consistency and reliability of the codebook, the intercoder reliability had to be checked. Intercoder reliability can be defined as "[...] the extent to which two or more independent coders agree on the coding of the content" (Lavrakas, 2008, p.1). Thus, 10% of the corpus was assessed in a second round of coding by a different researcher. Subsequently, the Cohen's Kappa was calculated for each code (see Table 2) resulting in a total Cohen's kappa of 0.87. Since a Kappa higher than .65 can be interpreted as sufficient (Strahl et al., 2019), the codebook (Table 1) is reliable. The Cohen's Kappa for the frame type and gain/loss frame are lower than the Cohen's Kappa of the other codes, because there was some disagreement about the conflict and responsibility frame as well as the gain frame. However, these codes are sufficient to analyze the newspaper articles.

Table 2:

Intercoder reliability for each main code

Code	*Cohen's Kappa*
Publication date	1
Stakeholder source	0.98
Sentiment	0.97
Frame type	0.69
Message style	0.7
Gain/Loss frame	0.66
Arguments	0.7

4. Results

In this section the results of the newspaper analysis are discussed. First, general findings about how media reported about the Covid-19 measures will be shown. Second, the communication style of policymakers, healthcare professionals and scientists will be displayed.

4.1 How Covid-19 measures are reported by the media

4.1.1 Type of frame

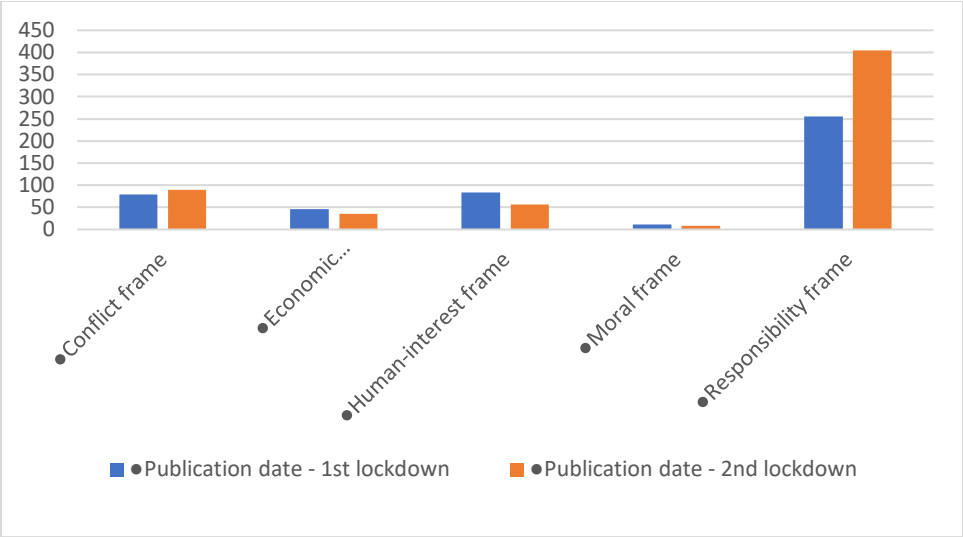
In general, in both lockdowns the media reported the Covid-19 measures most often in combination with the responsibility frame (61.7%) (see Figure 1). This frame includes why these measures are chosen by the government, hence the cause of the severeness of these restrictions, and how policymakers take the responsibility to react on the development on the virus. For example, media reported about how the German chancellor Angela Merkel spoke to the public about how citizens could prevent a more severe outbreak of the virus if they adhere to the measures. Additionally, by speaking directly to the public, citizens feel responsible to act according to the restrictions. The second most often used frame, although much less frequently, was the conflict frame (15.7%). This frame was mostly used when attention to a certain topic was raised, such as new restrictions coming up or a severe outbreak of the virus in certain location. Also, it was used when stakeholders argued differently about restrictions. For instance, when

policymakers from different parties or districts in Germany had opposite opinions and the media reported on their discussions. Less attention has been on the human-interest frame (13.2%), which was used when the measures were reported from the perspective of citizens, as well as what consequences these measures for citizens have. The economic consequences frame (7.4%) was also used less, as well as the moral frame (1.7%). The economic consequences frame is focusing on economic consequences, for instance, how smaller businesses had to fear their subsistence because they had to close their store or restaurant due to the lockdown. The moral frame was used when reported on the measures from an ethical or religious point of view, for example, how Muslims were not allowed to go to church in the evening because of the curfew.

When comparing the type of frame with the time period, it appeared that percentage of the human-interest frame was higher during the first lockdown than during the second lockdown, 60.2% versus 39.8%. On the other hand, the percentage of the responsibility frame was higher during the second lockdown (61.6%) than during the first lockdown (38.4%). This is because the media focused on the Covid-19 restrictions from a human perspective during the first lockdown and from a broader perspective during the second lockdown. Specifically, citizens needed the emotional and natural approach in media during the first lockdown in order to understand and get used to the new situation of the pandemic. During the second lockdown, however, citizens were used to the situation already and took the lockdown less serious, thus the media used the responsibility frame to emphasize the severeness and raise awareness of adhering to the restrictions.

Figure 1:

Frames used per time period



4.1.2 Sentiment

Generally, the articles are mainly neutral, 38.6%, and ambiguous, 22.4%, since paragraphs mainly informing about the measures were predominant in the articles. The sentiment negative was used fewer times, 19.6%, and the sentiment positive the least often, 5.5%. The sentiment negative was mainly used when media reported on negative consequences caused by the restrictions, and the sentiment positive was mainly used when media reported about how well citizens adhere to the measures or how restrictions can be abolished.

Comparing the two lockdowns, during the first lockdown the measures were communicated more positive (60.3%) than during the second lockdown (39.7%). The articles were less positive about the Covid-19 restrictions during the second lockdown, since the measures were stricter and remained over a longer time period than during the first lockdown. Additionally, during the second lockdown, media had to convince citizens more to adhere to the measures than during the first lockdown, because they were exhausted of taking the measures. This shift can also be seen at the sentiment code "ambiguous", which was used more often in the first (61.7%) than during the second lockdown (38.3). Hence, the articles were less neutral during the first lockdown (29.1%) than during the second (70.9%).

Similarly, as with the positive and negative sentiment, this means that during the second lockdown less emotions or sentiment were included in informing about Covid-19 measures in order to deliver a clear and neutral message to citizens with the intention to process the message seriously.

4.1.3 Argument – Sentiment

The argument "Covid-19 measures" was used the most frequently by the media (75%). Its frequency is so high, since it was used in the context of imposing or abolishing restrictions. Additionally, it was used in the context of taking a perspective on these measures as well as discussing them. The second most used argument was economic, which was used 10%, mainly in the context of economic consequences due to the lockdown. Public health was used 8.6%, when the severity of the disease or the threat for public health was mentioned or explained. Education was used 2.5%, in the cases that the restrictions influence citizen's education, e.g., when schools or kindergartens were closed. Ethical was used 2.6% mainly when media reported about human rights or religion, e.g., that the restrictions caused limited freedom of movement. Lastly, trust was used the least frequently (1.1%), in the context of how citizens trust policymakers in making their decisions about the measures, and scientists and healthcare professionals in research about the virus or the medical treatment.

The arguments were present in each sentiment, although public health, economic, education and ethical are most often used in combination with the sentiment "ambiguous". This might be caused by the balance between imposing and lifting restrictions. The argument Covid-19 measures is used most often in a neutral context (37.5%) and only a few times in a positive context (5%). The percentage of the positive sentiment is low, because media hardly covers the positive aspects of the measures, as for instance, abolishing restrictions or presenting the positive outcome of adhering and implementing to restrictions.

One main result is found at the argument trust. It is used much more in a negative context (60%), than in an ambiguous (20%) or positive context (20%). Since the German government imposed restrictions about Easter 2021, where for example, family meetings and openings of supermarkets were not allowed, and then abolished these restrictions after one day, German citizens were critical in

believing that the government decided correctly which measures were needed and which were not. Media reported a lot on the debate of how citizens' trust in government has decreased after this failed management of communication and decision-making.

4.1.4 Stakeholder - Sentiment

In total, the stakeholder general public was used the most often (47.5%). The second most often used stakeholders were policymakers, although less frequently (28.2%). The stakeholder other was used mainly in the context of companies (15.6%), media was used 4.2% when stakeholder talked directly to the media, for instance in an interview or when media was mentioned in reporting on a topic. Healthcare professionals were used 2.9%, scientists were used 2.8% and the Robert-Koch institute was used 1.4%.

When looking at the relation between sentiment and stakeholder, it becomes clear, that each stakeholder communicated predominantly neutral or ambiguous. But still, it is relevant to include the negative and positive sentiment in order to understand the differences between the communication styles of each stakeholder. The stakeholders who communicated most negative of all were the media themselves (32.4%). This might be caused by reporting on debates and discussions about Covid-19 measures from a perspective that mainly focuses on the negative consequences for society. The least negative were the stakeholders "other" (14.7%). Additionally, it is interesting to look at the percentages of when media reported the most and the least positive in combination with which stakeholder. Most positive was the Robert-Koch institute with 8.7% and least positive were scientists with 2.2%. Since the Robert-Koch institute can belong to both, scientists and healthcare professionals, and was oftentimes reporting on the current numbers of infections, it was communicated most positive, because media focused a lot on the positive news of decreasing numbers of infections when explaining the statement of the Robert-Koch institute. Among all stakeholders, scientists were reported most negative by the media, since the whole pandemic and its consequences are negative and difficult to present in a positive setting.

4.2 How healthcare professionals, scientists and policymakers communicate about Covid-19 measures

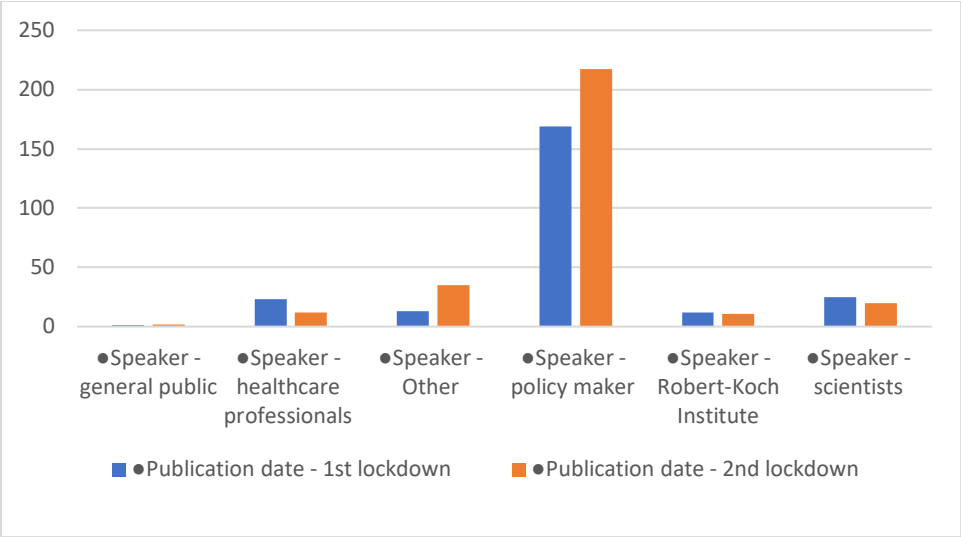
Apart from reporting on the Covid-19 measures, media also quoted relevant stakeholders, for instance policymakers, scientists or healthcare professionals, to directly deliver messages to the public. The most often quoted stakeholders are policymakers (71.5%), whereas scientists, healthcare professionals and the Robert-Koch institute together are only quoted in 19.1% of all newspaper articles (see Figure 2). Policymakers were mostly quoted when new restrictions were imposed which they explained and justified with the intention that citizens understand why it is important to adhere to these measures. With their messages they also took the responsibility to ensure that citizens are well informed and aware of the severeness of the pandemic.

Furthermore, scientists, healthcare professionals and the Robert-Koch institute were quoted less in general, and also less during the second lockdown (14.4%) than during the first (24.5%). The quotes of scientists and the Robert-Koch institute included mainly scientific information, more scientific information was given during the first lockdown, because of the recent outbreak of the virus. Additionally, healthcare professionals were quoted in the context of how they positively contributed to the German healthcare system. During the first lockdown they got more attention in the media about how present they are and which hard, but necessary occupation they have in times of a pandemic.

Additionally, an increase of frequency can be seen at the stakeholder other. It was quoted 5.3% during the first and 11.7% during the second lockdown. Since the stakeholder other was oftentimes coded as a company or other economic organization, the increase might be due to the long-time consequences the economy had to face during the second lockdown.

Figure 2:

Frequency of quoted stakeholder per lockdown



4.2.1 Speaker's use of frames

Within the s, the stakeholders also made use of the five frames. Policymakers used the responsibility frame most (62.8%), then the conflict frame (15.8%), then the human-interest frame (13.7%), then the economic consequences frame (5.9%) and least often the moral frame (1.8%). Healthcare professionals used the responsibility frame 40%, the human-interest frame 40% and the conflict frame 20%. The other frames were not used by them. Oftentimes, they are quoted in the context about patients in hospitals or the current situation in hospitals in relation to the restrictions, hence they communicate from a human and emotional angle. For example, one article of "Spiegel online" (2020) quoted Ute Teichert, a German specialist for public health. There she said „the German healthcare system is only functioning so well, because of the volunteers who help healthcare professionals. But still, also with this help, the personnel are working so hard that they are at their ends. Because of this, many volunteers go back into their usual jobs." This quote shows how healthcare professionals had to work and how their abilities came to an end by the increased workload due to the pandemic.

Further, scientists most often applied the responsibility frame (49%), since the mainly communicated how and which measures work best to lower the number of infections. They used the human-interest frame only 22.2% and the moral frame not at all. Similarly, the Robert-Koch institute

communicated through the media by also using the responsibility frame most (78.4%), the human-interest frame less (13%) and the moral frame not at all. For scientists and the Robert-Koch institute the predominant use of the responsibility frame can be explained by delivering the messages in a scientific approach. This means that in the articles scientists and the institute were mainly explaining the virus and how it develops to be comprehensible for the audience as well as that the measures make sense to citizens. The stakeholder "other" used the economic consequences frame 52%, which can again be explained by the economic loss caused by the pandemic.

4.2.2 Relation between gain/loss frame, message style and the time period

In total, the gain frame was more used in combination with the non-narrative message style (63.6%) than with the narrative message style (36.4%). On the contrary, the loss frame was used less with the narrative message style (41.7%) and more with the non-narrative message style (58.3%). Hence, the non-narrative message style was used more often than the narrative message style in general. Because the articles were mainly informing the public about the Covid-19 measures, it is obvious that the non-narrative message style was used predominantly.

Comparing the gain and loss frames with the time period, the loss frame was used more often during the second lockdown (60.9%) than during the first lockdown (39.1%). One explanation is that during the second lockdown, citizens needed the loss frame to understand what impacts the disease has on public health. By portraying the restrictions with a severe negative outcome, citizens are more likely to adhere to the measures, because they understand the consequences and meaning behind them. For the gain frame, the numbers do not differ much throughout both time periods. Comparing the message style with the time period, the non-narrative message style was used more often (60.4%) during the second lockdown than during the first lockdown (39.6%). The narrative message style was used little less in the second lockdown (46.2%) compared to the first (53.8%). This pattern is similar to the pattern of the use of the gain and loss frame. The non-narrative message style informed citizens about the rules in a concise and realistic manner to be better understood.

4.2.3 Relation between speaker, message style and gain/loss frame

It is also relevant to analyze the stakeholder who is quoted with the message style and gain or loss frame it uses. Policymakers used the narrative message style less (36.7%) than the non-narrative message style (63.3%). In addition, they used the gain frame more often (71.6%) than the loss frame (28.4%). For example, one quote including the non-narrative message style and the gain frame, is from the article of "Zeit online". Merkel is quoted with „No shaking hands, wash your hands often and thoroughly, keep one-and-a-half-meter distance from each other and if possible then do not visit elderly people, because they are more vulnerable." (2020). Merkel is speaking based on facts and arguments and presents them logically, while she uses the gain frame to show that adhering to the restrictions prevents elderly people from becoming infected with the virus.

In contrast, scientists, healthcare professionals and the Robert-Koch institute together used also less the narrative (39.8%) than the non-narrative message style (60.2%), but more often the loss frame (52.4%) than the gain frame (47.6%). Thus, when communicating to the public, scientists and healthcare professional use more the loss frame than the gain frame, while policymakers use more the gain frame than the loss frame. This is caused by the communication strategy of policymakers who try to motivate the public to adhere to the restrictions, whereas scientists and healthcare professional try to emphasize the severeness of the Covid-19 disease by using the loss frame and focusing on the risks this virus brings with it.

5. Discussion

The following section will discuss the results and the study in general. First, the main findings will be given and the research question as well as the sub questions will be answered. Second, some theoretical and practical implications of this research will be highlighted. This is followed by some limitations and recommendations for future research and ends with a brief conclusion.

5.1 Main findings

This study is conducted to find out how media reported about the Covid-19 measures and what message style and frame types, policymakers, scientists and healthcare professionals used when there are quoted.

To start off, the first part of the research question will be answered. Generally, in both lockdowns the media reported mainly the responsibility frame to explain where the virus came from and how persons in authority impose restrictions to reduce the number of infections. When looking at the two lockdowns and the human-interest frame more specifically, it became clear that during the first lockdown the percentage of the human-interest frame was higher than during the second. To explain this, media focused more on the Covid-19 restrictions from a human and emotional angle during the first lockdown, because the situation was new and overwhelming for many citizens. When looking at the responsibility frame and the time period, it became clear, that it was used most during the second lockdown. This is predominantly caused by the fact that during the second lockdown the use focus of the media was more on explaining the measures and the importance of adhering to them in order to still motivate citizens to be aware of the consequences if not adhering to the restrictions.

Furthermore, when comparing the two lockdowns in their sentiment, during the first lockdown the measures were communicated more positive than during the second lockdown. An explanation for this difference in sentiment could be that policymakers were hopeful and more motivated, that the pandemic will end soon. During the second lockdown, policymakers are more aware about the virus, since they experienced how the virus became more severe. A similar shift can also be seen at the sentiment ambiguous, which was used more often in the first than in the second lockdown. Hence, the articles were less neutral during the first lockdown than during the second. In times of the second lockdown, policymakers might communicate more neutral to overcome raising hope for the public, since the future of the pandemic cannot be predicted.

Moreover, another main result is found at the argument trust. It is used predominantly in a negative context. Since the code trust is mostly used in relation to the argument Covid-19 measures and the stakeholder general public, this result represents the insecurity and distrust among the general public about the restrictions imposed by policymakers. Citizens are insecure about the sufficiency of the

imposed restrictions or they disbelief the government about the whole Covid-19 pandemic, because the government was not strict and clear in their communication about the restrictions through media, for instance around Easter 2021.

To answer the second part of the research question, policymakers use mainly the responsibility frame, as well as scientists. The focus of policymakers lies in informing and motivating the public about the measures, whereas scientists emphasize the severeness of the disease and its consequences. However, healthcare professionals use the human-interest frame as much as the responsibility frame, which shows that healthcare professionals also take a human perspective. Healthcare professionals were oftentimes mentioned in the articles when they were also referring to public health, especially mental health. Their statement is to increase awareness on mental health, since due to the two lockdowns, people are having fewer social contacts and spend much time alone, which caused anxiety or depression.

Contrary to the expectation, when analyzing the message styles and the gain or loss frame, the most often used combination consists of the non-narrative message style and the loss frame. Since the non-narrative message style includes communicating about facts with arguments in a logical manner, the focus in communication during this pandemic lies in delivering logical information and facts about measures with the intention that citizen understand the situation. Furthermore, since the loss frame focuses on the negative consequences, that occur if people do not adhere to the restrictions, the severeness and threat of the virus were emphasized. The means by this are to deliver the message in an authoritative manner as well as to raise awareness about the importance to adhere to the measures.

The loss frame as well as the non-narrative message style were used more in times of the second lockdown than the first. This is caused by the fact that citizens have less motivation and patience to conform to the regulations in times of the second lockdown and that therefore, the messages about the restrictions are presented more severe, logical and based on facts so that citizens still adhere to the measures.

When looking at the relation between stakeholder, message style and gain or loss frame, policymakers used mainly non-narrative and the gain frame. In contrast, scientists, healthcare professionals and the Robert-Koch institute used mainly non-narrative and the loss frame. This showed that the government was more focused on the positive outcome of the pandemic as motivation for

citizens whereas the science and health sector emphasized the negative outcome to portray the seriousness and risk of the virus in order to motivate citizens.

5.2 Theoretical implications

This research contributes to the theory about communication styles and framing during a public health crisis. One implication is, that the comparison of message style and framing between the two lockdowns showed, what way of communicating to the public during a pandemic is more effective. As the study of Vaughan and Tinker (2011) already showed, effective health risk communication includes to inform and motivate appropriate self-protective behavior, as well as updates on risk information to build trust and dispel rumors. There are clear parallels when applying the findings of Vaughan and Tinker (2011) on the communication of German policymakers, healthcare professionals, scientists and the media during the Covid-19 pandemic. For instance, in times of the pandemic, the communication contains of mainly using the non-narrative message style and the loss frame with the intention to highlight the severity of the virus as well as to explain the restrictions logical with scientific evidence. This communication style is in line with the study of Vaughan and Tinker (2011), as they also state to include logical information and motivate self-protective behavior.

Furthermore, this study contributes to closing two research gaps. One, how media reported on the Covid-19 measures regarding their use of frames and second, how policymakers, scientists and healthcare professionals communicate in regard to frames and message styles to the public about the Covid-19 measures. To start off with the first one, the expectations about the frames from literature can be confirmed partly. On the one hand, the most used frames are responsibility, conflict and human-interest, but the morality and economic consequences frames did not increase in frequency throughout the two lockdowns. However, the focus on long-term consequences regarding economy and public health was increased, as it was expected beforehand. Although a much clearer communication of government is expected throughout the two lockdowns, when taking into account the unclear communication about the measures around Easter holidays, this expectation cannot be confirmed.

To close the second research gap, also here the expectations can be confirmed partly. First, it was expected that during the first lockdown, mostly narrative messages will be used, which also was the case. Although the difference in time periods was small, the narrative message still was used approximately 7% more in times of the first lockdown. Next, during the second lockdown it was expected that mostly non-narrative messages were used due to the fact that policymakers, scientists and healthcare professionals have more information about the virus. This can also be confirmed, since the non-narrative message style was used approximately 20% more often during the second lockdown than during the first lockdown. Lastly, it was expected that policymakers, healthcare professionals and scientists use predominantly the gain frame in combination with the non-narrative message style. This is not completely the case, since policymakers, healthcare professionals and scientists took a different approach to communicate about the measures, for instance, policymakers did use most often the gain frame in combination with the non-narrative message style, but healthcare professionals and scientists used mostly the loss frame in combination with the non-narrative message style.

5.3 Practical implications

Next to theoretical implications, there are also two practical implications. First, the role of media increases in importance during this pandemic. Media shape the perception and influence the opinion of citizen by framing and choosing a message style. In times of a pandemic, media have the role to share information and knowledge from policymakers, scientists and healthcare professionals in order to tackle the virus. Therefore, the responsibility and impact of the media should not be underestimated.

Second, the role of healthcare professionals became more relevant by media during this pandemic. Since healthcare professionals have fundamental knowledge in healthcare their reputation increased in regard to their acknowledgement by the general public. Although healthcare professionals were confronted with a heavily increased workload, they dealt well so that the German healthcare system was not overloaded.

5.4 Limitations & future research

Some limitations of this study should be acknowledged. For example, the articles included in this study are national and regional and were treated similarly, meaning that there was no focus on the difference in communication between national and regional articles in this study. In addition, this research only focused on policymakers, scientists and healthcare professionals, although it would also be interesting to analyze the reactions and communication of the general public through media on the pandemic.

For future research several recommendations can be given to study frames and message style regarding health communication or specifically the Covid-19 pandemic. First, while this study focuses on the frames and message styles used in Germany, which is representative for Western Europe, other countries, e.g., Russia, China or the US should be studied to gain insight into the different communication of governments, scientists and healthcare professionals across countries. Additionally, the media have different rights in other counties, so how do media report on the Covid-19 measures in other countries.

Second, in this study the communication of healthcare professionals, scientists and the government were analyzed during the lockdown of a pandemic. As the pandemic will be over sometime, it might be interesting to research how the use of frames and message styles change. Furthermore, if a similar crisis as the Covid-19 pandemic happens again, it might be relevant to investigate how governments or healthcare professionals and scientists apply their experience from the Covid-19 pandemic to the crisis. Also, how is media reacting on the end of the pandemic and how would media react on a similar crisis than the Covid-19 pandemic.

5.5 Conclusion

This research adds to the current literature about framing and message styles during a global health crisis, such as the Covid-19 pandemic. Media have the responsibility to inform citizens about the crisis, but to communicate effectively, an appropriate frame and message style needs to be applied. As found in this study, during the first and second lockdown media reported mainly using the responsibility frame,

and when stakeholder were quoted, they mainly use the non-narrative message style and the loss frame. The intention behind this communication style is the balance between raising awareness about the measures as well as the virus itself and preventing citizens from being too threatened by the virus.

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7. Appendix

Appendix A: Frequency tables

How Covid-19 measures are reported by the media

Table 1:

Frequency of frame types

Subcode	*Frequency*
Responsibility frame	61.7%
Conflict frame	15.7%
Human-interest frame	13.2%
Moral frame	1.7%
Economic consequences frame	7.4%

Table 2:

Frequency of frame types per time period

Subcode	*Frequency for first time period*	*Frequency for second time period*
Responsibility frame	38.4%	61.6%
Conflict frame	47%	53%
Human-interest frame	60.2%	39.8%
Moral frame	57.9%	42.1%
Economic consequences frame	56.8%	43.2%

Table 3:

Frequency of sentiment

Subcode	*Frequency*
Ambiguous	22.4%
Negative	19.6%
Neutral	38.6%
Positive	5.5%

Table 4:

Frequency of sentiment per time period

Subcode	*Frequency for first time period*	*Frequency for second time period*
Ambiguous	61.7%	38.3%
Negative	38%	62%
Neutral	29.1%	70.9%
Positive	60.3%	39.7%

Table 5:

Frequency of arguments

Subcode	*Frequency*
Covid-19 measures	75%
Economic	10%
Education	2.5%
Ethical	2.6%
Public health	8.6%
Trust	1.1%

Table 6:

Frequency of arguments per sentiment

Subcode	*Frequency for ambiguous sentiment*	*Frequency for negative sentiment*	*Frequency for neutral sentiment*	*Frequency for positive sentiment*
Covid-19 measures	36%	18.5%	37.5%	5%
Economic	39.5%	29.5%	22.5%	8.5%
Education	45.5%	12.1%	30.3%	12.1%
Ethical	67.6%	26.5%	5.9%	0%
Public health	41.8%	27.3%	23.6%	7.3%
Trust	20%	60%	0%	20%

Table 7:

Frequency of stakeholders

Subcode	*Frequency*
Policymakers	28.2%
Healthcare professionals	2.9%
Scientists	2.8%
General public	47.5%
Media	4.2%
Robert-Koch institute	1.4%
Other	15.6%

Table 8:

Frequency of stakeholders per sentiment

Subcode	*Frequency for ambiguous sentiment*	*Frequency for negative sentiment*	*Frequency for neutral sentiment*	*Frequency for positive sentiment*
Policymakers	34.2%	21.1%	40%	4.7%
Healthcare professionals	34.7%	20.4%	34.7%	8.2%
Scientists	49%	14.9%	31.9%	2.2%
General public	38.4%	18.3%	37.2%	5.7%
Media	40.8%	32.4%	21.1%	5.6%
Robert-Koch institute	30.4%	22%	34.8%	8.7%
Other	29.6%	14.7%	50.4%	0.5%

How healthcare professionals, scientists and policymakers communicate about Covid-19 measures

Table 9:

Frequency of quotes by stakeholders

Subcode	*Frequency*
Policymakers	71.5%
Healthcare professionals	6.5%
Scientists	8.3%
General public	0.1%
Robert-Koch institute	4.3%
Other	8%

Table 10:

Frequency of quotes per time period

Subcode	*Frequency for first time period*	*Frequency for second time period*
Policymakers	43.8%	56.2%
Healthcare professionals	65.7%	34.3%
Scientists	55.5%	44.4%
General public	33.3%	66.6%
Robert-Koch institute	52.2%	47.8%
Other	27%	73%

Table 11:

Frequency of frame types per stakeholder

Subcode	*Frequency for responsibility frame*	*Frequency for conflict frame*	*Frequency for human-interest frame*	*Frequency for moral frame*	*Frequency for economic frame*
Policymakers	62.8%	15.8%	13.7%	1.8%	5.9%
Healthcare professionals	40%	20%	40%	0%	0%
Scientists	49%	22.2%	22.2%	0%	6.6%
General public	0%	0%	100%	0%	0%
Robert-Koch institute	78.4%	8.6%	13%	0%	0%
Other	25%	10.4%	6.3%	6.3%	52%

Table 12:

Frequency of combinations of gain frame, loss frame and message styles

Subcode	*Narrative message style*	*Non-narrative message style*
Gain frame	36.4%	63.6%
Loss frame	41.7%	58.3%

Table 13:

Frequency of gain frame, loss frame and message styles per time period

Subcode	*Frequency for first time period*	*Frequency for second period*
Gain frame	48.1%	51.9%
Loss frame	39.1%	60.9%
Narrative message style	53.8%	46.2%
Non-narrative message style	39.6%	60.4%

Table 14:

Frequency of gain and loss frames and message styles per stakeholder

Subcode	*Frequency for gain frame*	*Frequency for loss frame*	*Frequency for narrative message style*	*Frequency for non-narrative message style*
Policymakers	71.6%	28.4%	36.7%	63.3%
Healthcare professionals	42.9%	57.1%	60%	40%
Scientists	48.9%%	51.1%	33.3%	66.7%
General public	100%	0%	100%	0%
Robert-Koch institute	52.2%	47.8%	21%	78.3%
Other	41.7%	58.3%	43.8%	56.2%