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Framing the COVID-19 Vaccine

An Experimental Investigation How Gain and Loss Frames Influence the COVID-19 Vaccine

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1. Defining the research problem [5p]

This chapter explains the context around the COVID-19 vaccine and the problem and relevance of vaccination hesitancy and how this topic is related to the field of strategic communication. It then explains the research question and research design, and why the knowledge produced will be relevant to specific stakeholders.

1.1 Introduction

When a "viral pneumonia" was first mentioned on the Wuhan Municipal Health Commission's website on December 31, 2019, the world had no idea what was to come in the months that followed (WHO, 2020). Several days later on January 9 2020, Chinese authorities determined that the outbreak was due to a novel coronavirus. On January 11, the first person in China died from this viral pneumonia, 2 weeks later cases were already reported in the United States, Thailand, Japan, and South Korea (NY Times, 2021). Just how dangerous this virus can be was demonstrated on January 23, when the city of Wuhan experienced a lockdown. Trains, buses, and flights to or from Wuhan or within the city were suspended, and more than 11 million people had to stay home and were not allowed to leave the city. WHO named the virus a "public health emergency of international concern" (NY Times, 2021) and gave it the name COVID-19. After Wuhan, Iran and North Italy experienced the next major outbreaks. while new infections and first victims were reported all over the world. Numerous countries reacted with restrictions, travel bans, quarantine of travelers or entire lockdowns. By April 2, 2020, over one million cases had been reported and millions of people had lost their jobs. On March 11, WHO made it official, calling the COVID-19 outbreak a pandemic (BBC, 2020). The second wave of the pandemic that swept the world after the summer and new mutations of COVID-19, such as in the UK, made it clear once again that the virus will not subside so quickly and will be with us for a while (NY Times, 2021). In September, 10 months after the outbreak in Wuhan, more than one million people have already died from the COVID-19 virus.

To stop the spread of the virus, many countries rely on stricter hygiene regulations such as sanitizers and face masks, social distancing such as home offices or homeschooling, or entire lockdowns. However, these strategies offer mere containment of the virus so as not to collapse the health care system. Governments placed their hopes in the manufactured COVID-19

vaccines, which could potentially put an end to the pandemic. The biotechnology company Pfitzer was finally able to show a 95% success rate in their studies (SZ, 2021). On December 8, 2020, the time came, and the UK started vaccinations (NY Times, 2021). This represented the kickoff of the largest vaccination campaign in human history. By the end of February, Bloomberg (2021) calculated 218 million vaccine doses administered in over 99 countries. By their calculations, over 6.15 million vaccine doses per day would be administered worldwide. At a rate of 1.3 million vaccine doses per day, the United States, for example, would achieve a 75% immunization rate and thus herd immunity in eleven months. Globally, it takes an estimated five years to achieve the desired herd immunity at the current rate. This time frame further illustrated that the vaccination campaign will continue for some time and will be relevant.

1.2 Problem statement

Given the extreme circumstances, the "far-from-universal willingness to accept a COVID-19 vaccine is a cause for concern" (Lazarus et al., 2020, p. 226). Several studies demonstrated a relatively low propensity to vaccinate, which tended to be more positive in Asian countries such as China, South Korea, or Singapore or middle-income countries such as Brazil, India, or South Africa and more negative in European countries in France, Spain, or Italy (Ipsos, 2020a, Ipsos, 2020b, Imperial College London, 2020, Lazarus et al, 2020, Kourlaba et al., 2021). The market research institute Ipsos (2020a) concluded in October 2020 that only 54% of people in France, 64% in Spain, 65% in Italy and 69% in Germany would like to be vaccinated against the COVID-19 virus. These results are in line with the findings of Imperial College London (2020) one month later in November, according to which only 35% of the French, 41% of the Spanish and 50% of the Germans are willing to be vaccinated. Even as the vaccination campaign was slowly gaining momentum, Ipsos (2020b) demonstrated a 40% vaccination willingness in France in December and another study showed a 57.7% vaccination willingness in Greece (Kourlaba et al., 2021).

This hesitancy for COVID-19 vaccination can be attributed to the vast amounts of misinformation on social media, as well as misinformation about vaccines in general (Guidry et al, 2021). There was controversy over the perceived rapid development, safety, efficacy, and forced delivery of the COVID-19 vaccine (Alley et al., 2021). In addition, conspiracy theories circulated all over the Internet (Ipsos, 2021). The circulation of false information is also reflected in studies, according to which the most common reasons cited were concerns about

possible side effects (59%), lack of trust in the government to guarantee the vaccine's safety and effectiveness (55%), worries that the vaccine is too new (53%) and concerns over the role of politics in the development process (51%) (Neumann-Böhme et al., 2020, KFF, 2020). Vaccination hesitancy grew to such an extent that WHO now considers it one of the greatest threats to global health (WHO, 2019). Vaccine hesitancy is not a new phenomenon, but as Koslap-Petraco (2019) aptly called it in his study, "vaccine hesitancy: not a new phanomenon, but new threat" (p. 624). As early as 1998, Ball, Evans, and Bostrom demonstrated that people were concerned about vaccine safety. According to them, a large proportion of the population has a misperception of severe side effects, although these occur very rarely (Ball, Evans & Bostrom, 1998, Freed, Clark, Butchart, Singer, & Davis, 2010). The most recent example is the H1N1 vaccination in 2009, where vaccination willingness was also low and resulted in outbreaks in several countries (Neumann-Böhme et al., 2020).

To achieve herd immunity, a country needs an immunization level of 60 percent or more (ZDF, 2020). If the vaccination willingness is as low as the fore-mentioned studies indicate, such a targeted herd immunity is difficult or takes more time to achieve. However, this is the goal to find a way out of this pandemic as quickly as possible. Otherwise, there is a threat of further complete lockdowns, restrictions on social life, a deeper recession in the economy, job losses, depression, collapses of the health care system, and, most importantly, more COVID-19 victims. However, the development is pointing in the right direction. The market research institute Ipsos (2021) writes: « Initial hesitancy among the public about getting vaccinated is rapidly transitioning to a growing demand for immediacy and a global stampede for access to vaccines is gaining speed». Imperial College London (2020) also notes in their study that these beliefs are not yet firmly established and could be influenced by a good communication strategy on the part of the government. A good crisis communication strategy is therefore of utmost relevance, as governments can use it to make their citizens' attitudes and intentions toward COVID-19 vaccination more positive and thus achieve high immunization levels more quickly and bring the pandemic to an end.

1.3 Relevance to Strategic Communication

According to research, message framing can provide such an effective and theoretically based communication strategy (Gerend & Shepherd, 2007). Framing, as a transdisciplinary science, can "easily form part of the strategist's communication toolkit" (Wickham, 2007, p. 64), as it is studied as part of strategic communication in a variety of ways in different disciplines. In

campaign communication, political candidates use framing to push their issues through media coverage (Froehlich & Rüdiger, 2006). In marketing, companies utilize frames to better sell their products (Garg, Govind & Nagpal, 2021). In crisis communication, managers use frames to influence the perception of blame (Coombs & Holladay, 2010). Knight (1999) also lists public relations, organizational communication, and external communication as other areas of strategic communication in that framing can be used profitably. Framing is used strategically in all these areas to influence decisions, perceptions, behaviors, or evaluations of importance.

Since this paper deals with the COVID-19 pandemic, it can be classified into the crisis and risk communication areas of strategic communication and is relevant for governments' risk and crisis communication and marketing departments of pharmaceutical and biotechnology companies. In crisis and risk communication, studies deal for example with communication campaigns that emphasize either in terms of the benefits of completing the recommended action (gain frame) or the costs of avoiding the recommended action (loss frame). As the first framing study in a COVID-19 context, Hameleers (2020) discovered that gain frames supported risk-averse interventions, while loss frames were more effective with risk-seeking alternatives. Hameleer's findings drew another study that failed to confirm his findings (Sanders, Stockdale, Hume & Johna, 2021). There were no differences between the effectiveness of gain and loss frames and the preference for COVID-19 restrictions, he said. Further research is needed to address the unanswered question of whether gain and loss frames lose their effectiveness in the face of extreme situations such as the high death rates and involvement with COVID-19 virus.

1.4 Research question

The research question of this thesis is: In what ways can people's intention and attitude toward COVID-19 be influenced? The work aims to produce knowledge on whether gain or loss frames are more effective in a COVID-19 context, how effective they are in such an extreme situation, and which moderators exert the greatest influence. As a foundation, the work thus makes use of framing theory and incorporates elements of the Theory of Planned Behavior. In a quantitative experimental research design, subjects complete several social demographic questions and answer several general and specific COVID-19 questions in a standardized online survey before being randomly assigned to read a loss or frame message. After the intervention, subjects are asked several questions about intention, attitude, and risk aversion. The results are used to examine three hypotheses derived from the research literature and evaluate them using statistical analyses.

This research question is relevant for several reasons. First, several framing studies have already shown significant results regarding vaccination of for example H1N1 influenza virus (Nan, Xie & Madden, 2012), MMR (Abhyankar, O'Connor & Lawton, 2008) or HPV (Gerend & Shepherd, 2007). However, more research is needed to identify moderators of gain and loss frames (Nan, Xie & Madden, 2012). For this reason, this paper incorporates several moderators, examines their moderation effect, and compares them with each other. First, several common moderators from framing studies such as perceived safety and efficacy of the vaccine, involvement, and age are included. Second, constructs such as barriers, education, and subjective norms, which Guidry et al. (2021) identified as significant intention predictors for COVID-19 vaccination, are used. Thus, this work can make an important contribution to the need for research on additional moderators. Second, this work represents the first classic inoculant study to examine the effectiveness of gain and loss frames in a COVID-19 context. Hameleers (2020) referred more to prospect theory, while Sanders et al. (2021) used a more "unusual [...] measure of loss aversion" (p. 8). Third, this study can make an important contribution to the open question to what extent gain and loss frames are still effective in extreme situations. Fourth, the COVID-19 vaccine is highly relevant to the world at large. If the vaccination campaign can be improved in any way, even a tiny bit, this is of great importance.

The knowledge produced by this work is relevant to several stakeholders. Framing researchers benefit from the use of common and new moderators that they may also use or need to consider in future studies, and the first classic framing study in a COVID-19 context that may provide an incentive for new framing studies in a COVID-19 context or extreme situations. Government crisis and risk communications benefit from the studied effectiveness of gain and loss frames and moderators in a COVID-19 context. If certain frames or moderators turn out to be relevant, governments' COVID-19 vaccine campaigns can be adjusted accordingly to achieve higher intent and more positive attitudes toward COVID-19 vaccination and thus achieve higher immunization rates among their populations. For the same reason, marketing departments of pharmaceutical or biotechnology companies can also benefit from this work, adjusting their product description and audience targeting accordingly to achieve higher sales. In this way, this work produces both theoretical knowledge for framing research and practical knowledge for governments’ crisis and risk communication and marketing departments of pharmaceutical and biotechnology companies.

2. Literature Review [8.2p]

This chapter will show an overview of the key studies of Framing and how the research area has developed over time. [presentation of previous studies, place study in a context, present overview & key studies]

2.1 Defining Frames

Because the framing term has been vaguely and broadly defined, the most important definitions and distinctions are made in this chapter to better situate this thesis within the framing research field and to understand the concept of frames. As the first definition of framing in the research literature, Bateson (1955, 1972) listed two functions of frames (Cornelissen & Werner, 2014). First, a frame involves elements that are inside the boundaries and excludes those elements that are outside the boundaries (Ardèvol-Abreu, 2015). On the other hand, a frame directs the attention of recipients and emphasizes those elements that are inside the boundaries and ignored those elements that are outside the boundaries. Bateson (1955, 1972) thus emphasized the inclusion and exclusion of information in messages.

As the next milestone, Goffman (1974) helped framing theory make its final breakthrough in the research literature. Based in the field of sociology, Goffman understood frames as social frameworks and mental schemes that people use to organize their experiences (Goffman, 1974, Ardèvol-Abreu, 2015). Frames, he argued, are tools that society can use to construct a shared interpretation of reality. This perspective entailed an expansion of the concept of frame from an individual and psychological to a collective and sociological understanding. With the help of this definition, journalistic news was from then on studied in communication studies, as media collectively can create and modify social frameworks of interpretation by intervening in a social discourse.

Entman (1993) finally came up with a definition that is widely used and accepted ever since. Entman (1993) defined framing as selecting "some aspects of a perceived reality and making them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation" (p. 52). With his definition Entman emphasizes the two functions selection and salience, as frames

select certain aspects of reality (selection) and draw attention to them, making them more noticeable, meaningful, and memorable to recipients (salience). Frames classify what a causal agent does with what costs and benefits (problem definition), identify their underlying problem (diagnose causes), evaluate the causal agent and its effects (moral evaluation), and offer proposed solutions to the problem (treatment recommendation). As an example, Entman refers to the "cold war" frame, in which media defined certain foreign civil wars as problems (problem definition), defined the communist rebels as their cause (diagnose causes), offered atheistic aggression as an evaluation of the rebels (moral evaluation), and suggested American support for the other side as a solution (treatment recommendation). Accordingly, framing research is less about differences in what is communicated than about variations in how a certain piece of information is presented or framed (Scheufele & Iyengar, 2014). According to Entman's definition (1993), the frame of this work focuses on the problem definition as it demonstrates the benefits of the COVID-19 vaccine.

Following Entman (1993), Scheufele (1999) organized fragmented framing research by distinguishing between media and audience frames. While media frames are understood as deep structures in a text, audience frames refer to cognitive deep structures in memory. A large part of framing research focuses on frame building, where the media frames produced and offered by journalists and the media are investigated and reconstructed by means of quantitative and qualitative content analyses (Scheufele, 1999, Bonfadelli & Friemel, 2015). Frame setting, on the other hand, focuses on how media users use their audience frames to perceive their reality in the first place and to what extent recipients transfer the media frames offered in media texts to their own audience frames and what effects this has on their perception, opinion formation, and behavior. Since this paper investigates the effect of gain and loss frames (media frame) on the intention of recipients (audience frame), this paper is classified in Frame Setting.

Years later, Scheufele and Iyengar (2014) attempted to diminish the conceptual vagueness by distinguishing between equivalence and emphasis frames. Equivalence frames are frames that present the same piece of information in different ways. Emphasis frames, on the other hand, refer to frames that present different perspectives on a piece of information. In this work, equivalence frames are used because the same topic (why you should get a COVID-19 vaccine) is presented in different ways (gain and loss frame).

Matthes: Framing = aktiven Prozess des selektiven Hervorhebens von Informationen und Positionen. Frames = Ergebnis dieses Prozesses. Funktionen, Typologien, episodische & thematische Frames

2.2 Gain and loss frames

López-Rabadán and Vicente-Mariño (2009) divided the development of framing theory into three major phases (Ardèvol-Abreu, 2015). They identified the first phase as the period from 1974 to 1990, which was characterized by the first instrumental applications based on the sociological definition of the term. Framing theory slowly entered and grew in communication studies. This phase includes Kahneman and Tversky's (1979) Prospective Theory from behavioral economics, the next milestone of framing theory. Prospective Theory states that presenting the same information in different ways changes people's perceptions, preferences, and actions (Kahneman & Tversky, 1979, Abhyankar, O'Connor & Lawton, 2008). On the one hand, people are willing to take risks when faced with losses or costs of an action (Nan, Xie & Madden, 2012). On the other hand, people behave risk averse when faced with the factual equivalent gains or benefits of the action.

The best example is the study that became famous as the "asian disease problem", in which Kahneman and Tversky (1981) placed the participants in the imaginary situation in which an Asian disease would kill 600 people. Participants each had to choose between Plan A and Plan B (Nan, Xie & Madden, 2012, Kahnemann & Tversky, 1981). Plan A involved a certain outcome with less risk, while Plan B offered an uncertain outcome with more risk. If the options were gain-framed ("if Program A is adopted, 200 people will be saved," "if Program B is adopted, there is one-third probability that 600 people will be saved and two-thirds probability that no people will be saved"), more participants went for the safer and less risky option A. However, when the options were presented in a loss frame ("if Program A is adopted, 400 people will die", "if Program B is adopted, there is one-third probability that nobody will die and two-thirds probability that 600 people will die"), the participants favored the riskier Plan B.

Kahnemann and Tversky (1979, 1981) thus demonstrated how positive or negative connotations (gain and loss frames) can manipulate decision making. People avoid risk in gain frames, whereas they seek risk in loss frames. These findings ultimately formed Kahnemann and Tversky's (1979, 1981) Prospect Theory. Their theory states, first, that a loss is perceived more significantly than an equivalent gain. Second, a certain gain is preferred over a probable gain. Furthermore, people prefer a possible loss over a definite loss. Thanks to Kahnemann and Tversky's results (1979, 1981), the study of gain and loss frames became a central component of framing research in communication science.

2.3 Detection and prevention behavior

López-Rabadán and Vicente-Mariño (2009) cited the 1990s as the second phase in which framing became a specialty in media studies, finding its application in the analysis of media discourse (Ardèvol-Abreu, 2015). During this period, there was an uncontrolled and dispersed methodology and a heated debate erupted as to whether framing theory was merely an extension of agenda setting theory or a complementary and distinct theory. Inspired by the findings of Prospect Theory (Kahnemann & Tversky, 1979) and of particular relevance to this Master's Thesis, Rothman and Salovey's (1997) study illustrates the effects of framing in health communication (Latimer, Salovey & Rothman, 2007). From Kahnemann and Tversky's study (1979), they concluded that "the effect of a particular frame on people's willingness to perform a behavior is contingent on whether the option under consideration is perceived to reflect a riskaverse or risk-seeking course of action" (Rothman, Kelly, Hertel & Salovey, 2003, p. 281).

The authors assumed that loss-framed messages are more persuasive when a situation or action is considered risky such as having a mammogram (Nan, Xie & Madden, 2012). Performing a mammogram is perceived as risky because it can detect life-threatening disease. Such loss frames would draw attention to the costs of not taking the recommended action such as lower chance of survival if the disease is discovered later. The advantage of loss frames for detection behavior has been empirically demonstrated several times in the research literature (Abood, Coster, Mullis & Black, 2002, Kalichman & Coley, 1995, Meyerowitz & Chaiken, 1987, Williams, Clarke & Borland, 2001). Gain-framed messages, on the other hand, are more persuasive when the situation or action is considered rather safe or harmless such as using a sunscreen. Using a sunscreen is not considered risky because it will prevent a future health problem. Such gain frames would emphasize the benefits of the recommended action such as prevention of skin cancer. Several studies could confirm the higher effectiveness of gain frames for prevention behavior (Detweiler, Bedell, Salovey, Prinin & Rothman, 1999; Millar & Millar, 2000).

They thus distinguished between detection behavior (e.g., mammography) and prevention behavior (e.g., using sunscreen) as different types of health behavior that moderate the effects of framing (Abhanyankar, O'Connor & Lawton, 2008). Thus, Rothman and Salovey (1997) concluded that gain frames are more persuasive for prevention behavior, whereas loss frames produce a stronger effect for detection behavior. Rothman and Salovey's (1997) work drew several studies that supported their prediction with empirical results (Cox & Cox, 2001,

Rothman, Martino, Bedell, Detweiler & Salovey, 1999, Rothman, Bartels, Walschin & Salovey, 2006).

2.4 Special case vaccination

López-Rabadán and Vicente-Mariño (2009) cited the beginning of the 21st century as the last phase marked by reorganization and empirical development, which continues today (Ardèvol-Abreu, 2015). In this phase, research attempted to carry out a conceptual and methodological unification, allowing a faster and more solid development through research synergies. This reorganization was also made in Rothman and Salovey's (1997) findings on prevention and detection behavior. Getting vaccinated is considered a preventive behavior and should not be considered risky, as it should prevent future health problems. Therefore, based on Rothman and Salovey's (1997) findings, gain frames should be more effective (Nan, Xie & Madden, 2012). Such gain frames would focus on the benefits of vaccination such as immune protection against measles. However, vaccination studies in framing research found that loss-framed messages are more persuasive in a vaccination message (Abhyankar, O'Connor & Lawton, 2008, Ferguson & Gallagher, 2007, Gerend & Shepherd, 2007). The reason for these inconsistent results is due to varying perceptions of risk of prevention and detection behaviors rather than the inherent features of these behaviors (Abhyankar, O'Connor & Lawton, 2008). In other words, gain frames are not more effective for, in example, using a sunscreen because it is a prevention behavior, but because this behavior is subjectively perceived as not risky.

While performing a vaccination is a prevention behavior and less risky, it is not equivalent to other harmless and safe prevention behaviors in framing studies such as applying sunscreen or wearing a condom. Vaccination is considered risky for several reasons. First, people must have an unknown substance injected into their body that could cause new harm (Gerend & Shepherd. 2007). Second, the very act of vaccination is considered risky because it can cause pain and discomfort. This is especially true for people who dislike injections in general. Third, a perception of risk may be evoked if people do not believe the vaccine will work. These multiple reasons are consistent with current research that people are concerned about the safety of a vaccine (Ball, Evans, & Bostrom, 1998, Freed, Clark, Butchart, Singer, & Davis, 2010). People have a misperception for the potential side effects of a vaccine, even though they are rarely severe. For example, the Taylor et al. (1999) study was able to show that some parents were opposed to MMR vaccination for their children because they believed that the MMR vaccine could cause autism.

For this reason, it must be noted that although vaccination is a prevention behavior and therefore no negative outcome is expected, it is perceived as a risky action. Thus, vaccination is a special case among the types of prevention behavior. Not gain frames as usually assumed, but loss frames promise to be more effective in getting people to vaccinate. Such loss frames draw attention to the costs of non-adherence to the recommended action, such as lack of immune protection against measles.

2.5 COVID-19 pandemic

Because the COVID-19 pandemic began only a year ago, not as much research literature has emerged on frames in the COVID-19 pandemic. Hameleers (2020) reconstructed the "asian disease problem" in a COVID-19 context and found that subjects with gain frames preferred risk-averse measures, while subjects with loss frames preferred risk-seeking alternatives. Sanders et al. (2021) picked up on his study and examined the direct influence of gain and loss frames on the intention to revoke COVID-19 restrictions. However, they were unable to obtain significant results. Although these two framing studies placed their focus on COVID-19 restrictions, several conclusions can be drawn for framing studies with a focus on the COVID-19 vaccine.

First, the specific situation of the COVID-19 pandemic needs to be considered. In a novel situation characterized by uncertainty and threat, such as the current COVID-19 pandemic, people are susceptible to media coverage (Boukes, Damstra & Vliegenthart, 2019). Moreover, crisis communication and information about pandemics in particular could generate stronger negative emotions (Van Bavel et al., 2020). Gain and loss frames that target the public good can be equally effective as, for example, tax liabilities (Hallsworth, List, Metcalfe & Vlaev, 2017). Therefore, Sanders et al. (2021) argued that gain and loss frames can also be equally effective because COVID-19 restrictions target the public good. While this work will be conducted in the classic design of a framing vaccination study, the COVID-19 vaccine cannot be compared to H1N1 influenza virus, MMR, or HPV because of this exceptional situation.

Second, the rapid evolution of the COVID-19 pandemic can be cited. Hameleers (2020) surveyed participants in the United States and the Netherlands who were at different points on the pandemic curve at that time. Gain frames focusing on lives saved, for example, may have a higher impact in countries with high infection rates than in countries with low infection rates. In addition, Sanders et al. (2021) cited the different timing of data collection as one reason for the non-significant results. For example, Hameleer's (2020) data collection had occurred very

early in the pandemic, when people's knowledge and emotional state were different. In addition, he said, people were now familiar with the expected death rate with or without COVID-19 measures. The rapid evolution of the vaccination campaign, such as the vaccination rate of 1.3 million doses per day in the United States, may play a critical role in influencing perceptions of the COVID-19 vaccine during the data collection of this paper.

Third, common moderators in framing studies occupy a special position in the pandemic. For example, older people tend to be at higher risk for a severe COVID-19 outcome, which is why their vaccination intentions are higher than those of young people (AARP, 2021). Furthermore, several studies in the United States indicated a large skepticism of the African American population toward COVID-19 vaccination, which can be attributed to the systematic disadvantage in the health care system (CNN, 2021). Another moderator is personal involvement, as negative frames are more effective at high levels of involvement, while positive frames show a stronger effect at low levels of involvement (Donovan & Jalleh, 1999). In the future, personal involvement is more likely to increase because increasing death rates make it more likely that one will be personally affected because of one's circle of friends or family. For this reason, moderators occupy a special position in this work and are measured accordingly.

2.6 Further research

Thanks to its broad applicability in both qualitative and quantitative studies, framing research enjoys great popularity in communication studies (Bonfadelli & Friemel, 2015). A significant body of research literature has addressed the relative effectiveness of gain and loss frames and it has demonstrated that message framing can be an effective, theoretically grounded, and empirically proven health communication strategy (Gerend & Shepherd, 2007, Nan, Xie & Madden, 2012). Framing research offers a theoretical approach to understanding effective health communication and rational health decision making (Rothman, Bartels, Wlaschin & Salovey, 2006). Framing can also demonstrate the importance of including which way to frame a message to the risk of a desired behavior. Not only are the results of framing studies statistically significant, but the desired health behavior would also have an impact on public health.

However, framing research is as controversial as it is popular (Bonfadelli & Friemel, 2015). The biggest problem is the vague and broad definition of framing (Scheufele & Iyengar, 2014, Bonfadelli & Friemel, 2015). On the one hand, framing research owes its boom and popularity

to its conceptual openness, as it can be applied as an interdisciplinary research or bridge concept in communication and political science as well as psychology. On the other hand, framing became "arguably a victim of its own success" (Entman, Matthes & Pellicano, 2009, p. 175). Scheufele and Iyengar (2014) write that framing "has been characterized by significant levels of conceptual obliqueness and sometimes even fallacious reasoning" (p. 3). On the one hand, frames are understood as deep structures underlying texts that are formulated to analyze media texts (Bonfadelli, 2002, Leonarz, 2006, Scheufele, 1999). On the other hand, frames can be considered as individual patterns of interpretation that serve to construct meaning. The heterogeneous understanding of the term entails several problems. First, the vague definition of framing complicates the theoretical integration of different works and thus significantly limits the integrative potential of the research field (Matthes, 2014). Second, the ambiguous use of the term frame makes empirical verification difficult (Bonfadelli & Friemel, 2015). Third, it often remains unclear which empirical criteria must be met to be considered a frame.

As further problems of framing research Scheufel and Iyengar (2014) mention the understanding of framing as a macro or meso-level phenomenon rather than a micro-phenomenon and an overly strong focus on emphasis frames. The theoretical conceptualization as well as the focus of framing effects needs to be broadened such as the interaction of print media, TV, and the Internet (Shah, McLeod, Gotlieb & Nam-Jin, 2009). Framing effects should be treated as complex, indirect, and non-uniform rather than as underlying mechanisms (Tewksbury & Scheufele, 2009). There is also a need for improvement in the methodology of framing research such as the realism of experiments or the short-term nature of measured effects (Matthes, 2007). This need for methodological reflection is in line with the question to what extent frames contribute to the understanding of behavior and whether they even go beyond the concept of attitude (Bonfadelli & Friemel, 2015).

Rothman, Bartels, Wlaschin and Salovey (2006) rightly noted that framing "in and of itself is not a magic bullet" (p. 216). The use of frames would not always produce the desired health behaviors because the effectiveness of a frame message is shaped by numerous other influences. Therefore, the next generation of framing research is revising Rothman and Salovey's (1997) original assumptions by exploring the optimal conditions for framing effects (Rothman et al., 1999, 2003, Latimer, Salovey & Rothman, 2007). This goes beyond the mere distinction between prevention and detection behaviors and considers individual's construal of a behavior and individual's dispositional sensitivity to favorable or unfavorable outcomes (Rothman, Bartels, Wlaschin & Salovey, 2006). Rothman, Bartels, Wlaschin and Salovey (2006) also

emphasize the further identification of moderators, their interaction, and underlying psychological mechanisms as the biggest areas for further research. Even years later, Nan, Xie, and Madden (2012) shared this opinion and emphasized that although a great deal of empirical research exists on the relative effectiveness between gain and loss frames, the empirical differences between the frames are rather small. For this reason, they argued that there is a need in framing research to identify potential moderators between framing and message effectiveness.

Bonfadelli & Friemel (2016, p. 196): Mediatisierende Faktoren

[Critical evaluation]

3. Theory [9.1p]

This chapter will discuss the framing theory as a research area and the theory of planned behavior. [brief about background, details for key areas, general/specific theories]

3.1 Framing Theory

The framing approach is closely related to the basic assumptions of schema theory from psychology. The cognitive psychology schema theory draws on the assumption that human knowledge is organized in a schema system (Matthes, 2014). A schema can be defined as pre-structured, relatively stable packages of knowledge that are activated or not. A human theoretically possesses an infinite number of schemas because there exists a schema for every situation, object, person, etc. For example, a person has different schemas for his friends and his work colleagues. He knows how to behave among friends because he has already created these schemata and only needs to activate them. The same applies to his work colleagues. The individual knows that he must behave differently among work colleagues than among friends because he has created and activated the corresponding schemata. When a human processes information, he either uses already existing schemas and thereby activates other linked schemas or no single schema is activated, and the information is not understood. In this case, the person forms a new schema to be able to process this information in the future.

Another assumption of the cognitive psychological schema theory is that humans tend to reduce complexity because they can only perceive and process a fraction of the information they receive (Bonfadelli & Friemel, 2015). To reduce complexity humans therefore discover common patterns in objects, events, and persons that that are consistent with pre-existing schemas in their minds (Bonfadelli & Friemel, 2015, Scheufele & Iyengar, 2014). Accordingly, humans process information based on hypotheses, which is not understood negatively as selective avoidance, but positively as a process of active meaning construction. These schemata guide the hypotheses as expectations and conceptions in the form of simple thinking strategies. The waiter example is used to illustrate this assumption (Bonfaddeli & Friemel, 2016). Most people understand the sentence "Lars called the waiter. After he came, he ordered a glass of milk" to mean that Lars ordered a glass of milk, even though the sentence is grammatically ambiguous. The schema concept can serve as an explanatory approach. People are familiar with

the procedure in a restaurant and "understand the sentence situation adequately by applying the 'restaurant schema'" (Bonfadelli & Friemel, 2016, p. 190). They reduce the complexity of information by applying the restaurant schema, which guides their information processing in the form of simple thinking strategies and hypotheses.

Based on the cognitive schemata of psychology, framing research assumes that topics in public discourse are also very complex such as abortion or genetic engineering, which is why certain aspects are emphasized while other aspects are neglected, depending on the communicator (Matthes, 2014). Several actors, such as politicians, companies, or the media, are therefore in a competition for the interpretive authority of certain topics in the public sphere, as they want to assert their own perspectives on topics. These actors communicate their own interpretations and compete with interpretations or frames of other actors with the aim that their own interpretation prevails in the public discourse. This result means the success of their own interpretation or frame in media coverage and the persuasiveness of the frame with the audience. For example, frames such as "scientific progress," "economic prospects," "ethical," "Pandora's box," or "public accountability" have been used in the debate on genetic engineering (Bonfadelli & Friemel, 2016, Leonarz, 2006). These frames form simple perspectives on the complex topic of genetic engineering. Recipients can reduce the complexity of this topic by connecting the frames discussed in public with their pre-existing schemas, such as Pandora's box or scientific progress. The way a piece of information is presented or framed (e.g., genetic engineering is a Pandoras Box) makes it more likely that this piece of information will be processed using a specific schema (Scheufele & Iyengar, 2014). In other words, the strength of a frame is based on how applicable they are to specific pre-existing cognitive schemas. Scheufele and Iyengar (2014) therefore refer to framing as applicability-based effects. For this reason, actors in public discourse resort to frames, as they reduce the complexity of the topic and increase the likelihood that recipients will connect these frames to pre-existing cognitive schemas and thereby process them further.

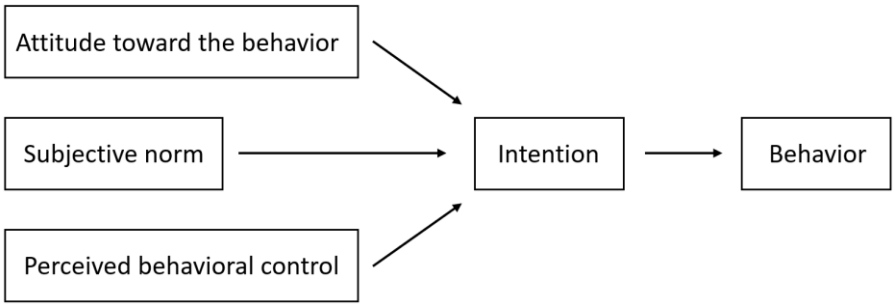
Matthes 4 Grundannahmen: Ambivalenz-, Selektions-, Konsistenz- & Wettstreitprinzip

3.2 Theory of planned behavior

This work is based on the framing approach, but some important moderators were derived from the theory of planned behavior. The theory states that subjective norms, perceived behavioral control, and attitude influence intention, which in turn determines whether an individual will

perform a behavior (Ajzen, 1991). Research has empirically demonstrated that these three constructs predict intention with high accuracy. Figure X below illustrates this relationship.

Figure X. Theory of planned behavior.



Attitude toward the behavior refers to whether a person has a favorable or unfavorable evaluation of that behavior such as a negative attitude toward COVID-19 vaccination. The term subjective norm describes the social pressure to perform or not perform that behavior. For example, parents may exert pressure on their child to be vaccinated against COVID-19. Perceived behavioral control refers to " people's perception of the ease or difficulty of performing the behavior of interest" (Ajzen, 1991, p. 183). In this regard, the resources, and opportunities available to the person determine this perception. For example, older people are prioritized for COVID-19 vaccination, which is why young and healthy people do not have the opportunity until later. Together, these three constructs influence an individual's intention to perform a certain behavior such as getting vaccinated against COVID-19. Intention is thought to comprise all motivational factors and is an indication of how much individuals are willing and how much effort they put into performing this behavior. The higher the intention, the more likely it is that a specific behavior will be performed. The theory of planned behavior offers itself well as a foundation for the framing approach, however, studies such as Abhyankar, O'Connor, and Lawton (2008) have demonstrated that the constructs of the theory of planned behavior moderate framing effects. For this reason, these constructs are included as moderators in this work.

3.3 Development of hypotheses

In this subsection, the hypotheses and research questions are derived and explained either from the research literature or from the author's own thought processes.

3.3.1 Hypothesis 1

Based on Kahnemann and Tversky's (1979, 1981) findings on gain and loss frames, Rothman and Salovey (1997) concluded that gain frames were more successful with prevention behavior and loss frames with detection behavior. The reason they gave was that detection measures are perceived as risky because they can detect a potential life-threatening disease. Prevention measures, on the other hand, are not perceived as risky because they seek to avoid future threats. Vaccination is, by definition, a prevention behavior, which is why gain frames promise a higher chance of success. However, numerous studies have demonstrated that loss frames achieve higher effectiveness for a vaccine (Abhyankar, O'Connor & Lawton, 2008, Ferguson & Gallagher, 2007, Gerend & Shepherd, 2007). The cause is thought to be differences in risk perception, as people judge vaccination to be a risky behavior. This view of research has been empirically confirmed (Ball, Evans, & Bostrom, 1998, Freed, Clark, Butchart, Singer, & Davis, 2010). However, the question now is whether loss frames are still more effective than gain frames for COVID-19 vaccination. Hameleers (2020) demonstrated that participants with gain frames preferred risk-averse COVID-19 measures, whereas participants with loss frames preferred risk-seeking alternatives. Sanders et al. (2021) then examined the direct influence of gain and loss frames on attitudes toward COVID-19 restrictions and failed to find significant results. However, they limited that they used an "unusual [...] measure of loss aversion" (Sanders et al., 2021, p. 8). From the researchers' contradictory results, the first hypothesis of this paper is derived:

> H1a: Subjects will express more favorable intention toward COVID-19 vaccination after exposure to a loss-framed message than after exposure to a gain-framed message.
>
> H1b: Subjects will express more favorable attitude toward COVID-19 vaccination after exposure to a loss-framed message than after exposure to a gain-framed message.

Thus, this hypothesis will test whether the results of Sanders et al. (2021) or Hameleers (2020) can be confirmed. In addition, this hypothesis will be the first classical framing study to test whether loss frames are more effective than gain frames in COVID-19 vaccination. Unlike Sanders et al. (2021), this study will rely on the usual measurement of intention and attitude. In addition, unlike Sanders et al. (2021) and Hameleers (2020), this hypothesis focuses on COVID-19 vaccination rather than COVID-19 constraints and provides an important contribution to vaccine studies.

3.3.2 Hypothesis 2

Kahnemann and Tversky's (1979, 1981) findings posited that two preexisting beliefs could moderate framing effects. Based on this, Nan, Xie, and Madden (2012) examined the influence of frames and perceptions of vaccine safety and efficacy in their study. Loss frames were expected to produce higher effectiveness when subjects perceived the safety and effectiveness of the vaccine to be low. For perceived vaccine safety, it can be argued that people view a vaccine as riskier when perceived safety is low because they are concerned about potential side effects or negative consequences. For perceived vaccine efficacy, the reason that can be given is that people view a vaccine as riskier at low perceived efficacy because they cannot expect a safe outcome and they are not convinced that the vaccine could truly protect them. Because of the higher risk perception, loss frames should be more effective. Indeed, Nan, Xie, and Madden (2012) demonstrated that loss frames led to higher intention than gain frames when subjects perceived the effectiveness of the vaccine to be weak. However, Gain and Loss Frames did not produce an effect when subjects rated the efficacy of the vaccine as strong. In addition, however, their results on perceived safety of the vaccine were limited because the results were not significant. These findings are linked to COVID-19 vaccine hesitancy. Reasons mentioned for COVID-19 vaccine hesitancy included concerns about the potential side effects (59%), lack of trust in the government to guarantee the vaccine's safety and effectiveness (55%) or worries that the vaccine is too new (53%) (Neumann-Böhme et al., 2020, KFF, 2020). In other words, the most common reasons cited for their aversion to the COVID-19 vaccine were its safety and effectiveness. From these findings, the next hypothesis can be derived:

> H2a: Subjects who scored low on perceived vaccine safety will express more favorable intention toward COVID-19 vaccination after exposure to a loss-framed message than after exposure to a gain-framed message.

> H2b: Subjects who scored low on perceived vaccine efficacy will express more favorable intention toward COVID-19 vaccination after exposure to a loss-framed message than after exposure to a gain-framed message.

Accordingly, the hypothesis seeks to determine whether the findings of Nan, Xie, and Madden (2012) can be confirmed in a COVID-19 context. If the hypotheses can be confirmed, important conclusions can be drawn about communication campaigns targeting unwilling vaccinators, as their most common reasons are the efficacy and safety of the COVID-19 vaccine.

3.3.3 Hypothesis 3

In addition to the perceived efficacy and safety of a vaccine, involvement is considered to play an important mediating role. Several studies have demonstrated an influence of involvement on framing effects (Donovan & Jalleh, 1999, De Graaf, Van den Putte & De Bruijn, 2015, Jung & Villegas, 2011, Maheswaran & Meyers-Levy, 1990). In all studies, gain frames were found to be more effective with low-involvement people, while loss frames were more effective with high-involvement people. The result could be found in different subject areas such as drinking behavior (De Graaf, Van den Putte & De Bruijn, 2015), smoking behavior (Jung & Villegas, 2011) or product attributes (Donovan & Jalleh, 1999). One reason for these unanimous results lies in human information processing (Jung & Villegas, 2011). According to the findings of Cacioppo and Petty (1979), people with high involvement process information centrally, whereas people with low involvement process information peripherally. This difference in information processing also has implications for potential framing effects. When people process information centrally, negative information is weighted more (Kanouse, 1984, Petty & Cacioppo, 1986, Weinberger, Allen & Dillon, 1981). For this reason, loss frames achieve greater effectiveness with high-involvement people because they process information centrally and give more weight to negative information. However, when people process information peripherally, they respond to framed messages only on simple cues (e.g., tone, endorser). For this reason, gain frames are more effective with low-involvement people because they process information peripherally and respond to simple cues. These findings are associated with the COVID-19 pandemic. Because the COVID-19 virus put the world in a state of emergency and caused an unprecedented pandemic in modern times, it is believed that involvement is correspondingly high for many people. Many people will be highly involved because of COVID-19 restrictions, personal losses, or being a member of the risk group. The third hypothesis is derived from these considerations:

H3a: Subjects high in involvement will express more favorable intention toward COVID-19 vaccination after exposure to a loss-framed message than after exposure to a gain-framed message.

H3b: Subjects high in involvement will express more favorable attitude toward COVID-19 vaccination after exposure to a loss-framed message than after exposure to a gain-framed message.

This hypothesis thus aims to test whether involvement will influence framing effects even in a COVID-19 context. Since the COVID-19 pandemic represents a state of emergency, involvement is assumed to be much higher than in other studied topics such as drinking behavior or product descriptions. However, it could also be that the involvement is lower due to different numbers of infections, non-membership of the risk group or fatigue of COVID-19 news.

3.3.4 Research question 1

One of the largest areas of research in framing is the further identification of moderators (Rothman, Bartels, Wlaschin & Salovey, 2006, Nan, Xie & Madden, 2012). Countless moderators, such as outcome efficacy, involvement, and age, have been studied. Since this paper aims to contribute to further identification of moderators, several common as well as a few potential moderators were integrated in the survey. With attitude, subjective norm, and perceived behavioral control, all items of the Theory of Planned Behavior were considered, which for example were examined in the study of Abhyankar, O'Connor and Lawton, (2008). Control variables such as age, perceived severity, and perceived susceptibility were also integrated, which were used in the study by Nan, Xie, and Madden (2012). Hypothesis 2 (H2a, H2b) and Hypothesis 3 (H3a, H3b) address other proven moderators with involvement and perceived safety and efficacy of the vaccine. As new moderators, risk aversion and risk seeking are assessed as personality traits of subjects in general scales. The rationale behind these moderators is the idea that people with a risk seeking personality will be more likely to prefer COVID-19 vaccination because the higher risk perception of vaccination exerts less influence on risk seeking people. In contrast, people more prone to risk aversion will avoid vaccination because the perceived risk of vaccination is less appealing to risk-averse people. In addition, residence integrates another new control variable that relates to the countries Switzerland and Sweden. It can be speculated that the different COVID-19 strategies of the countries as well as the different courses of the COVID-19 epidemic also have an impact on a possible COVID-19 vaccination. The study by Guidry et al. (2021) was already able to identify education, subjective norms, attitude, perceived susceptibility, and perceived efficacy of the vaccine as predictors of COVID-19 vaccination, further highlighting the importance of moderators in a COVID-19 context. From these considerations, the following research question is derived:

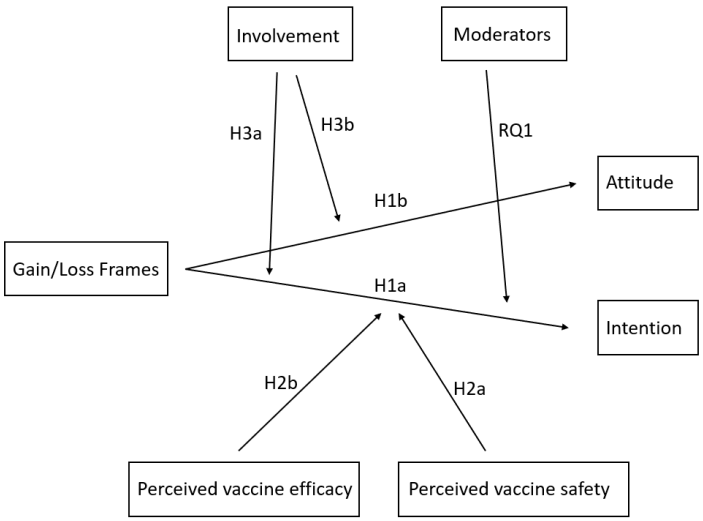
Which moderator exerts the greatest influence on framing effects?

Thus, this research question would like to consider several moderators of this work and compare their influence. This research question can reveal which moderators are still significant in a specific situation such as the COVID-19 pandemic and which are losing their influence. It also identifies the strongest moderator on framing effects. With country and risk aversion, two new moderators are also tested, which need to be investigated and considered in further framing studies if the results are significant.

3.4 Research model

The previously derived hypotheses and the respective dependent and independent variables are recorded in the following Figure X.

Figure X. Research model



The first two hypotheses suggest a significant influence of gain and loss frames on intention (H1a) and attitude (H1b). Subjects with loss frames should achieve higher intention (H1) and more positive attitude (H1b) for COVID-19 vaccination than subjects with gain frames. In both hypotheses (H1a, H1b), gain and loss frames represent the independent variables, whereas intention (H1a) and attitude (H1b) represent the dependent variables. This distribution of dependent and independent variables will be the case in all hypotheses. The next two hypotheses examine the moderation effects of perceived vaccination safety (H2a) and perceived vaccination efficacy (H2b) on the influence of gain and loss frames on intention. It is hypothesized that low perceived vaccination safety (H2a) and low perceived vaccination efficacy (H2b) will enhance the influence of negative frames on intention and thus moderate this relationship. The next two hypotheses (H3a, H3b) also examine possible moderation

effects, namely those of involvement. The hypothesis suggests that high involvement reinforces and thus moderates the influence of negative frames on intention (H3a) and attitude (H3b). The research question (RQ1) seeks to find out by exploration which moderators exert the strongest influence on the relationship of gain and loss frames on intention. Moderators such as age, country of residence, involvement, subjective norms, perceived vaccination safety, perceived vaccination effectiveness, perceived behavioral control, risk aversion, perceived susceptibility, and perceived severity will be examined and their strength of influence compared.

4. Methdology [S23]

In this chapter, the research paradigm is discussed, the design of the questionnaire is explained, and the models of the operationalization are presented. In addition, the sample choice is justified, the collection of the data is summarized, and possible biases and ethical considerations are stated. [present methods & empirical material, present sample & discuss consequences, present & discuss how the analysis has been conducted, ethical considerations]

4.1 Research paradigm and research design

4.2 Survey design

This subchapter explains the way in which the main constructs were measured and how the experimental design of the questionnaire was built and worked.

4.2.1 Operationalization

INTENTION The construct intention was measured by the established scales of Bae (2008) and Nan, Xie, and Madden (2012). In Bae's (2008) construct, subjects had to give their assessment on four statements on a 7-point scale with endpoints of "stronlgy disagree" and "strongly agree." (I plan to receive a COVID-19 vaccine in the forthcoming months, I intend to receive a COVID-19 vaccine in the forthcoming months, I expect to receive a COVID-19 vaccine in the forthcoming months, I am likely to receive a COVID-19 vaccine in the forthcoming months). In Nan, Xie, and Madden's (2012) study, subjects had to answer three questions on a 5-point Likert scale with the endpoints "Extremely unlikely" and "Extremely likely" (How likely are you to get the COVID-19 vaccine sometime soon for the 2021 season? If you were faced with the decision of whether to get the COVID-19 vaccine today, how likely is it that you would choose to get the vaccine for the 2021 season? How likely are you to get the COVID-19 vaccine in the future for the 2021 season?). Originally, only Nan, Xie, and Madden's (2012) measurement was used. In view of the great importance of the construct intention and the

measurement by only three questions, the operationalization was supplemented and deepened by Baes (2008).

ATTITUDE The construct attitude was adopted from Bae (2008) because this study involved both affective and instrumental aspects and included more items than comparable scales from other studies. On a 7-item scale with endpoints, subjects were asked the following question, "For me, receiving the COVID-19 vaccine in the forthcoming months is...". In seven different endpoints the subjects had to determine their feelings (sad/happy, unsatisfying/satisfying, unejnoyable/enjoyable, unpleasant/pleasant, of no use/useful, unimportant/important, not wortwhile/wortwhile, worthless/valuable).

INVOLVEMENT The construct Involvement was adopted in a shortened form from Bae (2008). On a 7-point scale with endpoints, subjects were asked the following question: "To me, receiving the COVID-19 vaccine is...". In ten different endpoints the subjects had to determine their feelings (unimportant/important, boring/interesting, irrelevant/relevant, unexciting/exciting, means nothing/means a lot, unappealing/appealing, mundane/fascinating, worthwhile/valuable, uninvolving/involving, unnecessary/necessary).

PERCEIVED VACCINE SAFETY Perceived vaccination safety was adapted from the Nan, Xie, and Madden (2012) exemplar study. On a 5-point scale with endpoints "strongly disagree" and "strongly agree," subjects were asked three questions (I worry about the short-term side effects of the COVID-19 vaccine, I worry that the COVID-19 vaccine might negatively affect my body, I worry that the COVID-19 vaccine might have unknown long term side effects).

PERCEIVED VACCINE EFFICACY Perceived vaccine effectiveness was also adopted from the Nan, Xie, and Madden (2012) exemplar study. Subjects had to answer three questions on a 5-point scale with endpoints of strongly disagree and strongly agree (I believe the COVID-19 vaccine is effective in preventing the spread of COVID-19, I believe if I get the COVID-19 vaccine, I will be less likely to get the COVID-19 virus, I believe the COVID-19 vaccine works in preventing the COVID-19 virus).

4.2.2 Experimental design

This paper aims to investigate the effectiveness of gain and loss frames in a COVID-19 context. Two questionnaires were created that had either a gain or loss frame as an intervention. The sample was thus divided into two groups with different conditions and their differences were compared afterwards. A survey link was used to randomly direct subjects to one of these

questionnaires. This ensured that there was a balanced distribution between the two questionnaires. The first two pages of the questionnaire included social demographic questions such as age, gender, and country of residence. The implementation of the framing message was guided by the studies of Nan, Xie, and Madden (2012), Abhyankar, O'Connor, and Lawton (2008), Gerend and Shepherd (2007), and Nan (2012), all of which examined framing effects on the intention to get vaccinated. All these studies ensured that all subjects were at the same level of knowledge regarding the virus prior to the actual message. For this reason, subjects read the following abbreviated description of the COVID-19 virus, from the European Centre for Disease Prevention & Control:

> The novel COVID-19 virus is a new strain of coronavirus that has not been previously identified in humans. SARS-CoV2 is mainly transmitted via respiratory droplets and aerosols from an infected person when they sneeze, cough, speak or breathe and are in close proximity to other people. The infectious period may begin around two days before symptoms appear, but people are most infectious during the symptomatic period, even if symptoms are mild and nonspecific.
>
> Symptoms of COVID-19 vary in severity from none at all (asymptomatic) to having fever, cough, sore throat, general weakness, fatigue and muscular pain. The most severe cases can develop pneumonia, acute respiratory distress syndrome and other complications, all potentially leading to death.
>
> COVID-19 vaccines aim to prevent COVID-19 disease by triggering an immune response. There is currently a limited number of doses available to the immunisation programmes in each country and therefore prioritisation among target groups has been necessary. Uptake in different target groups will be monitored carefully as well as vaccine safety and effectiveness when used in real world settings as compared to clinical trial settings.

The description thus informed the subjects about the possibilities of infection, the possible symptoms, and the development of COVID-19 vaccination. More information such as COVID-19 vaccination was not presented because it could distort the actual intervention of the study. This informational text was followed first by general COVID-19 questions such as positive infection and membership in the at-risk group, and then by specific COVID-19 questions such as subjective norms or perceived vaccine effectiveness. Before the actual intervention, the subjects still had to read an introduction:

> This is a message from your government. Several questions will be asked later in the survey based on this message. Therefore, you should take plenty of time to carefully read the text several times and give it your full consideration before turning to the next page.

This was to ensure that the subjects read through this message carefully and with concentration. Therefore, the government was chosen as the communicator because it was mainly the governments that announced new measures during the pandemic. In addition, it highlights the relevance of this work to government communication measures. After this introduction, subjects were exposed to the actual intervention. Either they read the gain frame or the loss frame. The message title "Why you should get the COVID-19 vaccine" was also used in the studies of Nan, Xie, and Madden (2012) and Nan (2012). In the following, the gain frame is presented, while the changes in the loss frame are shown in the parentheses.

> By [not] vaccinating yourself, you will be able [fail] to protect other people against the potentially deadly COVID-19 virus and may decrease [won't] your chance of contracting it. You will [fail] take advantage of a safe and lifelong immunization, which make you feel less [more] anxious and safer [less safe]. Moreover, you will contribute to a faster [slower] herd immunity in your country, which will result in a faster [slower] loosening of the COVID-19 restrictions.

While the Gain Frame focused on the benefits of COVID-19 vaccination, the Loss Frame provided information on the costs of avoiding COVID-19 vaccination. Several arguments were covered such as safety for you and the at-risk group, contribution to herd immunity, and feelings such as fear. The actual message was not kept too long so that subjects would be motivated enough to reread and internalize the message. After the presentation of the gain and loss frames, subjects were asked several questions designed to measure the influence of the frames. Among other things, they answered questions about intention, attitude, and perceived behavioral control. Since subjects were previously exposed to different conditions (gain and loss frames), by using the different ratings of intention, attitude, etc., conclusions can be drawn about the effectiveness of gain and loss frames.

4.3 Sample selection and data collection

Because this study examines the effectiveness of gain and loss frames on COVID-19 vaccination, no specific population was targeted, as people from all ages, education levels, and countries are affected by the COVID-19 pandemic and are therefore relevant. Originally, it was

planned to exclude people who have already received the COVID-19 vaccination, as they have already formed a firm opinion on the COVID-19 vaccination and therefore cannot be influenced by frames. In addition, people who belong to the risk group or have already suffered COVID-19 infection were also critically evaluated. For example, subjects who have already recovered perceive the virus to be less dangerous than subjects in the risk group who have not yet been infected. Despite these concerns, these subjects were retained because their data may be useful in certain hypotheses and the goal was to have many subjects as possible. If this study were to exclude vaccinated or already infected subjects, the potential sample size would be dramatically reduced and thus lose statistical significance. To detect potential bias in the results after data collection, subjects were asked whether they were already infected or vaccinated and whether they were in the at-risk group.

[Totale Anzahl von Testpersonen, Zahl nach Datenbereinigung]

This work makes use of what is known as convenience sampling, which "relies on available subjects - those who are close at hand or easily accessible" (Berg, 2009, p. 32). Convenience sampling is a nonprobability sampling method which made it possible to reach many people within a short period of time and with little effort (Berg, 2009, Michaelson & Stacks, 2014).

Data were collected between 02/24/2021 and XX/20/2021. A link randomly directing subjects to either the Gain Frame or Loss Frame questionnaire was shared on all social media channels (Facebook, Facebook Groups, WhatsApp, LinkedIn, Facebook Messenger). This strategy was chosen because it was possible to reach older segments of the population (Linkedin, Facebook) as well as young people (WhatsApp, Facebook). In addition, thanks to the international background of the author, it was also possible to include different cultures and countries of origin.

4.4 Considering biases

This work could be subject to several biases. The first is the use of convenience sampling. The strengths of convenience sampling are low cost, low effort, high speed of data collection, and the ability to collect preliminary information about a research question in a simple way (Berg, 2009). However, the convenience sampling strategy also includes the risk of having wrong subjects being part of the sample or the dominance of certain subgroups. Convenience sampling was appropriate for this work because all people were affected to a greater or lesser extent by the COVID-19 pandemic and thus are part of the sample. However, the distribution of the

survey link through the social media channels may lead to bias, as the sample was strongly influenced by the sociodemographic characteristics of the author, such as young age, being white, and good academic education. To counteract this, several sociodemographic characteristics (i.e., age, education) were queried in the survey and were considered in the data analysis. Furthermore, published framing studies such as Gerend and Shepherd (2007) also made use of convenience sampling strategies.

Another bias can be response bias when "participants give responses that do not necessarily reflect their true beliefs" (Field, 2016 p. 720). For example, in social desirability bias, subjects provide the socially desirable responses instead of expressing their possible rather less socially desirable opinions. This bias is particularly important for this study because governments as well as the media and large segments of the population are in favor of the COVID-19 vaccine, and thus public pressure to get vaccinated against COVID-19 is very high. Subjects may thus feel pressure in the survey not to express their possible dislike of the COVID-19 vaccine. To counteract this bias, it was emphasized before the survey that data would be collected anonymously and kept confidential. In addition, respondents were never asked directly about their intentions and attitudes toward the COVID-19 vaccine, but were asked about associated feelings or in applied phrases.

The last bias to be mentioned is measurement error, which can be defined as the difference between the observed and true numbers of a construct (Field, 2016). This error can be attributed to measurement instruments, interviewers, respondents, or survey mode (Baur & Blasius, 2014). To minimize errors due to the measurement instruments, only constructs from established studies that should guarantee high reliability and validity were used and were either directly adopted, abbreviated, or adapted to the COVID-19 context. To minimize errors by respondents, a small pretest ensured that subjects understood the questions in the correct way. Errors due to survey mode were ensured by data cleaning. Subjects who were unusually long or fast were excluded, as were those subjects who reported not being focused or distracted.

4.5 Ethical considerations

Informed consent

Anonomity & confidentiality

Canceled every time

No personal data

Withdraw any time

5. Analysis

5.1 Data analysis

5.1.1 Internal consistency

5.2 Hypotheses testing

5.2.1 Regression analysis

5.3 Experimental Stimuli Testing

6. Discussion

6.1 Hypotheses discussion

6.2 Stimuli discussion

7. Conclusion

7.1 Implications

7.2 Limitations

7.3 Suggestions for further research

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9. Appendix