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How to Promote COVID-19 Vaccination in the Digital Media Age: The Persuasive Effects of News Frames and Argument Quality

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Abstract: Vaccination-related information is important for the public to increase vaccine acceptance intention, while the guidance and persuasion effects of information are influenced by approaches to information presentation. Thus, this study has focused on news media, an important source of vaccination-related dissemination, and aimed to investigate how different presentations of news influence an individual's COVID-19 vaccine intention. Moreover, whether the cultural values individuals possess would influence the persuasive effects of news information was also considered in our study. A web-based experiment among 310 participants employing 2 (news framing: rights frame vs. obligation frame) × 2 (argument quality: high argument quality vs. low argument quality) × 2 (individual–collective orientation: individualism vs. collectivism) design was conducted in this study. Data were analyzed through a series of analyses of variance (ANOVAs) in SPSS 26. The results show that argument quality had a significant positive impact on individuals' psychological acceptance of the COVID-19 vaccine. The results also show that the rights framework was significantly more persuasive than the obligation framework. Furthermore, for individualistic individuals, news information with high argument quality and a rights frame was the most persuasive. These findings may help guide the writing of news, thereby improving vaccine uptake, enhancing the public's health literacy, and facilitating the implementation of vaccination policies during and after a pandemic.

Keywords: COVID-19; vaccination intention; news frame; argument quality; individual–collective orientation

1. Introduction

The spread of the novel coronavirus disease (COVID-19) was a global disaster. It cost approximately 6.9 million lives by 27 August 2023 [1]. The excess deaths related to COVID-19 reached 14.83 million during 2020 and 2021 [2]. Among the various measures taken to prevent the spread of COVID-19, large-scale vaccination is considered one of the most effective approaches [3,4]. However, despite the existence of substantial evidence supporting COVID-19 vaccination and immunization, people have long been skeptical about the effectiveness and safety of vaccines, which hinders the achievement of herd immunity [5–8]. As an important source of information, the news media played a crucial role in delivering valuable information related to COVID-19 [9–12]. In the age of digital media, people can access a massive amount of information from multiple channels. This also results in an infodemic, the explosion of disinformation and misinformation, and causes more misunderstanding about health issues and policies [13,14]. Naeem et al. analyzed 1225 pieces of news related to the coronavirus pandemic and found that fake news is pervasive on social media, putting public health at great risk [15]. Of these health-related fake news stories, vaccine-related news had the most fallacious content [16,17]. The

vast amounts of misinformation and disinformation impeded the effective dissemination of public health information, making the public feel fearful and anxious [18], less compliant with protective measures against the virus [19], and resistant or hesitant to vaccination [20]. Studies from several different countries and regions have confirmed the significant negative impact of fake news and misinformation on increasing public vaccine hesitancy during the COVID-19 pandemic [21–24]. However, a lot of current research has focused on how to detect fake news [25,26] or improve the public's ability to identify it [27], but not enough attention has been paid to how to help news organizations improve their ability to disseminate evidence-based, correct information in the age of digital media with the occurrence of an information explosion. Thus, this research explores how news information can be effectively presented to improve the effectiveness of vaccine promotion and the public's vaccination intentions.

Message framing plays a significant role in shaping public perceptions and attitudes toward vaccination [28]. Goffman argued that frames are "interpretive schemata" and cognitive structures used by individuals to understand and interpret the external objective world [29]. In modern society, individuals often find themselves in three realities: the objective, media, and audience reality. Based on objective reality, news reports "frame" a portion of facts by selecting and subjectively reorganizing them, which constitutes the main process of news framing. However, framing never means that news content can be manipulated at will; it should be based on objective reality, thus avoiding potential ethical risks. Audience frames are a collection of guiding cognitive structures stored in individuals' minds for information processing, reflecting the "internal constructs" of the audience, and representing the frames used to interpret social phenomena. A substantial body of research has demonstrated the significant influence of news frames on the formation of audience frames [30,31]. News frames possess ideological attributes, and a reasonable news frame can effectively guide public opinion and thus promote the development of public opinion and events in the desired direction.

In the digital media age, the public has easy access to news produced with different frames. However, which frame is more effective in disseminating health-related information remains unclear. We focus on the rights frame and obligation frame. Rights framing emphasizes vaccination as an individual right, highlighting personal autonomy and choice; the obligation framework emphasizes individuals' responsibility to protect themselves, their families, and society as a whole through vaccination [32]. The rights frame typically communicates the principles of "informed consent" and "voluntary" vaccination through policy guidelines and notifications, and also provides relevant scientific knowledge based on the demographic characteristics of the target audience [33]. The obligation frame promotes the collective immunity effects of vaccine administration from the perspectives of social and national interests, and employs political mobilization and other approaches to persuade the audience to overcome vaccine hesitancy [34]. Thus, these two different news frames may have different persuasive effects on vaccination.

In addition, the quality of arguments presented in the news plays a crucial role in influencing public attitudes and behaviors [4,35]. Argument quality refers to the strength, relevance, and credibility of the evidence and reasoning provided in a message [36]. It determines the persuasiveness of a message and its ability to shape individuals' beliefs and intentions regarding vaccination in the realm of vaccine promotion [37]. In the context of vaccination reporting, the quality of arguments is reflected by the degree of rational and comprehensive reasoning based on medical data and clinical trial results. High argument quality involves accurate and detailed statements on the safety and efficacy of vaccines, whereas low argument quality may result in vague or superficial statements [38]. The quality of arguments plays a determining role in persuasion effectiveness. Scientific, objective, and transparent vaccination information has been shown to increase individuals' willingness to get vaccinated [15]. Previous research has suggested that high argument quality helps to rebut fake news about COVID-19 [4]. Existing research has also confirmed that insufficient government vaccine information is one of the main reasons why elderly

individuals in Hong Kong are reluctant to receive vaccines [39]. As the decision to receive the COVID-19 vaccine is directly related to individuals' immediate interests and safety, audiences are usually motivated to process news information about COVID-19 vaccines in greater detail. Especially in the current era of information explosion, the public is surrounded by a large amount of low-quality information. Thus, providing substantial evidence, such as professional medical data analysis and clinical trial results, is particularly important to make news more persuasive in respect to vaccine uptake.

The individual–collective orientation of news audiences is also considered in our research. Individuals with a collective orientation typically define themselves as part of a collective, with their personal goals subordinate to those of the collective [40]. In cases of conflict between personal and collective goals, individuals prioritize the goals of the group, and their social behavior is influenced by norms, responsibilities, and obligations [41]. In contrast, individualists tend to operate independently of the collective [42]. When there is a discrepancy between collective and personal goals, individuals prioritize their individual goals [43]. As a low-cost means of establishing collective immunity, vaccination effectively reduces the risk of infection and significantly benefits society. However, there is a certain probability of individuals experiencing adverse reactions and vaccine failure, posing risks and harm. Therefore, individuals with stronger collectivistic inclinations place greater emphasis on collective interests, and are more likely to be persuaded by the obligation frame presented in news propaganda, thereby increasing their willingness to be vaccinated. However, individuals with more pronounced individualistic inclinations may prioritize personal safety and vaccination risks, exhibiting personal resistance to the obligation frame. Instead, they may be more receptive to milder and more inclusive rights frames. In terms of argument quality, we argue that high argument quality works well for both individualists and collectivists. Thus, we further explore the interactive effects of news frames, argument quality, and individual–collective orientation.

This study, the research model of which is shown in Figure 1, intends to examine the following research questions:

Is the persuasive effect of the obligation frame significantly different from that of the rights frame?

Does the argument quality of news information positively influence audiences' willingness to be vaccinated?

Are individualists more likely to be persuaded by news with high argument quality and a rights frame?

Are collectivists more likely to be persuaded by news with high argument quality and an obligation frame?
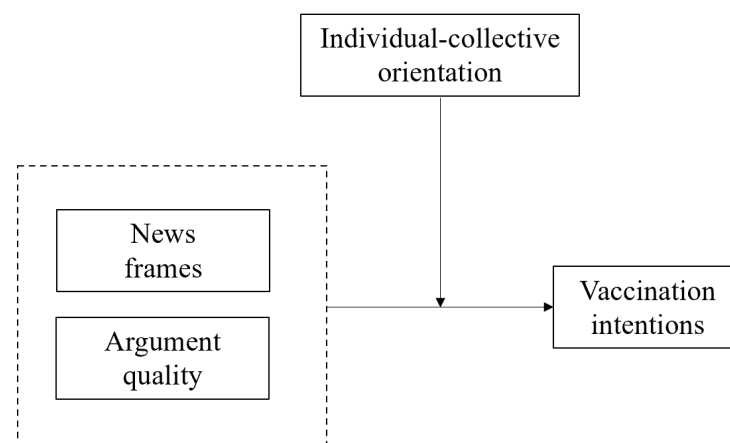
Figure 1. The research model.

2. Materials and Methods

2.1. Participants

This study employed an experimental approach and was conducted from February to the end of March 2021, before the large-scale promotion of COVID-19 vaccination in China. The participants in the current research were obtained through snowball sampling. Researchers first recruited initial participants from among acquaintances, then used the social networks of initial participants to nominate more participants who met the criteria. Participants were required to be individuals who had not yet received the COVID-19 vaccine but met the vaccination criteria. A total of 355 participants were recruited from Shanghai, Fujian, and Zhejiang. Questionnaires were collected after the completion of the experiment. After removing invalid responses, the final sample comprised 310 responses, resulting in a response rate of 87.32%. Participants were paid RMB 10 as compensation for completing the experiment.

Table 1 presents the basic information of all study participants. There were more female participants than male participants, and age distribution was mainly concentrated in the age groups below 30 years. Additionally, as the study was conducted before the widespread rollout of COVID-19 vaccination in the country, most participants were not influenced by vaccination requirements from their organizations (as indicated in the "Organizational Requirement" column of Table 1). Our research promptly investigated participants' willingness to be vaccinated before the mass requirements of COVID-19 vaccination in China.

Table 1. Demographic characteristics of participants.

Characteristic		Sample Size	Percentage
Gender	Male	115	37.1%
	Female	195	62.9%
Age	18–20	66	21.3%
	21–30	176	56.8%
	31–40	47	15.2%
	41 years and above	21	6.8%
Organizational requirement	Yes	77	24.8%
	No	233	75.2%

The participants we accessed were limited and we planned to target enough participants in each group. Thus, we employed a 2 (rights frame versus obligation frame) × 2 (high argument quality versus low argument quality) × 2 (individualism versus collectivism) experimental design. We first measured participants' individual–collective orientation and classified them into two categories using the mean score (M = 3.32) as a threshold (N individualism = 142, N collectivism = 168). The news texts were manipulated into four types, a rights-framed news text with low argument quality, a rights-framed text with high argument quality, an obligation-framed text with low argument quality, and an obligation-framed text with high argument quality. Both participants exhibiting individualism and those with collectivism were randomly assigned to the four conditions with different news pieces to promote COVID-19 vaccination, forming eight groups. Comparisons of demographic characteristics between the groups revealed no significant differences in terms of sex or age ($p > 0.05$), indicating successful random grouping. After reading the given news text, the participants of each group were asked to complete a questionnaire regarding the prevalence of the COVID-19 vaccine, which collected their demographic information and evaluated their COVID-19 vaccine intentions. Overall, the experiment took approximately 10–15 min to complete.

2.2. Experimental Design and Stimulus Materials

The experimental stimuli were provided in the form of common news reports comprising a combination of text and images. To control for the influence of news headlines,

news formats, news sources, publication dates, and image information, the same headline was used for the news pieces, namely, "How Safe and Effective Is the COVID-19 Vaccine? Should you vaccinate?" The news format was a public account tweet (PAT). The news sources were not presented, and the publication date was standardized as "Today". The images used were unrelated to the news frames and consisted of injection-related images.

Stimuli of high argument quality comprised detailed and specific information regarding the safety and effectiveness of the COVID-19 vaccine as well as relevant experimental data. In contrast, stimuli of low argument quality provided only summarized and simplified versions of the aforementioned information. Within the rights framework, emphasis was placed on highlighting that COVID-19 vaccination follows voluntary principles and is the right of citizens rather than an obligation. In the obligation framework, the focus was on highlighting that vaccine administration is an obligation of individuals and a means of contributing to their families and country. The detailed stimulus materials are reported in Appendix A.

2.3. Measurements

Five-point Likert scales were used to measure all variables, with 1 representing "strongly disagree" and 5 representing "strongly agree". A pretest was conducted to assess the reliability and validity of the scales, which used the same study design and measurement tools as the formal study. The pretest showed the good reliability and validity of each measurement tool.

2.3.1. Manipulation Check

To ensure the effectiveness of stimulus materials, separate manipulation checks were conducted on the dimensions of news frames and argument quality. Three items were used to measure argument quality after reading the assigned material, including "This report provides sufficient evidence regarding the performance of the vaccine", "This report provides extensive information proving the effectiveness of the vaccine", and "The argument in this news is well-founded" ($\alpha = 0.95$). News frames were measured using "This report suggests that getting vaccinated is a personal right rather than an obligation", "This report suggests that getting vaccinated is an autonomous choice rather than a civic responsibility", and "This report suggests that getting vaccinated is an individual matter rather than a social collective matter" ($\alpha = 0.87$).

2.3.2. Individual–Collective Orientation

Individual–collective orientation was measured using four items from scales established by Triandis and Gelfand [44] and Early [45]. Sample items included "I prefer to live independently from others", "I am unique and different in many ways", "I prefer to rely on myself rather than others", and "I work better independently than in a group" ($\alpha = 0.84$).

2.3.3. Vaccination Intention

Referring to previous research [28], this study used three items to measure vaccination intentions before and after reading the stimulus materials. Sample items included "I am willing to get vaccinated against COVID-19 sometime soon" ($\alpha_{\text{pre-test}} = 0.4$; $\alpha_{\text{post-test}} = 0.91$).

2.3.4. Control Variables

In addition to controlling for sex and age, this study assessed participants' understanding of vaccine-related expertise using a five-point Likert scale as a control variable ($M = 1.75$, $SD = 0.43$).

2.4. Data Analysis Strategies

This study conducted a series of analyses of variance (ANOVAs) in SPSS 26 to examine the research questions proposed. We first tested the main effects of news frames and argument quality on participants' vaccination intention, and then further examined the

interaction effects between news frames and argument quality and between news frames, argument quality, and individual–collective orientation.

3. Results

The results reveal that participants who read news with high argument quality scored significantly higher on the three test items than those who read news with low argument quality (M_{high} = 3.75, SD_{high} = 0.83; M_{low} = 2.69, SD_{low} = 1.12; t = −9.52, $p < 0.001$). Similarly, participants who read rights-framed news scored significantly higher on the three test items than those who read obligation-framed news (M_{rights} = 3.68, SD_{rights} = 0.81; $M_{obligation}$ = 3.01, $SD_{obligation}$ = 0.97; t = −6.57, $p < 0.001$). These findings indicate the successful manipulation of participants in the experiment.

We conducted a covariance analysis using the news frame as the independent variable, post-test vaccination willingness as the dependent variable, and pre-test vaccination willingness as the covariate. According to the results, after controlling for the influence of pre-test vaccination willingness, the news frame still had a significant effect on post-test vaccination willingness (F = 12.04, $p = 0.001$). Specifically, participants who read rights-framed news had significantly higher vaccination willingness than those who read obligation-framed news (M_{rights} = 3.48, SD_{rights} = 1.01; $M_{obligation}$ = 3.32, $SD_{obligation}$ = 0.72).

Then, this study conducted covariance analyses using argument quality as the independent variable, post-test vaccination willingness as the dependent variable, and pre-test vaccination willingness as the covariate. The results show that, after controlling for the influence of pre-test vaccination willingness, argument quality still had a significant effect on post-test vaccination willingness (F = 19.613, $p < 0.001$). Participants who read high-quality arguments exhibited significantly higher vaccination willingness than those who read low-quality arguments (M_{high} = 3.77, SD_{high} = 0.87; M_{low} = 3.09, SD_{low} = 0.77).

A multiple regression analysis was conducted using the interaction terms for argument quality, news frame, and individual–collective orientation as independent variables; post-test vaccination willingness as the dependent variable; and pre-test vaccination willingness, gender, age, occupational requirements, and level of professional knowledge as control variables. The results reveal that, apart from pre-test vaccination willingness (β = 0.65, $p < 0.001$), sex, age, occupational requirements, and level of professional knowledge did not have a significant effect on vaccination willingness ($ps > 0.05$). However, after controlling for the influence of pre-test vaccination willingness, the interaction effect of argument quality, news frame, and individual–collective orientation had a significant impact on post-test vaccination willingness (β = 3.01, $p = 0.003$).

Finally, this study conducted a covariance analysis using argument quality, news frame, and individual–collective orientation as independent variables, post-test vaccination willingness as the dependent variable, and pre-test vaccination willingness as the covariate. After controlling for the influence of pre-test vaccination willingness, the interaction effect of argument quality, news frame, and individual-collective orientation was found to have a significant impact on post-test vaccination willingness (F = 5.01, $p < 0.05$). As Table 2 shows, among participants with an individualist orientation, the highest vaccination willingness was observed after reading the news with high argument quality and a rights framework (M = 4.30, SD = 0.60). We have hypothesized that individualists are more likely to be vaccinated after reading news with high argument quality under a rights frame. The covariance analysis of a subsample of participants with an individualist orientation revealed a significant interaction effect between argument quality and news frame (F = 6.45, $p < 0.05$), supporting our hypothesis. We also hypothesized that news with high argument quality and obligatory frames is more persuasive among individuals favoring collectivism. However, in the analysis of the subsample of individuals with a collective orientation, the interaction effect between argument quality and news frame was not significant (F = 0.754, $p = 0.39 > 0.05$).

Table 2. Results for the interaction effects.

	High Argument Quality		Low Argument Quality	
	Rights Frame	Obligation Frame	Rights Frame	Obligation Frame
Individualism	M = 4.30 SD = 0.60	M = 3.55 SD = 0.76	M = 3.36 SD = 1.04	M = 3.02 SD = 0.54
Collectivism	M = 3.58 SD = 1.10	M = 3.42 SD = 0.91	M = 2.79 SD = 0.70	M = 3.22 SD = 0.54

4. Discussion

The current study is one of the first to explore the effects of different presentations of news on COVID-19 vaccination intention. We demonstrated that news frames, argument quality, and their interaction would influence the persuasive effects of news. Although our study had such findings, it is important to emphasize that news must be transparent regardless of the way it is presented. Transparency is regarded as a central journalistic norm [46], and helps to enhance credibility and public trust [47]. It should never be possible to conceal or misrepresent the position, sources, and methods of news production in order to achieve a better persuasive effect [48].

Consistent with the findings of previous research, the quality of persuasive arguments in textual messages continues to play an important role in audiences' decision-making processes [49–51]. Given that the COVID-19 pandemic and associated vaccines are significant factors affecting the personal, familial, and societal health and safety of the general public, audiences typically exhibit a high level of motivation to actively seek relevant scientific information and engage in detailed information processing. However, feelings of uncertainty, insecurity, and hesitation toward vaccine safety and efficacy can only be alleviated through comprehensive, effective, and clear scientific dissemination. In this context, news media, which serve as environmental monitors and professional information providers, have become one of the primary channels through which the public seeks information. The relevance of vaccination information to individual health and the uncertainty toward being vaccinated encourage audiences to pay more attention to the content of vaccination information, including the usefulness of the details provided. When the information contained in vaccination reports is supported by scientific and objective evidence, audiences feel that it is reliable, and the information thus influences their decision-making behavior. Consequently, ensuring the provision of sufficient, effective, and clear scientific information is crucial for addressing public uncertainty, alleviating feelings of insecurity, and mitigating hesitation related to vaccine safety and efficacy [35]. News reports should be clear in their viewpoints and argument logic in order to ensure their rigor and credibility. To address people's concerns regarding the safety and efficacy of the new vaccine, media reports should be specific and supported by evidence, including scientific experimental data to justify their position [37]. Additionally, the reliability of the information should be enhanced through rational and objective arguments. Basic vaccination issues—such as vaccine principles, time intervals, vaccine combinations, and precautions—should be popularized in a comprehensive and detailed manner, with particular attention paid to reaching the elderly, pregnant women, and other groups. Any vague statements regarding the contraindications of vaccination should be clarified.

Apart from argument quality, the effective dissemination of scientific information to audiences relies on its framing [28]. In view of the distinct public nature of vaccine-related issues, where individual behaviors and decisions impact the overall interests of society and the nation, this study focused on the "rights–obligation" news frame within vaccine promotion reports. We found that in our sample, the rights frame would be more persuasive than the obligation frame. The "failure" of the obligation framework in this study may be attributed to several factors. First, research has demonstrated that economic development would reinforce individualism in society [52], which may result in suggesting inherent resistance among the audience toward political mobilization discourse that carries

coercive implications within the obligation framework. The sample of our study also exhibited a preference for individualism (M = 3.32). Second, fake news and misinformation potentially lead to a lack of public trust in obligation-framed news related to vaccination. The obligation frame emphasizes that everything is in the collective interest, which implies that individuals may need to adopt some risks and losses. Exaggerated and inaccurate reports of the side effects of vaccines exacerbate public fear and hesitation [14], increasing public perception of potential costs and lowering the persuasive effects of the obligation frame. In the context of national governance, the large-scale implementation of COVID-19 vaccination is an important policy practice. As such, persuading the public to overcome vaccine hesitancy and voluntarily participate in vaccination has become a test of the news media's ability to guide public opinion. To harness the persuasive effects of the obligations frame, it is necessary to appeal to both reason and emotion within the discourse on political mobilization. This entails enhancing news media's capacity for emotional mobilization, establishing an emotional discourse system regarding COVID-19 vaccination, and eliciting a sense of collective consciousness among audiences. By effectively integrating individual interests with the broader interests of the family, organizations, society, and the nation, the obligation frame can better fulfill its schema role in the audience's vaccine perception and decision-making process.

Another major finding of this study is the observation of a significant interaction between high argument quality, news frames, and individual–collective orientation. As assumed in this study's hypotheses, individualists are most receptive to news with high argument quality and rights frames. It is worth noting, however, that the interaction between argument quality and news frames is not significant among collectivists, and that the main effects of both argument quality and news frames are not significant (ps > 0.05), suggesting that neither argument quality nor news frames sufficiently explain the variation in willingness to vaccinate in the subsample of collectivists. The fate of an individual is always embedded in the collective. However, in the case of vaccines, there will always be a few individuals who expect that the establishment of herd immunity will protect them from both the risk of contracting infectious diseases and the adverse reactions associated with vaccination. When this mentality becomes widespread among the public, vaccine hesitancy becomes commonplace, hindering the success of public health policies on mass vaccination. In this process, individual decision-making is primarily based on safety and risk considerations, with public interest excluded. Previous cross-sectional comparative studies have found that vaccine hesitancy can be more effectively mitigated in countries and regions with higher levels of trust in the government, such as China, Singapore, and other Asian countries and regions [53], which typically have a more pronounced collectivist cultural orientation. However, several recent studies indicate that societies like ours, where collectivism is a traditional cultural tendency, are experiencing a rise in individualistic culture and a decline in collectivistic cultures due to broader changes and various internal and external factors. When collectivist tendencies in the macro-culture of society are further diluted and individualist cultural tendencies strengthened, the social mobilization capacity of the news media's propaganda discourse dominated by the obligation framework will be inhibited. Will phenomena such as vaccine hesitation become more widespread and generalized in our society? If those in power do not address the trend of pluralism and individualistic tendencies in social thinking, merely enhancing the political mobilization capacity of news mouthpieces may amount to little more than "treating the symptoms but not the root cause", and fail to elucidate the contradiction underlying the difficulties in the implementation of public policies.

This study had several limitations. First, given the comprehensive implementation of COVID-19 vaccination activities during the data collection period, the time window for sample collection was very short. This may have influenced the overall sample size and balanced the distribution of demographic variables, making it difficult to include more samples. Second, in the development of stimulus materials, we employed a relatively simple design for the discourse system of the obligation frame, focusing primarily on

providing summary-style persuasive education without incorporating aspects of emotional mobilization. This may have resulted in the failure to evoke a sense of community awareness and social responsibility among the audience. In the discourse system of the obligation frame, emotional mobilization may have more persuasive power than rational persuasion. Therefore, future research should investigate the role of emotional mobilization within the obligation frame. Third, the generalizability of our findings may be influenced by national cultural differences. Although our study was conducted at the individual level, the influence of cultural values at the national level cannot be ignored. No individual can be isolated from the rest of society, and their cognition, behavior, and decisions are profoundly influenced by national cultural imprints [54,55]. Thus, future research should test whether our findings can be generalized to countries with different cultural values, such as individualism. Fourth, the dichotomous approach to the whole analysis may limit the drawing of more critical conclusions. Future research can advance our conclusions by dividing the variable into three or more levels, such as low, medium, and high argument quality.

5. Conclusions

The findings of this study indicate a positive correlation between the argument quality of news and people's willingness to get vaccinated, with the rights frame found to be significantly more persuasive than the obligation frame. Additionally, this study found that individual–collective orientation has an interactive effect on argument quality and news frames. These three factors should be considered in future vaccine-related news coverage to improve its persuasiveness.

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Institutional Review Board Statement: The study was approved by East China Normal University Committee on Human Research Protection (HR1312018).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data are available on request from the first author.

Appendix A

Table A1. Stimulus materials.

Rights-Framed	Obligation-Framed
Low argument quality The COVID-19 vaccine can stimulate the body to produce targeting antibodies, thus providing immunological protection to the vaccinated individual. The COVID-19 vaccines currently used in China are mainly inactivated vaccines. Inactivation is a common method of vaccine preparation in the international arena and is a mature and reliable means of classical vaccine development. It deprives the virus of infectivity and replication while retaining the response activity that can elicit human immunity.	Low argument quality The COVID-19 vaccine can stimulate the body to produce targeting antibodies, thus providing immunological protection to the vaccinated individual. The COVID-19 vaccines currently used in China are mainly inactivated vaccines. Inactivation is a common method of vaccine preparation in the international arena and is a mature and reliable means of classical vaccine development. It deprives the virus of infectivity and replication while retaining the response activity that can elicit human immunity.

Table A1. *Cont.*

Rights-Framed	Obligation-Framed
In China, COVID-19 vaccines are provided to the public free of charge and they can voluntarily choose to inoculate or not. The COVID-19 vaccination is solely based on the principles of informed consent and voluntariness. The COVID-19 vaccination is a citizen's right, not a duty. It is recommended that the public actively participate in vaccination on the premise of informed consent and exclusion of contraindications to better protect the health of individuals.	Maximizing vaccination and gradually building a herd immunity barrier is the inevitable choice for the future. Studies have shown that a vaccination rate of 70 to 80 percent is required to achieve herd immunity. Since the rate of vaccination among the population is a matter of public health and safety, getting the vaccines right at this stage is an individual's duty and a contribution to their family, society, and country. It is recommended that the public actively participate in vaccination on the premise of informed consent and the exclusion of contraindications for collective and national interests.
High argument quality	High argument quality
The COVID-19 vaccine can stimulate the body to produce targeting antibodies, thus providing immunological protection to the vaccinated individual. The COVID-19 vaccines currently used in China are mainly inactivated vaccines. Inactivation is a common method of vaccine preparation in the international arena and is a mature and reliable means of classical vaccine development. It deprives the virus of infectivity and replication while retaining the response activity that can elicit human immunity. As of the end of January 2021, the cumulative number of reported COVID-19 vaccinations in China has exceeded 24 million doses, and no serious adverse reactions have been reported. According to clinical trial interim data, the protection rate of the COVID-19 vaccine in China is 79.34%, which means that vaccines can reduce the risk of infection by nearly 80% within a certain period. Clinical results show that about two weeks after the completion of the second dose of vaccination, the vaccinated population can produce sufficient protective antibodies, and the antibodies can still maintain a high level for more than six months. In China, COVID-19 vaccines are provided to the public free of charge and they can voluntarily choose to inoculate or not. The COVID-19 vaccination is solely based on the principles of informed consent and voluntariness. The COVID-19 vaccination is a citizen's right, not a duty. It is recommended that the public actively participate in vaccination on the premise of informed consent and exclusion of contraindications to better protect the health of individuals.	The COVID-19 vaccine can stimulate the body to produce targeting antibodies, thus providing immunological protection to the vaccinated individual. The COVID-19 vaccines currently used in China are mainly inactivated vaccines. Inactivation is a common method of vaccine preparation in the international arena and is a mature and reliable means of classical vaccine development. It deprives the virus of infectivity and replication while retaining the response activity that can elicit human immunity. As of the end of January 2021, the cumulative number of reported COVID-19 vaccinations in China has exceeded 24 million doses, and no serious adverse reactions have been reported. According to clinical trial interim data, the protection rate of the COVID-19 vaccine in China is 79.34%, which means that vaccines can reduce the risk of infection by nearly 80% within a certain period. Clinical results show that about two weeks after the completion of the second dose of vaccination, the vaccinated population can produce sufficient protective antibodies, and the antibodies can still maintain a high level for more than six months. Maximizing vaccination and gradually building a herd immunity barrier is the inevitable choice for the future. Studies have shown that a vaccination rate of 70 to 80 percent is required to achieve herd immunity. Since the rate of vaccination among the population is a matter of public health and safety, getting the vaccines right at this stage is an individual's duty and a contribution to their family, society, and country. It is recommended that the public actively participate in vaccination on the premise of informed consent and exclusion of contraindications for collective and national interests.

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