'Waves' and 'flashes' of the pandemic: How COVID-19 metaphors in Russian media influence reasoning[1]

Ivan Aslanov[2]
Lomonosov Moscow State University, Russia

Alexey Kotov
National Research University Higher School of Economics, Russia

Abstract

In this study, we examined how metaphors used in the Russian media to describe the COVID-19 virus affect the audience's judgment about the virus and their willingness to take a vaccine. We found that the two conventional metaphors used to describe the dynamics of the spread of the coronavirus ('wave' and 'flash') have a limited impact on the audience. In particular, by conducting an online experiment (N=737), we revealed that texts in which the virus and vaccination were described metaphorically ('a new flash of coronavirus' / 'vaccination could extinguish the flames of a new flash of coronavirus'; 'a new wave of coronavirus' / 'vaccination could curb the onslaught of a new wave of coronavirus') reduced fear and anxiety at the thought of the coronavirus, but this effect appears only in vaccinated participants. Metaphorical framing, while impactful at the affective level, did not affect 'rational' reasoning, such as estimates of the likelihood of becoming vaccinated or estimates of the number of cases in the country. Also, subjects' responses to most of the questions correlated positively with their confidence in official information about the coronavirus. The article interprets the results in the context of current work in the field of metaphorical framing and health communication.

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[2] **Corresponding author:**
Ivan Aslanov, Lomonosov Moscow State University, Faculty of Journalism, 9, Mokhovaya st, Moscow, Russia.
Email: ivaslanov@gmail.com

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Introduction
The COVID-19 pandemic has increased the importance of the media as a social institution. Although the pandemic emergency was declared less than two years ago, people have already adapted to new formats of interaction, mediating social practices in many areas of public life, such as education (Poluekhtova et al., 2020), religion (Tudor et al., 2021), and sports (Goldman, Hedlund, 2020).

Not surprisingly, researchers are documenting the influence of media information on audience judgments and emotions related to COVID-19. This can range from information about the virus spread on social media, the consumption of which can be associated with a desire to self-diagnose illness (Laato et al., 2020), to journalistic publications disseminating information about the virus, which can polarize public opinion (Hart et al., 2020).

Separate attention has been paid to the linguistic tools of coronavirus reporting, and in particular to metaphors. On the one hand, attempts are made to capture metaphorical patterns found both in the speech of individual politicians (Bates, 2020; Berrocal et al., 2021) and in media discourse in general (Nerlich & Jaspal, 2021; Semino, 2021; Seixas, 2021; Kablukov, 2022; Shi-xu, 2022). On the other hand, there is a comparative analysis of metaphors used to describe the coronavirus versus metaphors previously used to describe other diseases and epidemics (Taylor & Kidgell, 2021; Yang, 2020). The results of such studies are significant not only in the linguistics context, but also for predicting the social and psychological effects of communication because, according to the theory of conceptual metaphor (Lakoff & Johnsen, 2003), the source domain of a metaphor can to some extent rearrange the structure of the target domain 'by analogy' (Wolff & Gentner, 2011). There are several studies demonstrating that 'metaphorical framing' can influence judgments about phenomena of various kinds, such as crime (Thibodeau & Boroditsky, 2011), the police institution (Thibodeau et al., 2017), corporate financial collapse (Landau et al., 2014), mental disorders (Aslanov et al., 2020) and even such abstract categories as love (Lee & Schwarz, 2014) and time (Boroditsky, 2000).

A recent publication by Panzeri et al. (2021) questioned how the common metaphor of 'war against a virus' in media discourse influences audience judgments. The authors found that this metaphor affects only certain audience groups, particularly those with right-wing political views and those who rely on independent sources of information. These respondents were influenced by the

'military' metaphor, prompting them to choose more decisive and authoritarian ways to fight the virus. The results of Panzeri et al. (2021) are consistent with work critical of the 'strong' interpretation of metaphorical framing, claiming that metaphor has limited influence on judgments and only on specific groups of people (Steen et al., 2014).

It should be noted that health and risk communication researchers have shown before that metaphor can be an effective framing tool, influencing how audiences perceive the threat of various viral diseases and even how they make decisions about vaccination. For example, Scherer et al. (2015) showed that metaphorical framing can increase the likelihood that respondents will want to be vaccinated against influenza, with this effect moderated by vaccination experience. In this experiment, the metaphors affected mainly those participants who had a vaccination experience but had not been vaccinated regularly. At the same time, the result of framing depends not only on the characteristics of the audience and the semantics of the metaphor, but also on the characteristics of the reported information. According to a study of Zika virus messages (Lu & Schuldt, 2018), the metaphor 'nation as a body' is able to reinforce feelings of exposure to the virus, but only when the symptoms of the virus are described as very dangerous to health.

In general, research on metaphorical framing in health communication has largely centered around the 'war' metaphor (Bowers et al., 2021; Flusberg et al., 2018; Hauser & Schwarz, 2015, 2019; Panzeri et al., 2021). In our study, we wanted to shift the focus to metaphors that are conventional for Russian media discourse. We studied which metaphors are used in the Russian media to describe the COVID-19 virus and how they influence the perception of the threat of this virus and the desire to get vaccinated. Thus, our study included two stages. In the first stage, a content analysis of Russian-language publications was conducted to identify conventional metaphors. In the second stage, an online experiment was conducted to find out how these metaphors affect people at the rational level (e.g., risk scores, estimates of the number of patients, willingness to be vaccinated) and at the affective level (e.g., feelings of fear, anxiety, anger at the thought of the virus).

Content-analysis
Because the study of metaphors does not always lend itself to automated analysis (Rai & Chakraverty, 2020) and requires careful reading of the text, it was necessary to focus on limited material in order to then extrapolate our findings with caution. For the content analysis, we chose a specialized information portal

about health and medicine: Medikforum.ru. This resource was chosen due to the fact that in 2020 it was the most cited media resource of the medical and pharmaceutical industry in the Russian media (Medialogia, 2020). This media resource was the leader in terms of citations not only among online publications, but also among all types of media (print media, TV channels, and radio stations) on this topic.

We analyzed all available publications of this site in the Coronavirus section for the six-month period since the beginning of the study (December 2020 to May 2021). We studied which metaphors were used in the headlines of this resource. In total, we studied 1,170 publications, 108 of which used metaphors in their headlines (i.e., about one in ten publications). A list of the metaphors we identified is available in the online repository[3].

In our analysis, we examined the types of topics to which metaphors were applied. In the array, 44% of the metaphors were used to describe the virus ('virus retreats', 'epicenter of the coronavirus', 'raging coronavirus'), 29% described the lockdown ('tough lockdown', 'make lockdown softer', 'put the screws [of lockdown] on'), 15% referred to the actions of authorities ('fight the coronavirus', 'a shy start of vaccinations', 'recruit an army of volunteers'), 7% described the actions of vaccines ('the vaccine suffers a defeat', 'the vaccine has a winning formula', 'long-playing vaccine'), 4% described symptoms and consequences of the disease ('brain fog', 'white heat', 'bringing back from the other side: why people who suffered a covid do not want to live'), and 1% (only one metaphor) referred to reactions to information about the virus ('escape from the stress of the coronavirus').

Among the virus metaphors, we found 17 different metaphors, 13 of which occurred only once, 2 metaphors ('flow of the virus' and 'slowdown of the pandemic') occurred twice each, and two metaphors ('a flash of the coronavirus' and 'a wave of the coronavirus') were used 20 and 14 times respectively. Thus, these two metaphors accounted for 19% and 13% of the total number of metaphors detected, or 41% and 30% of the virus metaphors, respectively.

As a proportion of the total number of publications studied, the metaphor 'flash' was encountered in 1.7% of the headlines (20 of 1,170), and the metaphor 'wave' was encountered in 1.2% of the headlines (14 of 1,170). An automated search of the Integrum archive of Russian-language publications[4] showed that this proportion corresponds to the representation of these

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[3] Available from: https://osf.io/5u2yw/?view_only=31ef69cfc3894bd9bb562
4641a5b7ef8
[4] Available from: https://integrum.ru/

metaphors in publications of the Russian-language Internet media on the topic of the coronavirus over the same period (N = 788,046): the metaphor 'flash of coronavirus' occurred in 1.1% of publications and the metaphor 'a wave of coronavirus' in 1.8%.

The results suggested that these two metaphors ('flash' and 'wave') are conventional for Russian media discourse. Both metaphors are used to describe the dynamics of the spread of the virus, which makes them convenient for comparison within the experiment.

Experiment
Participants

The study involved 1,062 subjects recruited on the Russian crowdsourcing platform Yandex.Toloka. Those questionnaires that contained incorrect answers to at least one of the two control questions on understanding the text of the stimulus material were excluded (85 questionnaires). Participants whose answers were not excluded at this stage received a reward of $0.07. Next, responses which had receiving times that differed from the mean by more than 1 SD were removed (M = 152, SD = 64 seconds). The strictness of these restrictions was due to the need to exclude bots and professional respondents from the sample, as well as those who were distracted while completing the task. The final sample size was N = 737; 313 were men (42.5%) and 424 were women (57.5%); mean age M = 34.5, SD = 11.7 years. There were 422 participants (57.3%) with higher education and 218 (29.6%) with specialized secondary education. Among the participants, 192 were vaccinated, while 545 were not. We used this information to analyze the responses of vaccinated and unvaccinated participants separately.

Material

For the purposes of the experiment, a short text fragment stylized as an excerpt from a journalistic piece was used. The text stated that, according to experts, the spread of the coronavirus in Russia had increased. It also reported on the symptoms of the coronavirus and stated that vaccination could be considered as a measure to reduce the growth rate of the disease. The control group read a report that the coronavirus has spread again in Russia. For the two experimental groups, however, the text contained one of the previously identified coronavirus metaphors: for one group, the spread of the virus was described as 'a new flash of coronavirus'; for the other, it was 'a new wave of coronavirus'. Also, wanting to make the metaphor more expansive, which, according to available data,

should have strengthened its effect (Thibodeau, 2016), we ended the text with 'vaccination could extinguish the flames of a new flash of coronavirus' for the first experimental group and 'vaccination could curb the onslaught of a new wave of coronavirus' for the second. The control group read the phrase 'vaccination could reduce the rate of further spread of coronavirus'. Factual information about the symptoms of coronavirus was taken from the official WHO website. An example of the stimulus material (translated into English) is presented below; the original material (in Russian) is available in the online repository:

Experts believe that there is a new wave of coronavirus in Russia. This wave could turn into a real tsunami, so all possible measures should be taken to keep the situation under control. The main symptoms of the coronavirus include fever, dry cough, fatigue, and shortness of breath and chest pain in severe cases. Some believe that mass vaccination could curb the onslaught of a new wave of coronavirus.

Procedure

Subjects were asked to read the news text and share their opinions. By taking the survey, the subjects agreed that they did not object to us using all of the transmitted data for processing. After reading the material, respondents answered a series of questions: a) whether they had been vaccinated against COVID-19 (yes/no answers); b) how likely they were to vaccinate against COVID-19 or revaccinate (probability was estimated from 0 to 100); c) how many or few people, according to their intuitive estimate, are now in Russia with the coronavirus (scale of 1 to 7); d) how severely, according to their intuitive estimate, they would have suffered from the disease caused by the virus (scale of 1 to 7); e) how serious the consequences for Russian society would be if mass vaccination was not carried out (on a scale of 1 to 7); f) how strongly they would feel the emotions of fear, disgust, anger, and anxiety at the thought of the coronavirus (the intensity of each emotion was rated on a scale of 1 to 7); and g) how much attention the government should pay to fighting the coronavirus (on a scale of 1 to 7). Three COVID-19 questions sought to determine the level of trust in official authorities in the context of the pandemic: we asked to what extent respondents trusted the authorities' actions to control the virus, to what extent they trusted official information about the virus, and to what extent they trusted official information about vaccines. For each of the three questions, a score of 1 to 7 was given, after which we obtained an arithmetic mean of the respondents' trust in authorities.

Thus, we relied on procedures previously used in health and risk communication studies. In particular, questions on the threat assessment of the virus and the perception of one's own emotional state were adapted from Lu and

Schuldt (2018), and the probability of being vaccinated scale was adapted from Scherer et al. (2015). Following the logic of these authors, we hypothesized that metaphorical descriptions of the pandemic help audiences better imagine the threat posed by the disease, as metaphors appeal to specific object images. Consequently, the threat of the disease should become more explicit, while at the same time assessments of the danger of the disease (for the individual and for the country as a whole) should increase. At the same time, the metaphorical description of the vaccine should increase the willingness to be vaccinated, since the metaphor makes the benefit of the vaccine clearer, using an analogy.

Focusing on the results of Panzeri et al. (2021), from which it follows that the respondent's political views moderate the influence of the metaphor, we intended to capture the political views of the participants in the experiment. With this we were able to test whether metaphors influenced people's responses, or whether those responses were more influenced by prior political attitudes. However, since Russia is characterized by an eclectic mix of leftist and rightist ideas (Yudina et al., 2020), it was difficult to determine the respondents' ideological orientation, so the analogue for this measure was a measure of trust in official authorities. After the experiment, messages were sent to all participants, clarifying that fictitious material was used in the experiment and that any information about the coronavirus was recommended to be obtained from official sources.

Results

Nonparametric statistics were used to analyze the results, because the Shapiro-Wilk test showed a difference from the normal distribution for each of the variables ($p < 0.001$). Because vaccination experience may have been a significant determinant of information perception in the text presented, we divided subjects into a vaccinated group and a non-vaccinated group to analyze responses within each group.

The unvaccinated group. For the unvaccinated group (N = 545), the Kraskell-Wallis test showed no effect of condition for each of the variables, namely for the probability of vaccination (χ^2 (2) = 1.486, p = 0.476); the intuitive estimate of national sickness (χ^2 (2) = 1.531, p = 0.465); the subjective severity of disease course in personal illness (χ^2 (2) = 1.497, p = 0.473); estimates of the consequences for the country if mass vaccination were not implemented (χ^2 (2) = 2.850, p = 0.241); levels of fear (χ^2 (2) = 0.464, p = 0.793), disgust (χ^2 (2) = 2.534, p = 0.282), anger (χ^2 (2) = 1.143, p = 0.565), and anxiety (χ^2 (2) = 0.207, p = 0.902) at the thought of the virus; and estimates of the

attention the state needs to pay to the coronavirus problem (χ^2 (2) = 1.460, p = 0.902).

Spearman's correlation coefficient was used to find out the relationship of the dependent variables to the level of trust in authority. It was found that the level of trust in authority in the virus questions was positively correlated with almost all variables. There was a slight correlation with the level of disgust at the thought of coronavirus (r = 0.084, p = 0.05); a weak correlation with the intuitive estimate of the number of people sick in the country (r = 0.261, p < 0.001) and the estimate of the subjective severity of the course of the disease in personal illness (r = 0.28, p < 0.001); a moderate correlation with the state's assessment of the attention needed to be paid to the coronavirus problem (r = 0.375, p < 0.001), with feelings of fear (r = 0.394, p < 0.001) and anxiety (r = 0.359, p < 0.001) at the thought of the virus; and a strong correlation with the likelihood of being vaccinated (r = 0.56, p < 0.001) and assessment of societal consequences if mass vaccination did not occur (r = 0.519, p < 0.001). A slight negative correlation was found between the level of trust in authority and feeling angry at the thought of the coronavirus (r = -0.085, p < 0.047).

Vaccinated group. For the vaccinated group (N = 192), the Kraskell-Wallis test showed no effect of condition for 7 of the 9 dependent variables, namely the probability of vaccination (χ^2 (2) = 4.833, p = 0.089); the intuitive estimate of the number of people sick in the country (χ^2 (2) = 3.535, p = 0.172); the subjective severity of illness course in personal illness (χ^2 (2) = 0. 846, p = 0.655); estimates of the consequences for the country if mass vaccination did not take place (χ^2 (2) = 3.335, p = 0.189); level of disgust (χ^2 (2) = 5.959, p = 0.051) and anger (χ^2 (2) = 2.983, p = 0.225) at the thought of the virus; estimates of the attention the state needs to pay to the coronavirus problem (χ^2 (2) = 4.608, p = 0.1). However, there was a significant effect of condition on fear (χ^2 (2) = 13.945, p < 0.001) and anxiety (χ^2 (2) = 10.118, p = 0.006) levels when thinking about coronavirus.

Post-hoc Dwass-Steel-Critchlow-Fligner pairwise comparison showed that scores for the level of fear at the thought of coronavirus were also reduced in the 'flash' metaphor group (W = 5. 292, p < 0.001; M = 3.40, SD = 1.84) and in the group with the 'wave' metaphor (W = 3.524, p = 0.031; M = 3.65, SD = 2.02), relative to those in the control group (M = 4.54, SD = 1.79). The same was true for anxiety scores: they were reduced in the 'flash' metaphor group (W = 4.283, p = 0.007; M = 4.18, SD = 1.87) and in the 'wave' metaphor group (W = 4.283, p = 0.007; M = 4.23, SD = 2.18) relative to the control group (M = 5.18, SD = 1.84). At the same time, a comparison of the responses

of the two experimental groups to the same questions showed that neither fear level scores (W = 0.97, p = 0.772) nor anxiety level scores (W = 0.245, p = 0.984) differed significantly between them (*Figure 1*).

Figure 1

Average fear and anxiety scores in the experimental and control conditions (95% confidence interval)

A) Vaccinated group

B) Unvaccinated group
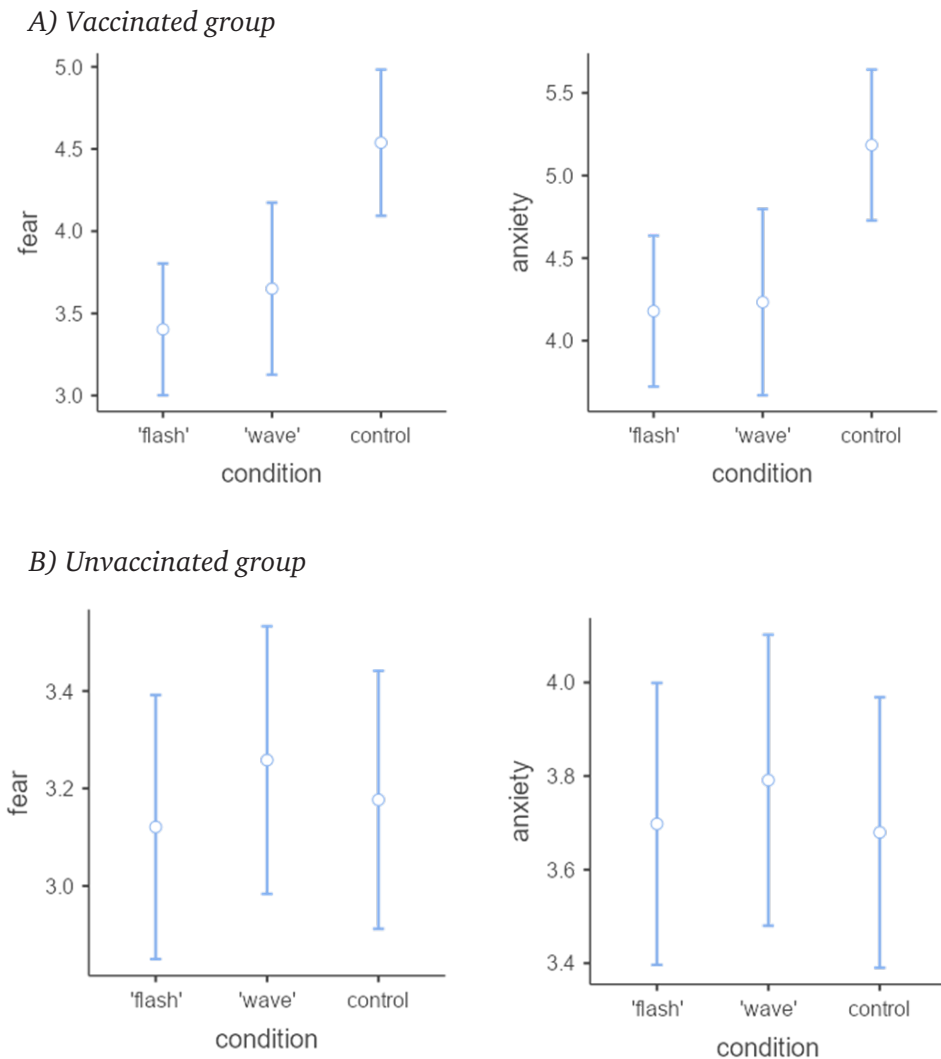
Spearman's correlation coefficient was used to discover the relationship of the dependent variables with the level of trust in authority. It was found that the level of trust in authority in virus-related issues was positively correlated with a number of variables. A weak correlation was found with the likelihood of being vaccinated ($r = 0.281$, $p < 0.001$), with an estimate of the attention the government needs to pay to the coronavirus issue ($r = 0.246$, $p < 0.001$), and with feelings of fear ($r = 0.149$, $p = 0.039$) and anxiety ($r = 0.142$, $p = 0.049$) when thinking about the virus; a moderate correlation was found with the assessment of the consequences for society if mass vaccination did not take place ($r = 0.323$, $p < 0.001$).

Discussion

As shown by the content analysis of the headlines in the most quoted Russian media related to news from the medical field, among the most frequent metaphors used to describe the COVID-19 virus are the metaphors 'wave' and 'flash', which refer to the dynamics of the spread of this disease. The proportion of these metaphors in the studied array of headlines corresponds to the frequency of their appearance in Russian media discourse over a similar period, which allows us to assume that in this case we are not dealing with an exceptional stylistic feature of the studied publication, but with a trend that is more or less characteristic of the entire Russian media. In other words, these metaphors can be considered conventional in the context of Russian journalism.

The results of the experiment demonstrated that these metaphors have a limited effect on the respondents. In particular, the effect of metaphorical framing was detected only in the group of vaccinated respondents, while people with no experience of coronavirus vaccination were not affected by metaphorical framing. This is consistent with earlier research showing that metaphorical framing in influenza and vaccination publications is moderated by vaccination experience (Scherer et al., 2015). In addition, these metaphors had influence more on an affective level: they reduced fear and anxiety when thinking about the coronavirus in the vaccinated group and did not affect responses requiring more 'rational' assessments (such as the likelihood of getting vaccinated or estimates of the number of cases in the country). It is likely that in this case there was a metaphor consistency effect (Thibodeau, 2016), since in the experimental material the description of the vaccine action also contained a relevant metaphor. Thus, vaccinated participants who read the statement that, for example, 'vaccination could extinguish the flames of a new flash of coronavirus' could indeed feel a decrease in fear and anxiety, as this metaphor helped to

present the principle of vaccine action more easily and to convince them of the correctness of their decision. Overall, we can say that the metaphors used in the Russian media to describe the coronavirus were able to reduce anxiety and fear in the audience, but apparently only in people who had already been vaccinated. Thus, messages containing such metaphors may partially reduce social tension, but are unlikely to encourage people to get vaccinated. Perhaps this pragmatic challenge could be addressed by finding a better way to represent the disease metaphorically in public discourse — for example, by using metaphors that help draw analogies between national diseases and disease in one's own body. 'Body' metaphors of this kind can effectively represent social processes (Landau, 2009), including health care (Lu & Schuldt, 2018).

An interesting finding of our study is that almost all dependent variables (relating to both the rational and affective levels) are positively correlated with the level of trust in information from official authorities. People who trust the authorities are more likely to be willing to receive a vaccination, give higher estimates of the total number of people who fall ill in Russia, consider it a more dangerous social problem, and experience more negative emotions at the thought of the virus. These correlations are stronger in the group of unvaccinated people, but this may be due to the fact that this group is quantitatively much larger than the group of vaccinated people. The presence of such a correlation can be explained by the fact that the vaccine available in Russia is perceived as a drug directly affiliated with the authorities, and therefore the perception of its effectiveness and safety depends on the willingness to trust the actions of the authorities in general. At the same time, distrust of official information about the coronavirus may prompt people to underestimate the real threat of this disease, which is expressed in a lower level of negative emotions at the thought of the virus. Either way, we have shown that the level of trust in the authorities is a significant factor influencing the perception of coronavirus reports and the willingness to be vaccinated. Unfortunately, because there was a large bias toward distrust of authority in the sample, this made statistical analysis of the interaction between the experimental condition and the level of trust in authority difficult. We limited ourselves to correlation analysis, but in the future we hope to find out how the level of trust in authority directly affects the interpretation of metaphors in such messages.

At the end, let us point out some limiting factors of our study. We did not control for trust in the stimulus material; that is, there may have been respondents in the sample who did not believe that they were reading an excerpt from a real journalistic publication. Some authors recommend paying attention to this in

experimental studies of framing (see, e.g., Graf et al., 2019), and future studies should probably try to account for this factor as well. Another limitation is that the study was conducted in an online format. Because of the 'digital divide' observed in Russia (Gladkova et al., 2020), not all groups of citizens have equal access to the Internet, which may lead to the underrepresentation of certain social groups on crowdsourcing platforms. However, since we did not set out to obtain a sample that is representative in the strict sociological sense, the influence of this factor should not be considered determinative.

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