When the Minister speaks: Framings of the vaccination hesitant and impact on the propensity to vaccinate girls for HPV

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Abstract
Vaccination hesitancy is a complex phenomenon influenced by numerous factors, including the communicative messages to which individuals are exposed. Policy-makers, through public communication, might contribute to shape this behaviour. In the study we report the results of an experiment in which respondents were randomly exposed to three different messages about the vaccination against the human papilloma virus (HPV) of girls. The messages were derived from the public statements (2015–2017) of the Italian Minister of Health and contained different frames of the vaccination hesitant (misinformed, antiscientific, or socially dangerous) and correspondingly policy solutions to counteract vaccination hesitancy (information campaigns, compulsory vaccination or compulsory vaccination and sanctions). Results show how framing the vaccination hesitant as antiscientific or socially dangerous, that in turn supports coercive and sanctioning policies, tends to discourage vaccination. These findings alert us to the importance of designing with great care the communication about vaccinations and avoid counterproductive effects.

Introduction
Acceptance of vaccination is a behaviour resulting from a complex decision-making process influenced by a wide range of factors (Smith, 2017). While in the past immunization was deemed a fundamental prevention measure by most (Streeand, 2001) in the last two decades public distrust in vaccinations has spurred heated debates about the safety of vaccines (Streeand, 2001; Lane et al, 2018) and the legitimacy of compulsory immunization programs (Larson et al, 2016). This has been accompanied by a drop in vaccination coverage in several countries and the resurgence of some preventable infectious diseases such as measles and mumps (Omer et al, 2009).

Recently, much attention has been dedicated to the analysis and understanding of the issue of vaccination (or vaccine) hesitancy (Larson et al, 2014; MacDonald et al, 2015). In particular, the Covid-19 pandemic and the development of vaccines against the disease have put the topic back at the forefront of the international debate (Dror et al, 2020). Vaccination hesitancy “refers to delay in acceptance or refusal of vaccines despite availability of vaccination services” (MacDonald et al, 2015). The phenomenon of vaccination hesitancy has been shown to be influenced by a variety of contextual, social and individual factors (Larson et al, 2014), with lack of or low trust in the medical profession as one of the most relevant determinants with respect to children immunization (Benin et al, 2006; Yaqub et al, 2014).

Attempts to counteract the phenomenon of vaccination hesitancy and stimulate immunization have been various across countries. Some national governments have intervened by making vaccination mandatory, imposing financial fines on non-compliant parents and making school attendance conditional on immunization (Haverkate et al, 2012). Others have adopted softer measures, through either national information campaigns or reminder programs with the aim of persuading parents to vaccinate their children (Jarrett et al, 2015).
While we have some knowledge about the impact on the propensity to vaccinate of messages delivered through the media, social media and internet websites (e.g., Kata, 2012; Glanz et al, 2017; Jacobson Vann et al, 2018) little is known about how the communication by relevant policy-makers might influence the propensity to vaccinate. This despite the fact that the framings created by relevant politicians around issues of public health, such as alcohol consumption, obesity, HIV, just to name a few, are known to shape public opinion about the same issues (Chong and Druckman, 2007; Druckman, 2001). In this work, through an experiment, we assess the impact that a relevant policy-maker’ framings of the “vaccination hesitant” and of the policies to counteract such hesitancy have on the propensity to vaccinate. We consider the case of vaccination for the human papilloma virus (HPV) to prevent cervical cancer in girls, a case that has raised heated debates in several countries (Colgrove et al, 2010). In the following section, we illustrate what the literature tells us about the impact of communication on the propensity to vaccinate and vaccination hesitancy. We then summarize the recent debate on vaccination policies in Italy, the empirical context of our study, debate that has inspired this study.

**Vaccination hesitancy and communication**

Among the interventions to counteract vaccination hesitancy those based on communication have shown to have the most impact (Goldstein et al, 2015; Jarrett et al, 2015), suggesting that the discourse to which individuals are exposed might be particularly influential in shaping their views on vaccines and vaccinations. Some evidence, for instance, has accumulated on the capacity of face-to-face communication with parents to increase vaccination uptake (Kaufman et al, 2018). A recent systematic review shows that the most effective strategies were multi-component, used variety of media and were personalised and tailored (Olson et al, 2020). Less strong is, instead, the evidence of the efficacy of interventions aimed at entire communities, with differences that depend on the vaccination under consideration, the context and the target group (Saeterdal et al, 2014).

Overall, the literature suggests that vaccination hesitancy might be particularly sensitive to communicative messages with a thin boundary between an effective and a non-effective, or even counterproductive, message. For instance, a study considering messages to encourage measles-mumps-rubella (MMR) vaccination showed that communicating to parents the potential benefits for society of vaccinating their children (i.e., the “herd immunity” argument) did not have any impact on their propensity to vaccinate (Hendrix et al, 2014). In a randomized trial, Nyhan and colleagues (2014) found that pro-vaccination messages had no effect on vaccination hesitant parents who, instead, appeared even reinforced in their “misperceptions” of vaccinations and of their risks (Nyhan and Reifler, 2010).

Political leaders and policy-makers are important contributors to debates about public health issues, besides having the authority to propose and pass laws about those issues. They not only discursively frame the issues under discussion, but, based on their connotation of the problems, also suggest the most suitable policy solutions (Chong and Druckman, 2007). Yet, we know little of how the communication by relevant policy-makers affects the propensity to vaccinate and vaccination hesitancy. Recently, a couple of studies that examine the messages about vaccinations of Donald Trump and some
Australian leading politicians (Zhang et al, 2019; Hornsey et al, 2020) point to the great influence (mainly anti-vaccination) that policy makers’ communication might have especially on parents with doubts and concerns about vaccinations. In the present study, we will examine the impact on the propensity to vaccinate against HPV of different framings (Chong and Druckman, 2007) drafted based on the public statements of the Italian Minister of Health Lorenzin, the policy-maker at the centre of the recent debate on vaccinations in Italy.

The Italian debate on vaccinations

In Italy, similarly to other countries, the history of compulsory vaccination has been marked by controversies (Signorelli, 2019). While in the 1970s and 1980s the population accepted without much opposition compulsory vaccination for a number of relevant diseases such as smallpox, diphtheria, polio, tetanus and hepatitis B, starting from the 1990s signs of intolerance for the obligation to be vaccinated to attend school started to emerge. The refusal of unvaccinated children from schools and their coercive vaccination with the involvement of police forces ignited the mobilization of part of Italian society and the first parents’ associations started to organize.

In 1999, after a long political and judicial controversy, the possibility to vaccinate coercively children was abolished and, soon, the policy of school attendance conditional on vaccination was relaxed (Signorelli, 2019). This policy change, though, did not affect vaccination coverages and even when in 2007 one of the Italian regions opted for making all vaccinations voluntary in its territory, coverages remained high, indicating that the population had internalized the principles of mass immunization (Signorelli, 2019).

Yet, it is during these years that the publication of the Wakefield paper on the relationship between vaccination and autism, a corruption scandal related to vaccinations, and some suspicious deaths after flu vaccination undermined the public trust in vaccines (Signorelli, 2019).

In 2015, the debate about vaccinations re-emerged in the public arena when the data about vaccination coverage in Italy showed that the target of 95 per cent was not reached for any of the four compulsory vaccinations (diphtheria, polio, tetanus and hepatitis B; Bonanni et al, 2015). The then Minister of Health Lorenzin took immediately the issue on board and worked with the scientific community to elaborate a new national vaccination plan that suggested the possibility to increase the number of compulsory vaccinations (Signorelli et al, 2017). In 2017, with the occurrence of some measles outbreaks, the Minister started advocating for the reintroduction of a strict vaccination mandate for a large set of vaccinations, well beyond the four already mandated in the country. In this period some medical doctors, who showed to be critical of vaccines, were also banned from the profession. Overall, this led to the progressive mobilization of parents and parents’ associations who took the streets in different parts of the country, asking for freedom of choice on vaccinations. Soon also opposition and majority parties alike started discussing fiercely their positions with respect to a compulsory vaccination policy and the debate scaled up to the political arena.

The debate culminated with the Minister of Health's proposal of a rather harsh decree. The decree not only proposed to increase the number of compulsory vaccinations from four to 12 but also to introduce a
series of sanctions on non-compliant parents: the ban of their children from school, a pecuniary fine of 7,500 euro and the possibility of losing parenting rights (if persevering in not vaccinating their children). The decree was heavily criticized for its strong coercive and sanctioning nature and spurred a debate about its constitutional legitimacy in the national political arena, across governmental tiers and within civil society. The social and political climate in the country became tense and the Minister claimed receiving life threats by no-vax groups. The Minister defended firmly her position over the entire time of the parliamentary discussion of the decree. Finally, the Parliament transformed the decree into law - that is commonly called “Lorenzin decree” - but reduced the compulsory vaccinations to ten, and softened the sanctions by decreasing the pecuniary fine and removing the parenting rights option.

Materials And Methods

Preparatory phase to experiment

The first step of data collection implied reconstructing the public discourse about vaccinations in Italy. We retrieved all official statements released to ANSA, the most important news agency in Italy, about the issue. Several times a day the ANSA agency reports statements verbatim and the great majority of TV and radio broadcasters and newspapers in the country then employs these statements for their communication. The corpus was assembled by retrieving all ANSA statements between January 1st 2015 and January 21st 2019, using the word “vaccini” (vaccines in Italian). The corpus comprised of 3,225 statements for a total of more than half a million words. We retrieved 170 statements by the Minister of Health Lorenzin, the highest number of statements for a single actor, confirming the central role played by this policy-maker in the debate.

To analyse the statements by the Minister of Health, we employed the linguistic software Sketchengine and examined combination of words that could be considered “key” to the study corpus with respect to a reference corpus in the Italian language (i.e., key multi-words). More details about the software and the calculation of keyness can be found at https://www.sketchengine.eu/. We inductively grouped the retrieved key multi-words based on their linguistic similarity (i.e., synonyms; e.g., compulsory vaccination and obligation to vaccinate) or convergence on a similar conceptual category (e.g., multi-words all related to the act of non-vaccinating or to parents who refused vaccination). In particular, we identified in the Minister’s statements three issue framings (Chong and Druckman, 2007) that paired a characterization of the problem (i.e., vaccination hesitancy) to the appropriate policy measures to counteract the problem. Based on these framings, we generated the messages to be administered in the experiment.

Experiment: design

Despite the fact that the Minister had talked indistinctly about many different vaccines, we structured the experiment around the HPV vaccination. The reason for this choice was two-fold. First, to guarantee respondents’ candour, the experiment needed to address a vaccination for which choice of vaccinating was still possible in 2019 and for which not vaccinating was a lawful behaviour. Given that the 2017 decree declared the HPV vaccine highly recommended but not compulsory, and made it available for free
to 12-year old girls, this specific vaccine appeared well suited for the experiment. Second, vaccination hesitancy about HPV vaccine is quite high in Italy (Fondazione GIMBE, 2018) so understanding which type of communication by policy-makers might be influential to counteract such hesitancy could be especially useful in this respect.

The experiment was organized in one control and two treatment groups. The control and treatment questionnaires were structured in the same way (see Appendix 1 for the text of the three questionnaires) with the only difference of core messages. After the core messages, respondents were asked about their intention to get their underage daughter(s) vaccinated against HPV. Besides those close-ended questions, respondents were asked also to provide justifications for their answers to get deeper insights. Finally, the respondent was asked some demographic information (i.e. age, level of education, job, status of parent of underage daughter), some of which have been shown to be correlated with vaccination hesitancy (Larson et al, 2014). The three versions of the questionnaire were randomly allocated to those who accepted to participate in the study. The interviewer was blind to the version of the administered questionnaire.

For what concerns the differential core messages, we employed as: a) control: the “misinformed” framing of the vaccination hesitant plus the “better information” policy solution; b) treatment 1: the “antiscientific” framing of the vaccination hesitant plus the “compulsory vaccination” policy solution; c) treatment 2: the “socially dangerous” framing of the vaccination hesitant plus the “compulsory vaccination and sanctions” policy solution.

**Experiment: respondents**

The study was conducted in a public maternal health facility in the province of Salerno in the Campania region with a target sample size of 150 respondents. The setting was selected as Campania displays below average vaccination rates for HPV (Ministero della Salute, 2018). The sample consisted of women attending the public health facility for ambulatory visits. The access to the facility was granted by the head of the facility, after approval that the text of the questionnaire did not contain sensitive or potentially distressing questions. In addition, all respondents were explained both verbally and in written form that participation in the study was voluntary, that the study had only research purposes and that answers were anonymous.

**Analysis**

The analysis was conducted comparing groups for their willingness to vaccinate girls according to a Likert scale from 1 (minimum) to 6 (maximum). The Likert scale was converted into a binomial variable, hereafter pro-vaccination and vaccination hesitant, respectively. Pro-vaccination attitudes corresponded to answers “absolutely yes”, “yes”, “probably yes” on the Likert scale and indicated a high propensity to vaccinate, while vaccination hesitant corresponded to answers “probably not”, “absolutely not”, “I don’t know” on the Likert scale, and indicated different positions of vaccination hesitancy, from full rejection to doubt, as contemplated in the definition of vaccination hesitancy proposed by MacDonald and colleagues (2015).
The data were analysed through the packaged software R, and the analysis proceeded as follows: i) randomization check; ii) significance tests and iii) multiple logistic regression. To check for randomization we ran chi-squared tests for the collected set of demographic variables to detect whether differences among control and treatments groups were significant. Then, significance tests assessed whether the impact of each treatment (vs. control) on the propensity to vaccinate was statistically significant or dictated by chance. Significance tests were conducted using both the 6-point Likert scale (i.e., continuous variable) and its conversion into the binomial variable, i.e. pro-vaccination vs vaccination hesitant. Finally, multiple logistic regression tested whether being subjected to different message framings (i.e., treatments) could explain the propensity to vaccinate of respondents.

Open answers were, instead, analysed inductively to extract the main explanations for pro or vaccination hesitant attitudes and aggregated based on their similarity.

Results

Framings by the Minister of Health of the vaccination hesitant and possible counteractive measures

From the analysis of the Minister Lorenzin’s public statements three main framings of the problem of vaccination hesitant parents emerged: 1) the vaccination hesitant as misinformed, holding irrational beliefs and victim of misinformation campaigns and false myths; 2) the vaccination hesitant as antiscientific, belonging to a subculture with positions against science and scientific progress, and suffering from scientific illiteracy; 3) the vaccination hesitant as socially dangerous, proactive in spreading fake news, persevering in selfish and improvident behaviours, and contributing to fuel dangerous no-vax movements (Table 1).

The three framings could be arranged in a continuum with an increasing degree of moral judgment of the vaccination hesitant by the Minister. These framings, in fact, appeared in temporal sequence, starting from 2015 to the months just before the decree proposal while the controversy about compulsory vaccination ignited and the social mobilization of parents and parents’ associations intensified. It is not surprising, therefore, that the three framings were paired with three different policy solutions starting with information campaigns to counteract the “misinformed”, through compulsory vaccination to oblige the “antiscientific” minded, to compulsory vaccination and sanctioning to restrain the “socially dangerous”.
Table 1  
Key multi-words in the Italian Minister of Health’s public statements (2015–2017)

<table>
<thead>
<tr>
<th>Framing 1 “Misinformed”</th>
<th>Framing 2 “Antiscientific”</th>
<th>Framing 3 “Socially dangerous”</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-vaccinating parents</td>
<td>• Misinformation campaigns</td>
<td>• [circulating] Fake news</td>
</tr>
<tr>
<td></td>
<td>• [holding] Absurd beliefs</td>
<td>• Great egoism</td>
</tr>
<tr>
<td></td>
<td>• Rumours without scientific support</td>
<td>• Improvident attitude</td>
</tr>
<tr>
<td></td>
<td>• False myths</td>
<td>• Dangerous no-vax movements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sectarian positions</td>
</tr>
<tr>
<td><strong>Solution:</strong></td>
<td>• Information campaigns</td>
<td>• Compulsory vaccination</td>
</tr>
<tr>
<td>Policy intervention</td>
<td>• Correct information</td>
<td>• Sanctions</td>
</tr>
<tr>
<td></td>
<td>• Communication campaigns</td>
<td>• Judicial authorities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Stringent measures</td>
</tr>
</tbody>
</table>

**Impact of framings on propensity to vaccinate and vaccination hesitancy**

Out of the 178 women contacted, 150 accepted to participate to the study. The chi-squared tests, shown in Table 2, indicated how the randomization had succeeded in creating similar control and treatment groups with respect to age, level of education, job status, and status of parent of an underage daughter. This result gave us assurance of the possibility of comparing the different respondent groups for their expressed propensity to vaccinate with no risk of confounding.
Table 2
Descriptive characteristics of control and treatment groups and randomization check (n = 50 for each group)

<table>
<thead>
<tr>
<th>Age</th>
<th>Control framing “Misinformed”</th>
<th>Treatment framing 1 “Anti-scientific”</th>
<th>Treatment framing 2 “Socially dangerous”</th>
<th>X-squared</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–30</td>
<td>6</td>
<td>10</td>
<td>6</td>
<td>3.8089</td>
<td>0.7025</td>
</tr>
<tr>
<td>31–40</td>
<td>22</td>
<td>16</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41–50</td>
<td>10</td>
<td>14</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>over 50</td>
<td>12</td>
<td>10</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Middle school diploma</td>
<td>7</td>
<td>4</td>
<td>1.0094</td>
<td>0.9084</td>
</tr>
<tr>
<td></td>
<td>High school diploma</td>
<td>28</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>University degree</td>
<td>15</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Job</td>
<td>Employed</td>
<td>33</td>
<td>34</td>
<td>1.6162</td>
<td>0.9514</td>
</tr>
<tr>
<td></td>
<td>Self-employed professional</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Housewife</td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unemployed</td>
<td>6</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underage daughter</td>
<td>Yes</td>
<td>25</td>
<td>20</td>
<td>2.9408</td>
<td>0.2298</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>25</td>
<td>30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The differences in the pro and anti-vaccination attitudes between the control and treatments (Table 3) were statistically significant at less than 0.05 per cent. Similar results were obtained using the continuous variable (Table 3a) and the binomial variable (Table 3b). Results showed a steady increase in vaccination hesitancy when comparing the treatment groups to the control. In particular, respondents displayed vaccination hesitancy with an increase of 38 per cent between the treatment framing 1 (i.e., the antiscientific) and the control framing (i.e., the misinformed) and of around 45 per cent between the
treatment framing 2 (i.e., the socially dangerous) and the control. The difference between the two treatments, instead, was not statistically significant, even if with the expected sign.

Table 3
Significance tests: Control versus treatment groups (n = 50 for each group)

<table>
<thead>
<tr>
<th></th>
<th>Vaccination-hesitancy</th>
<th>t-test (unequal variances) or X-squared</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a) Likert scale (1–6)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control vs treatment framing 1</td>
<td>3.56 vs 4.65</td>
<td>3.264</td>
<td>0.0015</td>
</tr>
<tr>
<td>Control vs treatment framing 2</td>
<td>3.34 vs 4.65</td>
<td>3.874</td>
<td>0.0002</td>
</tr>
<tr>
<td>Treatment framing 2 vs treatment framing 1</td>
<td>3.34 vs 3.56</td>
<td>0.581</td>
<td>0.5267</td>
</tr>
<tr>
<td><strong>b) Binomial variable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control vs treatment framing 1</td>
<td>16% vs. 48%</td>
<td>8.00</td>
<td>0.00468</td>
</tr>
<tr>
<td>Control vs treatment framing 2</td>
<td>16% vs. 54%</td>
<td>10.314</td>
<td>0.00132</td>
</tr>
<tr>
<td>Treatment framing 2 vs treatment framing 1</td>
<td>48% vs. 54%</td>
<td>0.17467</td>
<td>0.67444</td>
</tr>
</tbody>
</table>

This finding was confirmed by the multiple logistic regression analysis (Table 4) that evidenced a negative correlation between the treatments and propensity to vaccinate. This means that respondents belonging to the two treatment groups were much more inclined to vaccination hesitancy than those belonging to the control, and that their behaviour could be explained by the fact that they had been exposed to the treatment framings. Moreover, results showed also a negative correlation between the level of education and propensity to vaccinate. In line with the literature (Larson et al, 2014), respondents with lower education exhibited higher vaccination hesitancy than those with a university degree.

Overall, we can conclude that framing the vaccination hesitant as antiscientific or socially dangerous and proposing compulsory vaccination/sanctions as the policy solution to the issue can have a counterproductive effect and encourage vaccination hesitancy.
Motivations for pro- and vaccination hesitant attitudes

As summarized in Table 5, the justifications for pro and vaccination hesitant answers allowed some interesting trends to emerge. For pro-vaccination respondents the most important explanation for the propensity to vaccinate (60 per cent) was that prevention was fundamental for people’s health. To a much lesser extent, pro-vaccination respondents showed to trust the safety of vaccines and the scientific progress associated with them. A part of them also expressed a sense of contraposition to anti-vaccination activists and, more in general, to vaccination hesitant parents to the point of considering fair obliging them to vaccinate their children or sanctioning them if they did not comply.

For vaccination hesitant respondents, instead, explanations were more diverse. Besides roughly 37 per cent of the respondents claiming not to have enough knowledge about vaccines to decide, others indicated that their preference was for not vaccinating, both based on their rational assessment of pros and cons and on the distrust of institutional information sources about vaccines. Finally, a good proportion of respondents appeared to consider not vaccinating as a way to exercise a right to self-determination and to express disagreement with mandatory policies.
### Table 5
Explanations provided by pro- and vaccination hesitant respondents

<table>
<thead>
<tr>
<th>Explanations</th>
<th>Frequency</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pro-vaccination</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Prevention is fundamental                                                    | 60.00%    | • Vaccines are one of the many prevention tools available to the public. They protect us from serious diseases.  
                                          |           | • Prevention is important in a civilized society                                               |
| The vaccine is safe                                                          | 12.73%    | • HPV is the most frequent sexually transmissible infection. The most effective way to prevent HPV is the vaccination, which has a very high safe profile |
| I do not support anti-vaccination movements                                  | 9.09%     | • Those parents that decide not to vaccinate their kids represent a danger for other children, and they foster the spread of fake news |
| I suffered from cervical cancer                                               | 7.27%     | • I suffered from cervical cancer, and I don't want my daughters and those of others to get it too |
| I trust in and support scientific progress                                   | 5.45%     | • Because I want my family and my daughters to live better. And I believe that medical research has made great progress. |
| Non-vaccinating has implications for society and especially for more vulnerable children | 3.64%     | • Because I want my children to live well, as I wish the same for those children who have little immune defences |
| Obliging to vaccinate and sanctioning parents who do not vaccinate is fair    | 1.82%     | • My daughters are already vaccinated, and I think mothers who do not trust science must be educated, or even obliged to vaccinate their daughters  
                                          |           | • Prevention is necessary, and those parents who do not understand its importance, should be punished! I protect my daughter and I hope others do the same |
| **Vaccination hesitant**                                                     |           |                                                                                               |
| Too little information about the vaccine                                      | 36.59%    | • Institutions should be much more transparent about vaccines and their side-effects (treatment 1)  
                                          |           | • There is little information about the vaccine, and consequently the decision to punish people is never the right solution (treatment 2) |
| Self-determination should be respected                                       | 19.51%    | • I think prevention is a personal choice that institutions should not interfere with (treatment 1)  
<pre><code>                                      |           | • I don't want to be forced to do something. I must be free to choose, maybe through the advice of the physician and medical professionals (treatment 2) |
</code></pre>
<table>
<thead>
<tr>
<th>Explanations</th>
<th>Frequency</th>
<th>Examples</th>
</tr>
</thead>
</table>
| I do not trust the scientific community nor some institutions suggesting vaccines | 14.63%    | • I don’t trust medical research. Many studies, indeed, confirmed the risks correlated with vaccinations. What should I do? Who should I trust? (treatment 1)  
  • I did not vaccinate my kids, and parents can have valid reasons to decide not to vaccinate theirs. Fake news exist, but what institutions should be trusted? (treatment 2) |
| The vaccine is not one hundred per cent safe or efficacious                   | 12.20%    | • I don’t believe in the efficacy of vaccinations (treatment 1)  
  • I don’t trust vaccinations! A girl became paraplegic. I don’t want to risk disastrous consequences for a disease that my daughter might never get in her life (treatment 2) |

**Discussion**

The study employs an experiment conducted in Italy and uses the case of HPV vaccination to uncover how framings of the vaccination hesitant as antiscientific or socially dangerous, that in turn support coercive and sanctioning policies, tend to discourage vaccination. The framings used in the experiment have been derived from the public statements of the Italian Minister of Health Lorenzin, the policy-maker at the centre of the recent debate around compulsory vaccinations in Italy.

Two elements of the messages to which respondents were exposed might have induced this effect. On the one hand, the stereotypical characterization of vaccination hesitant parents might have polarized respondents. Stereotypes are known to induce both ideological as well affective polarization on issues and to magnify inter-group conflicts (Allport, 1954). This means that vaccination hesitant respondents might have reacted to the categorization as antiscientific or socially dangerous by becoming even more confident in their scepticism about vaccinations (Nyhan et al., 2014). This is consistent with results that show how vaccination-hesitant individuals exposed to pro-social messages are not more willing to vaccinate against influenza (Isler et al., 2020). At the same time, pro-vaccination respondents might have been stimulated by this categorization to blame and hold accountable vaccination hesitant parents for their choices (Power et al., 1996). The qualitative justifications to their answers provided by respondents support, at least partially, this interpretation of the results.

On the other hand, the proposal of coercive and sanctioning policies contained in the messages might have distanced part of the respondents. The refusal of coercive policies is known to be influenced by numerous factors, including the perception of infringement of freedom and the degree of trust in government (Ejelöv and Nilsson, 2020). As evident from the explanations to the answers provided by the respondents, the language of the messages might have elicited a strong perception of freedom infringement and unfairness. Indeed, the literature documents the state of anger that vaccination hesitant individuals experience once exposed to ideas of compulsory vaccination even for only some vaccinations.
(Betsch and Böhm, 2016). Alternatively, a good percentage of respondents distrusting institutions and government in the first place might have been prompted to express their disagreement with compulsory vaccination policies and sanctions.

The study it is not spared from limitations. First, the outcome is hypothetical in the sense that we observed intentions rather than actual decisions. As stated intentions to vaccinate may differ from actions, this warrants caution in extrapolating results. Nevertheless, overcoming this limitation would be difficult given the unfeasibility of following up respondents to observe their actual behaviours and the potential confounding effect of exposure to additional messages after the treatments. Second, the messages used in the experiment were inspired by the analysis of the Minister’s statements but they did not reproduce her statements verbatim. This choice, in our view, does not detract from the validity of the experiment whose aim was not to evaluate the effectiveness of the communication of one policy maker nor to assess how her public statements impacted the propensity to vaccinate at the time they were pronounced. Instead, we aimed at understanding the effect of certain political communication strategies on the propensity to vaccinate. Numerous studies show how the communication strategy utilized by the Italian Ministry of Health is rather common in the political world for a variety of issues, such as immigration, obesity, drug addiction (e.g., Kübler, 2001; Barry et al, 2009; Merolla et al, 2013) for which coercive policies are on the table for discussion. Third, like with any experimental design, we could isolate the effect on vaccination hesitancy of only one framing at a time. The literature examining how the debate around vaccinations unfolds on social media (e.g, Schmidt et al, 2018; Gargiulo et al, 2020) has documented well, instead, the variety of framings present at the same time in the debate and their complex relationships. For instance, Schmidt and colleagues (2018) showed how the layering of contrasting framings in social media was able to generate further polarization of anti-vaccination positions (Schmidt et al, 2018). Further research needs, therefore, to be conducted to mimic the complex reality of the debate around vaccinations.

Conclusions

The study shows that acceptance of vaccination might be particularly sensitive to the discursive messages to which parents are exposed when thinking about vaccinating their children. In particular, it contributes to understand better the effect of communication conveyed by politicians and how parents react to negative connotations of non-vaccination behaviours. It alerts policy-makers, especially those with authority over public health issues, to consider carefully what communication strategies they employ when addressing the population about vaccinations, even amidst a fierce controversy. Our work suggests that while some communication strategies centred on categorizing the vaccination hesitant might be conducive to gain support for compulsory vaccination policies, at the same time, they might generate counterproductive effects and distance part of the population. In particular, the study hints to the fact that this kind of public communication might make salient deeper beliefs about the legitimacy of a moral judgment of deviant behaviours and of compulsory measures, and elicit absolute values such as freedom and right to self-determination.
Declarations

Ethics Approval and Informed Consent

All methods were carried out in accordance with relevant guidelines and regulations in the Helsinki Declaration. Ethical approval was provided by the Department where the survey was conducted and informed consent obtained by each participant.

Consent for publication

Not Applicable. The questionnaire was anonymous.

Availability of data and material

The dataset is available upon request to the corresponding author.

Competing interests

None

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Author’s contribution

All authors conceptualized the study; DP collected the data; DP and GF performed the statistical analysis; all authors contributed to the interpretation of results; AC wrote the first draft of the manuscript; all authors revised the draft and agreed with its content.

None

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