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The Social Construction of Vaccination Hesitancy and Confidence

Summary

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Bucharest
2024

The vaccine against COVID-19 was the fastest human immunization serum ever approved. A traditional vaccine takes about 10 years or more to be developed, but scientists discovered multiple COVID-19 vaccines in less than a year. By doing this, they achieved one of the most remarkable scientific results in recent history. However, what was praised by some as a scientific triumph was - for others - reason for doubt and social unrest. In some states, mandatory vaccination laws caused massive protests and political tension.

However, vaccination hesitancy is not a new issue. In 2019, the World Health Organization declared it one of the ten most significant global health threats. One of the culprits indicated by the health authorities was the growing anti-vaccination movement. The last years have seen a decrease in vaccination coverage for many diseases, the most recent before COVID-19 being the measles outbreak that led to the death of tens of thousands of children worldwide.

Before SARS-CoV-2, weighing the perceived risks and benefits of immunization was a concern mostly for parents who were to decide whether to comply with their children's immunization schedule. The global coronavirus pandemic has expanded the discussion beyond children to the general population, thus diversifying vaccine-hesitant arguments.

The critical approach toward COVID-19 science and the rapid distribution of divergent information in the public sphere have made it challenging for doctors and for authorities to convince people to vaccinate.

Science, healthcare, and modern institutions have been put on trial as individuals of all ages and cultures around the globe have been on a quest to assess the novel vaccines' risks and benefits and seek certainty in the uncertain pandemic world.

In this thesis, I aim to describe processes through which various actors contribute to the social construction of vaccination hesitancy and confidence. To this

purpose, I will explore the discourse production of perceived vaccination risk and its mitigation from various angles and with multiple methods.

Vaccines are highly sophisticated, complex, scientifically informed, industrially produced, and clinically tested. The probability of adverse effects after their approval is very low. When a serious health event occurs after a person is vaccinated, health authorities and pharmaceutical companies investigate the incident in large studies and use statistical methodology to determine the causality between the event and the vaccine. All these studies require time and resources. They take into account similar events, the time from vaccination to the health event, the person's medical background, etc.

In reverse, in mass media and popular discourse, various social actors often interpret serious rare health events that follow vaccination as certain side effects of the vaccine, regardless of the time interval (it can be hours, days, weeks, or maybe months), disregarding other factors that may have led to the situation.

Due to the complexity of the product and the process of establishing causality regarding vaccine side effects, there is an increasing gap between public attribution of side effects and mainstream scientific attribution of side effects.

This gap and the diverging attributions are important for sociologists to study, as they are an arena in which the discoursive legitimation of anti-vax or vaccine-hesitant choices is made. This is why my thesis also includes a qualitative study of the divergent processes of the social construction of vaccination risks in the case of serious health events following vaccination.

My doctoral research question is: How are vaccine confidence and vaccine hesitancy socially constructed through discourse?

In order to clarify this overarching concern, I will address several **specific questions**:

1) What is the timeline of vaccine hesitancy in Romania and what are its specific temporal milestones, as reflected in mass media and social media?

2) What are some of the types of vaccine confidence and vaccine hesitancy that we can encounter in Romanian public opinion as regards the COVID-19 vaccine, based on people's perception of their usefulness and their risks?
3) How are vaccine risks constructed discoursively in the case of serious adverse health effects following vaccination? What is the role of quantification in the social construction of vaccination hesitancy?
4) What are the main types of vaccine confidence and vaccine hesitancy that we encounter at the European level during the COVID-19 pandemic, and how is vaccine hesitancy changing in relation to pre-pandemic times?
5) How is vaccine hesitancy operationalized and measured through dedicated scales for the measurement of vaccine confidence and hesitance, globally and in EU-funded research?

Each specific research question was approached in a dedicated study. The methodology employed to address these questions relies on a combination of exploratory qualitative and quantitative approaches.

The conceptual framework emphasizes the social construction of knowledge and science, the management of risk and uncertainty, the function of quantification in understanding vaccination hazards, and the historical evolution of medical knowledge. These concepts offer a methodical approach to examine the vaccine-trusting and vaccine-hesitating debates that surfaced during the COVID-19 epidemic.

This thesis is based on the **theoretical viewpoint** of the **social construction of knowledge**, which holds that rather than being just objective truths, reality and knowledge are co-created by social interactions. Informed by the work of Berger and Luckmann (1966), this viewpoint emphasizes how society influences, and shared experiences shape scientific knowledge. From Enlightenment ideas, which aimed at objective truth, to 20th-century constructivist views that acknowledge the impact of

social prejudices connected to class, ideology, and power on scientific knowledge, the idea of science has changed over time.

The thesis also looks at how modern society view and control **risk**, contrasting this with conventional wisdom in which danger was considered as unavoidable aspect of life. Risk today is closely related to ideas of control and is controlled by ever more complicated and centralized organizations like government departments and the media. This debate depends much on the writings of sociologists such as Beck (1992) and Giddens (1999), who show how these institutions view and control modern risk, so influencing public knowledge and reactions. Beck's idea of the "risk society" shows how contemporary technological developments have changed our attitude to risk and resulted in reliance on centralized institutions for risk management. Giddens further separates between modern, manufactured risks—products of scientific and technical progress—and traditional hazards, thought of as part of fate.

In modern vaccination-hesitant debate, **quantification**, as conceptualized by Espeland and Stevens (2008), turns out to be an indispensable instrument. Numbers and statistics are not only abstract facts but also greatly influence how risks—especially those related to vaccination—are seen and discussed. Though sometimes using the same data, vaccine-hesitant people often use quantification to create narratives that clearly differ from those of those of vaccine supporters. This difference in perspective emphasizes how quantification might produce a symmetrical but opposing body of knowledge between various groups.

Furthermore, as Fleck (1936) and Kuhn (1962) argue, science is shaped by cultural and social elements rather than a straight search of objective truth. Fleck's idea of "thought collectives" and Kuhn's theory of scientific revolutions underline the **context-dependent character of scientific knowledge** and imply that paradigm changes take place when current models fail to solve fresh anomalies.

Another emphasis of this framework is on the part social systems play in forming scientific knowledge. Merton's **sociology of science** (1973) holds that rather

than the brilliance of individual scientists, society needs and pressures drive scientific development. This point of view emphasizes the impact of social and cultural elements in scientific discovery, so subverting the conventional wisdom of science as an essentially objective activity.

The thesis aims to follow a "strong program" in the sociology of scientific knowledge, as supported by Bloor (1976), who advocates **a symmetric approach** to analyzing all knowledge claims, treating successful and failed claims with equal scrutiny. This method challenges the idea of science as an intrinsically objective field by underlining how strongly ingrained in social and cultural settings scientific knowledge is.

Using the **cognitive sociology** viewpoint, especially the work of Zerubavel (1996), helps one understand how societies classify and view hazards. This method proposes that people jointly define what is regarded as safe or dangerous by means of cognitive processes of socialization, so building their impressions of safety and risk.

The thesis also investigates the **social amplification of risk** (Kasperson et al., 1988), a theory explaining how different social actors transmit and understand risks, so either amplifying or reducing the perceived dangers. This dynamic process emphasizes how intricately technical risk assessments interact with public opinions molded by social, cultural, and cognitive elements.

Therefore, my research focuses on understanding how vaccination risk is being manufactured in the COVID-19 pandemic world and, consequently, what discursive processes lead to the social construction of vaccination confidence and hesitancy. Starting from the sociological conceptualization of the social construction of safety and danger (Simpson, 1996, Zerubavel, 1991), quantification (Espeland & Stevens, 2008), and the social amplification of the risk framework (Kasperson et al., 1988), I tried to answer a series of specific research questions, in an **exploratory** approach. I used relevant and adequate methods for each question, as presented below. The overall **methodology of the thesis** is based on a **mixed methods approach**,

starting with qualitative investigations that identified major types and processes in the social construction of vaccination hesitancy and confidence and continuing with a secondary analysis of the Eurobarometer survey data regarding public opinion and experiences concerning vaccination. I have also analyzed all scales dedicated to the measurement of vaccine hesitancy and confidence that I found in the English-language literature.

I have used several types of **sampling** for the selection of my respondents and for the selection of analyzed documents (Etikan, Musa, and Alkassim, 2016). The content analysis studies have mostly relied on purposeful sampling of documents, identifying those accounts, reports, and articles that best fulfilled the needs of the research question and covered a large diversity of viewpoints. As the focus of my qualitative research has been to capture the divergent construction of vaccination risks and the different uses of quantification in vaccine-confident and vaccine-hesitant accounts, I aimed to maximize the spectrum of the arguments found in various published accounts, in order to capture a wide variety of interpretations and forms of evidence.

Given the investigation's exploratory nature, the interview-based study respondents were selected in a convenience sample. I aimed to compensate for the limitations of this sample with the secondary analysis of Eurobarometer 494/2021 data, which consists of answers from a statistically representative sample for EU-27 countries.

Table 1. Overview of research methods employed in the doctoral research

Specific research question	**Research approach and methods**
1) What is the timeline of vaccine hesitancy in Romania and what are its specific temporal milestones, as reflected in mass media and social media?	**Qualitative** **Purposeful sampling of documents** **Geographical focus:** Romania Comprehensive review of mass media and social media coverage of vaccination-hesitancy in Romania, in relation to previous studies on this topic

2) What are some of the types of vaccine confidence and vaccine hesitancy that we can encounter in Romanian public opinion as regards the COVID-19 vaccine, based on people's perception of their usefulness and their risks?	**Qualitative** **Convenience sampling of respondents** **Geographical focus:** Romania Participant observation in Romanian infectious disease hospitals during the COVID-19 pandemic, in my role as medical doctor Thematic analysis of interviews with people selected through convenience sampling
3) How are vaccine-risks constructed discoursively in the case of serious adverse health effects following vaccination? What is the role of quantification in the social construction of vaccination hesitancy?	**Qualitative** **Purposeful sampling of documents** **Geographical focus:** Europe, USA Thematic analysis of accounts of adverse health effects following vaccination, including: a) a set of articles in various mass media and social media platforms covering the death of Dr. Gregory Michael following his Pfizer COVID-19 vaccination; b) the news reports, in general and medical publications, identifying the countries that stopped using the Astra Zeneca vaccine because of adverse health effects
4) What are the main types of vaccine confidence and vaccine hesitancy that we encounter at European level, during the COVID-19 pandemic, and how is vaccine hesitancy changing in relation to pre-pandemic times?	**Quantitative** **Representative sample at EU27 level** **Geographical focus:** Europe Secondary analysis of Eurobarometer data: - EB 91.2: European Commission, 2019. Eurobarometer 91.2 [WWW Document]. Kantar Public, GESIS Data Arch. Col. URL https://europa.eu/eurobarometer/surveys/detail/2223 - EB494: European Commission. Standard Eurobarometer 94 - Winter 2020-2021 https://europa.eu/eurobarometer/surveys/detail/2355
5) How is vaccine hesitancy operationalized and measured through dedicated scales for the measurement of vaccine confidence and hesitance, globally and in EU-funded research?	**Qualitative** **Purposeful sample of documents** **Geographical focus:** Europe, USA - Analysis of measurement scales included in European surveys: The Vaccine Confidence Project (VCP) items, 2018 and 2020; The Eurobarometer EB 91.2/2019 items, and the Flash Eurobarometer EB 494/2021 items - Analysis of 11 measurement scales, detailed in Appendix 3

Source: Author's synthesis

During certain periods between 2021 and 2022, I used direct and participant observation in several hospital settings (local vaccination unit, COVID-19 treating department, medical ward where rheumatological patients were treated) and in-person

and telephonic semi-structured interviews with vaccine-trusting and vaccine-hesitant individuals.

I have assembled an available sample for an interview, recruiting friends, acquaintances, and other people, through a snowball method, who were willing to answer my questions about COVID-19 vaccines, as seen in Table 2. The COVID-19 interviews were also compared to before-pandemic interviews regarding general attitudes about vaccination. To have a broader representation of vaccine-hesitant discourses, I also completed the interviews with a field trip to a village that had the lowest coverage for COVID-19 vaccination in the country. The visit, part of a case study, was done in collaboration with my PhD colleague Simona Vulpe in 2021. We observed village life, and we conducted short, unstructured interviews with the members of the community.

Table 2. List of respondents for the semi-structured interviews

Pandemic interviews
1. A.C. woman, 43 years old, Bucharest, secondary education, beautician
2. F.T. man, 65 years old, Bucharest, higher education, former patient, father of a friend
3. C.D. man, 33 years old, Bucharest, higher education, fitness trainer, friend of a girlfriend
4. F.C., woman, 46 years old, Olt, secondary education, factory worker, aunt of a friend
5. N.T., woman, 48 years old, Deveselu, secondary education, mother of a friend
6. I.M., woman, 32 years old, Bucharest, higher education, dentist, former colleague
7. S.T., man, 32 years old, Bucharest, secondary education, friend
8. G.C., man, 32 years old, Călărași, higher education, friend
Pre-pandemic interviews
1. D.A., woman, 36 years old, Bucharest, higher education, fashion stylist
2. O.F., woman, 39 years old, Bucharest, university degree, architect - graphic designer
3. M.F., woman, 33 years old, Bucharest, higher education, pharmaceutical field
4. E.A. woman, 37 years old, Bucharest, higher education, individual coach
5. I.M., woman, 37 years old, higher education, alternative media
6. I.U., woman, 33 years old, former UNATC academic, painter
7. S.B., woman, 35 years old, higher education, social worker
8. M.B., woman, 39 years old, higher education, works in communication

Source: Author's synthesis

I also performed a thematic and content analysis of news reports and social media posts focused on a specific adverse effect reaction, exploring the infrastructures

of knowledge used in the vaccine-hesitant and vaccine-trustworthy discourses while also studying how quantification and commensuration of health dangers are used in manufacturing COVID-19 vaccination risks.

To complete my doctoral research with a representative sample study, I used Eurobarometer survey data to construct a typology of vaccination attitudes and explore vaccine confidence and hesitancy changes from previous years to the COVID-19 pandemic. During this research, I noticed considerable variability in how vaccine confidence and hesitancy are operationalized and measured in different studies. Therefore, I completed the thesis by analyzing a collection of English language scales used in the international scientific literature, constructing an inventory of items for each dimension of the construct, and identifying missing areas in the European survey-based monitoring of vaccine hesitancy.

I will further synthesize the answers to the specific research questions formulated to approach the topic of the social construction of vaccination hesitancy and confidence.

1) **What is the timeline of vaccine hesitancy in Romania and what are its specific temporal milestones, as reflected in mass media and social media?**

My research highlights the importance of several milestones in the emergence of vaccine-hesitant discourses in Romania. One of the first major events was the failed public campaign of HPV vaccination in 2008. The amplification of vaccine-hesitant and antivax voices at that time also resonates with global milestones, specifically the publication of Wakefield's study in 1998 that had powerful consequences in the growth of vaccine hesitancy in the next decade, and even later, even after being retracted, in 2010. At the national level, a structural factor was the introduction of the shared responsibility of the medical act between doctors and parents and the models of informed consent, which made parents more cautious and eager to avoid mistakes in relation to the paternalistic model prevalent in the Communist regime. The measles

outbreak in 2016 was brought again to the forefront of the public discourse, as authorities tried to blame the antivax movement for the public authorities' failures to vaccinate hard-to-reach children and for shortages of vaccination. In 2017, the debate on a proposed compulsory vaccination law intensified the controversy and its public relevance, leading to a better organization of vaccine-hesitant actors through advertising campaigns.

COVID-19 and the creation of the anti-SARS-CoV-2 vaccines only further diversified and expanded the Romanian vaccine-hesitant discourses and arguments.

2) **What are some of the types of vaccine confidence and vaccine hesitancy that we can encounter in Romanian public opinion as regards the COVID-19 vaccine, based on people's perception of their usefulness and their risks?**

Based on my participant observation and exploratory, semi-structured interviews conducted with a convenience sample, I have created an initial typology of respondents to capture diverse and ambivalent combinations of trust in the power and necessity of vaccines versus trust in their safety (or lack thereof). This classification offered an initial orientation in the complicated terrain of vaccine acceptance and hesitancy, using two axes – the perceived severity of COVID-19 disease and the perceived risks of the vaccines.

Respondents in the "Trusting" group observed no appreciable risk connected to the immunization but rather a considerable risk from COVID-19. Their willingness to get vaccinated and to promote vaccination was probably a result of their high faith in medical knowledge and public health guidelines.

Individuals who maintained serious worries about the vaccination and believed they were at high risk from the illness were included in the "Hesitant" group. They were faced with a conundrum by this double load of anxiety as they understood

they needed to be protected from the virus but were also concerned about possible adverse effects.

The “Denialist” group saw no appreciable risk from the vaccine or COVID-19. Their dismissive response to the illness and the vaccination suggested a broad downplay of the pandemic's severity, which may have resulted from false information, mistrust of scientific evidence, and/or a preference for natural immunity over medical intervention.

Finally, the “Skeptic” group was quite concerned about the vaccination even though they saw no real risk from the illness. This group's mistrust of the vaccine's development process or its components, rather than of the medical system as a whole, was not matched by fear of the disease itself.

3) **How are vaccine-risks constructed discursively in the case of serious adverse health effects following vaccination? What is the role of quantification in the social construction of vaccination hesitancy?**

Through my case study on how the death of Dr. Gregory Michael was reported and interpreted in relation to the serious adverse effects of vaccines, I documented the diverging sense-making efforts of the vaccine-confident and the vaccine-hesitant actors and media. This analysis also highlighted the important role of quantification for both sides of the debate. Although they use the same data sources—the Vaccine Adverse Event Reporting System (VAERS) in the United States—vaccine-confident and vaccine-hesitant or antivax groups count, evaluate, and present data about the grave hazards associated with vaccinations in somewhat different ways. This divergence of approach is based on the underlying ideologies of public health, risk, and authority trust as much as the data itself.

Regarding interpretation and use of the data, both discourses and actors have access to VAERS, a US public platform created to gather data on side effects from immunization. The two view the same facts rather differently, though. Actors with a

mainstream vaccination confidence, such those in scholarly publications or mainstream media outlets like the New York Times, use this information in a larger epidemiological setting. They see the negative occurrences recorded in VAERS as a component of a bigger dataset that has to be scientifically, quantitatively examined to ascertain risk and causality. Many times, these actors use statistical techniques to correct for possible biases and confusing elements included in a passive monitoring system such as VAERS.

In contrast, vaccine-hesitant or antivax actors frequently publicize individual incidents without doing the same degree of contextual research using raw VAERS data, though evaluating it in conjunction with individuals' testimonies and personal experiences. Frequently without realizing the data's limitations from a scientific and data analysis perspective, such the absence of confirmed causality between the vaccine and the reported adverse events, they tend to read these events as clear proof of vaccine hazards. This technique reinforces their story of the significant danger connected to vaccination and heightens worries about vaccine safety.

Anecdotes and narrative evidence are very frequent in the vaccine-hesitant and antivax rhetoric, giving the listener a personal and immediate sense of the problem. Though statistically rare, these accounts of individual negative effects become potent arguments that generate mistrust and anxiety over vaccinations. This narrative technique backs their more general claim that vaccinations are potentially dangerous and that the materialized risks are minimized and hidden by the government under the corrupting influence of the pharmaceutical industry.

The vaccine-skeptical voices also focus on the asymmetry of risks and benefits of vaccination. They contend that there is a heterogeneous distribution of the risk of severe COVID-19 and the following advantages of vaccination. This makes them question or even oppose the concept of immunization campaigns at large and propose more focused immunization initiatives, highlighting the importance of individual choice and responsibility. They contend using the statistics that, for certain people,

the hazards of vaccination may exceed the advantages, particularly, for example in the case of the COVID-19 pandemic, if they think their chance of contracting severe COVID-19 is minimal.

Credibility of medical and state authorities is another important distinction. Many times, vaccine-hesitant groups say that these authorities are not open enough or sensitive enough to the serious risks they associate with vaccinations, even those publicly declared in the prospect. The vaccine-confident perspective, which depends on well-established public health frameworks and believes that, for the great majority of people, the advantages of vaccination much exceed the hazards, is contrasted with this mistrust.

The vaccine-confident actors operate with a symmetrical, epidemiological perspective. That is, the mainstream perspective sees every person as a possible disease vector. This point of view supports the case for broad vaccination as a means of halting additional virus propagation and mutation, framing in an epidemiological context the ethical value and the policy usefulness of individual choice in this respect. A keystone of this strategy is the group advantage of obtaining herd immunity, which can shield those who cannot get the vaccine.

Therefore, although often using the same data sources on serious adverse health events following vaccination, such as passive monitoring platforms such as VAERS or individual accounts of their experiences, vaccine-confident and vaccine-hesitant actors have quite different goals and approaches. The second group concentrates on individual cases and their hazards, therefore creating a narrative of doubt and dread about vaccination, whereas the former group places the data within bigger epidemiological research and public health goals, aiming to maximize public trust in vaccines and the effectiveness of vaccination campaigns. My findings support the idea of a social bifurcation of reality as regards public understanding of vaccination (Rughiniș and Flaherty, 2022), in which similar numbers are transformed through polarized interpretations in arguments for divergent worldviews.

On the basis of my analysis of vaccine-hesitant and antivax discourses in mass media and social media, as synthesized in the case studies concerning the timeline of vaccine hesitancy in Romania, the typology of vaccination discourses and the diverging construction of serious risks of vaccination, I proposed a contrarian vaccine-hesitant pyramid of evidence. This model synthesizes the argumentation force of different types of evidence in vaccine-hesitant discourses.

Thus, the proposed contrarian pyramid of evidence provides a means of understanding how various organizations rank and validate various kinds of information in the vaccination debate. This model exposes basic divergences in how vaccine-hesitant and vaccine-trusting groups evaluate data and construct their arguments, standing in contrast to the traditional science-trusting evidence pyramid. The mainstream scientific pyramid of evidence is used in conventional medical research as a hierarchical framework to evaluate the authority and dependability of various study categories. Unorganized observations and beliefs are at the bottom of this pyramid. The evidence gets stronger and more trustworthy as one ascends the pyramid; at the top are meta-analyses and systematic reviews. In order to be comparatively broad and relatively bias-free, this top-tier research combines data from several studies to provide the strongest kind of evidence. This higher level of the pyramid is often referenced in the vaccine-trusting discourse, which emphasizes a strict differentiation between correlation, consequence, and coincidence. Public health guidelines and regulations are supported by this scientific method, which promotes confidence in vaccinations because of the building up of solid data.

On the other hand, the contrarian pyramid for those skeptical of the benefits of vaccination in relation to its risks reverses the conventional wisdom. At the top of this pyramid are well-chosen individual testimony and narrative syntheses, such as books or documentaries. Although strong and frequently emotionally resonant, these kinds of evidence are usually seen as weaker in conventional scientific debate since they might be biased and very selective. Selected scientific papers that may not prove

causality but do point up possible problems and side effects follow, along with case studies and correlational data from sources like VAERS. This pyramid also heavily weighs lawsuit results, which can be impacted by legal rather than scientific criteria.

This alternative method to formulate arguments, employed in vaccine-hesitant discourses, gives individual and anecdotal experiences precedence over compiled and regulated statistics. Vaccination-hesitant groups can influence public opinion by emphasizing the personal and sometimes statistically disregarded elements of vaccination reactions through the focus on individual experiences and instances. These narratives can more successfully instill mistrust about the safety of vaccinations because they are more emotionally and practically appealing to the general population than mathematical analysis.

The diverging pyramids of evidence employed in argumentation illustrate quite different views on authority, risk, and knowledge. The mainstream scientific pyramid aims to translate personal variability into more universal, generalizable principles that can direct population health. On the other side of the public controversy, the contrarian pyramid emphasizes the uniqueness and distinctiveness of personal experiences, contending that large-scale statistical studies obscure or ignore these stories and downplay, for commercial interest, the serious risks of vaccination.

4) What are the main types of vaccine confidence and vaccine hesitancy that we encounter at European level, during the COVID-19 pandemic, and how is vaccine hesitancy changing in relation to pre-pandemic times?

My quantitative secondary analysis of Eurobarometer 494 data, through cluster analysis, led to a categorization of respondents according to their vaccination viewpoints. The resulting typology shows a range of views, from trust to hesitancy and skepticism, all supported by different views and convictions about the effectiveness and safety of vaccination.

The five groups that I found—vaccine-trusting, agreeable, fence-sitters, hesitant & free choice, and vaccine-distrusting—cover a broad spectrum of opinions. Believing in the safety of vaccines and the need of their broad usage, the vaccine-trusting group exhibits an unequivocal confidence in them. These respondents trust medical research and public health recommendations highly, which is why they also favor universal coverage vaccination laws.

On the other hand, the vaccine-distrusting group has substantial doubts about the effectiveness and safety of vaccinations, frequently because they are suspicious of the pharmaceutical business or the reasons for public health regulations. They raise concerns on perceived risks, especially serious adverse effects of vaccination, and on inadequate openness in the distribution of vaccine-related information from pharmaceutical companies and state authorities, questioning not just the safety of vaccines but also the need of immunization.

Agreeable, fence-sitters, and reluctant & free choice respondents, the three intermediary categories, stand for different levels of ambiguity and conditional acceptance of vaccinations. Though they may not have strong personal beliefs, the agreeable respondents—who often agree with both positive and negative claims regarding vaccinations—seem to be swayed by the mainstream conversation. The fact that this category lacks strong opinions leaves them open to changes in public opinion, which emphasizes the need of providing accessible and well-balanced vaccination information.

Fence-sitters, those who waver between support and resistance, highlight how contradictory, or ambivalent messages affect public opinion. Their hesitancy indicates that convincing, constant, and unambiguous communication from health authorities is useful to incline the scales in favor of vaccine adoption.

Lastly, the group of hesitant & free choice is in favor of vaccination generally but is skeptical about certain vaccinations, such the COVID-19 immunization. Their perspective points out a difference between a general trust in established vaccinations

and fear of recently created ones, maybe as a result of hurried testing phases or contradicting data. They want to be autonomous in making decisions about their health, hence they favor a voluntary vaccination program.

These different opinion clusters indicate that public health communication needs to be differentiated and adapted to the unique issues and informational requirements of every group. Good communication techniques should not only reaffirm the advantages of vaccination to those who are already inclined to trust but also actively interact with people who are vaccine-hesitant and the unsure to promote a wider knowledge and acceptance of vaccinations. Higher vaccination rates generally and more successful public health initiatives may result from recognizing and resolving the relevant issues of each type.

Comparison with my proposed interview-based typology

The quantitative typology resulting from my secondary analysis of Eurobarometer 494 data has both similarities and differences with my initial typology, based on interviews with a convenience sample of respondents in Romania. Of course, the large-scale classification is more useful in capturing the spectrum of variability. This is why it has five categories, capturing a larger spectrum of opinions. Still, the interview classification was a useful starting point in my understanding that typologies of opinion on vaccination are not unidimensional.

Interestingly, the quantitative classification captures a five-type model, which includes an "agreeable" category not present in the four-type interview-based model. This group, characterized by a tendency to agree with both positive and negative statements about vaccines, suggests a segment of the population that may not hold strong personal convictions but instead reflects a broader acceptance of prevailing discourses. This category highlights the impact of social conformity or ambiguity in vaccine perceptions, which is less emphasized in the four-type model developed through interviews. It is also possible that this type may be a result of the research method. That is, people may be more prone to acquiescence when answering

questionnaires than when discussing issues in a more open, conversational dialogue in a semi-structured interview.

Another difference is the hesitant & free choice group from the quantitative study, which specifically distinguishes between general trust in vaccines and skepticism towards particular vaccines like those for COVID-19. This differentiation is less apparent in the interview-based resulting classification, which did not explicitly separate opinions on different vaccines but rather focused on COVID-19 vaccines.

Country-level analysis of vaccine opinion configurations

The results at the country level of the quantitative categorization of vaccination views within the EU show a diverse terrain of views throughout Europe. These results give a picture of the alignment of various populations inside different countries with the recognized opinion configurations: vaccine-trusting, agreeable, fence-sitters, hesitant & free choice, and vaccine-distrusting.

With large percentages of the "vaccine-trusting" configuration, nations like Sweden, Italy, and Ireland demonstrate a robust public acceptance and confidence in vaccinations. This implies that in these areas the advantages of vaccination are being successfully promoted via public health messaging and trust in healthcare institutions.

Portugal and Spain are particularly “agreeable”, in the proposed typology. This might represent a flexible attitude toward vaccine-related information or a cultural inclination to avoid disagreement or a general acceptance of information provided by authorities and the media.

Countries in Eastern Europe, such as Latvia and Bulgaria, have larger proportions of people who are skeptical of vaccination. This indicates a high level of mistrust of vaccinations, perhaps a result of a decreased confidence in public institutions and possibly a greater occurrence, or credibility, of contrarian information.

Germany, France, and the Netherlands are among the countries where intermediate groups like fence-sitters and hesitant & free choice responders are rather

common. These groupings show a population that, while not totally opposing vaccinations, exhibits prudence and wants more knowledge before making health decisions.

Generally speaking, Eastern European countries are more skeptical and hesitant about vaccinations than are Nordic countries. The picture in Southern Europe is varied; high agreeableness points to a complicated interaction between skepticism and trust.

These results emphasize the importance of customized public health plans that take into account the particular social, historical, and cultural settings of every nation. While some areas can profit from campaigns that strengthen the current strong confidence in vaccinations, others might need strategies that target particular issues and false information that fuels doubt and reluctance. Although there are general trends, such higher vaccine confidence in the Nordic countries and greater skepticism in the Eastern Europe, each nation has a distinct profile of vaccine views, according to the country-level examination of vaccination opinions across Europe. Designing efficient public health initiatives and communication plans that are aware of the specific requirements and concerns of every type requires an understanding of these characteristics.

Through my analysis I have also documented a correlation, at country level, **between the Human Development Index (HDI) 2019 and the proportion of vaccine trusting, hesitant-free choice and vaccine-distrusting types**. HDI is a composite measure that aggregates average performance in three fundamental areas of human development: long life (life expectancy), education, and economic prosperity. Better socioeconomic circumstances, shown by higher HDI values, can have a strong influence on public health responses, including vaccination uptake.

The results of the secondary analysis of Eurobarometer data indicate that higher HDI-scoring nations—like Sweden, Ireland, and Germany—tend to have greater vaccine confidence. Public acceptance of vaccination depends on these

countries' strong healthcare systems, very good educational levels, and high levels of trust in government and scientific organizations. The high HDI probably helps people be more health literate, which helps them to engage better with mainstream scientific institutions and mass media.

At the opposite end of the spectrum, nations with lower HDI scores—like Latvia, Bulgaria, and Romania—show greater levels of vaccine hesitancy, mistrust, and skepticism. Less education, less faith in public institutions, and less efficient healthcare systems may all be linked to lower HDI. These elements can make one more prone to contrarian information and inclined to consider that experts and governmental authorities are corrupted by the financial interests of pharmaceutical companies.

Vaccination attitudes are sometimes mixed in nations like Portugal and Greece with intermediate HDI values. These countries may have sizable areas of vaccine reluctance mixed together with sizable populations that believe in vaccinations. The contradictory answers can be a reflection of changing socioeconomic circumstances as well as different public trust and involvement with health systems. Crafting focused public health initiatives can be aided by knowing the relationship between HDI and vaccine attitudes. Less developed nations may need to improve their public health systems, boost health literacy, dispel false information, and foster confidence in medical services. Meanwhile, it is still essential to preserve and strengthen current trust and compliance in high HDI nations through ongoing education and open communication.

5) **How is vaccine hesitancy operationalized and measured through dedicated scales for the measurement of vaccine confidence and hesitance, globally and in EU-funded research?**

Overall, I have identified the following main dimensions in the operationalization of vaccine hesitancy and confidence in English language scales: Vaccine effectiveness, safety, importance, religious or moral compatibility, and

individualization and customization. Each dimension may be studied as regards confidence in vaccination in general, or confidence in vaccination concerning some specific categories of vaccines (eg. vaccines for children or for teenagers) or specific vaccines (eg. COVID-19, flu, MMR, HPV, etc). In Appendix 3 I have synthesized an inventory of items previously used in the scientific literature for each of these dimensions and types of focus. The European surveys do not capture all of them. Notably, religious and moral compatibility was not measured in the three EC-funded surveys that I analyzed. Also, comparability is limited because surveys do not always use the same formulation for items that purport to measure the same construct. The European surveys also do not capture public trust in pharmaceutical companies, or lack thereof. This is an important omission since qualitative analysis indicates that mistrust of profit-driven Big Pharma companies is a significant force underlying contrarian arguments and vaccine hesitancy.

Scientific publications

The scientific contributions of the thesis have been derived from my research sociological activity concerning vaccination hesitancy and confidence, from which the following scientific publications have resulted:

1) Rughiniș, C., Dima, M., Vulpe, S. N., Rughiniș, R., & Vasile, S. (2023). "Patterns of protection, infection, and detection: Country-level effectiveness of COVID-19 vaccination in reducing mortality worldwide". Public Health in Practice, 6, 100416. Elsevier. Indexed in: Directory of Open Access Journals (DOAJ), Scopus. Indexing information: https://www.sciencedirect.com/journal/public-health-in-practice/about/insights#abstracting-and-indexing
2) Vulpe, S. N., & Vasile, S. (2023). "Unvaccinated, Just Like Everybody Else. Vaccine Hesitancy in a Romanian Religious Community". European Review Of Applied Sociology, 16(26), 16-24. Indexed in DOAJ, Ebsco, ERIH PLUS

and other international databases. Indexing information: https://sciendo.com/journal/ERAS?content-tab=indexing

3) Rughiniș, C., Vulpe, S. N., Flaherty, M. G., & Vasile, S. (2022). "Vaccination, life expectancy, and trust: patterns of COVID-19 and measles vaccination rates around the world". Public Health, 210, 114-122. Elsevier. Indexed in Web of Science, Impact Factor 5.2. Indexing information: https://www.sciencedirect.com/journal/public-health/about/insights#abstracting-and-indexing
4) Rughiniș, C., Vulpe, S. N., Flaherty, M. G., & Vasile, S. (2022). "Shades of doubt: Measuring and classifying vaccination confidence in Europe". Vaccine, 40(46), 6670-6679. Elsevier. Indexed in Web of Science, Impact Factor 5.5. Indexing information: https://www.sciencedirect.com/journal/vaccine/about/insights#abstracting-and-indexing
5) Rughiniș, C., Dima, L., & Vasile, S. (2020). "Hydroxychloroquine and COVID-19: lack of efficacy and the social construction of plausibility". American Journal of Therapeutics, 27(6), e573-e583. Wolters Kluwer.

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