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Article

Narratives of Anti-Vaccination Movements in the German and Brazilian Twittersphere: A Grounded Theory Approach

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Abstract
Since February 2020, the world has been facing a global pandemic of the SARS-CoV2 virus. All over the world, people have been urged to take protective measures. It is hoped that the implementation of widespread vaccination campaigns will defeat the pandemic in the long term. While many people are eager to be vaccinated against Covid-19, other voices in the population are highly critical of vaccination and protective measures, circulating much misinformation on social media. The movements opposing pandemic response measures are heterogeneous, including right-wing groups, spiritualists who deny science, citizens with existential fears, and those who equate vaccination with a loss of individual freedom. This study aims to map and compare the social media communication of anti-vaccination movements that defy social cohesion and circulate online misinformation in Germany and Brazil. By following a grounded theory approach suggested by Webb and Mallon (2007), we coded content from social media communication of opinion leaders on Twitter with extended narrative analysis methodology finding different narratives that were mapped within the inhomogeneous anti-vaccination movements. The results show that both countries' main narratives against vaccination are very similar, but the main difference stems from Brazil's stronger politicization of vaccines.

Keywords
anti-vaccination movements; Brazil; Germany; narratives; social cohesion; social media; Twitter

Issue
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1. Introduction

Since the beginning of 2020, the world has been facing a pandemic of the new SARS-CoV-2 virus. To contain the spread of the virus, political measures were taken that, under normal circumstances, would be classified as authoritarian, such as closing borders and stores or restricting personal freedoms (Muldoon et al., 2021). State leaders were confronted with the difficult task of explaining the measures to the population, contributing to meaning-making, and strengthening social cohesion (Montiel et al., 2021). Besides the traditional media, press conferences, billboard campaigns, and social networks especially were used to inform citizens about government measures (Melki et al., 2022). The pandemic situation has underlined that health is not solely dependent on individual choices and personal lifestyle but that cultural, social, and political factors also have a major influence (Cárdenas et al., 2021).

One of the central measures for sustainable control of the pandemic was vaccination campaigns. From the point of view of epidemiologists and virologists, vaccination was the most effective way to achieve herd immunity and ultimately end the pandemic (Fontanet & Cauchemez, 2020). In Germany, 79% of the German population was willing to get vaccinated in April 2020, which dropped to 62% as of January 2021 (Jensen et al., 2021). In general, many factors influence the willingness

to get vaccinated, such as the fear of unforeseen side effects (Neumann-Böhme & Sabat, 2021). While many citizens are eager to get vaccinated against Covid-19, other voices in the population are very critical of vaccination and protective measures (Johnson et al., 2020). In Germany and the German-speaking countries, these critical voices against the vaccination campaigns and other protection methods came from different political opinion camps and involved people with clearly right-wing ideas, spiritualists who associated themselves with anthroposophical movements, as well as citizens with existential fears who joined each other in the form of the "Querdenker" movement (English: "lateral thinkers"; Frei et al., 2021). Querdenker are followers of a protest movement against the Covid-19 restrictions. Such protest movement combines many sociodemographic groups with a high conspiracy mentality (Bonnevie et al., 2021). Believing in Covid-19-related conspiracy theories is especially problematic in vaccination campaigns since believing in such theories significantly decreases the likelihood that the Covid-19 vaccine will be accepted (Salali & Uysal, 2020).

In contrast to Germany, Brazil suffered even more immensely from the spread and effects of the Covid-19 pandemic and, at times, became one of the epicenters of the pandemic (Ferrante et al., 2021). In the country, critics of the measures and vaccination quickly emerged, frequently supported by leading politicians, most notably President Jair Bolsonaro (Ferrante et al., 2021). Until the Covid-19 pandemic, the country had a historical tradition of successful vaccination campaigns, in which the country's former presidents were always strongly supportive of mass vaccination in their public statements. Nevertheless, the strategy that led Bolsonaro to the Brazilian presidency has a highly neoliberal and individualistic approach, characterized by statements attacking the efficacy of public services and assistance politics, such as the Brazilian Universal Public Healthcare System (Pinheiro-Machado & Scalco, 2020); this outlook directly impacted his approach to mass vaccination public campaigns. However, Bolsonaro's opponents, like the São Paulo State governor João Dória, one of the president's former supporters, focused pandemic combat strategies on the fast adoption of mass vaccination campaigns. This was perceived by Bolsonaro and his followers as a political provocation (Gramacho & Turgeon, 2021), partially motivating their attacks against such measures on social media and the highly politicized mobilization around the subject.

In both countries, protests against the vaccination campaigns gathered momentum on social networks and were both characterized by an inhomogeneous group composition (Recuero & Stumpf, 2021). Understanding the structure of the Brazilian and German anti-vaccination movements will provide crucial insights into how these movements might be countered effectively. Therefore, this qualitative study addresses the following research question to capture these pockets of resistance:

RQ: Which narratives are used by the German and the Brazilian anti-vaccination movements on Twitter, and how far do they differ?

To answer this question, opinion leaders of the German and Brazilian anti-vaccination movements were identified by studying the reporting on fact-checking sites about the vaccines and vaccination campaigns in Germany and Brazil in a three-month period after the first approval of the vaccines and the start of the vaccination campaigns (Germany: start in December 2020; Brazil: start in January 2021). After identifying the opinion leaders, their social media profiles were identified, and all related Twitter communication was collected, filtered, and analyzed based on the extended narrative analysis (Webb & Mallon, 2007). We focused our analysis on Twitter due to its centrality in political debates among scientists, journalists, and politicians during the Covid-19 pandemic (Rosenberg et al., 2020; Rufai & Bunce, 2020), as well as the fact that it allows data collection through APIs for scientific purposes (Ahmed et al., 2017).

This article is part of a bigger project with researchers from Germany and Brazil. Thus, it is part of an interdisciplinary research network to understand how collective action frames succeed (or fail) in social media pandemic response. This joint project combines qualitative frame analyses with social media analytics techniques—both quantitative and qualitative—to investigate collective action frames on social media about the Covid-19 vaccination in Brazil. The analysis aims to derive strategies for health organizations to succeed at social mobilization via social media and at overcoming "infodemic" counter-movements.

2. State of the Art

2.1. Social Movement and Narratives

The development of social media and online communities created an arena for social movements (Mirbabaie et al., 2021). By offering benefits such as low individual cost of participation and connectivity between users, social media has transformed individuals' passive state of participation into self-organized participation (Kavada, 2015). Compared to traditional forms such as formal organizations, social movements on social media are mainly based on personal expression of identity (Kavada, 2015).

During a social movement, a collective identity between the movement's participants develops (Mirbabaie et al., 2021). Collective identity facilitates the generation of a social movement and sustains commitment and cohesion between the actors (Fominaya, 2010). Over time, a set of individuals becomes a collective entity due to a process that involves cognitive definitions and is shared through common narratives (Brown, 2006; Fominaya, 2010). Narratives are a core component of constructing meaning in social movements, and they

can determine and give insight into processes of self- and collective identity construction (Barassi & Zamponi, 2020). Narratives of a social movement are endowed with a temporally configurative capacity that allows actors to "integrate past, present and future events" (Polletta, 1998, p. 139).

In the context of the Covid-19 pandemic, new social movements have been formed, and existing social movements revolutionized (Pullan & Dey, 2021). The anti-vaccination movement, which originated in the 18th century, has been given a new lease of life by outbreaks of diseases (Hussain et al., 2018). Due to the international vaccination campaigns for the Covid-19 virus, the anti-vaccination movement gained increasing attention and growth (Pullan & Dey, 2021), especially on social media platforms such as Twitter (Bonnevie et al., 2021).

2.2. Anti-Vaccination Movement on Social Media

Anti-vaccine messages are more widespread and uninhibited on the Internet than in other forms of media (Kata, 2012). Social media creates a platform that allows anti-vaccination activists to effectively spread their messages without verification by the expert medical community (Kata, 2012). Messages that are spread online within the anti-vaccination movement contain narratives such as that the vaccine causes disease, that it is ineffective, that vaccine is part of a medical/pharmaceutical/government conspiracy, or that mainstream medicine is wrong or corrupt (Kata, 2012). Reading such content can have an immense impact on one's decision-making process regarding vaccination and attitude toward vaccination (Betsch et al., 2010). Examining the impact of anti-vaccination content on the Internet, research has shown that visiting an anti-vaccination website for as little as 5–10 minutes leads to an increase in perceiving vaccinations as riskier (Betsch et al., 2010).

These listed findings suggest that anti-vaccination movements on social media can contribute to vaccine refusal by shaping perceptions and reinforcing opposition (van Schalkwyk et al., 2020), especially since social media is one of the main communication channels for anti-vaccinationists (Yuan & Crooks, 2018). As soon as the level of anti-vaccinationist sentiment within a population is higher than herd immunity can tolerate, a disease can rapidly be transmitted (Yuan & Crooks, 2018). This underlines that the basis for achieving herd immunity is social cohesion because unity, solidarity, and collective coordination of vaccination campaigns are essential for its success (Cárdenas et al., 2021). A divided society through the rise of anti-vaccination movements, a general increase in vaccine hesitancy, and the spread of false narratives will delay the successful management of pandemic situations (Ruisch et al., 2021). Strengthening social cohesion online, especially on social media, can directly impact social cohesion in real life and can thus be an important factor in crisis response (Marlowe et al., 2017).

3. Research Design

3.1. Methodology

The derived research question is addressed with a qualitative approach suitable for the context of social media. It aims to openly analyze the anti-vaccination movement to achieve a certain generalizability without condensing the context too much and thereby distorting it (Goguen, 1997) instead of working in a more theory-driven and teleological method. This study, therefore, follows the extended narrative analysis methodology of Webb and Mallon (2007), which combines the strengths of Strauss and Corbin's (1997) grounded theory methodology with Chatman's (1975) narrative analysis to increase the breadth and depth of the analysis. The overall goal is a rich description of the narratives found in the collected data to better understand the movements described (Wiesche et al., 2017).

The grounded theory approach has been used to start from the empirical and then goes back to theory as many times as the object needs. Its applications have not been widely discussed in the context of social media research (Fragoso et al., 2011). In our adaptation to narratives extracted from Twitter, we follow the ideas of Webb and Mallon (2007, p. 378) to investigate and test different approaches. In this sense, the combination of the social media analytic framework (Stieglitz et al., 2018) and extended narrative analysis has shown itself to be a very prolific method to create core categories and give us an initial map to understand and compare anti-vaccination movements.

3.2. Data Collection

While most publications that apply a grounded theory approach use interviews for the analysis, this study takes another approach, using social media data. The starting points of our analysis are December 2020 for the German (Paul-Ehrlich-Institut, 2021) and January 2021 for the Brazilian (Ministério da Saúde, 2021) data set, as those were the months when the first vaccines were approved by their national health organizations. To map the main narratives of the anti-vaccination movements, we applied an account-driven data collection approach by identifying German and Brazilian opinion leaders. The leading fact-checking organizations, which focused on identifying and debunking the Covid-19 pandemic-related mis- and disinformation, have been identified in Germany and Brazil. For Germany, 12 fact-checking websites were identified, such as Correctiv or Mimikama. Ten Brazilian fact-checking websites were found, for example Aos Fatos or Agência Lupa. All articles of the identified fact-checking websites published in the identified three-month periods were analyzed regarding the mentioning of opinion leaders. Figure 1 visualizes the procedure conducted to identify the opinion leaders of the German and Brazilian anti-vaccination movements.

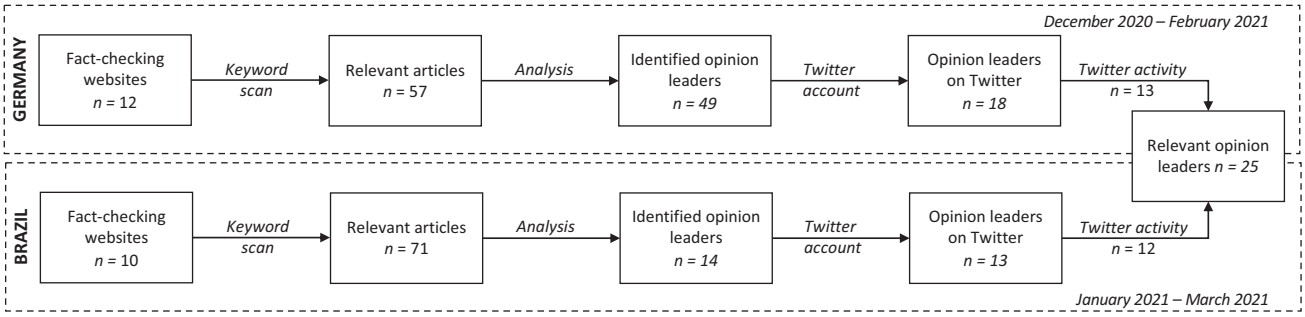

Figure 1. Procedure of identifying opinion leaders of the anti-vaccination movement.

As seen in Figure 1, the articles on the fact-checking websites were scanned and allocated as relevant if keywords such as vaccination or corona were mentioned in the headline or description of the articles. Then, the relevant articles were read by a native-speaking researcher. If the articles pointed out a person who spread anti-vaccination content, the name of such person was collected. In total, 49 German opinion leaders were identified after inspecting 57 articles from the different fact-checking websites and 14 Brazilian opinion leaders out of 71 fact-checking articles. For each anti-vaccination opinion leader, their Twitter profiles were identified. For Germany, 18 out of 49 opinion leaders had a Twitter account; 13 accounts were found for the Brazilian leaders. For each Twitter profile, the tweets were inspected and allocated as relevant or not based on the Twitter activity, leading to 25 (13 German accounts, 12 Brazilian accounts) identified opinion leaders in total regarding anti-vaccination movements (note that Twitter accounts that post such adverse content are regularly flagged and eventually deleted by the platform operators). Each opinion leader had a follower count above the average; therefore, we were able to confirm that they reached a larger number of individuals with their content, and thus we identified them as opinion leaders.

The data for the identified Twitter accounts were then collected by a self-developed crawler based on the social media analytics framework (Stieglitz et al., 2018), which uses the open-source library Twitter. An account-based tracking was conducted, meaning that all Twitter activity around the identified Twitter accounts was collected, including not only that of the opinion leaders but also the reactions (retweets, quotes, replies) to the content produced by other Twitter users.

In total, the collected data contained 30,945 tweets for the Brazilian and German opinion leaders, representing tweets and retweets. For Germany and Brazil, 5,240 and 25,705 tweets were tracked, respectively. The data sets were then filtered for specific keywords to ensure the relevance of the tweets' contents. Figure 2 shows the two filtering steps for both data sets.

As a first step, the data sets were filtered for Covid-19-related keywords (Covid-19, corona, coronavirus, pandemic), leading to a set of 1,390 tweets for the German data and 755 tweets for the Brazilian. Next, the remaining tweets were filtered for vaccination-related

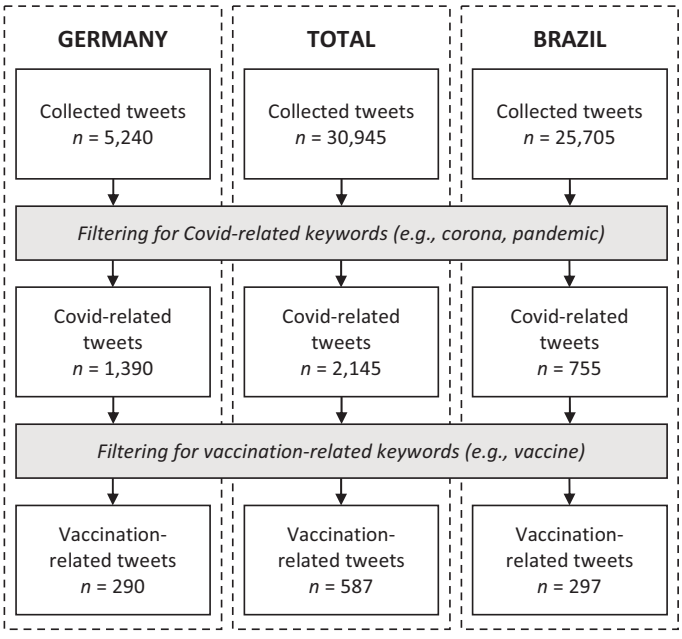

Figure 2. Filtering steps for the German and Brazilian data sets.

keywords—such as vaccine, Astra, BioNTech, Pfizer, immune, and injection—in the German and Portuguese languages. In the end, 290 German and 297 Brazilian tweets were analyzed.

3.3. Data Analysis

To identify the main narratives, the collected tweets have been analyzed according to the extended narrative analysis by Webb and Mallon (2007). Table 1 summarizes the main steps of the data analysis.

Five native-speaking researchers coded the posts; three for the German tweets and two for the Brazilian tweets. The four stages of coding were carried out in the tweets' original language (German or Portuguese), and then the developed main narratives were translated into English. It is important to emphasize that for the grounded theory approach, the main narrative categories emerge from the data and go back for discussion as many times it is needed. Another important fact about this method is that the team of coders analyzing the two different samples (two Germans and two Brazilians) met after the first coding to discuss the categories again and compare them.

4. Findings

4.1. Sample

Thirteen German and 12 Brazilian opinion leaders were found during the scan of the fact-checking websites. Even though the "digital-age social research will involve situations where reasonable, well-meaning people will disagree about ethics" (Salganik, 2019, p. 283), we followed AoIR's Internet Research: Ethical Guidelines 3.0 (Franzke et al., 2019) and Salganik's (2019) four ethical principles: respect for persons, beneficence, justice, respect for law and public interest. Thus, we refrain from mentioning the opinion leaders' names or Twitter handles to ensure their privacy. We, however, provide some background information on our sample. All opinion leaders have spread misinformation regarding the vaccination against Covid-19 and are part of the anti-vaccination movements. With their Twitter accounts, they aim to "enlighten" their followers on the "truth" about vaccinations. Regarding the German opinion leaders, ten were male, two were female, and two of the 13 accounts were verified by Twitter. Six opinion leaders in Brazil were male and six female, and two were verified by Twitter, both parliamentarians. The German opinion leaders had, on average, on our point of measurement, 24,954,67 followers, ranging from 2,401 to 126,225. In Brazil, 320,630 Twitter users followed, on average, the Brazilian opinion leaders, ranging from 48 to 1,480,759. In the German context, different backgrounds of the opinion leaders could be identified. Three of them were medical doctors in different fields (e.g., Internal medicine), three claimed that they were journalists, two were politicians of a right-wing party, two were professors at a university, one was a priest, and one called themself a "lawyer for Querdenker." In general, most German opinion leaders are placed in the Querdenker movement. In Brazil, we identified two main profiles: three were parliamentarians allied to President Bolsonaro, and nine were medical doctors in varied fields. One was a physician holding an official job position in government (Secretary of Labour and Education in Health Administration in the Ministry of Health). Seven of the physicians worked as consultants for strategies against Covid-19 for Bolsonaro's administration, officially or extra-officially. Regarding these consultants, five of them were investigated by a parliamentary commission (*CPI* in Portuguese, meaning Parliamentary Investigation Commission) for being members of a "Shadow's Council": A secret extra-official group of medical doctors who advised the Ministry of Health about measures to combat the pandemic, which led to the delay in adopting mass vaccination campaigns in Brazil, and to the equivocal use of scientifically unproven medicines, such as Hydroxychloroquine and Ivermectin, as a public health strategy. Two were banned

Table 1. Steps of the extended narrative analysis.

Stage of Method	Function of Stage	Contribution of Stage
Stage 1: Open Coding	Fractures source narrative into concept	Delays imposition of narrative structure retaining contextual richness for longer
Stage 2: Story Decomposition	Organizes concepts in a story structure through abstraction, categorization & generalization	Dries out the narrative, presenting its basic events and existents, or building blocks
Stage 3: Axial Coding	Examines properties and relationships of concepts to determine causality	Adds depth to the story structure by examining its building blocks in greater detail
Stage 4: Selective Coding	Identifies and develops a core category	Simultaneously adds depth and breadth by collapsing concepts into one meta concept and then developing that meta concept into further detail

Source: Webb and Mallon (2007).

from Twitter for posting fake news about Covid-19, both doctors who acted as government consultants, as mentioned above.

Another important aspect relates to the presence of bots in both our samples. The importance of the use of bots for measuring public opinion in social media has been discussed by Ross et al. (2019, p. 409):

> A relatively small number of bots was sufficient to sway the opinion climate in the direction of the opinion supported by the bots, triggering a spiral of silence process that ultimately led to the bot opinion becoming accepted as the perceived majority opinion.

Even though in the dataset there were bots from the categories described by Stieglitz et al. (2017), in our filtered sample, there were none left for coding.

4.2. German Narratives

For the 290 German tweets, each tweet was coded following the four stages of coding (Table 1). After analyzing all tweets, 395 selective codings were found, meaning that in several cases, a tweet conveyed more than one narrative. Thirteen selective codings could not be allocated to the developed main narratives. The identified codings were then inspected in detail to find overlapping themes and build narratives. In total, 13 narratives were found for the German tweets. Table 2 visualizes the narratives and selective codings which were allocated to the narratives.

The occurrence of the 13 narratives, which are represented by the selected codings of the tweets, differed from each other. Figure 3 demonstrates the distribution and the emergence of the narratives.

When inspecting Figure 3, it can be seen that Distrust in Vaccination is the most common narrative in the German anti-vaccination movement. Overall, this narrative conveys messages such as fear of side effects, fear of the vaccination itself, or high risks associated with the Covid-19 vaccination. The second most represented narrative is Criticism of Vaccination/Covid-19 Policy. Individuals sharing this narrative resist being vaccinated to express their dissatisfaction. The narrative Scientific Skepticism stands for the overall distrust in the vaccination research. In this regard, anti-vaccinationists believe that the vaccines (e.g., AstraZeneca, BioNTech-Pfizer) have been approved too early. The Compulsory Vaccination narrative criticizes that the government forces individuals to get vaccinated either directly or indirectly. The narrative of Anti-Vaccinationists as Victims/Social Divide reflects the opinion that vaccination advocates are clueless. They see themselves in a victim role and adopt an "us versus them" attitude. Their belief that important information about vaccination is actively censored by both media and government is mirrored in the narrative of Information Censorship. The narrative Vaccination Is Pointless reflects the assumed ineffectiveness of the vaccinations. The Pharmaceutical Industry Profit is a narrative where individuals believe that the pharmaceutical industry prioritizes money through vaccinations over the population's health. The narrative that the Vaccine Has

Table 2. German narratives and example selective codings.

#	Narrative	Example Selective Coding
1	Distrust in Vaccination	Fear of vaccination, fear of side effects
2	Criticism of Vaccination/Covid-19 Policy	Criticism of vaccine strategy, government failure
3	Scientific Skepticism	Premature approval of vaccines, lack of vaccine research
4	Compulsory Vaccination	Indirect compulsory vaccination, criticism of social pressure
5	Information Censorship	Censorship of important information, vaccination propaganda
6	Anti-Vaccinationists as Victims/Social Divide	Blinding the others, us against them
7	Pharmaceutical Industry Profit	Vaccination as money-making for the pharmaceutical industry
8	Vaccination Is Pointless	Doubts about the effect of vaccination
9	Vaccine Has Been Tampered With	Alteration of DNA by vaccine, poisoning by vaccination
10	Violation of Fundamental Rights	Restricted freedom, deprivation of liberty for the unvaccinated
11	Neutral/Vaccination Advocates	Vaccinate with reason, no clear position
12	Distrust in the Existence of Covid-19	Covid-19 is a big lie, Covid-19 pandemic is staged
13	Fighting the Virus With Physical Strength Alone	Power of love and togetherness, trust in the immune system instead of vaccination

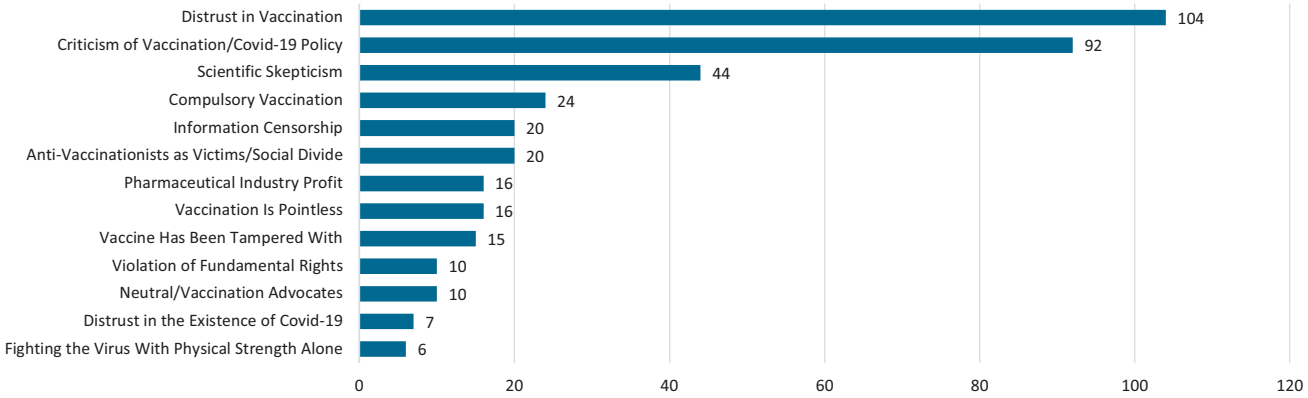

Figure 3. Distribution of German narratives.

Been Tampered With mirrors the fear that the vaccine has been manipulated in different ways, e.g., by a chip inserted into the body during the vaccination process or by some means which allow it to manipulate human DNA. The Violation Of Fundamental Rights narrative goes in the same direction as the Compulsory Vaccination narrative. However, it extends the narrative by positing that the vaccination campaigns violate human rights by restricting people's freedom in general or denying them freedom of expression. One narrative—Distrust in the Existence of Covid-19—mirrors the assumption that Covid-19 does not exist (in the form presented by the media). In this context, it is either believed that Covid-19 was invented, for example, by the government or that the pandemic is less dangerous than is presented to the public. The final narrative, Fighting The Virus With Physical Strength Alone, states that the vaccination is pointless because the immune system is strong enough to fight the virus.

4.3. Brazilian Narratives

The 297 Brazilian tweets were also analyzed through the same process. After the analysis, 78 selective codings were identified, resulting in the 11 narratives listed in Table 3.

Like the German narratives, the Brazilian narratives are represented to different extents. Figure 4 shows

Table 3. Brazilian narratives and example selective codings.

#	Narrative	Example Selective Coding
1	Distrust in Vaccination	Fear of vaccination, fear of side effects, high risks of vaccination
2	Violation of Individual Rights	Restricted freedom, deprivation of liberty for the unvaccinated, compulsory vaccination is social control
3	Vaccination Is Pointless	Doubts about the effect of vaccination, vaccination has no effect against variants
4	Scientific Skepticism	Premature approval of vaccines, lack of vaccine research, corruption among researchers
5	Protecting Children and Youth	Vaccines are dangerous to children and young people, vaccination without parents' authorization is illegal
6	Politicizing of Vaccination	Vaccination as a political strategy, weaponizing vaccination against political opponents
7	Alternatives to Vaccination	Treatments with unproven drugs such as Ivermectin and Hydroxychloroquine are more effective than vaccination
8	Anti-Vaccinationists as Victims/Social Divide	Blinding the others, us against them, persecution against unvaccinated
9	Information Censorship	Censorship of important information, vaccination propaganda
10	Fighting the Virus With Physical Strength Alone	Trust in the immune system instead of vaccination, herd immunity is more effective than vaccination
11	Pharmaceutical Industry Profit	Profit through vaccination, vaccination as money-making for the pharmaceutical industry

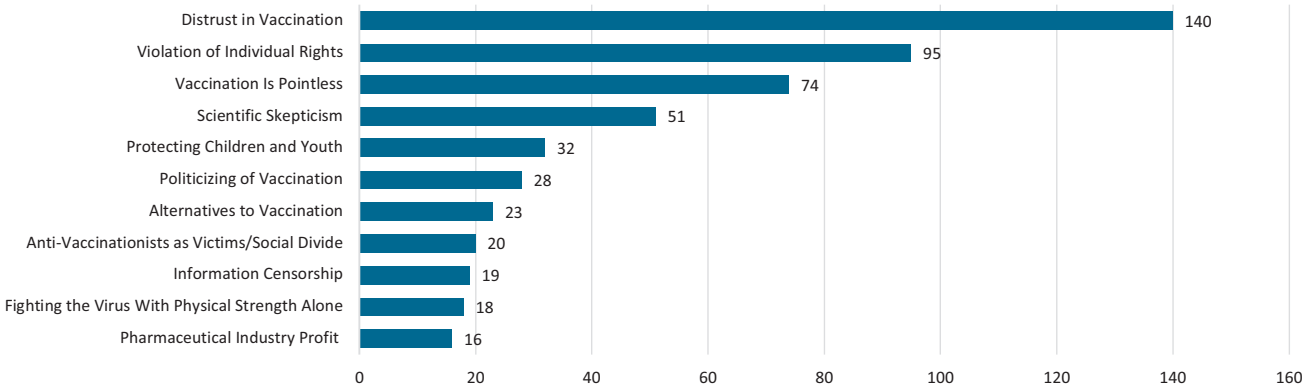

Figure 4. Distribution of Brazilian narratives.

the narratives' distribution and emergence based on the number of selected coding allocated to the respective narrative.

Some of the German and Brazilian narratives overlap, while some narratives only emerge in the German or Brazilian tweets (Figure 4). Four of the narratives only appeared in the Brazilian dataset: Violation of Individual Rights, Protecting Children and Youth, Politicizing of Vaccination, and Alternatives to Vaccination.

The narrative Violation of Individual Rights conveys that the individual and their own desires must take precedence over collective interests. The Politicizing of Vaccination narrative contains messages about political opponents using the Covid-19 vaccination campaign to damage the public image of Bolsonaro since the president shows distrust in vaccination in his public statements. The Alternatives to Vaccination narrative is related to Bolsonaro's public support of adopting scientifically unproven treatments against Covid-19, such as the prescription of Hydroxychloroquine and Ivermectin. The Protecting Children and Youth narrative expresses a kind of moral panic prevalent in conservative ideologies: the belief that children are in danger because of shady political interests and must be protected at all costs (Edelman, 2004).

As stated before, some narratives only occur in the German anti-vaccination movement (green lines), some emerge only in the Brazilian tweets (yellow lines), and some appear in both movements (combination of green and yellow). Figure 5 represents the occurrence of the German and Brazilian narratives, visualizing those that overlap by showing how strongly the narratives are represented to different degrees.

5. Discussion and Conclusion

This article aimed to better comprehend the anti-vaccination movement in the context of the Covid-19

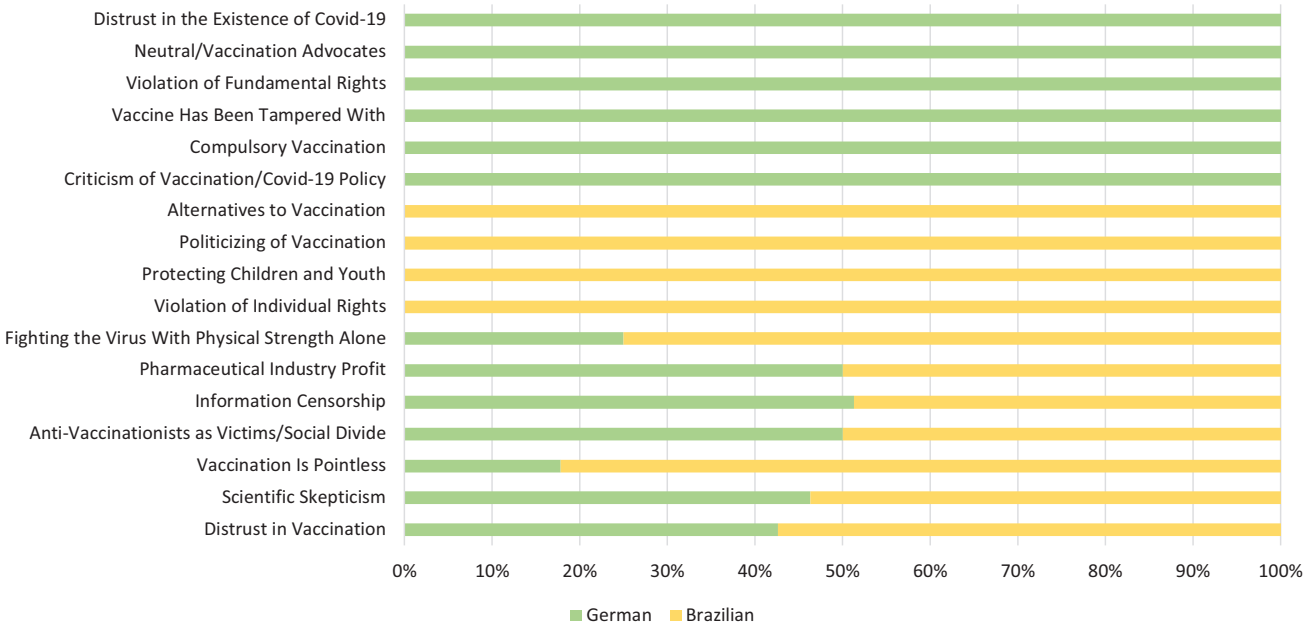

Figure 5. Occurrence of German and Brazilian narratives.

pandemic in Germany and Brazil. The narratives used within the anti-vaccination movements were detected by analyzing German and Brazilian Twitter data from the opinion leaders and their followers of the movement in the respective countries.

Understanding the occurrence and distribution of the narratives regarding anti-vaccination movements, nationally and internationally, helps to understand the anti-vaccination movements in-depth as narratives are a core component of social movements and are a determining factor for collective identity (Barassi & Zamponi, 2020). Thus, in the scope of the article's analysis, the narratives of the Brazilian and German anti-vaccination movements were analyzed. Following analysis of the results, 17 narratives were found, six of which were only found in the German anti-vaccination movement, four only in the Brazilian movement, and seven overlapped between both countries. By far, the most common narrative of the two movements stems from Distrust in Vaccination. Both Brazilian and German anti-vaccinationists feared that the vaccination was unsafe or that the risks and side effects were too severe. They claimed that the vaccines had not been not properly tested, often providing examples, none of them proven, of those who had supposedly died or become seriously ill following vaccination. This narrative is evenly distributed between the two countries. When inspecting the overlapping narratives, it was determined that they convey critique against the vaccination itself but not against the vaccination campaigns or policies. Excluded from this is only the narrative Pharmaceutical Industry Profit, stressing the strength of the skepticism in the pharmaceutical industry level, which is in line with previous findings (Pahus et al., 2020). The core of the remaining overlapping narratives is that individuals do not need vaccination since the body itself is strong enough to fight against the disease. A deep skepticism against vaccination can be seen, mirrored in Scientific Skepticism (van Zoonen, 2012) or the fear that crucial information about vaccination has been censored. This skepticism against vaccination is not new; it did not emerge during the Covid-19-anti-vaccination movements but has been the core of anti-vaccination movements since their inception (Hussain et al., 2018).

When depicting the narratives found within both anti-vaccination movements, one main similarity can be found: skepticism in politics. Due to the different nature of the governments in Germany and Brazil, the narratives convey criticism of the vaccination policy but with various specificities. The idea of Violation of Individual Rights, despite its similarities with the German narratives' Violation of Fundamental Rights and Compulsory Vaccination, has particularities in the Brazilian scenario due to the hyper-individualism that characterizes the masculinist neoliberal ideology adopted by the far-right politicians such as Bolsonaro (Pinheiro-Machado & Scalco, 2020). In this point of view, the individual's desires must be privileged over collective needs in the name of freedom (Harsin, 2020). In contrast, the critical voices against vaccination in Germany did not come from politicians themselves but from different political opinion camps. They included those with right-wing ideas and citizens with existential fears who had joined forces in the "Querdenker" movement (Frei et al., 2021). Skepticism in politics has also been vocalized in other anti-vaccination movements (Hussain et al., 2018). Narratives such as Criticism of Vaccination/Covid-19 Policy or Politicizing of Vaccination have been part of these movements. However, due to the circumstances of the Covid-19 pandemic, new narratives emerged, such as Distrust in the Existence of Covid-19 and Protecting Children and Youth. The disbelief in the existence of Covid-19 can be explained by the fact that individuals' psychological needs are likely to be frustrated during a pandemic (Douglas, 2021). Since uncertainty is high, individuals fear for their future, and as a result, they start to believe in conspiracy theories to explain why such events happen. The latter narrative expresses a moral panic prevalent in conservative ideologies, the belief that children are in danger and must be protected (Edelman, 2004).

The great overlap of anti-vaccination narratives in Brazil and Germany emphasizes that despite cultural particularities and the diverse foci of the individual members, similarities exist between the movements. It can be assumed that there is a collective identity, which strengthens the cohesion between individual members, as described by Fominaya (2010) and Brown (2006). The findings on the distinctions between the narratives in both countries further reinforce the assumptions of Haslam et al. (2021) and Sibley et al. (2020) that the different political leadership styles of those in political power influence how the population deals with the pandemic. Under the authoritarian leader Bolsonaro, narratives that point to a strong division of political camps play a greater role, while under Merkel, who has campaigned more strongly for a unified society, these narratives have less meaning. The question arises whether the anti-vaccinationists in Brazil have had a more fertile breeding ground regarding the Covid-19 pandemic than Germany, as the willingness to vaccinate has been declining in recent years, in combination with a president who reinforces anti-vaccination narratives (Ruisch et al., 2021). However, an answer to this question is beyond the scope of this study; future investigations should be conducted to answer this question.

The derived narratives may guide scientists, government officials, and (science-)journalists on where to start their information campaigns to counter the spread of misinformation. As Burki (2020) emphasizes, attention should not be given to dogmatic anti-vaccinationists; it may be more fruitful to reach out to the undecided and doubtful, who are more receptive to education and information. However, the information campaigns should bear in mind the most recent findings that effective campaigns need to be formulated to avoid backfire effects and which can strengthen misinformation (Pluviano

et al., 2017). The focus on the most solidly united citizens instead of a minority of non-compliant individuals has been proven to have fewer backfire effects, which again underlines that the focus on social cohesion and unity is essential (Marlowe et al., 2017). Furthermore, de-platforming opinion leaders could be an effective short-term measure to deal with misinformation on social media platforms such as Twitter (Jhaver et al., 2021), although only using this strategy would be insufficient to deal with the problem (Rogers, 2020). Especially in cases such as Brazil, where the opinion leaders have connections with the government and even influence important decisions concerning public health administration, de-platforming needs to be combined with other institutional measures. Although platforms also have a responsibility to control misinformation, they have often hesitated to ban politicians and other public figures even when they engage in spreading fake information, and they do not accept that their algorithmic curation also has a role in spreading it (Bandy & Diakopoulos, 2021).

In terms of limitations, we have only identified the narratives that emerge from the opinion leaders on Twitter, but we are aware that opinion leaders also have their social media presence on other platforms such as YouTube, which can lead to new narratives and discussions. In future work, we intend to analyze the three main camps that have emerged from this codification of anti-vaccination narratives: clear supporters, dogmatic opponents, and undecideds. We can also learn from our findings which narratives need to be debunked and where information and education are lacking to win over the undecided for the pro-vaccination camp.

In this first comparative study of anti-vaccination movements in Germany and Brazil, we have contributed to the understanding of the emergence of narratives from opinion leaders on Twitter about Covid-19 vaccines in both countries. Also, the grounded theory approach combined with social media analytics framework and extended narrative analysis can contribute methodologically to more qualitative studies on social movements and social cohesion.

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Conflict of Interests

All authors declare no conflict of interest.

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