RESEARCH ARTICLE

UNRAVELING THE HESITANCY: ANALYZING CONSPIRACY THEORIES ABOUT THE COVID-19 VACCINE THROUGH 'TWITTER'

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This study complies with research and publication ethics.

Abstract

The vaccine hesitancy developed during the COVID-19 pandemic has spread the disease, delayed immunity, and increased death rates. Social media platforms have contributed to the spread of doubts, misinformation about vaccines. *Twitter*, being one of the most popular social networks in Türkiye, has become a significant platform for vaccine polarization. This study aims to examine the reasons for vaccine hesitancy and conspiracy theories developed by Turkish users on *Twitter*. 3939 tweets were analyzed with the hashtags *#aşıyahayır* (*#notovaccine*), *#aşıolmayacağım* (*#Iwillnotgetvaccinated*), *#denekolmaTürkiye (#donotbeatestsubjectTürkiye*), *#aşıolmakistemiyorum (#Idonotwanttogetvaccinated*). The examined categories are as follows: scientific (the highest number of comments in this category were related to medical side effects), miscellaneous (the highest number of comments were about the lack of mentioning reasons for vaccine hesitancy), conspiracy theories (the highest number of comments were about major pharmaceutical companies), and general content (opinions against administering Covid-19 vaccines to children).

Keywords: Covid-19, Covid-19 vaccine, vaccine hesitancy, *Twitter*, conspiracy theory.

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ARAŞTIRMA MAKALESİ

AŞI TEREDDÜDÜNÜ ANLAMAK: COVID-19 AŞISI İLE İLGİLİ KOMPLO TEORİLERİNİN 'TWITTER' ÜZERİNDEN ANALİZİ

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Bu çalışma araştırma ve yayın etiğine uygun olarak gerçekleştirilmiştir.

Öz

Covid-19 pandemisi sırasında gelişen aşı tereddüdü hastalığın yayılmasına, bağışıklığın gecikmesine ve ölüm oranlarının artmasına neden olmuştur. Sosyal medya platformları, aşılar hakkındaki şüphelerin ve yanlış bilgilerin yayılmasına katkıda bulunmuştur. Türkiye'de en popüler sosyal ağlardan biri olan *Twitter*, aşı karşıtlığı için önemli bir platform haline gelmiştir. Bu çalışma, Türk kullanıcıları tarafından *Twitter*'da geliştirilen aşı tereddüdü ve komplo teorilerinin nedenlerini incelemeyi amaçlamaktadır. *#aşıyahayır, #aşıolmayacağım, #denekolmaTürkiye, #aşıolmakistemiyorum* gibi etiketlerle atılmış 3939 tweet analiz edildi. İncelenen kategoriler arasında bilimsel (bu kategorideki en yüksek sayıdaki yorumlar genellikle tıbbi yan etkilerle ilgili), çeşitli (en yüksek sayıdaki yorumlar aşı tereddüdü nedenlerinin belirtilmemesi ile ilgili), komplo teorileri (en yüksek sayıdaki yorumlar büyük ilaç şirketleriyle ilgili) ve genel içerik (Covid-19 aşılarının çocuklara uygulanmasına karşı görüşler) yer almıştır.

Anahtar Kelimeler: Covid-19, Covid-19 aşısı, aşı tereddüdü, *Twitter*, komplo teorisi.

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Introduction

At the beginning of 2021, intensive COVID-19 vaccination programs were launched worldwide with the aim of reducing the transmission of the disease in society and helping to control the pandemic. As of 2022, it can be said that these goals have largely been achieved, but it is clear that this process has been threatened by vaccine hesitancy and anti-vaccine sentiments expressed especially by citizens who do not want to get vaccinated. The World Health Organization considers vaccine hesitancy to be the biggest threat to the world (WHO, 2019).

The hesitations about vaccines have increased due to the rapid development of vaccines. People who are skeptical about vaccines are also influenced by negative content about vaccines. Especially those running anti-vaccine campaigns exacerbate vaccine hesitancy by negatively influencing those who are hesitant about the developed vaccines. In recent years, vaccine hesitancy has reached a threatening level due to reasons such as the increasing skepticism towards global pharmaceutical companies and developed countries and global capital owners, and the uncontrolled spread of all types of content on social media platforms.

The conspiracy theories that already existed before the pandemic about vaccines have increased, especially after the COVID-19 outbreak. Belief in conspiracy theories related to vaccine hesitancy has become more prevalent in both traditional and social media. Misinformation disseminated on high-traffic social media platforms such as *Twitter*[1], among others, can lead followers to develop fears and conspiracy theories, believe in them, and of course, spread them. Despite the fact that *Twitter* took some measures during the pandemic (such as issuing warnings, deleting *tweets*, and banning users), *tweets* related to vaccine hesitancy have shaken public confidence in vaccines (Puri et al., 2020; Roth & Pickles, 2020). It underscores social media's pivotal role during the COVID-19 pandemic in spreading vaccine hesitancy-related conspiracy theories, and highlights the damaging effect of disseminating misinformation on vaccine confidence.

This study aims to understand the COVID-19 vaccine hesitancy and anti-vaccine content and conspiracy theories developed by users on *Twitter*, which is one of the widely used micro-networks in Türkiye. This research is based on the content analysis of 4306 *tweets* with under anti-vaccine hashtags on *Twitter* posted between May 15-30, 2022, during the ongoing fifth wave. After eliminating repost *tweets*, content analysis was conducted on 3939 remaining *tweets*. The literature review of the study evaluated the relationship between vaccine hesitancy and conspiracy theories, and examined the literature on how effective *Twitter* is as a tool in developing conspiracy theories.

[1] The institutional name *X* was used as *Twitter* in the process of conducting this research; therefore, the name *Twitter* is used instead of *X* in the article.

The Relationship between Vaccine Hesitancy and Conspiracy Theories

Vaccine hesitancy is the uncertainty or concern that individuals have towards vaccines. Vaccine hesitancy occurs when individuals refuse or postpone one or all of the vaccines for any reason (Dubé et al., 2013). Conspiracy theories, on the other hand, are beliefs that often claim that there is a secret agreement between two or more groups, serving a purpose, using little or no evidence or misinterpreted data. Psychological factors, cognitive motives, existential motives, social motives, demographic factors, political factors, and ideology are among the key factors in individuals' inclination towards conspiracy theories (Douglas et al., 2019). On the other hand, conspiracy theories, it is crucial to comprehend why individuals might gravitate towards conspiracy theories and similar beliefs. Furthermore, it can aid in the formulation of tactics to mitigate the dissemination and influence of such theories.

The relationship between vaccine hesitancy and conspiracy theories become clear when individuals express their concerns or doubts about vaccines based on false information or conspiracy theories, instead of realistic evidence that would support their concerns or doubts. For example, an individual may have concerns about the harmful effects of vaccines and base these concerns on a conspiracy theory that claims that harmful substances are present in vaccines. Such beliefs can lead to behaviors such as vaccine opposition, based on false or misleading information about the safety and efficacy of vaccines, and can be detrimental to public health. As for political factors, Einstein and Glick (2015) have shown that people's political attitudes are influenced by conspiracy theories, reducing their trust in the government (Ejaz et al., 2021). This erosion of trust may further exacerbate vaccine hesitancy and hinder efforts to promote vaccination as a crucial public health intervention.

There are studies on vaccine hesitancy related to COVID-19 in different countries. In the US, there are studies on adults and different ethnic groups (Reinhart 2020; Funk & Tyson 2020); in the UK, there are studies on vaccine hesitancy among adults and the low vaccination rates among these individuals (Skinner 2020; Freeman et al., 2020); in Italy, there has been an increase in distrust towards vaccines during the first wave of COVID-19 (Palamenghi et al., 2020); in China, there are widespread concerns about the vaccine and almost two-thirds of the Chinese population prefer a domestic vaccine over a foreign one (Wagner et al., 2020; Lin et al., 2020). Salalı and Uysal (2020) conducted a comparative analysis for Türkiye and the UK, stating that COVID-19 vaccine hesitancy is higher in Türkiye (31%) than in the UK (14%), and that the participants are not sure about getting vaccinated themselves or their children. In a global study conducted by Lazarus et al. (2021) in 19 countries in 2020, it was found that vaccine hesitancy varied between 10% (China) and 45% (Russia) among countries. In these studies (Reinhart, 2020; Funk & Tyson, 2020; Skinner, 2020; Freeman et al., 2020; Palamenghi et al., 2020; Wagner et al., 2020; Lin et al., 2020; Salalı & Uysal, 2020; Lazarus et al., 2021), it can be seen that the concerns developed by individuals within the scope of vaccine hesitancy are

based on different worries, hearsay, and interesting conspiracy theories.

According to an accepted theory, individuals are inclined towards conspiracy theories because they need to maintain a positive self-image. Conspiracy theories give individuals a sense of importance and boost their self-confidence by providing them with significant information that others do not have. In fact, very few of these theories are new. It is possible to say that most of them are narratives with a long history, mutations, or combinations of existing conspiracy themes that take advantage of rhetorical maneuvers (Tutors & Night, 2020). Although this viewpoint offers an explanation for conspiracy theories, it might not entirely clarify the intricate psychological, social, and cultural factors at the core of each theory. Undertaking more extensive research into the nature and ramifications of these theories could aid in enhancing our comprehension of why individuals tend towards such convictions.

From the past to the present, technological devices and developments have received a fair share of conspiracy theories. Conspiracy theories related to mobile phone technology have been circulating since the 1990s. Doctors first spoke about "radiophobia" as early as 1903. After fears related to power lines and microwaves in the 1970s, in the 1990s, opponents of 2G technology claimed that radiation from mobile phones could cause cancer, and later this information began to be covered up. Other conspiracy theories related to 5G, such as the idea that it is responsible for the unexplained deaths of birds and trees, also exist (Tutors & Night, 2020). The conspiracy theorists who produce these theories generally have a worldview in which they interpret new information and events to fit their existing theories. Indeed, one of the defining features of conspiracy thinking is that it is self-sealing, unfalsifiable, and resistant to challenge. Ironically, the absence of evidence is often accepted as evidence of a large cover-up.

As known, the psychological, sociological, and physiological effects of the COVID-19 pandemic on society have been severe, much like other pandemics. Therefore, the motivation to take action in the current pandemic is likely to be undermined because it is difficult to partly refute conspiracy beliefs (Uscinski et al., 2016). Additionally, it is likely that belief in any of these conspiracies is related to belief in others, suggesting that some individuals may be more susceptible to such beliefs regardless of their content (Douglas et al., 2019). Additionally, some conspiracy beliefs have been associated with groundless vaccine fears and vaccine hesitancy (Hornsey et al., 2020; Jolley & Douglas, 2014). This finding could be a particularly important observation because vaccinating a high proportion of the population is one of the surest ways to control it when faced with the threat of an epidemic (Greenwood, 2014). If beliefs in conspiracy theories are associated with groundless fears about the nature or effects of vaccines, their circulation through word-of-mouth or social media platforms can undermine countries' ability to defeat infectious diseases. Research on conspiracy theories developed about the COVID-19 virus

and vaccine has found that these theories differ in different countries and cultures. For example, Salalı & Uysal (2020) found that the belief in Türkiye that the virus is of natural origin is higher than that of the British public, while the British public is closer to the idea that the virus is not natural. Varol et al. (2021) found in their research that vaccine hesitancy in Türkiye is high for mRNA-based narratives, bioterrorism, and global gang-related Bill Gates and "globalists" narratives.

It can be said that social media is especially used as a source of spreading conspiracy theories and disinformation during such times. According to a study conducted in Türkiye, the most popular claim on social media during this period was that the virus was intentionally spread by the elites and wealthy families of the world (Efendioğlu, 2020). Most of the theories refer to Bill Gates and the Bill and Melinda Gates Foundation. Although the Gates Foundation has been a strong supporter of the elimination of various diseases (such as polio and measles) in different countries over the past decade, it is at the forefront of COVID-19 conspiracy theories due to its mission.

Many conspiracy theories have been put forward about the COVID-19 virus and vaccine worldwide. Especially, many theories (Megget, 2020; Geldsetzer, 2020; Pennycook et al., 2020) such as the connection between 5G mobile networks and the virus, people who participated in vaccine trials died due to various illnesses after receiving the COVID-19 vaccine, and the outbreak being a biological weapon quickly spread through social media platforms. The analysis of these theories shows that many of them have the potential to negatively affect people, such as the belief that research on vaccine efficacy has been manipulated to benefit pharmaceutical companies, thus these research results encourage anti-vaccine attitudes (Jolley et al., 2014).

According to the conspiracy report prepared by the Turkish verification platform "Teyit.org" in 2021, COVID-19 related conspiracies are categorized under three main headings: mRNA-based conspiracies, side effect-based conspiracies, and conspiracies related to individual rights and freedoms. mRNA-based conspiracies claim that mRNA is actually a game played by Bill Gates, *Pfizer*, and other globalists represented by Uğur Şahin. These findings are parallel to the conspiracy contents developed by anti-vaxxers on *Twitter* in Türkiye, which will be discussed in the later sections of the study. The mRNA vaccines related conspiracy theory is also centered around Bill Gates and globalists (Efendioğlu, 2020). The circulation of various videos and text messages among anti-vaxxer groups claiming that the Gates Foundation has a secret plan to implant trackable microchips in people through vaccines. These allegations have caused Gates to officially deny these unfounded and illogical statements with no evidence supporting them.

Side effect-based conspiracies, on the other hand, are conspiracies that discuss the side effects of vaccines. It is claimed that vaccine side effects include psychological distress, allergies, anaphylactic shock, Parkinson's disease,

Alzheimer's disease, and even autism in children. In conspiracies related to individual rights and freedoms, it is claimed that individual rights are violated by mandatory vaccinations. The existence in Türkiye of vaccine cards, required for access to malls and public transportation, as well as travel restrictions for those who do not own them, it has led to allegations claiming that individuals are being monitored and tracked by global and state powers, which is seen as a violation of individual rights and freedoms. It has been argued that the real purpose of these restrictions is to violate people's rights, monitor individuals, and control their movements (*Teyit*, 2021).

Conspiracy Theories and 'Twitter'

Those who have doubts about vaccines developed at record speed are affected by organized disinformation campaigns about vaccines. This has also been the case in Türkiye. Those conducting disinformation campaigns have misled people having doubts, casting a shadow over the fact that vaccinessave lives, and will continue to do so. Anti-vaccination movements have reached a new level due to the increase in scientific and government skepticism in recent years, the rapid spread of information on social media, and individuals producing and sharing content, making infodemics a new threat (Ratzan & Parker, 2020). In particular, there has been intense belief in conspiracy theories during the COVID-19 pandemic.

Nowadays the belief about conspiracy theories is widespread both in social media and traditional media (Olatunji et al., 2020; Romer & Jamieson, 2020; Theocharis et al., 2020). As it is known, *Twitter* has a high number of users in many countries, including Türkiye (16.1 million users), the USA (76.9 million users), Japan (58 million users), and the UK (18.40 million users) in terms of internet population (*We Are Social*, 2022). The report shows that Türkiye has a significantly higher number of users compared to countries such as Germany, France, and Spain. Therefore, understanding the impact of popular platforms like *Twitter* on health information related to COVID-19 (including vaccine hesitancy and vaccine conspiracies) is important (Rosenberg et al., 2020; Statista, 2020; Blank et al., 2019; Wojcik & Hughes, 2019). The widespread belief in conspiracy theories is heavily present on social media and traditional media today, particularly on platforms like *Twitter*, which boast significant user bases in several countries.

Conspiracy theories are also frequently spread on social media in Türkiye, serving as a source of disinformation. On *Twitter*, common theories include mRNA-based narratives, bioterrorist and global cabal-focused narratives centered around Bill Gates and "globalists," narratives about severe side effects and the need to avoid vaccines, and finally, narratives focused on individual rights violations with mandatory vaccination (Varol et al., 2021).

Methodology

With the development and release of the COVID-19 vaccine, there has been a group of people who want to get vaccinated, as well as a segment who have vaccine hesitancy. Considering both the current situation and the literature, it has been understood that vaccine hesitancy is being discussed particularly through social media, and content is being produced and shared about the subject regardless of its accuracy, which supports individuals' vaccine hesitancy. This research aims to determine the subject matter of these conspiracies produced on *Twitter* and to discuss vaccine hesitancy based on conspiracy theories. The research investigates the conspiracy topics in tweets related to vaccine hesitancy. Moreover, it aims to identify whether there are different conspiracies in *Türkiye* beyond the existing vaccine hesitancy discourses in the literature.

Concerning methodological aspects, since this research combines textual and non-textual analysis, together with an empirical study based on existing material, content analysis has been preferred. Content analysis is also generally preferred in analyzing content on *Twitter* (Einspanner et al., 2016, p. 139).

Research design

The purposive sampling method was used to select tweets shared with the hashtags *#aşıyahayır* (*#notovaccine*), *#aşıolmayacağım* (*#Iwillnotgetvaccinated*), *#denekolmaTürkiye* (*#donotbeatestsubjectTürkiye*), and *#aşıolmakistemiyorum* (*#Idonotwanttogetvaccinated*), and content analysis was applied to these tweets. The reason for selecting these *hashtags* is that they were frequently used during the relevant period and generally reflect vaccine hesitancy.

The research was conducted between May 15, 2022, and May 30, 2022, during the period referred to as the fifth wave in Türkiye during the COVID-19 pandemic. Despite this being the fifth wave, it coincided with a period of increasing case numbers and discussions about third doses of the vaccine. Content analysis was performed on *tweets* posted under the relevant *hashtags*. The coding sheet used in content analysis was developed from the studies of Thelwall, Kousha, and Thelwall (2021). The vaccine hesitancy discourses obtained were grouped according to main categories. In this study, a total of 4306 *tweets* were included in the sample, selected using purposive sampling method to be suitable for content analysis. Out of these *tweets*, 367 *retweets* were excluded from the research sample. Therefore, the research sample consisted of 3939 Turkish *tweets*. Within the scope of the research, 3939 *tweets* were classified according to categories, and the data were analyzed using the *SPSS 22.0* program.

Before the research, coders were trained for inter-coder data reliability, and then a pilot test was applied to the coders. After the relevant revisions were made, the coding process began. The Krippendorff's alpha value for in-

ter-coder reliability measurement is α=0.764, which is within an acceptable range (Krippendorff, 2011).

Findings and Discussion

A total of 3939 *tweets* were analyzed from 4306 *tweets* obtained from the relevant *hashtags*. These are classified under four main headings as scientific content, miscellaneous content, content related to conspiracy theories, and content based on general topics. There are also subcategories under these main categories. Under the scientific content category, categories such as research results, the origin of the vaccine, the speed of vaccine development, the usefulness of the vaccine, and medical conditions/side effects are included. Under the miscellaneous category, posts include such as jokes, irrelevant posts that did not say anything about vaccine opposition, and posts about reasoning religion were classified. Under the content related to conspiracy theories category, subcategories such as the World Health Organization, global pharmaceutical companies and mRNA, Bill Gates and globalists, developed countries, genetic code alteration, and mRNA are included. Under the general topics based content category, beliefs such as COVID-19 being similar to the flu, critics to the decisions of healthcare workers, contradictory statements by institutions developing vaccines, opinions against the application of COVID-19 vaccines to children, reservations about mRNA vaccines, and opinions that the public is not provided with sufficient information about vaccines are grouped. The distribution of *tweets* belonging to 4 main categories is presented in *Table 1*.

Table 1. The distribution of main categories related to vaccine hesitancy

Main Categories	N	%
Scientific Content	1373	34,5
Miscellaneous Content	662	16,7
Content Related to Conspiracy Theories	1486	37,7
General Topics	418	11,1
Total	3939	100

When the distribution of content generated regarding COVID-19 vaccine hesitancy was examined by categories in *Table 1*, it was found that content related to conspiracy theories (n=1486) was the most generated content with a rate of 37.7%. Scientific content (n=1373) ranked second with a rate of 34.5%, while miscellaneous content (n=662) ranked third with a rate of 16.7%, and content dealing with general topics (n=418) ranked last with a rate of 11.1%.

While the distribution of main categories is as stated above, each sub-category of each main category was also examined in the scope of the research.

Table 2. The distribution of content related to scientific subjects

Scientific Topics	N	%
Research Results	64	1,6
Origin of the Vaccine	20	,5
Speed of Vaccine Development	200	5,0
Effectiveness of the Vaccine	406	10,2
Medical Conditions/Side Effects	683	17,2

The distribution of content based on scientific topics is presented in *Table 2*. When the main category of content based on scientific topics with five subcategories is examined, it is founded that content related to medical conditions/side effects (n=683) is the most frequently produced content topic. Doubts about the effectiveness of the vaccine (n=406) ranks second with a rate of 10.2%, and the speed of vaccine development (n=200) ranks third with a rate of 5%. It has been determined that the categories with the least amount of content produced are the origin of the vaccine (n=20) and research results (n=64).

The COVID-19 vaccine, which was produced in a short period of time as part of the vaccine development process, was positively received by some people but has also generated distrust among others due to the speed of its production. This process has had a negative impact on global vaccine acceptance (Danchin & Buttery, 2021). It is appropriate to note that concerns and doubts about the rapid development of vaccines have been reflected in the content shared in Türkiye.

Due to the fact that developed countries are also producers of the vaccine, conspiracy theories have been developed regarding their intentions. Conspiracy theories about the vaccination process have also been frequently developed due to the financial interests of vaccine producers (Küçükali et al., 2022). Many different vaccines, such as *Sinovac* developed by China, *Biontech* developed by the American company *Pfizer* and the German company *Biontech*, and *Moderna* developed by the United States, have entered the market today.

Discussions have been held on issues such as the contents, effectiveness, and origin of these vaccines. As shown in *Table 2*, conspiracy theories related to the origin of the vaccine have been produced in the content created by the Turkish public, although they are not as intense. Here are a few examples of *tweets* about the origin of the vaccine:

> What exactly is in the Chinese vaccine?
>
> Türkiye will pay $1.8 billion for 120 million doses of BioNTech vaccine. With orders for China's Sinovac and Russia's Sputnik, Türkiye will pay a total of 30 billion TL for the vaccine market. This vaccine spiral will continue like this. How did the world get

into such a vortex

The rapid development of the vaccine is another subject of discussion and a reason for vaccine hesitancy. Some individuals have questioned the vaccine due to its quick development and short trial periods. Example *tweet* about the rapid development of the vaccine:

> Even the phase 3 study alone takes at least 3 years on tens of thousands of volunteers.

On the other hand, research shows that concerns about the efficacy and efficacy of the vaccine are among the main reasons for vaccine hesitancy (Troiano & Nardi, 2021; Reno et al. 2021). Of course, these statements have quickly spread through content shared on social media, causing similar concerns in Türkiye. It can be said that this situation is reflected in the content shared. Example *tweet* about the vaccination efficacy:

> They say that when you get vaccinated, there are not enough antibodies to protect you for the first 14 days. They also say that even if three months have passed since your vaccination, it won't protect you. The full sentence is this: "If you want, get the 10th dose, the protection only lasts for 2.5 months, the truth is this: There is no protection.

Under this main category, there are also posts related to vaccine hesitancy based on research results with a scientific basis. One of an example of these posts: "New research results have been published. According to a study published in the world's most prestigious scientific journal, Nature, COVID-19 vaccines increase the risk of #heartattack by 25% in young people."

Table 3. The distribution of content related to miscellaneous contents

Miscellaneous Contents	**N**	**%**
Jokes	37	0,9
Irrelevant posts for Vaccine Hesitancy	618	15,6
Religious Reason	7	0,2

According to *Table 3*, under the main category of "Miscellaneous", there are three subcategories. It is observed that the subcategory of irrelevant posts for vaccine opposition (n=618) has the highest percentage of 15.5%. Jokes (n=37) ranks second, and religious reasons (n=7) rank third.

Moreover, there are also studies evaluating the reasons for COVID-19 vaccine hesitancy within the framework of religious beliefs. Research showed the spreading of the false belief that pig meat was used in the development process of the vaccine (Khan et al., 2020) had an impact on vaccine hesitancy. However, when considering the produced content, it can be seen that expressions of vaccine hesitancy due to religious beliefs are quite low among *tweets*. Although the relationship between religious reasons and COVID-19 vaccine

hesitancy is debated worldwide, it can be said that this finding did not stand out in the content during the period under review.

An interesting finding is the content that declares being vaccine hesitant without stating the reasons for it. The high number of content expressing vaccine hesitancy without a causal relationship being specified is a noteworthy finding.

The studies have shown that people who have vaccine hesitancy use jokes and sarcasm to spread their hesitancy and convince those who are inclined to get vaccinated not to get vaccinated (Scannell et al., 2021). In Türkiye, humor is also frequently used as a tone in social media content. In this context, jokes were also found in some of the content shared by people who have vaccine hesitancy.

One example of such content is: "You must definitely get the 5th dose. My guess is that dose is the 'common sense dose.' I could be wrong though. Maybe it's the 6th dose or the 8th or 9th. I'm surprised too at this point."

Table 4. The Distribution of content related to conspiracy theories

Content Related to Conspiracy Theories	N	%
World Health Organization (WHO)	250	6,7
Large Pharmaceutical Companies	359	8,9
Bill Gates and Globalist	337	8,5
Developed Countries	320	8,1
Genetic Code Modification and mRNA	220	5,5

According to *Table 4*, which shows the distribution of content related to conspiracy theories, content related to large pharmaceutical companies (n=359) is in the first place with a rate of 8.9%, followed by content related to Bill Gates and globalists (n=337) with a rate of 8.5%, and in third place, content related to developed countries was found to be the most produced content topics. The lowest rate in this main category was 6.7% for the World Health Organization (WHO) (n=250) and 5.5% for genetic code modification and mRNA (n=220).

There have been claims that the COVID-19 vaccine, being an mRNA vaccine, will affect and even alter the DNA structure of humans. Conspiracy theories have been produced and shared regarding genetic code changes being a cause for vaccine hesitancy. Some examples of content related to this topic are: "Pfizer Biontech and mRNA vaccines can affect and change the genetic structure in the nucleus of cells" and "Isn't it clear that mRNA is gene therapy?"

On the other hand, it is noteworthy that narratives centered around "Bill Gates and globalists" are prevalent in *tweets* about mRNA vaccines. In fact,

some who expressed this narrative have thought that Bill Gates has implanted chips in *Sinovac*, *Moderna* and *Biontech* vaccines that can give commands and manipulate people. It is also claimed that Gates is working with institutions such as the CDC (Centers for Disease Control and Prevention) and the WHO (World Health Organization), as well as *Pfizer* and Uğur Şahin. In a study conducted by Teyit.org, it is known that names frequently mentioned in popular culture such as "illuminati" and "Rockefeller family" are also mentioned in the context of this narrative (*Teyit.org*, 2021).

> One example related to major pharmaceutical companies is as follows:
>
> *Pfizer* Vice President Rady Johnson has been arrested at his home and is awaiting bail hearing on numerous fraud charges by federal agents. This comes after thousands of secret documents were released from *Pfizer* showing the real risks of the experimental vaccine.

Research confirms that conspiracy theories are a common discourse. According to a study conducted in the United States, it was found that the most common conspiracy theories in tweets were those related to Bill Gates (Kearney et al., 2020). Studies conducted in different countries have also found views related to the microchip and tracking device within the vaccine through the Bill Gates discourse (Nuzhath et al., 2020; Berry et al., 2021). In this context, it would be correct to say that this conspiracy theory is a widely believed and shared conspiracy theory among the Turkish public, both in the literature and in our study. Among the conspiracy theories regarding the side effects of vaccines, there are also observations that even if vaccinated, deaths continue and death rates increase after vaccination. Similar remarks were observed in a 2021 study conducted by *Teyit.org*, and it was understood that this conspiracy narrative was intertwined with the narrative related to mRNA vaccines (Teyit, 2021).

Some conspiracy theories also include the idea that WHO collaborates with pharmaceutical companies. An example of a *tweet* about WHO is as follows: "There are pharmaceutical companies and vaccinators behind the World Health Organization."

On the other hand, among the conspiracy theories put forward is the view that developed countries produced the COVID-19 virus in a laboratory to reduce the world population. An example of a tweet about developed countries is: "Why are third world countries with extremely low vaccination rates experiencing far fewer ' COVID-19 deaths' than Western countries with high vaccination rates? This is a complete mystery! Isn't it?"

Table 5. The distribution of content related on general topics

General Topics	N	%
The Belief That COVID-19 is Similar to the Flu	42	0,9
Criticizing the Decisions of Healthcare Workers	78	2,0
Conflicting Statements from Institutions that Developed the Vaccine	62	1,6
Hesitant about Vaccinating Children against COVID-19	165	4,6
Concerns about mRNA Vaccines	66	1,8
The View that Sufficient Information is not Provided to the Public about Vaccines	5	0,2

The distribution of content based on general topics can be seen in *Table 5*. The sub-category of opinions against vaccinating children (n=165) is the highest with a rate of 4.6% among the sub-categories of this main category. Criticizing the decisions of healthcare workers (n=78) has a rate of 2%; concerns about mRNA vaccines (n=66) have a rate of 1.8%; and conflicting statements from institutions that developed the vaccine (n=62) have a rate of 1.6%.

Both in Türkiye and worldwide, there are opinions approach with hesitation the vaccination of children against COVID-19. Studies have shown that there is a group that is hesitant about vaccinating children against COVID-19 (Yang et., 2021). In this context, the fact that the highest sub-category in the general topics category is about theories regarding vaccinating children indicates a similarity of thought between Türkiye and the world.

An example of a *tweet* on this issue is as follows: "We will see and hear more of these events. I wonder if he had been vaccinated. A 14-year-old kickboxer had a heart attack and died while walking on the street."

On the other hand, criticizing the decisions of healthcare workers and distrust towards them is one of the globally discussed issues. Especially during the vaccination period, different opinions and conspiracies emerged due to reasons such as contradictions in the statements of healthcare workers. Similarly, in the study conducted by Jiang et al. (2021), the distrust of social media users towards healthcare workers regarding the COVID-19 vaccine was emphasized. An important finding that stands out in this study is that some conspiracy narratives are intertwined. It is possible to state that in these narratives, vaccine hesitancy is used together with Bill Gates and globalists. An example of how both narratives are intertwined in the content produced about healthcare workers: "Bill Gates managed the pandemic process alone. Medical experts followed him."

On the other hand, the belief that COVID-19 is similar to the flu also appears in posts related to vaccine hesitancy, and therefore, arguments not to get vaccinated are put forward. Studies also show that there is a group that believes that COVID -19 is not worse than the flu. The view that Covid-19 is exaggerated due to reasons such as damaging national economies or introducing unpopular/restrictive laws is widespread (Imhoff & Lamberty, 2020). An example post on this issue is: "Disease cannot be detected with the PCR test. COVID-19 is a normal type of flu. Biological fluids called vaccines are not reliable."

Among the limitations of the study are the selection of only *Twitter* for the research, the necessity of framing the research with specific *hashtags*, and its coverage limited to only the fifth wave (due to time constraints).

Conclusion

The world has been going through a period of intense debates on the safety of COVID-19 vaccines for the past three years. Concerns about vaccine hesitancy and the impact of anti-vaccination content on individuals' hesitancy have constantly increased during periods when the Covid-19 virus was widespread and seriously affecting public health. In this context, it can be stated that the lack of information and trust threatens the success of vaccination programs. In addition to traditional media, various voices continue to rise through various social media platforms regarding vaccine hesitancy. Among these voices, negative content, misinformation, rumors, myths, and conspiracies in particular, continue to spread rapidly throughout society via various social media platforms, in addition to traditional media (Wolfe et al., 2002; Zimmerman et al., 2005). This widespread effect is also harmful because it clouds the importance of vaccines in developing herd immunity against viruses and discourages individuals from getting vaccinated (Kata, 2012). An old study conducted in the United States (National Immunization Survey, 2009) is noteworthy. This study found that individuals who are hesitant or opposed to vaccinations tend to gather information about vaccines from the internet (Smith et al., 2011).

In the study, a total of 3939 *tweets* shared with the *hashtags #aşıyahayır* (*#notovaccine*), *#aşıolmayacağım* (*#Iwillnotgetvaccinated*), *#denekolmaTürkiye* (*#donotbeatestsubjectTürkiye*), and *#aşıolmakistemiyorum* (*#Idonotwanttogetvaccinated*) were analyzed through content analysis method to investigate the main topics of COVID-19 vaccine hesitancy shared on *Twitter* in Turkish language. The shared content was categorized into four main categories, with the highest percentage (37.7%) being represented by conspiracy theories. Conspiracy theories were grouped into sub-topics such as World Health Organization-related issues, major pharmaceutical companies, Bill Gates and globalists, advanced countries, genetic code modification, and mRNA. In this context, it can be emphasized that conspiracy theories are prominent on social media and vaccine hesitancy is spreading based on these

theories.

The main topics of *tweets* related to vaccine hesitancy have been examined. In addition, issues other than the current vaccine hesitancy discourse in the literature have been explored. It can be noted that, similar to the literature worldwide, conspiracy theories have come to the forefront during this process. Along with conspiracy theories that claim that large pharmaceutical companies created the virus to make a profit, there are also claims that global powerful company owners such as Bill Gates aim to control the world by injecting microchips with vaccines, that COVID-19 vaccines cause genetic code changes, and that advanced countries spread the COVID-19 virus to reduce the world population and that those without access to vaccines will die from the virus. A wide range of conspiracy theories are observed to be present on social media.

According to the findings, expressions related to vaccine hesitancy have been remarkable in miscellaneous contexts without citing a specific reason for vaccine opposition. Although the content regarding general topics is quite diverse, hesitations about administering the COVID-19 vaccine to children were found to be predominant.

Misinformation due to anti-vaccine behaviors in society potentially hinders the COVID-19 vaccine. The failure of such a vaccine program can actually have a domino effect on other vaccine programs. Vaccine hesitancy can narrow the scope of the vaccine, increase the risk of preventable diseases and epidemics (Dube et al., 2013).

The development of conspiracy theories and their spread on social media emphasizes an important deficiency in health literacy and vaccine literacy. In this process, vaccine literacy has also become important. Because during the pandemic, governments, public health officials, and healthcare workers have been working to convey the right message to persuade people to get vaccinated. On the other hand, the issue of the society interpreting the messages correctly has also become important. Although clear and consistent communication in new vaccine programs such as Covid-19 is very important to gain public trust, gaining health and vaccine literacy is vital (Etesaminia & Bağcı, 2021). Therefore, multi-sectoral elements are required to reduce Covid-19 and the theories, myths, and conspiracies related to vaccines, and to increase vaccine acceptance. In addition, such studies can help understand how and where anti-vaccine information is shared and can assist in counteracting these efforts (Wang et al., 2019).

For further studies, it is recommended to support this research topic with a field survey to determine the views of the Turkish people on COVID-19 vaccine hesitancy and to examine the reasons for believing in conspiracy theories.

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