Article

Re-Gendering Conspirational Thinking: How Social Media Use, Gender and Population Densities Affect Beliefs in Conspiracy Theories on COVID-19

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Abstract: This paper aims to investigate how social media use and gender affect beliefs in conspiracy theories on COVID-19 and how these beliefs correlate with the frequency and patterns of their use, as well as the distribution of population density in rural, town, and urban areas. I collected data from Valcon Project surveys, analyzing the usage of social media by citizens from six European countries (Italy, Germany, France, Spain, Poland, and Ireland) on issues like the origin of the COVID-19 pandemic spread. The findings, which take into consideration gender and population density, suggest that different social media platforms affected such beliefs in different ways (platform association), and this effect is also mitigated by the specific content of such conspiracy theories (content association).

Keywords: conspiracy theories; social media; gender gap; gender differences; population density; COVID-19; survey data

1. Introduction

Conspiracy theories are defined as “an explanation of historical, ongoing, or future events that cites as a main causal factor [behind events] a small group of powerful persons […] acting in secret for their benefit against the common good” (Uscinski 2018). Although, with the advent of the pandemic, there has been a proliferation of conspiracy theories related to the creation and dissemination of the virus, the phenomena are not unprecedented, as they “have a long history” (Harambam and Aupers 2017) and “exist in all cultures and societies” (Butter and Knight 2018). In the 1940s, Karl Popper conceptualized a “conspiracy theory of society” (Popper [1945] 2011), but the phenomenon gained more visibility with Richard Hofstadter’s “The Paranoid Style in American Politics” (Hofstadter [1964] 2008), as he framed conspiracy theories as a fringe phenomenon related to clinical paranoia. The author’s influence has been considerable until more recent times, since a lot of studies are based on his previous assumptions and focus more on psychological factors associated with conspiracy beliefs (such as “paranoia and anxiety”) or existential factors (such as “feeling unsafe”). This has the effect of increasing the level of agreement among citizens with regard to conspiracy theories, including those related to COVID-19 (Georgiou et al. 2020; Miller 2020). As Goertzel (1994) argues, conspiracy beliefs are associated with a monological belief system, meaning that those who endorse some conspiracy theories are more likely to believe in others. Cognitive and social psychologists highlight how belief in conspiracy theories is related to a variety of cognitive biases (Wagner-Egger et al. 2018), an intuitive thinking style (Swami et al. 2014), and paranormal beliefs (Bruder et al. 2013). Other researchers have focused on the cultural meaning of conspiracy theories, arguing that suspicions about the state, industry, or corporations could be quite “reasonable” in a context that has become highly complex and globalized (Aupers 2012). Conversely, other studies focus more on the social conditions as a predictor of conspiracy beliefs in those individuals who belong to marginalized groups, such as women. Uscinski and Parent (2014) argue that, in the United States, “conspiracy theories are for losers”. Conspiratorial beliefs...
are also associated with individuals’ political orientation; several studies have shown that those who endorse an extreme political view are more prone to conspiracy beliefs (Van Prooijen et al. 2015). Other research has shown that mistrust of authorities, institutions, and the media is strongly associated with conspiratorial beliefs (Cordonier et al. 2021). If paranoic traits of the personality, cognitive bias, sense of social anxiety and threats, mistrust in government and media, as well as extremist political views are considered prominent conspiracy predictors, there is still a lack of knowledge about other variables that could be associated with conspiracy endorsement. This study aims to fill this gap by considering how conspiracy beliefs vary according to a series of conspiracy predictors such as context, gender, the content of the specific conspiracy theories, and the use of social media platforms. By adopting what I here call a “multivariate approach” in investigating COVID-19 conspiracy predictors, I analyze how the pattern and frequency of social media use and gender affect the level of agreement about the two popular conspiracy theories on COVID-19, net of any differences based on the distribution of population density. I collected data from Valcon project surveys carried out in six European countries (Italy, Germany, France, Spain, Poland, and Ireland) in 2021 about issues like the origin of the COVID-19 pandemic spread. The findings suggest that the use of different social media platforms could affect conspiracy beliefs about COVID-19 in different ways, and the specific content of such conspiracy theories also mitigates this effect. The article structure is as follows: the first section reviews previous studies on conspiracy theories about COVID-19, gender, population densities, and social media use. This review frames the hypotheses. Subsequently, I discuss the data being used, the research methods applied, and the results obtained. The article concludes with a general discussion of the findings and their implications.


Recent research has focused on the “context” through which conspiracy theories spread (Caycho-Rodríguez et al. 2022), highlighting how their endorsement varies according to country-level contextual settings, socio-economic and cultural factors, the level of democracy in the country, and the media landscape (Van Mulukom et al. 2022; Tsamakis et al. 2022; Hornsey et al. 2022; Douglas et al. 2023). In line with this study, Schlipphak et al. (2021) highlighted the importance of context, as they sustained how the credibility of the content of conspiracy theories among the public is dependent on the country specificity (context effect). Recent research has shown that the level of agreement of conspiracy theories may be more related to time and contexts than to long-term individual predispositions (Decker et al. 2020; Roozenbeek et al. 2020). Other research emphasizes the importance of analyzing each conspiracy theory separately and adopting a geographical approach to explain why they are more successful among certain countries and populations than others.

In their study on conspiracy endorsement worldwide, Fotakis and Simou (2023) demonstrate the significance of geographical context by identifying a “regional pattern” in endorsing a singular conspiracy narrative. For instance, the Lab Theory Item is more widely believed in Ireland and Germany, with prevalence rates ranging from 21 to 30%, compared to the big pharma plot, with only 6.8%. The Lab Theory is also popular in Italy, with a 33% acceptance rate among the population. A study conducted by Caycho-Rodríguez et al. (2022) aimed to explore the variation of conspiracy beliefs regarding COVID-19 in 13 Latin American countries, indicating that women, people with a lower educational level, and those who received information about the vaccine and COVID-19 from family are more supportive of conspiracy ideas about them. Less investigated in conspiracy belief research is how these beliefs are accepted by those living in rural, town, and urban contexts with different population densities—i.e., the number of individuals per unit area or volume within a defined spatial boundaries (Schowalter 2022).

These areas, indeed, are characterized by various socio-environmental factors such as the number of residents, the degree of urbanization, the gentrification processes, as well as demographic, socio-economic, and cultural differences. For example, Flaherty et al.
found in their study that 5G conspiracism is a distinctly urban concern as—being it a predominantly urban technology—its devices are currently installed in areas of high population and production densities. On the other hand, investigating vaccine hesitancy in the rural population of Peshawar (Pakistan), Khan et al. (2023) found that 54.4% of citizens believed the vaccine was part of a “conspiracy”. These results align with another study by Mbombi et al. (2022) among Black people living in rural areas of Limpopo Province, South Africa, which demonstrated that COVID-19 vaccine hesitancy is correlated with low levels of education, gender, religion, conspiracy beliefs, and reliance on traditional healers. This study aligns with the proposed research directions, advancing a deeper understanding of the dynamics of endorsement of conspiracy theories on COVID-19 in rural, town, and urban settings by addressing how gender, frequency, and pattern of social media use affect these beliefs, net of any population density.

3. How Gender Differences and Social Media Use Affect Beliefs in Conspiracy Theories on COVID-19

In previous research on conspiracy beliefs, gender is often treated in terms of sexual differences between men and women (Cassese et al. 2020; Georgiou et al. 2020; Popoli and Longus 2021). These studies do not consider gender as a “social construction” (Lorber 2018), a concept that goes beyond biological differences and indicates how an individual’s personality is constructed from his/her interactions and social experiences. On the one hand, this bias in terms of analysis is because gender differences in conspiracy endorsement are still under-explored, and, on the other hand, gender is often used as a “control variable” (Cassese et al. 2020). Although aware of this limitation, which is in line with other research based on the survey, I use the concept of “gender” in this study to indicate sexual differences between men and women, given that, in the sample, only three respondents identified themselves as “non-binary” in terms of gender identity. Although aware of this limitation, the data show clear differences between women and men concerning conspiracy beliefs on COVID-19. Therefore, future research investigation are needed about how conspiracy beliefs are endorsed by non-binary, queer, and transfeminist subjectivities. Existing literature is conflicting when analyzing gender differences as conspiracy predictors. While recent studies have shown that women were significantly less likely to support conspiracy theories than men, and that this gender gap transcended party lines (Cassese et al. 2020), other research shows that women compared to men are more prone to endorse conspiracy theories. Popoli and Longus (2021) found that females’ scores were higher than males in all five facets of a conspiracy theory: government malfeasance, malevolent global conspiracies, extraterrestrial cover-up, personal wellbeing, and control of information. Other research has shown that gender is a more reliable predictor of COVID-19 conspiracy beliefs than political affiliation (Anderer 2020). Therefore, what role specifically do gender differences play in the use of social media in endorsing conspiracy beliefs on COVID-19? Social media have played a pivotal role in the dissemination of conspiracy theories (Erokhin et al. 2022), despite the attempt by these platforms to remove this content (Rogers 2020). While recent studies underline how social media represent the ideal public arena for spreading conspiracy theories (Enders et al. 2021), Stecula and Pickup (2021) argue that it is important to look at these platforms individually, given that “different social media platforms could have different effects on people accepting conspiracy theories”. They refer to the theoretical framework of “technological affordances” (Bossetta 2018), which assumes that different features of social media platforms could ease or restrain particular behavioral outcomes (Evans et al. 2017). In a platform like Facebook, the “dyadic” mode of connectivity among like-minded users could facilitate the spread of conspiracy theories (Bossetta 2018). Allington et al. (2021) showed a significant relationship between holding one or more conspiracy beliefs and using friends as a source of information about COVID-19. Conversely, on a platform like Twitter, the unidirectional mode of interaction among accounts does not require a user to confirm the request for the connection s/he receives. This technical feature encourages users to build a large network composed of weak ties with no real-life connec-
tion (Huberman et al. 2008). Thus, the “visibility” of posts depends on the users’ capacity to attract a great number of followers—like politicians and journalists—who can play a gatekeeping role in the dissemination of conspiracy theories, which have the effect of mitigating user exposure. Twitter has also implemented a strict policy of content moderation against conspiracy theories, compared to other platforms. A study conducted by Theocharis et al. (2021, p. 3426) found that the use of Twitter is negatively associated with the level of agreement of conspiracy theories on COVID-19. YouTube is considered a “special case” given that the mode interaction among users is asymmetrical, and the user’s exposure to content is mediated by algorithms, which select videos based on previous preferences (Theocharis et al. 2021). This selective exposure to content could strengthen conspiracy beliefs in those users who already endorse a conspiratorial mindset. On Instagram, the connectivity is very similar to that on Twitter, but the visibility of the content is entrusted to “ordinary users” who can attract several followers that give resonance to the content being posted. A study conducted by Quinn et al. (2021) found that on 200 posts that contained the theme of general mistrust, 67% of them either directly or indirectly mentioned COVID-19, and within conspiracy theory-themed posts, 46% of them had either a direct or indirect link to COVID-19. However, more research still needs to be conducted about the interplay between gender, the use of social media, and conspiracy beliefs on COVID-19 to include diverse perspectives into research “with special attention to the voices of the marginalized” (Beetham and Demetriades 2007, p. 200). A recent study reported that women, people with lower educational levels, and those who relied on social networking platforms as the main source of information presented higher conspiracy beliefs about COVID-19 vaccines (Romer and Jamieson 2020; Sallam et al. 2021). A study conducted by Moskalenko et al. (2023) found that QAnon narratives moved through and across social media platforms to appeal not just to Republican supporters of Trump, but also to traditionally left-leaning women, yogis, vegans, and mom influencers. This conspiracy narrative has a special appeal for women, spreading quickly over female-centric platforms, i.e., Instagram and Facebook. Burt-D’Agnillo (2022) highlights a difference between the male-dominated conspiracy theory space and the female-dominated conspiracy theory, mainly focused on “conspirituality” (Ward and Voas 2011). This concept refers to the combination of conspiracy theories and New Age philosophies, to which many groups linked to the extreme left often refer. One of the factors that may be contributing to the proliferation of COVID-19 anti-vaccination conspiracy theories is the way that the messaging has been branded as soft and maternal by women wellness influencers. A study conducted by Hermanová (2022) on ‘spiritual influencers’ in the Czech Republic shows that some women influencers propagate conspirative narratives about COVID-19 through their profiles, claiming that the COVID-19 was not a dangerous virus, but rather a pretext used by the government to control citizens. These public figures could facilitate the spreading of conspiracy theories and feed and reinforce conspiracy thinking among their followers and communities by using photos, reels, and stories posted on their profiles.

Considering these theoretical implications and empirical evidence, I can formulate a set of hypotheses:

**Hypothesis H1.** Frequent use of Facebook, YouTube, and Instagram by women, compared to men, will be positively associated with agreement with COVID-19 conspiracy theories.

**Hypothesis H2.** Frequent use of Twitter by women, compared to men, will be negatively associated with agreement with COVID-19 conspiracy theories.

### 4. Results

#### 4.1. Level of Agreement of the Two Conspiracy Theories by Gender Differences and Population Density

Figures 1 and 2 provide insights into the agreement patterns with two COVID-19 conspiracy theories, considering gender and population density (Cities, Rural Area, and Towns). Regarding the level of agreement on the big pharma and Gates Foundation
theory, in towns, 33.7% of women versus 20.8% of men strongly disagree with the idea of pharmaceutical companies’ involvement. Conversely, in rural areas, more men (57.7%) than women (44.6%) strongly reject this notion. Interestingly, both genders in cities exhibit similar disagreement rates (men 58.6%, women 57.5%). Concerning the theory of the COVID-19 virus being artificially created in a Chinese lab, the majority in towns, both men (71.4%) and women (69.5%), strongly disagree. Rural respondents show remarkable unanimity, with 86.6% of men and 87% of women strongly rejecting the idea. However, in cities, 53.6% of men disagree strongly, while 63.2% of women strongly agree, indicating a significant difference in perspectives based on living environments.

**Figure 1.** Degree of agreement with the first conspiracy theory by gender and population density (percentages by gender and population density). Source: Elaborations on data from Valcon survey 2021.

**Figure 2.** Degree of agreement with the second conspiracy theory by gender (percentages by gender). Source: Elaborations on data from Valcon survey 2021.

4.2. Level of Agreement between the Two Conspiracy Theories, Gender Differences, and Frequent Use of Social Media Platforms

To test the two hypotheses, in the second part of the descriptive analysis, I explore the percentage distributions of agreement concerning the two conspiracy theories by gender and the frequency of use of social media (Facebook, Twitter, YouTube, and Instagram). The frequency pattern ranges from Every day, to Almost every day, to Two or three times a
week, to About once a week, to Two or three times, to Once, to Never this last month, and to I have never used this source.

The graphic depiction of Facebook usage on conspiracy theory beliefs in Figure 3 unveils interesting patterns. Particularly regarding the belief that the virus originated in a Chinese lab, the data points to a generally higher acceptance of the theory among women compared to men across all levels of social media usage. Additionally, a clear trend emerges among men: as social networking activity increases, so does the adherence to this theory. However, this trend does not appear as distinctly in women, who do not show a proportional increase in belief with greater Facebook use. We focus on the conspiracy theory involving pharmaceutical companies, where a distinct gender-based trend surfaces. Males tend to endorse this theory as valid. Interestingly, the pattern of Facebook use does not influence acceptance of this particular conspiracy theory.

Figure 3. Degree of agreement with the conspiracy theories by frequency pattern for women and men, using Facebook (percentages by usage). Source: Elaborations on data from Valcon survey 2021.

In the context of Instagram, analogous outcomes come to light in Figure 4: women exhibit a little greater inclination toward endorsing the theory of a laboratory-originated virus. Notably, there is little correlation between increased belief in this theory and heightened usage of Instagram, although the progression is somewhat less linear. While women slightly prefer the China lab items on Instagram, concerning men (independently from the level of usage of Instagram), the correlation between belief intensity and Instagram usage is weak, suggesting a more complex interaction. Regarding the conspiracy theory involving pharmaceutical companies and Bill and Melinda Gates, a noteworthy pattern surfaces: males tend to express, globally, a higher level of belief. Intriguingly, individuals
who engage less with Instagram are more prone to outright rejection of this theory, deeming it entirely false.

In the context of Twitter, particularly when examining the conspiracy theory on the China lab, a discernible correlation emerges between Twitter usage and the level of agreement concerning this theory in Figure 5. The proportion of individuals endorsing or strongly endorsing this theory escalates with heightened social media activity. A parallel observation holds for theories related to big pharmaceutical companies’ items. Interestingly, the impact of Twitter usage seems more pronounced than that of other social networks, especially among males. This underscores an initial but significant differentiation—various social platforms can exert distinct influences based on gender and the content of the conspiracy theory. Twitter usage correlates with a stronger belief in both the China lab and big pharma items, especially among men, highlighting Twitter’s unique influence in spreading these beliefs.

Lastly, I turn the attention to the impact of YouTube usage. Notably, a peculiar trend emerges concerning China’s lab item in Figure 6: individuals engaging in intermediate levels of YouTube use exhibit a diminished inclination to believe in this theory, irrespective of gender. This intriguing pattern is consistently observed for the second conspiracy theory as well. So, intermediate levels of YouTube engagement are associated with a lower belief in conspiracy theories, indicating a potential “moderation effect” where an intermediate level of use contributes to skepticism, irrespective of gender.
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4.3. Model Analysis

In this section of the paper, I delve into the influence of specific variables such as gender, social media usage (YouTube, Facebook, Twitter, Instagram), the big pharma item, and the China lab theory. I employ a mixed-effects logistic regression model to analyse these probabilities, incorporating population density as a mixed effect to account for geographic variations among respondents. In this way, I am considering that population density can significantly influence the model’s estimates, as this variable may allow me to explain a portion of variability that can be attributed to some conditions not measured by the questionnaire, but fortunately shared by the subjects according to the context in which they live. The choice of a mixed-effects modeling approach stems from its capacity to handle the hierarchical structure of data, enabling the modeling of both fixed (i.e., for the variable with an estimated coefficient) and random variations (i.e., for the population density) across analysis units. This method is particularly suited for data with potential intra-class correlations, such as those arising from differences in population density among the geographical areas of participants. In the results table, I present the estimated coefficients for each conspiracy separately, offering a nuanced view of how each variable impacts conspiracy beliefs.

**Figure 5.** Degree of agreement with the conspiracy theories by frequency pattern for women and men, using Twitter (percentages by usage). Source: Elaborations on data from Valcon survey 2021.

**Figure 6.** Cont.
4.3. Model Analysis

In this section of the paper, I delve into the influence of specific variables such as gender, social media usage (YouTube, Facebook, Twitter, Instagram), the big pharma item, and the China lab theory. I employ a mixed-effects logistic regression model to analyse these probabilities, incorporating population density as a mixed effect to account for geographic variations among respondents. In this way, I am considering that population density can significantly influence the model’s estimates, as this variable may allow me to explain a portion of variability that can be attributed to some conditions not measured by the questionnaire, but fortunately shared by the subjects according to the context in which they live. The choice of a mixed-effects modeling approach stems from its capacity to handle the hierarchical structure of data, enabling the modeling of both fixed (i.e., for the variable with an estimated coefficient) and random variations (i.e., for the population density) across analysis units. This method is particularly suited for data with potential intra-class correlations, such as those arising from differences in population density among the geographical areas of participants. In the results table, I present the estimated coefficients for each conspiracy separately, offering a nuanced view of how each variable impacts conspiracy beliefs.

The “Covariates” column in Table 1 shows the variables and, in parentheses, the baseline mode. All the possible modes this can take are shown on the side. In addition to the estimated parameter, the standard error and the p-value are given.

Looking at the China lab item, the gender variable shows that being male (compared to the reference category, which is female) is associated with a small but statistically significant decrease in the level of agreement with the conspiracy theory. For YouTube usage, compared to no usage, low and moderate usage are associated with a statistically significant decrease in the level of agreement with the conspiracy theory. The estimates become more negative as the usage increases from low to moderate, indicating a stronger disagreement with the conspiracy theory as YouTube usage increases. Facebook usage shows a different pattern. There is no significant coefficient for low usage, but moderate and frequent usage is associated with a statistically significant increase in the level of agreement with the conspiracy theory. Twitter usage does not show a statistically significant coefficient in any of the usage categories compared to no usage. The estimates are also very small, indicating that Twitter usage does not have a strong association with the level of agreement with the conspiracy theory in this model.
Table 1. Parameter estimates of the random-effect logistic models.

<table>
<thead>
<tr>
<th>Covariates</th>
<th>China-Lab Theory</th>
<th>Big Pharma Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>Std. Error</td>
</tr>
<tr>
<td>Intercept</td>
<td>−0.791</td>
<td>0.164</td>
</tr>
<tr>
<td>Gender (F)</td>
<td>−0.092</td>
<td>0.046</td>
</tr>
<tr>
<td>YouTube (None)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>−0.244</td>
<td>0.096</td>
</tr>
<tr>
<td>Moderate</td>
<td>−0.311</td>
<td>0.099</td>
</tr>
<tr>
<td>Frequent</td>
<td>−0.231</td>
<td>0.094</td>
</tr>
<tr>
<td>Facebook (None)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>0.117</td>
<td>0.110</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.322</td>
<td>0.107</td>
</tr>
<tr>
<td>Frequent</td>
<td>0.283</td>
<td>0.098</td>
</tr>
<tr>
<td>Twitter (None)</td>
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<td></td>
</tr>
<tr>
<td>Low</td>
<td>−0.059</td>
<td>0.089</td>
</tr>
<tr>
<td>Moderate</td>
<td>−0.020</td>
<td>0.089</td>
</tr>
<tr>
<td>Frequent</td>
<td>0.149</td>
<td>0.086</td>
</tr>
<tr>
<td>Instagram (None)</td>
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<td></td>
</tr>
<tr>
<td>Low</td>
<td>0.209</td>
<td>0.088</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.248</td>
<td>0.088</td>
</tr>
<tr>
<td>Frequent</td>
<td>0.477</td>
<td>0.073</td>
</tr>
<tr>
<td>sd_(Intercept)</td>
<td>0.355</td>
<td></td>
</tr>
</tbody>
</table>

*** indicates significant variables, sd the standard deviation of the coefficients, and the modalities of the variables in parentheses indicate the baseline category.

For Instagram, moderate and frequent usage are associated with a statistically significant increase in the level of agreement with the conspiracy theory. The effect size also increases with the frequency of use, with the frequent category showing the largest effect. The standard deviation of the random intercept (0.355) suggests that there is variability in the baseline level of agreement with the conspiracy theory across different groups or contexts not explained by the model, so the choice of using the population density as a random effect is a good methodological choice.

Conversely, for the big pharma item, the coefficient for men, as opposed to the reference group of women, indicates that men are significantly more likely to agree with the big pharma conspiracy theory than women. The use of YouTube does not show a statistically significant association with belief in the big pharma conspiracy theory for low and moderate usage levels. However, frequent usage has a positive and significant effect, suggesting that frequent YouTube users are more likely to believe in this conspiracy theory. None of the levels of Facebook usage show a statistically significant association with the belief in the big pharma conspiracy theory. Similar to Facebook, Twitter usage at low, moderate, or frequent levels does not have a statistically significant association with the belief in the big pharma conspiracy theory. Low usage of Instagram is not significantly associated with belief in the big pharma conspiracy theory. However, moderate usage shows a positive and significant coefficient, and this effect is even stronger for frequent users, indicating that the more frequently individuals use Instagram, the more likely they are to believe in the big pharma conspiracy theory. The standard deviation of the random intercept is 0.694, indicating substantial variability in the baseline level of agreement with the big pharma conspiracy theory across the different subjects among population density, confirming the goodness of the model.

In the provided analysis, there is an intricate interplay between gender and social media usage when it agrees with different COVID-19 conspiracy theories. While men tend to be more skeptical of the China lab theory, they are significantly more susceptible to believing in the big pharma narrative. Regarding social media’s role, it is interesting to see that YouTube has a different impact: it is linked to greater skepticism toward the China lab theory as usage increases, but when it comes to the big pharma theory, frequent YouTube users are more likely to believe in the conspiracy. This suggests that the type of
content consumed on YouTube and its engagement could vary significantly between these theories. Facebook’s influence is noticeable for the China lab theory, where increased usage correlates with belief, but this pattern does not hold for the big pharma theory. Twitter stands out for its non-significance in influencing belief in both theories. Instagram usage demonstrates a consistent coefficient across both theories, with more frequent use tied to a stronger belief in conspiracies. This coefficient is especially pronounced with the big pharma theory.

Based on the analysis and results discussed, Hypothesis 1 (H1) appears to be partially confirmed. The data indicate that frequent use of Instagram is associated with a higher level of agreement with the China lab conspiracy theory, which supports H1. However, for Facebook, the results are mixed. While there is an indication of increased agreement with the China lab theory for moderate and frequent Facebook users, the association is not statistically significant for the big pharma theory at any level of usage. YouTube shows different associations based on the theory: while for the China lab item, it is associated with a lower probability of believing in the theory; for the second one, it is associated with a higher level of endorsement. The data do not support Hypothesis 2 (H2). Twitter usage, whether low, moderate, or frequent, does not show a statistically significant association with belief in either the China lab or big pharma COVID-19 conspiracy theories. The estimates for Twitter are not statistically significant, which suggests there is no substantial relationship between Twitter usage and belief in these conspiracy theories within the observed data set.

5. Discussion

This study aimed to analyse how the level of agreement with COVID-19 conspiracy theories is affected by the pattern of social media use (YouTube, Facebook, Instagram, and Twitter), gender differences, and the distribution of population density in different rural, town, and urban areas. I used an original survey that was fielded during the pandemic in six EU member states. To operationalize conspiracy beliefs, I referred to two of the most prominent conspiracy theories about the origin of the COVID-19 virus—“The pandemic was an invention of big pharmaceutical companies and the Bill & Melinda Gates Foundation and that the COVID-19 virus was leaked from a Chinese laboratory”. Findings show that the level of agreement with these conspiracy theories varies according to the content of such conspiracy narratives, gender differences, and the frequency of the platform being used. The first interesting result shows that women, compared to men, are more prone to endorse China lab items, and conversely, men are significantly more likely to agree with the big pharma item. These gender differences suggest “content association”, which means the two conspiracy theories studied are embraced differently by men and women on social media platforms. This finding could be explained by referring to recent research that suggests the need to consider the specificities of different conspiracy theories and the “context” of their reception (Schlipphak et al. 2021).

A study in Indonesia found that Muslims are more inclined to believe in anti-Western conspiracy theories due to the perception of the West as a threat to their group identity (Mashuri et al. 2016). Similarly, in Europe, the “Chinese lab theory” could find more support among women who could perceive China as a threat. As regards the men’s high level of agreement with the big pharma theory, it could be explained by considering this theory as an implicit critique of the capitalist system. The pharmaceutical multinational and hi-tech companies represent symbols of capitalism, held responsible by public opinion for driving profit generation, disregarding the health and wellbeing of the people. This aspect could contribute to a growing increase in the probability of embracing conspiracy theories and vaccine hesitancy among populations. The second interesting finding is that different social media platforms affect conspiracy beliefs in different ways (Theocharis et al. 2021). The frequent use of Instagram shows a high level of agreement for both conspiracy theories; conversely, the use of Twitter at any level of usage does not have a statistically significant association with the beliefs of both items. Thus, it can be observed that a
“platform association” could be explained by referring to the “technological affordance” theory, which assumes that the different features of the platform could ease or constrain specific behavioral outcomes (Evans et al. 2017). On Twitter, the visibility of the content depends on journalists and politicians, who play the role of gatekeepers in spreading news on social media, which, combined with a policy of deplatforming, has the effect of mitigating the user’s exposure to conspiracy theories. On Instagram, the visibility of the content is entrusted to hubs or ordinary users who can attract several followers but also share unverified posts or with a low level of reliability (Hefmanová 2022). The third interesting finding shows that on YouTube and Facebook, there is an intricate interplay between the features of the platforms, the content of such conspiracy theories, and the level of agreement between both items. On Facebook, the “horizontal” mode of interaction between like-minded users facilitates the dissemination of conspiracy theories. The same positive association between the frequency of platform use and conspiracy beliefs occurs also for YouTube, despite the platform’s different technical features. On YouTube, content is selected by algorithms based on the user’s previous preferences, which often influences and reinforces conspirational thinking among users who are already prone to accept conspiracy theories (Theocharis et al. 2021). However, in the case of YouTube and Facebook, the technological affordance theory could only partially explain the positive association between the use of these platforms and the level of agreement between the respective different conspiracy items. A content association is once again observed, which makes it possible to understand and explain how users endorse a specific conspiracy theory rather than another. As mentioned before, for the Chinese lab leak theory, it could be important to consider the wider geopolitical context, which attributes to China the responsibility for the creation and spread of the virus. As regards the level of agreement with big pharma theory, it must also consider the general context within which the survey took place—the third wave of the pandemic. The health and economic crises, the containment policies implemented by national governments, and the controversial debate on vaccines may have had a greater influence on respondents, increasing conspiratorial thinking. This empirical study provides important insight and implications in understanding the dynamics among social media use, gender and geographical differences, and conspiracy beliefs, taking COVID-19 as a case study. Findings suggest that a conspiracy theory is not an “abstract phenomenon” and conspiracy beliefs are not only personality traits and individual-level attitudes toward society and politics (Goreis and Voracek 2019)—as recent literature on psychological determinants of conspiracy theorizing suggests (Douglas et al. 2023)—but their reception also depends on their specific content (content association), the economic, social, and geographical context, the socio-demographical characteristics of the users and the technical features of digital tools through which they are spread (platform association). This “multivariate” approach to the study of conspiracy theories also allows a deeper insight into “conspiracism” as a political phenomenon that has important social effects in influencing collective behaviors. However, a limit of this study is to consider gender not as a social construction (Lorber 2018) but in terms of sexual differences between women and male; future research needs to adopt the lens of intersectionality as a theoretical framework (Crenshaw 1991) to deeply investigate how conspiracy beliefs are endorsed by those subjectivities who recognize themselves as not binary, queer, and transfeminists.

6. Materials and Methods

Since the beginning of the pandemic, there have been many theories about the origin and spread of the virus. The most widely accepted have been those that saw the virus as the result of a zoonosis or how the virus was artificially created in Chinese laboratories. Thus, this theory cannot be entirely considered a true conspiracy theory (Harrison and Sachs 2022). To test the guiding hypotheses, I used an original survey carried out in six European countries (Italy, Ireland, Spain, France, Germany and Poland) within the Valcon project. These data allow us to analyze the user’s level of agreement with conspiracy theories at a micro level, taking COVID-19 as a case study. The Valcon Project survey
was carried out online by IPSOS. Each national sample ($n = 2000$) is representative of the national population in terms of age, gender, and education. The fieldwork took place in the spring of 2021.

To operationalize the level of agreement by individual users to believe conspiracy theories, I use a couple of variables, namely two items that ask respondents whether they agree with statements that reflect some of the most popular conspiracy theories related to COVID-19:

1. “The COVID-19 pandemic is an invention by big pharmaceutical companies and the Bill & Melinda Gates Foundation”.
2. “The COVID-19 virus was artificially produced in a Chinese lab”.

Both items offer response options ranging from 1 (Strongly disagree) to 4 (Strongly agree). After such transformation into a scale of 1–4, the mean for the big pharma item is 2 and 2.7 for the Chinese lab leak, with higher values indicating stronger agreement.

The dataset provides a near-even split between genders, with women making up 50.31% and men 49.69%, indicating a balanced gender representation among respondents. Social media usage patterns reveal Facebook as the most frequently used platform, with 58.90% of respondents using it often, indicating its continued dominance in social networking. Instagram follows with 48.45% frequent usage, though it also has a higher rate of non-usage at 22.71%, pointing to varied preferences for image-based social media. Twitter’s usage is more dispersed, with 37.79% using it frequently and 16.36% not using it at all, reflecting its niche appeal for news and social commentary. Lastly, YouTube holds a strong presence in daily media consumption, with 40.27% frequently engaging with the platform, underscoring its role as a critical source for video content.

In summary, the data uncover a complex tapestry of opinions, preferences, and behaviors ranging from digital engagement to views on health, revealing the multifaceted nature of societal attitudes and social media habits. I considered data from all six countries for statistical analysis. For the explanatory analyses, I use both marginal and conditional bar plots. In the first part of the analysis, the control variables include sex (0—male, 1—female) and population density (towns, rural, cities). In the second part of the analysis, I study the percentage distributions of the level of agreement or disagreement concerning the two conspiracy theories by gender, consumption pattern (Every day, Almost every day, Two or three times a week, About once a week, Two or three times, Once, Never this last month, I have never used this source), and social platform (YouTube, Facebook, Twitter, Instagram). Marginal and conditional graphs typically focus on the relationship between two or more variables while keeping all other variables constant. This approach allows for a simplified analysis of the direct association between the chosen variables.

However, it comes with the limitation that it neglects the potential impact of other variables. Following, I employ a mixed-effects logistic regression model to evaluate the net effects of the variables in question.

This approach uses both qualitative insights from the visual analysis and quantitative data from the regression model. This ensures a full understanding of what drives belief in conspiracy theories, making it clearer and simpler.

**Funding:** This research was found by Volkswagen Stiftung, with the Grant Approval Letter on the 4 December 2019.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** All the respondents agree to participate in the Ipsos Panel.


**Conflicts of Interest:** The author declares no conflicts of interest.
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