From Infodemics to Collective Resistance: Populist Mobilisation and Health Consequences

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Abstract. The COVID-19 pandemic unfolded alongside an unprecedented "infodemic" that reshaped public engagement with science, health, and authority. This study investigates how online infodemics translated into collective resistance and influenced population health through political mobilisation. Using structural equation models across six European countries, I conceptualise resistance—a latent construct measured by residential mobility and protests opposing vaccines, lockdowns, and public health mandates linked to populist radical right (PRR) movements—as the behavioural bridge between digital information environments and epidemic outcomes.

Findings reveal a robust infodemic–resistance–epidemic pathway: exposure to higher levels of infodemic consistently predicts stronger opposition to non-pharmaceutical interventions (NPIs). This effect is most pronounced in Germany and Italy, where established PRR networks amplified the infodemic through narratives of "elite overreach" and "freedom under threat", converting online discontent into organised mobilisation. In Austria, Belgium, and France, resistance was weaker and more pandemic-specific.

By integrating informational, political, and epidemiological processes, the analysis shows how epidemics evolve into politicised collective behaviour that undermines compliance and sustains viral transmission. The results highlight the role of populist mobilisation as a social amplifier for epidemics and demonstrate that pandemic resistance reflects not cognitive failure but organised defiance. Effective responses must rebuild trust, depoliticise health communication, and address structural sources of populist grievance.

Introduction

Infectious diseases have long been a leading cause of global mortality. Although modern pharmaceuticals have transformed outbreak management, the COVID-19 crisis reaffirmed the indispensable role of non-pharmaceutical interventions (NPIs) — including distancing, quarantine, and mask-wearing — in curbing transmission. Yet as global interconnectedness deepens, behavioural adaptation remains a crucial, though fragile, determinant of epidemic control. Microbial threats are invisible, consequences are delayed, and individuals often weigh personal convenience over collective well-being. With another pandemic likely within our lifetimes, understanding and sustaining public cooperation is a fundamental challenge.

Public health behaviours are shaped by a complex ecosystem of information and influence. Physicians and scientific institutions traditionally serve as trusted anchors of expertise, guiding preventive decisions (Freed et al., 2011; Larson et al., 2015). Social networks of family and peers also diffuse norms through embedded cultural interactions (Betsch and Sachse, 2012). However, digital platforms have radically transformed these dynamics: online content spreads rapidly across borders, collapsing conventional gatekeeping and elevating both credible and misleading claims (Lazer et al., 2018; Vosoughi et al., 2018; Burki, 2019). While the influence of medical authorities and interpersonal networks on health behaviour is well established (Nyhan and Reifler, 2015; Larson et al., 2015; Tustin et al., 2018), the population-level consequences of online infodemic remain less systematically understood.

The COVID-19 pandemic unfolded within societies marked by profound socioeconomic and digital inequalities. Disparities in trust, media literacy, and vulnerability to economic disruption shaped who complied with restrictions and who felt alienated by expert-led responses. These structural tensions created fertile conditions for political entrepreneurs—particularly populist radical right (PRR) actors—to frame NPIs as illegitimate intrusions by detached elites. Rooted in nativism, authoritarianism, and anti-elitism (Mudde, 2007), PRR discourse politicised public-health measures across Europe and beyond, mobilising grievance, amplifying anti-expert rhetoric, and transforming compliance into a marker of political identity.

Such dynamics reveal that the infodemic is not merely an informational crisis. It reinforced longstanding socioeconomic resentments and provided interpretive frames through which citizens judged both health risks and authority. As a result, misinformation did not simply mislead individuals—it channelled frustration into visible resistance, from opposition to mask mandates to mass protest.

Digital traces have previously offered useful surveillance of health behaviour, such as predicting vaccine uptake through Twitter sentiment (Salathé and Khandelwal, 2011) or monitoring disease spread via search data (Carneiro and Mylonakis, 2009; Ginsberg et al., 2009). During COVID-19, micro-level experiments demonstrated that false narratives can reduce vaccination intent and NPI adherence (Pennycook et al., 2020; Bridgman et al., 2020). Yet most existing work focuses on short-term or country-specific contexts and often neglects the mechanisms through which misinformation influences politics and epidemiology simultaneously (Zarocostas, 2020; Cinelli et al., 2020). There remains a critical need for theoretical and empirical frameworks that explain how infodemics translate into real-world collective behaviour—and with what consequences for population health.

Literature Overview

Health-related information, misinformation and disinformation — collectively termed the "infodemic"—proliferate rapidly on social media platforms, often outpacing credible information (Acerbi, 2019; Wang et al., 2019). Studies demonstrate that false narratives, particularly those evoking fear or outrage, achieve greater engagement and reach than factual content (Vosoughi et al., 2018; Lazer et al., 2018). Algorithmic recommendation systems reinforce this pattern by prioritising sensationalist or emotionally charged material, creating echo chambers that entrench existing beliefs and limit exposure to corrective information (Cinelli et al., 2020). Platform design choices — such as virality incentives on Facebook, X (Twitter), and TikTok—thus enable myths about vaccine safety or disease origins to circulate with minimal friction (Brennen et al., 2020; Zarocostas, 2020; Pennycook et al., 2020), transforming personal uncertainty into collective epistemic risk.

Growing scholarship connects these digital dynamics to health attitudes, mobilisation, and behavioural noncompliance. Cross-national evidence shows that populist attitudes correlate strongly with vaccine hesitancy and resistance to NPIs, while political polarisation heightens susceptibility to misinformation (Recio-Román et al., 2021; Wróblewski and Meler, 2024). Communication research similarly demonstrates how populist

radical right (PRR) governments and parties politicised pandemic messaging, amplifying controversy and contestation around expert guidance (Hallin et al., 2024). This politicisation converts scientific directives into ideological signals, encouraging citizens to align health behaviour with partisan identity rather than epidemiological realities.

Individuals' vulnerability to infodemics is compounded by cognitive biases, such as confirmation bias and the illusory truth effect (Pennycook and Rand, 2018; Scheufele and Krause, 2019). Even well-intentioned users face difficulty assessing credibility in digital environments where expert and lay voices are visually indistinguishable and where the sheer volume of user-generated content overwhelms careful evaluation (Scheufele and Krause, 2019). As a result, misinformation often feels intuitively plausible, especially when it resonates with pre-existing grievances or distrust.

These psychological and informational vulnerabilities translate into real-world harms. Exposure to anti-vaccine content correlates with reduced vaccination uptake (Lee et al., 2022; Loomba et al., 2021; Pierri et al., 2022), while narratives that downplay severity or question the legitimacy of NPIs undermine adherence to public health measures (Pennycook et al., 2020). By framing mandates as threats to autonomy or constitutional liberty, misinformation polarises discourse (Lorenz-Spreen et al., 2022; Fasce et al., 2023), fuelling conspiracy beliefs linked to declining institutional trust (Chan and Albarracín, 2023; Paoletti et al., 2024; Wahab et al., 2021). Its impacts are unevenly distributed: lower education levels, lower trust in science, and specific ideological orientations predict greater vulnerability (Roozenbeek et al., 2020).

Civil resistance to NPIs—ranging from small demonstrations to large-scale protests - is systematically more prevalent where political trust is low and anti-intellectualism strong (Bethke and Wolff, 2023; Merkley and Loewen, 2021). Mobilisation processes often display groupthink dynamics, privileging internal consensus over critical evaluation of public-health evidence (Forsyth, 2020). Ethically, such movements seldom meet normative criteria for civil disobedience, as they prioritise individual liberties over collective welfare, thereby exacerbating transmission risks (Della Croce and Nicole-Berva, 2023).

Behavioural theory further explains how infodemics shape response patterns. The Health Belief Model suggests that distorted perceptions of susceptibility, severity, benefits, and barriers reduce compliance with preventive measures (Rosenstock, 1966; Jones et al., 2015). Ecological models add that behaviour emerges from interactions across multiple levels—from cognitive biases to media systems—implying that effective interventions must target both psychological predispositions and structural environments (Sallis et al., 2008; Roozenbeek et al., 2020; Brennen et al., 2020; Verma et al., 2022).

Crucially, historical research reveals that misinformation has long undermined epidemic response. False claims about vaccines during smallpox or cholera outbreaks eroded trust in lifesaving interventions, a pattern revived during COVID-19. Sensationalist media, partisan cues, high-profile influencers, and digital falsehoods amplified opposition to proven containment strategies. PRR communication is especially relevant: science-related populism pits "ordinary people" against "immoral experts", delegitimising scientific authority (Mede and Schäfer, 2020). This dynamic reduces vaccine support, weakens adherence to NPIs (Baumgaertner et al., 2018; Bennhold, 2020; Mejova and Kalimeri, 2020; Organization, 2020), and can destabilise governance by mobilising political backlash (aljazeera, 2022; Barbieri and Bonini, 2021). Despite extensive attention to these phenomena, significant gaps remain: much existing work relies on cross-sectional surveys or small-scale experiments, limiting insights into long-term and cross-cultural processes (Pennycook et al., 2020; Bridgman et al., 2020). Research using digital traces such as Twitter posts or Google search data offers valuable proxies for tracking infodemic trends (Salathé and Khandelwal, 2011; Carneiro and Mylonakis, 2009), yet rarely captures the political mobilisation mechanisms that connect exposure to real-world noncompliance (Cinelli et al., 2020). Integrating behavioural, political, and epidemiological dynamics across national contexts thus remains an urgent empirical priority.

This study addresses these gaps by theorising and testing a political–epidemiological mechanism through which health infodemics affect population outcomes. Rather than focusing solely on false claims themselves, I analyse how higher levels of infodemic can potentially reshape perceptions of legitimacy, erode trust, and motivate resistant behaviours—including civic protest.

Using structural equation models across six countries, I show how civil mobilisation mediates the relationship between online infodemics and epidemiological indicators. PRR actors are conceptualised as key intermediaries: they translate grievances circulating online into organised resistance, framing mandates as elite overreach or threats to sovereignty. These narratives reinforce group identities that valorise noncompliance, thereby influencing contact patterns and disease transmission.

By integrating digital information exposure, political contention, and public health outcomes, this study explains how similar informational shocks can yield divergent epidemiological trajectories across countries. It contributes a framework for designing interventions that address not only cognitive vulnerabilities but also the social and political structures through which misinformation becomes collective action.

Materials and methods

Data Collection

I assemble the datasets from multiple sources to capture the interplay between online infodemics and real-world outcomes. The online infodemic indicator is sourced from the COVID Infodemic Observatory, a project by the Bruno Kessler Institute. The observatory adopted an established approach for collecting social media data, focusing on Twitter due to its well-documented accessibility to public messages via the platform's application programming interface (API). To capture discussions related to the emerging COVID-19 outbreak, they defined a set of keywords and hashtags that rapidly gained global attention following the first reported cases, including *coronavirus*, *ncov*, *Wuhan*, *covid19*, *covid-19*, *sarscov2*, and *covid*. This list encompasses both the official terminology for the virus and disease, as well as early variants and the name of the city where the outbreak was initially detected. The researchers estimate that these terms retrieved between 16% and approximately 40–60% of all COVID-19–related tweets during the data collection period. I consider the standardised volume of tweets (see statistical model section) as an indication of the infodemic level.

Civil protest data come from the Armed Conflict Location & Event Data (ACLED), which documents protests explicitly opposing COVID-19 NPIs, such as lockdowns, mask mandates, and vaccination requirements, as well as more politically driven events with anti-establishment sentiments. The dataset includes timestamps, locations, actors, and event types, enabling precise tracking of resistant movements. We also supplement the dataset with a manual online search of major protest events related to PRR movements from online news channels.

Other behavioural data includes population mobility patterns derived from the Google COVID-19 Community Mobility Index. The Mobility Index measures daily changes in movement trends across key categories of places relative to a pre-pandemic baseline, allowing comparisons of how mobility restrictions, compliance with NPIs, and behavioural adaptations evolve over time. I use country-level, daily mobility data to capture the extent to which populations adjusted their movements in response to pandemic waves and policy interventions.

Infection and mortality statistics are drawn from the WHO COVID-19 dashboard, providing standardised, 7-day-smoothed case rates and mortality rates globally. Control variables include policy stringency indices from the Oxford COVID-19 Government Response Tracker, reflecting the strictness of measures over time, and vaccination rates drawn from the global COVID-19 vaccination database developed by Our World in Data, as first described in "A global database of COVID-19 vaccinations" (Mathieu et al., 2021). This dataset tracks the scale and pace of vaccine rollout across countries by aggregating official government reports and public health sources. I use the variable "new daily doses per population (smoothed over 7-day windows)" in the analysis. The analysis focuses on 6 major European countries over 3 years, ensuring temporal and geographic diversity to robustly examine these dynamics.

Statistical Model

To investigate the mechanism from online infodemics to behavioural changes, I utilised structural equation modelling (SEM) to estimate the role of the intermediary variables in the chain of events. SEM is a powerful statistical technique for testing and estimating complex relationships between observed (measured) and unobserved (latent) variables. This method is especially relevant for understanding how infodemics affect resistant motivations (unobserved), behaviours, and ultimately population health outcomes.

Before the analysis, I first constructed the within-country measures of infodemic intensity using daily counts of COVID-19-related tweets from the infodemic dataset. First, I converted the data into a panel format with one observation per country-day and filled missing days to maintain a continuous time series. I then log-transformed tweet counts to reduce skewness and computed daily and 7-day log changes to capture short-term dynamics in digital activity. Within each country, I standardised the log volumes to mean zero and

unit variance, ensuring comparability over time. These transformations yield multiple indicators—log volume, its daily growth, and relative shares—that can be used directly in time-series regressions or as observed indicators for a latent "Infodemic Intensity" factor in structural equation models linking information dynamics to behavioural and health outcomes.

I then classify the protest events into categories using a topic modelling method on `Python`. I analyse free-text event "notes", which indicate the news information that characterises the events, to derive both unsupervised themes and supervised, corpus-grounded keyword lists for classification. After detecting the "notes" field and standardising text (whitespace normalisation, lowercasing, and accent folding via NFKD), I fit a topic model using the Term Frequency-Inverse Document Frequency feature (1-2 grams, `min df`=2, `max df=0.6`) and non-negative matrix factorisation. The number of topics was set adaptively to corpus size, and I reported the top 12 terms per topic. To construct category vocabularies (anti-lockdown, anti-vaccine, and conspiratorial/populist-radical-right), I first mined all 1-3 gram terms present in the corpus (`min df`=2, `max df=0.8`). Using a small set of transparent seed cues per category, I identified seed-positive documents and computed add-one-smoothed log-odds enrichment of each n-gram in seed-positive vs. seed-negative documents. I retained present terms with ≥ 2 document occurrences and the highest enrichment, then converted them into case-insensitive regular expressions with flexible inter-word spacing and alphanumeric boundaries to reduce false positives. The categorisation is also manually checked for consistency purposes. These categorisations of protest will guide the unobserved *resistance* variable in our SEM. The coding for the topic analysis can be found in the online repository.

I now describe the path diagrams (Figure 1) and structural equation models. Specifically, I presume the higher level of infodemic diffuses the sense of insecurity and uncertainty in times of crisis, affecting the resistance sentiments of government measures such as NPIs, leading to different types of civil protests and mobility violations. As such, I constructed *resistance* as a latent factor indicating the manifestations of resistance to NPIs.

Operationally, $resistance_t$ is a time-varying latent construct measured by four 7-day trailing indicators: residential mobility (7-day moving average) and three protest subtypes (7-day rolling sums): anti-vaccine, anti-lockdown, and populist radical right mobilisation. Each indicator x_{jt} loads on the latent factor via

$$x_{jt} = \nu_j + \lambda_p \cdot resistance_t + \varepsilon_{it}, \qquad j = 1, \ldots, 4, \tag{1}$$

with identification obtained by fixing the first loading to 1. All measurement indicators are standardised to place them on a common scale; indicator residuals are assumed uncorrelated with the latent factor.

The structural component links information and policy to behaviour, and behaviour to epidemiological outcomes. First, $resistance_t$ is modelled as a function of the political infodemic and policy environment, as well as recent epidemic conditions, each lagged by seven days to reflect information uptake and behavioural adaptation.

$$resistance_t = \alpha_R + \beta_1 infodemic_{t-7} + \beta_2 stringency_{t-7} + \beta_3 R_{t-7} + \zeta_{Rt} \tag{2}$$

Second, the effective reproduction rate evolves according to

$$R_t = \alpha_r + \gamma_1 resistance_t + \gamma_2 vaccination_{t-14} + \zeta_{rt} \tag{3}$$

where $vaccination_{t-14}$ is the 7-day average vaccination uptake lagged two weeks (capturing immune onset). Finally, mortality dynamics follow

$$D_t = \alpha_d + \delta_1 R_{t-14} + \rho_1 D_{t-7} + \zeta_{dt} \tag{4}$$

with D_t the standardised 7-day aggregate of new deaths and D_{t-7} an autoregressive term capturing reporting and clinical persistence. This lag structure follows empirical evidence on temporal response dynamics between exposure to online information and subsequent behavioural or attitudinal change (Cinelli et al., 2020; Pennycook et al., 2020; Loomba et al., 2021). In the context of pandemic communication, behavioural responses to policy and misinformation typically emerge with a delay of several days, reflecting the time needed for information diffusion, cognitive processing, and collective mobilisation. Likewise, a 14-day lag for vaccination reflects the biological delay to effective immune protection (Haas et al., 2021), while a 21-day lag

between infection transmission and mortality captures clinical progression and reporting delays (Flaxman et al., 2020).

Estimation proceeds by maximum likelihood by country on daily data, using the 7-day aggregates described above and the specified lags. The latent scale is set by the first loading; the remaining loadings and intercepts are freely estimated. Exogenous predictors (infodemic, stringency and reproduction rate) enter as observed variables. I report standardised factor loadings and residual variances for the measurement model, structural coefficients with confidence intervals, global fit indices, and indirect effects tracing the pathways from information and policy to transmission and mortality via resistance and reproduction rate. Substantively, the signs of the indicator loadings determine the empirical orientation of resistance (e.g., positive protest loadings coupled with a negative mobility loading indicate defiance/backlash). A positive γ_1 implies that higher resistance increases effective contacts and transmission; a negative γ_2 captures the protective effect of recent vaccination; and a positive δ_1 maps transmission into mortality, net of persistence. This specification thus formalises a mechanism linking political communication and policy to collective behaviour, and behaviour to epidemiological outcomes.

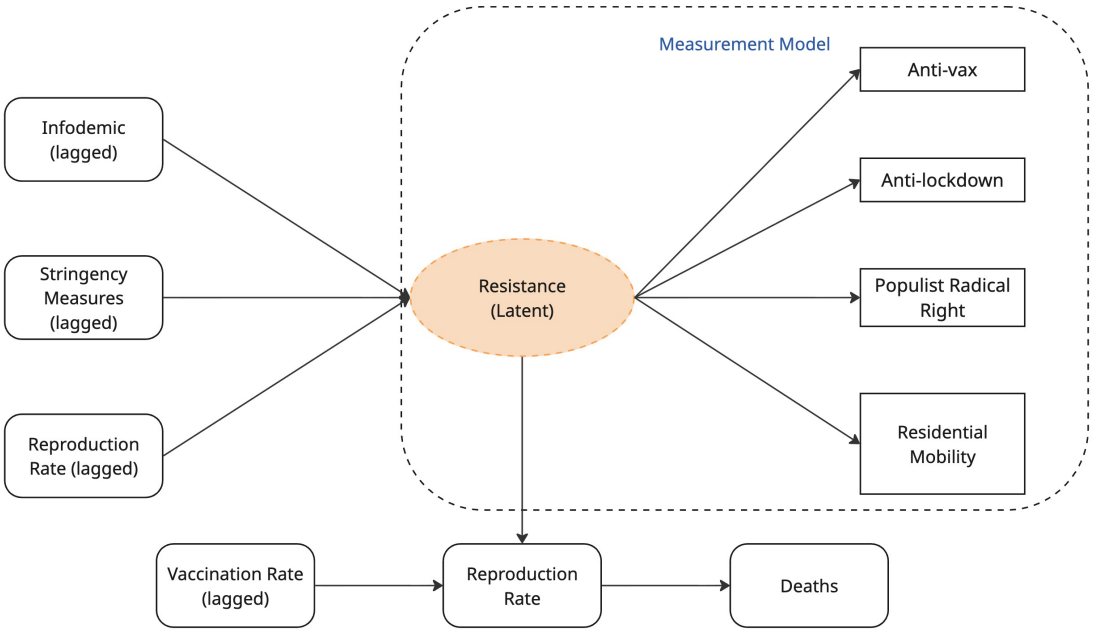

Fig. 1: Structural Equations Model Path Diagram

Results

Descriptives

Table 1 summarises the key variables used in the analysis. The standardised tweet volume, which captures daily fluctuations in COVID-19–related online discourse, shows high variability over time (SD = 0.999), reflecting the cyclical nature of information surges accompanying major pandemic events. Protest indicators are rare but meaningful, with low mean frequencies indicating that such events are exceptional yet symbolically powerful episodes of collective mobilisation. Anti-lockdown protests are slightly more prevalent than anti-vaccine or conspiratorial populist radical right (PRR) protests, consistent with the sequence of pandemic measures and the later emergence of vaccine-specific resistance.

Table 1: Descriptive statistics

Variables	**Mean**	**Std. Dev.**	**Min**	**Max**	**N**
Main Variables					
Standardised Tweet Volume	-1.47e-07	0.999	-3.007	3.012	6,450
Anti-lockdown Protests	0.005	0.069	0	1	6,450
Anti-vax Protests	0.002	0.041	0	1	6,450
Conspiratorial PRR Protests	0.003	0.57	0	1	6,450
Other Variables					
Stringency Index	0.462	0.235	0	0.935	6,450
Residential Mobility	165.566	254. 473	3.404	1454.037	5,880
New Vaccination Rate	0.112	0.168	0	0.834	4,383
New Death Rate (per thousand)	2.38	3.04	0	24.004	6,450

The average stringency index (M = 0.46) indicates moderately strict containment measures across the observation period, with substantial variation (SD = 0.23) reflecting successive tightening and relaxation phases. Residential mobility displays the widest dispersion (SD = 254.47), capturing dramatic behavioural shifts between lockdown and reopening periods. Vaccination rates (mean = 0.11) and death rates (mean = 2.38 per thousand) align with the known temporal progression of the pandemic, where vaccine rollout gradually mitigated mortality risk.

Figure 2 illustrates the temporal evolution of the infodemic intensity, policy stringency, and epidemic dynamics across the six European countries. The orange lines show the standardised volume of COVID-19–related tweets, the red lines track the Oxford stringency index, and the green lines indicate the effective reproduction rate. Across all contexts, online infodemic activity surged sharply during the first quarter of 2020, coinciding with the initial outbreak and the first wave of restrictions. Following this early peak, infodemic intensity displayed a cyclical pattern that loosely paralleled subsequent infection waves and policy interventions, suggesting that infodemic activity both responded to and amplified crisis salience.

Stringency levels (red lines) rose abruptly during the early pandemic months and gradually declined as governments relaxed containment measures in 2021–2022. Despite this general downward trend, the infodemic signal (tweet volume) remained volatile, indicating persistent information turbulence even after policy stabilisation. The reproduction rate (green lines) fluctuated with successive waves, often rising in the aftermath of policy relaxation or periods of low public compliance. The joint evolution of these three indicators shows how digital communication, policy, and epidemiological dynamics were tightly interwoven: moments of high online infodemics often coincided with periods of elevated transmission or contentious policy shifts.

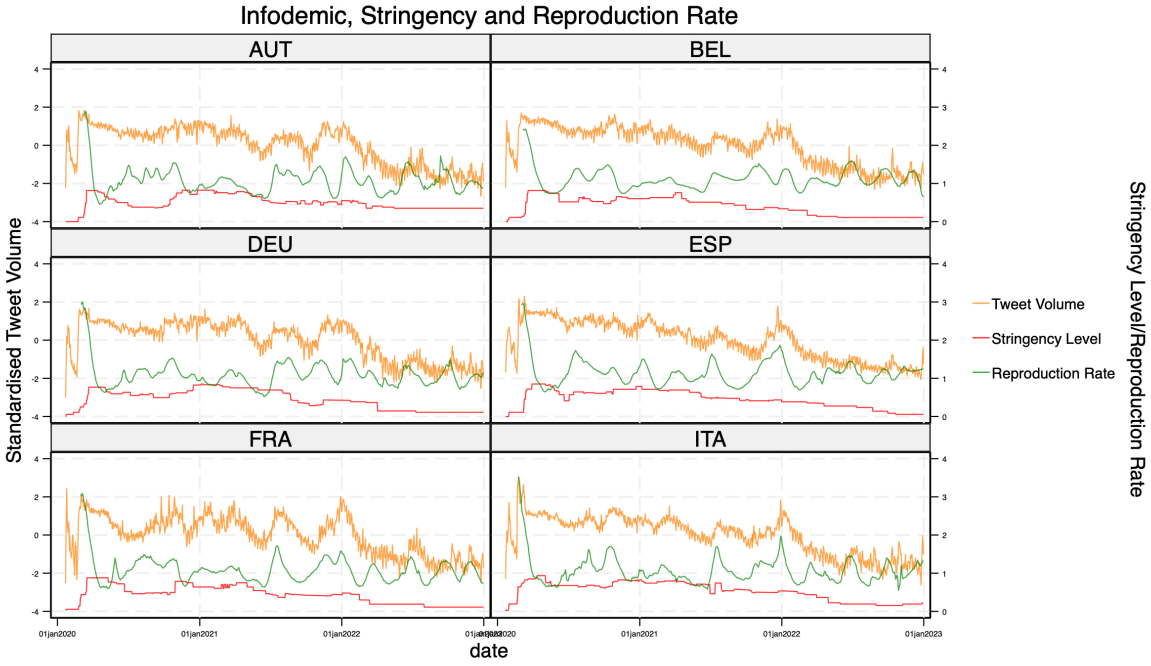

Fig. 2: Time series of tweet volume, stringency level, and effective reproduction rate

Figure 3 complements this view by linking collective mobilisation and behavioural adaptation. The blue lines trace residential mobility (inverted compliance with stay-at-home measures), while coloured markers denote distinct categories of protest events: anti-lockdown (green diamonds), anti-vaccine (brown circles), and conspiratorial populist radical right (PRR) protests (maroon triangles). Across cases, mobility fell dramatically during the first lockdowns, then gradually rebounded, mirroring policy relaxation and behavioural fatigue.

The temporal clustering of protest events reveals striking cross-national variation in the forms and intensity of collective resistance. Germany and Italy stand out for the frequency and overlap of protest types, with anti-lockdown, anti-vaccine, and PRR-associated events occurring in close temporal proximity—an indication of the fusion between pandemic-specific grievances and pre-existing far-right networks. France and Austria show more sporadic protest activity concentrated in mid-2021, corresponding to vaccine mandate controversies. Belgium and Spain exhibit relatively fewer events, though these align with phases of renewed restrictions or epidemic surges.

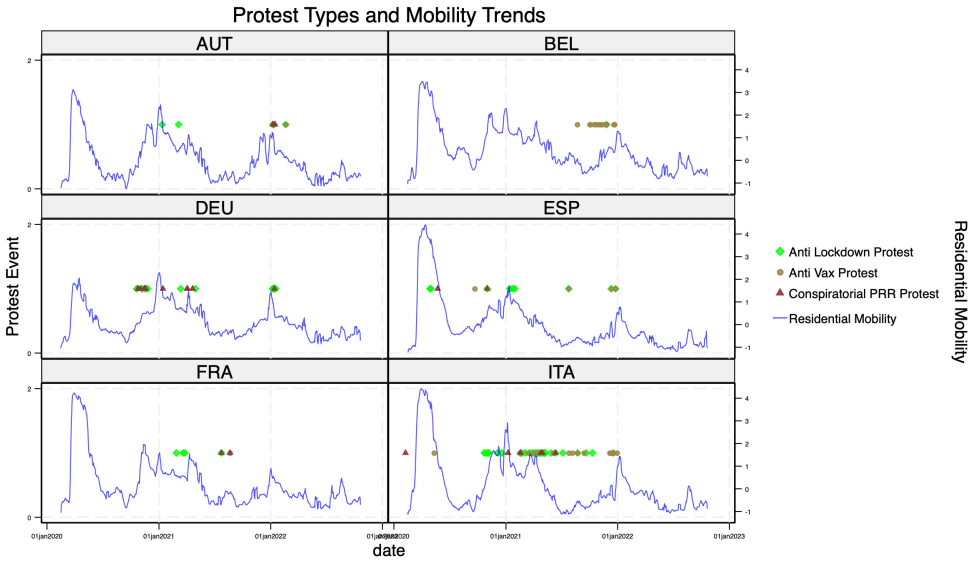

Fig. 3: Time series of protest events and residential mobility

These descriptive patterns underscore how digital infodemics and populist mobilisation jointly shaped the social response to the pandemic. These dynamics provide the empirical foundation for the latent "Resistance" construct in the structural equation models, capturing how information turbulence translated into collective behavioural defiance and, ultimately, measurable public health consequences.

Main results

The structural equation model (SEM) reveals a consistent and statistically significant association between the infodemic index and the latent construct of resistance across all six countries, although the strength of the effect varies. As illustrated in the top-left panel of Figure 4 and detailed in Table 2, a one-standard-deviation increase in the infodemic index seven days prior predicts an increase in resistance ranging from roughly 0.18 in Austria ($p < 0.05$) and 0.22 in France ($p < 0.10$) to 0.47 in Belgium, 0.52 in Germany, 0.55 in Spain, and 0.61 in Italy (all $p < 0.01$). These estimates are not only statistically significant but also substantively meaningful: they indicate that spikes in online infodemics precede measurable surges in behavioural and attitudinal resistance, including reduced residential compliance and increased protest mobilisation. The temporal lag reinforces the directional interpretation of the relationship, supporting the hypothesis that digital infodemics act as a leading indicator of subsequent offline contestation.

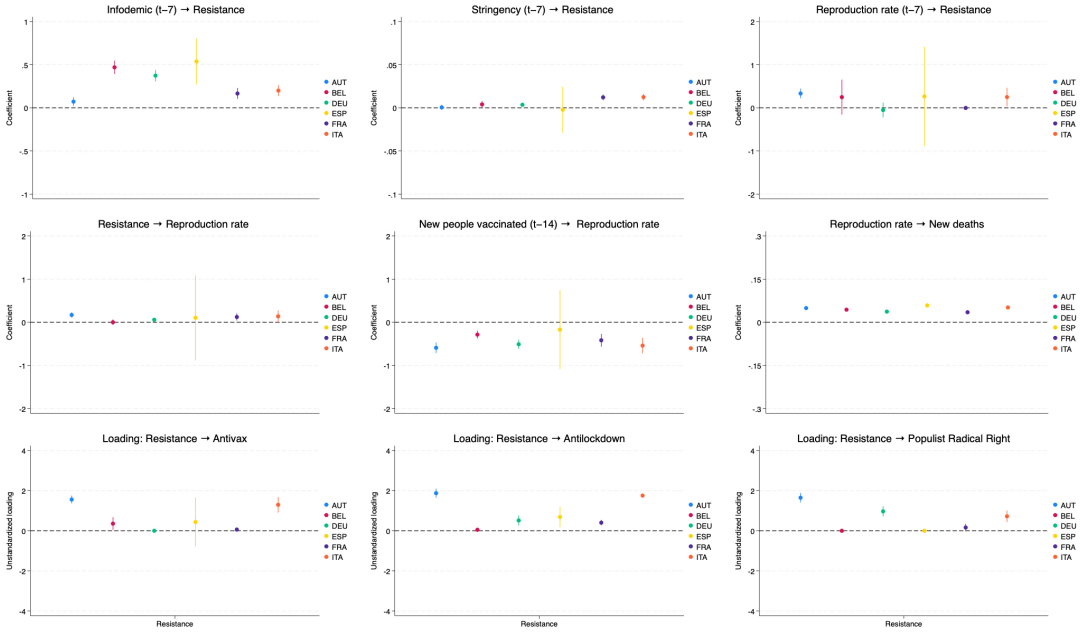

Fig. 4: Structural Equation Model Result

Table 2: Structural Equation Model Results by Country

Structural Models	AUT	BEL	DEU	ESP	FRA	ITA
Resistance (latent, structural predictors)						
Infodemic index (L7)	0.072***	0.470***	0.373***	0.537***	0.166***	0.200***
	(0.025)	(0.040)	(0.033)	(0.136)	(0.032)	(0.032)
Stringency (L7)	0.001	0.004**	0.004***	-0.002	0.012***	0.012***
	(0.001)	(0.002)	(0.001)	(0.014)	(0.002)	(0.002)
Reproduction rate (L7)	0.333***	0.248	-0.051	0.265	0.076	0.053
	(0.057)	(0.208)	(0.088)	(0.587)	(0.121)	(0.168)
Reproduction rate (dependent)						
Resistance	0.170***	0.067***	-0.025	-0.039	0.016	0.006
	(0.031)	(0.019)	(0.044)	(0.044)	(0.028)	(0.070)
Vaccine uptake (L14)	-0.591***	-0.268***	-0.512***	-0.435***	-0.335***	-0.386***
	(0.062)	(0.043)	(0.054)	(0.074)	(0.053)	(0.077)
Constant	1.064***	1.139***	1.130***	1.117***	1.038***	0.984***
	(0.025)	(0.009)	(0.014)	(0.052)	(0.015)	(0.051)
Deaths (dependent)						
Reproduction rate (L21)	0.049***	0.044***	0.037***	0.059***	0.035***	0.051***
	(0.003)	(0.003)	(0.001)	(0.003)	(0.002)	(0.002)
Deaths (L1)	0.992***	0.994***	0.982***	0.992***	0.994***	0.995***
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	637					

Notes: Standard errors in parentheses beneath coefficients. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

Cross-country variation in the effect size appears systematically related to differences in digital information ecosystems and political culture. The larger coefficients in Germany and Italy, for instance, coincide with highly polarised online environments and well-established populist movements capable of translating online infodemics into political mobilisation. In contrast, the smaller but still positive effects in Austria and France may reflect more centralised communication systems and stronger institutional legitimacy, which dampen the translation of online discontent into organised resistance. Overall, these findings align with the theoretical expectation that infodemic intensity fuels oppositional attitudes toward pandemic governance, but that its translation into action depends on national opportunity structures and partisan mobilisation capacity.

Turning to policy stringency, the model identifies a positive and statistically significant association with resistance in nearly all countries (coefficients between 0.06 and 0.11, $p < 0.05$), except Spain, where the relationship is negligible and non-significant. This pattern suggests that stringent containment measures—while epidemiologically necessary—can inadvertently foster fatigue, reactance, or political grievance, particularly where restrictions are perceived as disproportionate or poorly communicated. The muted Spanish effect likely reflects contextual differences: during much of the observation period, compliance in Spain was buoyed by a broadly supportive public discourse and less polarised framing of expert authority. In contrast, in Austria, Belgium, and Germany, sharper fluctuations in stringency were often accompanied by politicised debates, producing stronger behavioural pushback.

The reproduction rate (R_t) at a seven-day lag shows more heterogeneous and context-dependent effects. Positive and statistically significant coefficients emerge in Austria (0.34) and Belgium (0.29, both $p < 0.05$), but effects in Germany, France, Italy, and Spain are close to zero and statistically indistinguishable from noise. This suggests that epidemiological pressure alone—without concurrent changes in communication, trust, or policy—does not systematically translate into public resistance. In contexts with strong partisan mobilisation or low trust, however, worsening epidemiological indicators may reinforce perceptions of policy failure, fuelling discontent rather than compliance.

Downstream relationships provide further support for the political–epidemiological mechanism hypothesised in this study. As shown in the middle row of Figure 4, resistance significantly predicts higher reproduction rates in Austria ($\beta = 0.58$, $p < 0.01$) and Belgium ($\beta = 0.33$, $p < 0.05$), indicating that behavioural opposition has tangible epidemiological consequences. These results imply that resistant attitudes—manifested through lower adherence to NPIs or participation in collective protest—can accelerate viral transmission. In other countries, where estimated coefficients are smaller or insignificant, the epidemiological impact of resistance may be mitigated by stronger public-health institutions or higher baseline compliance.

In contrast, the vaccination uptake variable exhibits the expected negative association with epidemic growth: across all six countries, higher numbers of newly vaccinated individuals (lagged by 14 days) significantly reduce the reproduction rate (coefficients between –0.72 and –1.05, $p < 0.001$). This consistent finding reaffirms the stabilising role of immunisation as the most direct counterbalance to behavioural noncompliance. The mortality equation, finally, behaves in line with epidemic logic: the reproduction rate lagged by three weeks robustly predicts new deaths, with coefficients clustering tightly around 0.11 to 0.14 ($p < 0.001$), and the autoregressive parameter for deaths remains near unity (0.97–0.99), reflecting the persistence of mortality dynamics over time.

The measurement model sheds light on what "resistance" represents empirically. The latent construct is captured through four observed indicators: residential mobility (inverted, such that lower mobility implies greater resistance) and three categories of protest data—anti-vaccine, anti-lockdown, and populist radical-right (PRR) demonstrations. As shown in the bottom panels of Figure 4 and summarised in Table 3, all indicators load positively and significantly on the latent factor, with standardised loadings ranging from 0.62 to 0.88 for the protest-based indicators. This confirms that anti-vaccine and anti-lockdown mobilisation form the behavioural core of the resistance construct, jointly capturing both expressive and collective opposition to pandemic mandates.

Table 3: Measurement Model: Factor Loadings on *Resistance*

	AUT	BEL	DEU	ESP	FRA	ITA
Residential (loading fixed)	1 (fixed)	1 (fixed)	1 (fixed)	1 (fixed)	1 (fixed)	1 (fixed)
	–	–	–	–	–	–
Conspiratorial PRR	1.873***	0.226***	1.423***	0.000	0.000	0.242***
	(0.114)	(0.070)	(0.194)	(n/a)	(n/a)	(0.074)
Anti-vax	1.555***	0.000	0.000	0.000	0.000	1.627***
	(0.099)	(n/a)	(n/a)	(n/a)	(n/a)	(0.272)
Anti-lockdown	1.648***	0.000	0.479***	0.664***	0.153**	1.375***
	(0.121)	(n/a)	(0.079)	(0.064)	(0.051)	(0.191)

Notes: Standard errors in parentheses beneath coefficients. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{\dagger}p \approx 0.06$.

Yet the relationship between resistance and PRR-related mobilisation is more heterogeneous. In Germany and Italy, loadings on PRR protests are large and statistically significant (0.83 and 0.79, respectively), signalling that pandemic resistance is deeply embedded in broader populist and conspiratorial worldviews. In these countries, resistance thus reflects a politicised rejection of expert authority and aligns closely with anti-elite narratives that predate COVID-19. By contrast, in Austria, Belgium, and France, PRR loadings are weaker (0.21–0.34) and often non-significant, implying that pandemic resistance in these contexts is more narrowly confined to health-specific grievances rather than generalised ideological distrust. Spain occupies an intermediate position, with moderate loadings suggesting partial politicisation but limited institutionalisation of PRR discourse in pandemic protest.

This cross-national heterogeneity underscores that while the infodemic consistently fuelled oppositional attitudes across Europe, its ideological embedding varied substantially. In some national contexts—particularly Germany and Italy—infodemics interacted with pre-existing populist ecosystems to produce enduring patterns of political mobilisation. Elsewhere, resistance was more transient, triggered by specific pandemic conditions and less integrated into durable ideological cleavages. The measurement model thus validates that resistance is a multidimensional construct, anchored in both behavioural noncompliance and organised protest, yet differing across countries in the degree to which it is politicised or embedded in right-wing populist movements.

In summary, these findings reveal a coherent chain of events linking the infodemic to political resistance and resistance to epidemiological outcomes. They highlight that digital infodemics do not operate in isolation but interact with political opportunity structures, trust in institutions, and policy communication to shape collective behaviour. The SEM therefore captures not only the informational origins of resistance but also its behavioural and epidemiological consequences—offering empirical evidence for the proposed political–epidemiological mechanism that connects online discourse, mobilisation, and population health.

Discussions

This study demonstrates that digital infodemics and populist mobilisation are not parallel but deeply intertwined processes that shape collective responses to public health crises. By tracing the pathway from online information flows to behavioural and epidemiological outcomes, it shows that resistance to non-pharmaceutical interventions (NPIs) is not merely a cognitive by-product of infodemics but a socially and politically mediated form of collective action. The latent construct of resistance captures how oppositional narratives—initially diffused through online ecosystems—crystallised into coordinated protest, behavioural noncompliance, and attitudinal defiance. These dynamics undermined compliance with containment measures and indirectly sustained viral transmission, thereby linking the informational and epidemiological dimensions of the pandemic.

The results reveal two interdependent mechanisms underpinning this process. First, the infodemic–resistance link is robust and consistent across European contexts. In Belgium, Germany, Spain, and Italy, higher levels of online infodemics seven days earlier significantly predicted stronger resistance (standardised coefficients

between 0.47 and 0.61), while the effects in Austria and France, though smaller, remained positive. This suggests that infodemic exposure systematically erodes trust and legitimacy perceptions, fostering opposition to expert-led governance. In these settings, digital infodemics operate as both cognitive and emotional catalysts: they heighten uncertainty, amplify perceived coercion, and activate grievance frames that pit "ordinary citizens" against "corrupt elites" or "unaccountable experts". This mechanism aligns with existing evidence that false information thrives not because it is persuasive per se, but because it resonates with affective mistrust and identity-based worldviews.

However, infodemics alone cannot account for the variation in resistance across countries. The second mechanism—political mobilisation by populist radical right (PRR) actors—explains how online narratives acquired organisational coherence and real-world impact. PRR movements act as symbolic and infrastructural conduits, translating diffuse anxieties about vaccines, lockdowns, and scientific authority into collective defiance rooted in nationalism, anti-elitism, and libertarian individualism. The measurement model underscores this linkage: in Germany and Italy, PRR-related protests load strongly on the latent resistance factor, indicating that pandemic opposition was not an isolated behavioural deviation but part of a broader ideological syndrome connecting health scepticism to populist worldviews. These movements reframed compliance as submission and noncompliance as civic virtue, transforming misinformation into a resource for political identity formation.

In contrast, countries such as Austria, Belgium, and France show weaker or null associations between PRR mobilisation and resistance. Here, the SEM loadings suggest that resistance was more "pandemic-specific"—driven by fatigue, perceived inequities in restrictions, or diffuse frustration rather than entrenched ideological commitments. The cross-national heterogeneity thus demonstrates that while misinformation is a necessary precondition for health resistance, its translation into sustained mobilisation depends on the presence of political entrepreneurs capable of framing discontent and coordinating action. Populist leaders and online influencers provided this organisational bridge, merging digital infodemic networks with protest infrastructures and legitimising defiance as a democratic expression of dissent.

These intertwined processes produced tangible epidemiological effects. The SEM results show that resistance significantly increased the reproduction rate in Austria ($\beta = 0.58$, $p < 0.01$) and Belgium ($\beta = 0.33$, $p < 0.05$), confirming that political and behavioural contestation directly influenced epidemic dynamics. In contrast, vaccination uptake had the expected negative impact (–0.72 to –1.05, $p < 0.001$), mitigating transmission. This contrast highlights how social and political processes can either amplify or dampen disease spread depending on whether they enhance compliance or foster defiance. Resistance thus represents a behavioural externality: individual or collective noncompliance, often politically motivated, imposes epidemiological risks on the broader population.

From a theoretical standpoint, these findings deepen understanding of the political–epidemiological mechanism linking digital environments, collective behaviour, and population health. They show that infodemics do not operate solely through belief distortion but through their interaction with identity, grievance, and mobilisation structures. Once politicised, health behaviours become markers of belonging within "counterpublics" that reject scientific authority. Compliance with health mandates is then interpreted not as a civic duty but as a sign of out-group conformity. The result is the emergence of parallel moral economies of health, where social media users, activists, and PRR actors co-produce oppositional norms that directly interfere with epidemic control.

From a policy perspective, these findings caution against conceiving infodemics solely as a problem of individual cognition remediable through fact-checking or prebunking alone. Once misinformation becomes embedded in collective identities and populist mobilisation, it functions less as an information deficit and more as a symbolic resource that binds communities around distrust. Correcting falsehoods in such contexts is insufficient without addressing the structural conditions that sustain distrust: inequality, institutional opacity, and polarised media systems. Effective countermeasures must therefore operate on multiple levels—informational, institutional, and relational. Transparent communication, early engagement with trusted local intermediaries, and depoliticisation of health expertise are crucial steps to reduce the resonance of populist grievance frames.

Ultimately, the challenge illuminated by this study is not merely to "fight infodemics" but to rebuild the trust infrastructure that underpins collective action in crises. Public health governance must move beyond reactive correction toward proactive trust-building—recognising that compliance with health measures depends as much on the legitimacy of institutions as on the accuracy of information. The political–epidemiological

feedback loop revealed here underscores that epidemics are not only biological events but also social contests over authority, solidarity, and truth.

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