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Multimodal Crisis Messaging in Times of Pandemic: Comparing Instagram Posts Published by Governments and Public Health Institutions in Germany, Türkiye, the UK, and the USA

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Governments and health institutions have extensively used various media channels to disseminate preventive information and instructional messages to citizens during public health crises. This study focuses on crisis messages on Instagram, which predominantly adopts textual-visual modes of communication. Drawing on the concept of multimodality, a framework was suggested for comprehending multimodal crisis messages: the integration of textual and visual elements and the influence of contextual factors. A quantitative content analysis examined 2,140 Instagram posts (Germany *N* = 417, Türkiye *N* = 388, United Kingdom *N* = 684, United States *N* = 651) published by governments and health institutions between 2020 and 2021. Hierarchical clustering on principal

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components (HCPC) unveiled three clusters of multimodal crisis messages: person-oriented protective pattern (United Kingdom and United States), state-oriented instructional pattern (Germany and partly United States), and politicizing crisis pattern (Türkiye). The findings contribute to a better understanding of how risk cultures and political systems shaped textual-visual narratives during a global health crisis.

Keywords: crisis communication, multimodality, visual framing, government and public health institution, COVID-19

The COVID-19 pandemic differs from previous health crises, such as SARS, H1N1, Ebola, and MERS, because of its magnitude and impact on global health systems, politics, economies, and people's daily lives. Greatly complicating the situation was what the World Health Organization (WHO) called an "infodemic," referring to the widespread dissemination of information, "including false or misleading information in digital and physical environments during a disease outbreak" (World Health Organization [WHO], 2022). This infodemic posed challenges to information seeking and evidence-based communication (King & Lazard, 2020) and impacted perceived severity, trust in public health authorities, and the effectiveness of preventive interventions (Meppelink, Bos, Boukes, & Möller, 2022; WHO, 2022). Public sectors, particularly governments and public health institutions, are expected to provide timely information, reduce uncertainty, respond to rumors, ensure public awareness of preventive knowledge, mobilize appropriate actions to reduce morbidity and mortality, and mitigate economic and social disruption (Liu & Horsley, 2007; Sellnow & Sellnow, 2019). Analyzing government crisis communication enables the professional evaluation of messaging strategies and helps identify successes and failures for improvement. Cross-national comparative studies can foster the exchange of best practices and establish effective frameworks for global preparedness for future crises.

In addition to traditional channels, such as press releases and briefings, government institutions have made extensive use of social media to reach citizens, disseminate instructive crisis messages, and promote policies (e.g., Mazid, 2022; Rivas-de-Roca, García-Gordillo, & Rojas-Torrijos, 2021). The rise of visually oriented platforms, such as Instagram, resonates with the "multimodal turn" that describes how digital technologies make manifest changes to the combination of visual and textual resources in mediated communication (Geise & Baden, 2015; Ravelli, Adami, Boeriis, Veloso, & Wildfeuer, 2018; Russmann & Svensson, 2017). Researchers have emphasized the effects of visuals on health risk perceptions (e.g., Lazard et al., 2017; Lipkus, 2007), self-protective behaviors (e.g., Zillmann, 2006), and functions in misinformation (e.g., Brennen, Simon, & Nielsen, 2021). Advancing visual communication research can provide insights into how governmental sectors leverage multimodal messages to diverse audiences in response to health crises during a pandemic (King & Lazard, 2020).

This research suggests a theoretical framework and a methodological approach for examining multimodal crisis messages. The authors present a cross-national comparative analysis of Instagram posts published by governments and public health institutions in four countries during the first two years of the pandemic. The study also aims to investigate the influence of risk cultures and political systems on the patterns of crisis messages.

Literature Review

Government Crisis Communication of the COVID-19 Pandemic on Social Media

Risk and crisis communication encompasses research on how information is produced, disseminated, and perceived in situations that pose threats, danger, and disruptions to individuals, communities, organizations, and societies (Coombs & Holladay, 2010). Researchers and practitioners have various theoretical approaches to crisis taxonomies, issue and reputation management, organizational attributes, stakeholder relationships, and crisis response tactics at their disposal (see Diers-Lawson, 2017; Diers-Lawson et al., 2021). Among these theories, the IDEA model was proposed to develop effective messages to instruct people on how to protect themselves during risk events, crises, disasters, and other emergencies (Sellnow, Lane, Sellnow, & Littlefield, 2017; Sellnow & Sellnow, 2019). The IDEA model is composed of four dimensions: Internalization (I) includes key elements to motivate recipients by stressing proximity, relevance, and compassion; Distribution (D) requires opening communication channels for fragmented audiences; Explanation (E) involves communicating scientific knowledge and policies to recipients in an understandable way; and Action (A) mobilizes appropriate behaviors, compliance measures, and attribution of responsibilities. As a stakeholder-centered model in crisis communication, the model has been tested by many empirical studies in different crises and social systems (see Diers-Lawson et al., 2021; Sellnow & Sellnow, 2019).

Compared with corporate organizations that are more concerned with reputation and image restoration (Liu & Horsley, 2007), public sectors, such as government and healthcare institutions, have different goals and responsibilities that aim to prioritize public interests, communicate frequently and transparently, ensure the credibility of information for various audiences (Strömbäck & Kiousis, 2011; Yang, 2018), and collaborate with cross-sector organizations by all means of strategic communication (Löffelholz, Auer, & Schleicher, 2013). An emergent agenda in risk and crisis communication research is the lack of representation of different cultural perspectives, as most studies focus on case studies within a specific national context (Diers-Lawson, 2017; Diers-Lawson et al., 2021). Only a few studies have investigated government communication of the COVID-19 beyond national contexts (Hanson et al., 2021; Johansson, Ihlen, Lindholm, & Blach-Ørsten, 2023; Rivas-de-Roca et al., 2021). According to a systematic review (Schwarz, Alpers, Wagner-Olfermann, & Diers-Lawson, 2024), cross-cultural research in a global pandemic is rare, although it allows for awareness and understanding of systematic differences and cultural nuances in crisis responses and communication.

Social media is considered an effective tool for disseminating timely information, creating dialogues, reflecting public opinions, and collaborating with traditional media (Austin & Jin, 2016; Eriksson, 2018; Jin, Liu, & Austin, 2014). In public health crises, such as the unprecedented COVID-19 pandemic, the communication environment is saturated by multidirectional information of varying accuracy and purpose. Sometimes, socially mediated information can impede evidence-based communication, clarification of misleading views, and trust in authorities (King & Lazard, 2020).

Thus, governments and health institutions have actively deployed different media channels to reach broader audiences. Numerous studies have investigated government communication of the pandemic on

institutional websites (e.g., Rivas-de-Roca et al., 2021) and Twitter or Facebook (e.g., Mazid, 2022; Rivas-de-Roca et al., 2021). However, health crisis communication on Instagram is still under-researched (e.g., Guidry, Jin, Orr, Messner, & Meganck, 2017). Instagram has become a popular platform because of its attractiveness among younger audiences and inherent visual culture (Highfield & Leaver, 2016). While Instagram is mainly used for social and entertaining purposes, one study revealed that Instagram users were less exposed to reliable news sources and thus tended to have more misperceptions about the coronavirus (Meppelink et al., 2022). A gap exists in the effectiveness of visually oriented crisis messages on Instagram.

Visual images can be effortlessly framed, published, and reproduced across digital sites, thus presenting strategic and reflexive values in communication (Russmann & Svensson, 2017). Risk and crisis communication scholars have recommended when and how to use visuals to scientifically communicate health information (e.g., Lipkus, 2007) and analyzed the effectiveness of visual health messages (e.g., Lazard et al., 2017; Zillmann, 2006). Moreover, some studies have investigated textual-visual news frames of the pandemic (e.g., Xu, Yu, & Löffelholz, 2024) and visuals in COVID-19 misinformation (e.g., Brennen et al., 2021). Only a few studies have paid attention to the government's use of visualization in press briefings (Allen, Bandola-Gill, & Grek, 2024) and visuals on institutional websites (Delicado & Rowland, 2021). Nevertheless, review articles found a lack of visual research on both health communication and risk and crisis communication (Schwarz et al., 2024).

A Framework for Multimodal Instructional Crisis Messages

Since the 2010s, visual communication scholars have used the term "multimodal turn" to highlight the (re-)orientation of contemporary society and the paradigmatic shift in humanities and social sciences (Jewitt, 2009; Jewitt, Bezemer, & O'Halloran, 2016). Multimodality describes the approaches that "understand communication and representation to be more than about language, and which attend to the full range of communicational forms people use—image, gesture, gaze, posture, and so on—and the relationships between them" (Jewitt, 2009, p. 14). In contemporary mediated communication, visual and textual messages appear together, and recipients receive and process them simultaneously (Geise & Baden, 2015). The multimodal configuration of media messages has become a trend in communication practice and research.

Amid the impact of the pandemic, King and Lazard (2020) called for the advancement of visual research to improve the quality of health communication and "lessen the unintended effects of infodemic conditions" (King & Lazard, 2020, p. 1723). Drawing on the concept of multimodality, two theoretical considerations are proposed as central to deciphering multimodal crisis messages.

Integration of Textual and Visual Message Elements

According to Jewitt (2009), the basic assumption of multimodality is that language (or textual/verbal mode) is "part of a multimodal ensemble" (p. 14), and other modes (such as the visual) also have certain communicative roles. That is, a multimodal approach to communication discards the convention that prioritizes texts over visuals. Textual and visual messages should be scrutinized within their specific analytical systems (Geise & Baden, 2015). Textual communication relies on argumentation that is structured by grammar and conventions, while visual communication relies on association, in which certain patterns spontaneously match the memorized visual precursors in the viewer's mind (Messaris & Abraham, 2001).

The textual mode has been dominant in health communication and crisis communication studies (Schwarz et al., 2024; Sellnow & Sellnow, 2019). This article highlights the four levels of visual analysis (Rodriguez & Dimitrova, 2011) to comprehend visual representation in crisis messages: The denotative level captures the subjects and objects manifested in visual materials. The stylistic-semiotic level refers, for example, to camera shots and angles. The connotative level underlines the signs or symbols used to convey social meanings. The fourth level refers to ideological representations.

Building on these considerations, the interaction between modes in messages constructs a holistic multimodal meaning (Jewitt, 2009). While most studies have examined visual or textual messages in isolation, integrative analyses of different modes have been relatively underexplored (Geise & Baden, 2015; Xu & Löffelholz, 2021). Therefore, this study uses Instagram posts as a typical example of how textual and visual message elements jointly frame multimodal meaning in crisis messages.

RQ 1: What were the similarities and differences in the multimodal crisis messages posted by governments and public health institutions about the COVID-19 pandemic on Instagram in Germany, Türkiye, the United Kingdom, and the United States during 2020–2021?

Influence of Contextual Factors on Multimodal Crisis Messages

The other assumption is that the production and interpretation of multimodal meaning are shaped by certain contextual factors, such as political beliefs, social norms, and cultural conventions (Jewitt, 2009). The seminal work of Douglas and Wildavsky (1982) argued that risk is not only an objective dimension but also a social construct. Cultural conventions strongly influence how communities understand risks and hazards. In a study of seven European countries, Cornia and colleagues (2016) proposed three dimensions contributing to risk cultures: disaster framing, trust in institutions, and attribution of responsibility. The typology of risk cultures (i.e., state-oriented, individual-oriented, and fatalistic) sheds light on how sociocultural contexts influence risk perceptions and crisis communication (Cornia et al., 2016).

Political systems serve as another factor shaping how public sectors manage crisis response and communication. From a social-integrative perspective, societal subsystems, institutional complexes, and constellations of actors can contribute to the formulation of organizational products (Löffelholz et al., 2013), in this case, Instagram posts. Crisis communication theories, such as the IDEA model (Sellnow & Sellnow, 2019) and the government communication decision wheel (Liu & Horsley, 2007), also support that

organizational and individual factors influence information seeking, evaluation, and self-protective behaviors. Previous studies have demonstrated that political systems act as structural biases that influence government dominance in political news reports (e.g., Van Dalen, 2012). This study further explores the influence of risk cultures and political systems on the patterns of multimodal crisis messages in Instagram posts.

RQ 2: To what extent did contextual factors (i.e., risk cultures and political systems) shape the variations in multimodal crisis messages?

Method

Research Design

The COVID-19 pandemic is a prolonged global crisis. Comparative research can enhance our understanding of one society by contrasting similarities and differences with those of other systems, thereby shedding light on testing and generalizing universally applicable theories across different settings (Esser & Hanitzsch, 2012). Thus, the comparative design is suitable not only for improving our knowledge of cross-national variations in government crisis communication but also for examining the influence of contextual factors on the formation of multimodal crisis messages.

Country selection is guided by two main contextual factors: risk cultures and political systems, which are hypothesized to shape cross-national variations in the instructional crisis messages disseminated by governments and health institutions during health crises.

Table 1 shows the characteristics of risk cultures in four selected countries: Germany, Türkiye, the United Kingdom, and the United States. Cornia et al. (2016) took Germany as a typical example of a state-oriented risk culture, where citizens have strong trust in authorities and public institutions are believed to take responsibility for risk prevention and crisis management. In contrast, existing studies have shown that the United Kingdom and the United States represent an individual-oriented risk culture, characterized by self-reliance and individual responsibility (e.g., Dimitrijevska-Markoski & Nukpezah, 2023; Hanson et al., 2021; Liu & Yang, 2023; Strange, 2022). Citizens are expected to be responsible for risk prevention and crisis mitigation, while public authorities play a role in providing the necessary information (Cornia et al., 2016). The fatalistic risk culture is characterized by citizens' unpredictable beliefs, perceptions of powerlessness, and mistrust in authorities' preparedness (Cornia et al., 2016). Studies have found that Turkish citizens have a high level of fatalistic beliefs in risk assessments, and that crisis outcomes are decontextualized by politicizing and tabloidizing discourses (Baloglu, 2021; Nordfjærn, Şimşekoğlu, & Rundmo, 2012). Based on the literature, the first hypothesis is formulated.

H1: The types of risk culture significantly influence the cross-national variations in the patterns of multimodal crisis messages.

Table 1. Risk Cultures and Political Systems in Comparison.

	Germany	The United Kingdom	The United States	Türkiye
Risk cultures	State-oriented	Individual-oriented	Individual-oriented	Fatalistic
Political systems	Federalist consensus democracy	Devolved majoritarian democracy	Federalist majoritarian democracy	Partial majoritarian democracy with authoritarian tendencies

Table 1 also shows the varying features of the four selected democracies. Lijphart's (2012) seminal work contributes to the comparison of political systems. Consensus democracy is most closely embodied in Germany, where parliament has formal dominance over the executive of the multiparty coalition government (Schmidt, 2015). Both the United Kingdom and the United States are types of majoritarian democracies where two parties dominate the political sphere (Lijphart, 2012). The United Kingdom has a system where devolved parliaments, counties, and local authorities enjoy a high degree of autonomous power (Schmidt, 2015). The United States follows a federalist system where smaller subdivisions (states) govern issues of local concern alongside the overarching national government (Schmidt, 2015). Türkiye underwent a significant transformation after the Justice and Development Party (Turkish: Adalet ve Kalkınma Partisi, also known as the AK Party) came to power in the 2002 general elections. The AK Party adopted a democratizing and transformative politics, aiming to become a full member of the European Union with an active foreign policy (Lord, 2012). However, the dominant party rule led to a weakening democracy in Türkiye, which has been described as a partial and limited majoritarian democracy with authoritarian tendencies (Keyman & Gumuscu, 2014). It is assumed that political systems influence how governments communicate the extent and measures of compliance to the public. Thus, the second hypothesis is developed.

H2: The types of political system significantly influence the cross-national variations in the patterns of multimodal crisis messages.

Data Collection and Sample

We conducted a quantitative content analysis to evaluate Instagram posts published by governments and health institutions in the selected countries. The unit of analysis is a post that includes textual and visual messaging elements. The time frame covers two years, from January 1, 2020, to December 31, 2021. To ensure comparative equivalence, two Instagram accounts per country were selected with the following criteria: One account should represent the national central administrative unit, namely the Office of the Presidency (or the Prime Minister, the Chancellor), and the other account should represent the national leading health institution.

Because of API restrictions, all posts (N = 5,676) between January 1, 2020, and December 31, 2021, were manually collected from these publicly viewable pages in October 2022. As shown in Table 2, the preliminary sample consisted of 3,072 posts related to COVID-19 between 2020 and 2021. The Centers for Disease Control (n.d.) Instagram account published many more posts than other institutional

accounts. For equivalence of sample sizes across countries, systematic sampling was applied using the ratio 1:3 (95% confidence level, 5% margin of error), resulting in 465 posts from this account. Therefore, the final sample included 2,140 Instagram posts from eight official Instagram accounts: $N_{Germany}$ = 417, $N_{United\ Kingdom}$ = 684, $N_{United\ States}$ = 651, and $N_{Türkiye}$ = 388.

Table 2. Selected Accounts and Sample of Instagram Posts From 2020 to 2021.

Country	Institutions and Instagram accounts	Posts related to COVID-19	Sample
Germany	The Chancellery of Germany (Bundeskanzlerin a.D. Merkel, n.d.) [a]	259	259
	Robert-Koch Institute (Robert Koch-Institut, n.d.)	158	158
The United Kingdom [a]	Prime Minister's Office (UK Prime Minister, n.d.)	581	581
	National Health Service (NHS, n.d.)	103	103
The United States	The White House (The White House, n.d.) [b]	186	186
	Centers for Disease Control and Prevention (Centers for Disease Control, n.d.)	1,397	465 [c]
Türkiye	The Presidency of the Republic of Türkiye (T.C. Cumhurbaşkanlığı, n.d.) [d]	226	226
	General Directorate of Public Health (Halk Sağlığı Genel Müdürlüğü, n.d.) [d]	162	162

Note. (a) It is important to note that England does not have a devolved parliament like Northern Ireland, Scotland, and Wales. For clarity in this article, these agencies refer only to England and do not apply to the other devolved nations; (b) The White House (n.d.) joined Instagram in January 2021 and Robert Koch-Institut (n.d.) joined Instagram in December 2020; (c) The posts were selected by a systematic sampling; and (d) Comment turned off for T.C. Cumhurbaşkanlığı (n.d.) and Halk Sağlığı Genel Müdürlüğü (n.d.).

Codebook

The codebook includes formal and content variables (see supplementary materials). The formal variables include the URL of posts, date, country, institution, format, and number of likes and comments. The "format" variable refers to the modalities of an Instagram post, including 1: text embedded in an image, 2: diagrammatic image, 3: illustrative image, 4: photo, 5: video, and 0: other formats.

Coding items for textual crisis messages. The IDEA model (Sellnow & Sellnow, 2019) guided the deduction of textual variables to assess the effectiveness of instructional crisis messages. The four dimensions are operationalized as follows:

- Internalization: proximity (1: local, 2: regional, 3: national, 4: international, and 0: not mentioned) and relevance (1: directly addressing the pandemic, 2: indirectly related);

- Distribution: audience (1: differentiated target groups, 0: not differentiated) and channels (1: links to other channels, such as government websites, 0: no redirecting links);
- Explanation: scientific explanations (1: yes, 0: no) and political explanations (1: yes, 0: no);
- Action: protective actions (1: yes, 0: no), compliance measures (1: yes, 0: no), personal responsibility (1: yes, 0: no), and institutional responsibility (1: yes, 0: no).

Coding items for visual representation of health crises. Visual variables were derived from the levels of visual analysis (Rodriguez & Dimitrova, 2011). The categorical variables include:

- Manifested subjects (1: politicians, 2: doctors and health workers, 3: individual or group of people, 4: mixed, 0: other);
- Camera shot (1: close-up, 2: medium shot, 3: long shot, 0: not identifiable);
- Camera angle (1: low angle, 2: eye-level angle, 3: high angle, 0: not identifiable);
- Semiotic signs (1: iconic, 2: indexical, 3: symbolic, 0: not identifiable).

The visual semiotic signs were adapted from existing studies (Lazard et al., 2017; Xu et al., 2024) with three categories: The iconic sign means the mimetic resemblance (e.g., an anatomical picture of the coronavirus); the indexical sign represents a correspondence of the fact that evokes the physical connections (e.g., ventilator, test kit, vaccine, and medical mask); and the symbolic sign indicates the imputed or arbitrary representation that should be understood in a learned social construction (e.g., the depiction of lockdown, and empty street).

Analysis Strategy

The multimodal approach considers messages to contain textual and visual elements. Thus, the clustering of these elements can reveal the composition of modes and compare the similarities and differences in the holistic patterns (RQ1). Traditional cluster analysis approaches are better suited for dichotomous data and, therefore, are limited in detecting patterns from multifaceted categorical variables.

Hierarchical clustering on principal components (HCPC) is an advanced approach for multivariate exploratory data (Husson, Josse, Lê, & Mazet, 2020) involving three steps: (1) Multiple correspondence analysis (MCA) transforms the textual and visual categories into a new set of continuous variables called the principal components. MCA aims to reduce multilayered categories and determine the parameters that are most likely to reveal clusters in the next step. (2) Hierarchical cluster analysis of MCA components can detect aggregated clusters (or patterns). Based on the dendrogram, researchers determine the cluster solution, which is also considered the number of multimodal message patterns. This methodological step realizes the composition of textual and visual message elements as addressed in the theoretical considerations. And (3) Descriptive analysis of variables in each cluster can depict the cross-national variations of multimodal crisis messages. Existing studies have used the clustering method to extract multimodal news frames (e.g., Xu & Löffelholz, 2021) and visual communication strategies used by politicians (e.g., Bast, 2024).

Multinomial logistic regression is helpful in exploring how risk cultures and political systems (both predefined nominal variables based on the literature) influence clustered multimodal crisis messages (RQ2). We used R for the HCPC analysis and multinomial logistic regression (see supplementary materials).

Intercoder Reliability Test

Ten coders worked in four country teams for reliability testing and coding, including two native German speakers, three native Turkish speakers, and five very fluent English speakers. After three rounds of coder training, the final pretest was conducted on 10% of the sample posts per country. Despite the complexity of the codebook, the final reliability test achieved at least 0.80 agreement for all content variables. The average reliability results (excluding formal variables) per country were for the German sample (two coders, Cohen's κ = 0.87), the United Kingdom sample (three coders, Fleiss's κ = 0.89), the United States sample (three coders, Fleiss' κ = 0.89), and the Turkish sample (three coders, Fleiss' κ=0.84).

Results

Descriptive Results

From 2020 to 2021, governments and health institutions published 2,140 Instagram posts related to the COVID-19 pandemic in four countries, including Germany (*N* = 417, 19.5%), Türkiye (*N* = 388, 18.1%), the United Kingdom (*N* = 684, 32.0%), and the United States (*N* = 651, 30.4%). The appendix shows the descriptive results of all variables by country (see supplementary materials). Figure 1 illustrates the evolution of the frequency of Instagram posts by country over two years. During the first year of the pandemic, the United Kingdom Prime Minister's Office and the National Health Service published significantly more instructional crisis messages than institutional accounts in other countries.

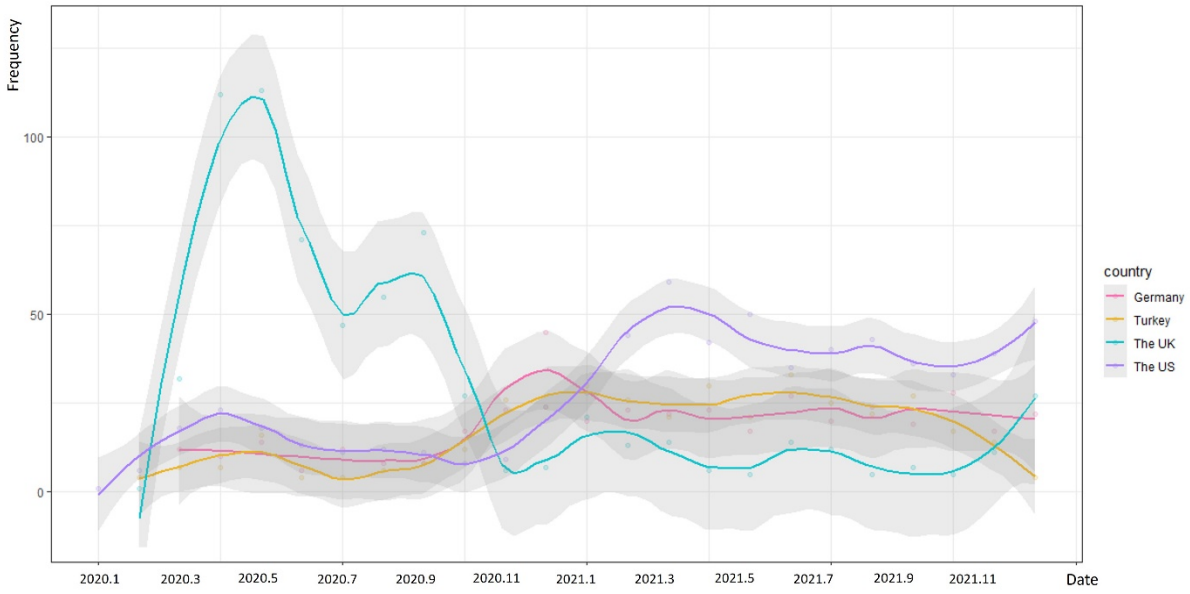

Figure 1. Frequency of Instagram posts by country between 2020 and 2021.

Note. Total *N* = 2,140 Instagram posts (Germany *N* = 417, the United Kingdom *N* = 684, the United States *N* = 651, Türkiye *N* = 388).

About the modalities, it is not surprising that photos (*N* = 673, 31.4%) and videos (*N* = 503, 23.5%) are the main formats, followed by text in pictures (such as the slogans "stay home" and "save lives") (*N* = 351, 16.4%), diagrammatic images (including tables, graphs, and informatics) (*N* = 344, 16.1%), and illustrative images (*N* = 267, 12.5%). The "other" category (*N* = 2, 0.1%) refers to podcasts, which are primarily auditory modalities.

RQ1: Clusters of Multimodal Crisis Messages

A three-step HCPC analysis was conducted on 2,140 Instagram posts to detect patterns in multimodal crisis messages. Step one was an MCA on the Burt matrix to transform the multifaceted categorical variables into a set of continuous principal components. To reduce noise, the first 14 MCA dimensions (explaining 91.42% of the variance) were selected for subsequent clustering. Figure 2 shows the MCA plot of the cluster centers and categories. Two sets of principal components were observed. One set was associated with visual-oriented variables, such as manifested subject, camera shot, camera angle, and semiotic sign. The other set was related to text-oriented variables, including proximity, political explanation, institutional responsibility, personal responsibility, compliance measures, and protective measures. Obviously, four countries were located in distinct clusters with different textual and visual message elements.

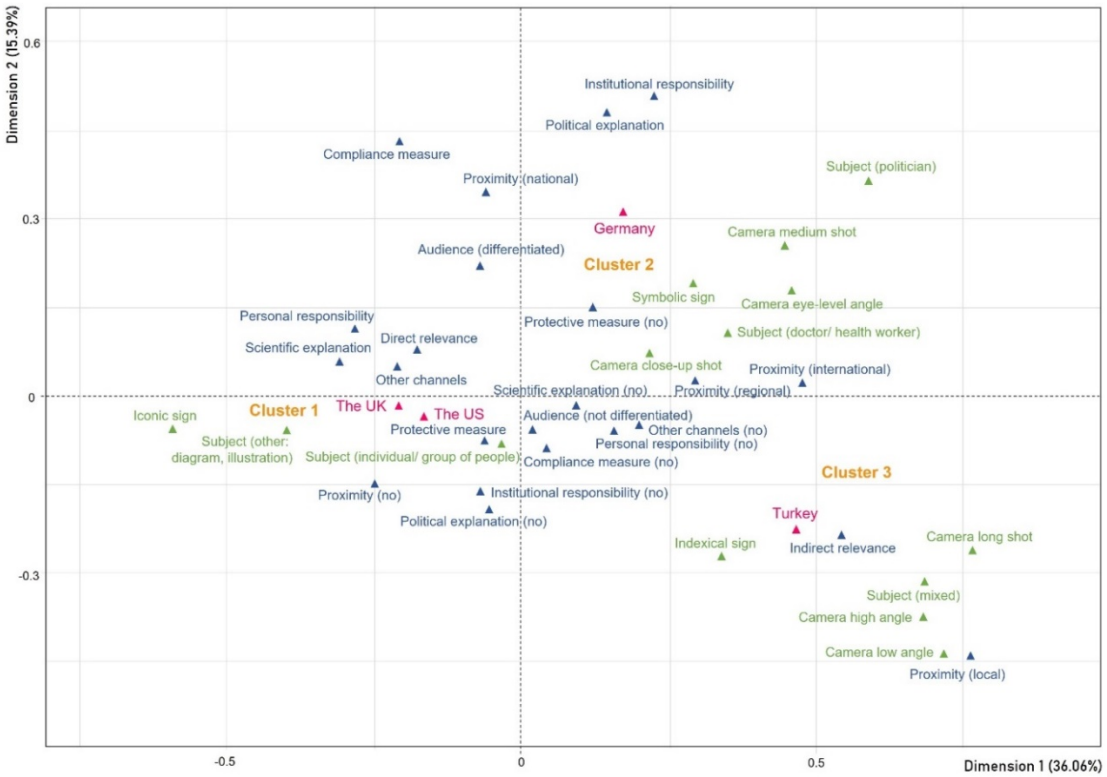

Figure 2. MCA plot of elements in multimodal crisis messages.

The second step was a hierarchical cluster analysis (using Ward's method) of the detected MCA components. Figure 3 displays the dendrogram of the hierarchical cluster analysis, which guides the choice of the cluster solution. The elbow criterion is commonly used to identify the number of clusters in multidimensional scaling. The curves and points in the scree plot typically form a convex pattern. The point where a sharp bend (or elbow) occurs indicates the appropriate number of cluster solutions. Figure 3 illustrates the rapid loss of inertia when passing from a two-cluster solution to a four-cluster solution. Namely, the correct cluster solution for this sample is a three-cluster solution, which represents the number of patterns detected from textual and visual message elements.

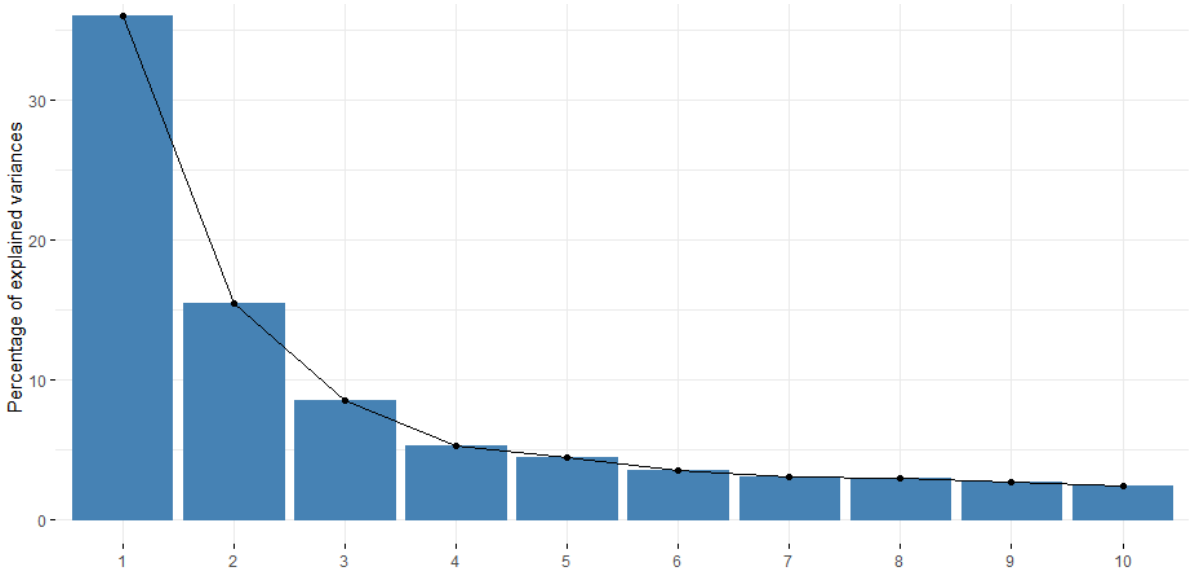

Figure 3. Scree plot of cluster solutions in HCPC.

The third step was to describe the characteristics of each cluster. Table 3 shows the composition and interpretation of the three patterns of multimodal crisis messages. The numbers in the table are the proportions of elements in a particular cluster. The salient features are based on two criteria. First, within each cluster (vertical column), the salient message elements are highlighted by dark gray (occupying at least 50%) and light gray (between 30% and 50%). Second, some elements have low percentages in the vertical column but stand out when comparing relative frequencies across clusters (horizontal row). These message elements are highlighted in bold. Cross-national differences are significant in the clusters of multimodal crisis messages: $\chi^2(6) = 614.65$, $p < .001$, Cramér's $V = 0.38$. Below, three patterns of multimodal crisis messages are named according to their salient characteristics.

Table 3. Multimodal Crisis Messaging Patterns.

		Cluster 1	Cluster 2	Cluster 3
		N = 1,177	*N* = 587	*N* = 376
Country	Germany	13.3	**26.1**	28.5
	Türkiye	9.6	10.4	**56.9**
	The United Kingdom	**41.1**	29.1	7.7
	The United States	**35.9**	34.4	6.9
Textual information				
Proximity	Local	1.7	3.1	**40.2**
	Regional	**2.8**	3.9	7.2
	National	**31.1**	42.8	9.8
	International	6.4	7.8	**31.9**
	Not mentioned	58.0	42.4	10.9
Relevance	Direct	**87.6**	87.9	15.7
	Indirect	12.4	12.1	**84.3**
Differentiating audiences		**19.2**	30.5	6.9
Channel		**59.0**	53.7	8.2
Scientific explanation		**28.0**	25.0	0.8
Political explanation		22.0	**50.1**	16.5
Protective action		**68.6**	63.2	63.6
Compliance measure		**20.0**	22.5	0.5
Personal responsibility		**42.7**	40.7	2.9
Institutional responsibility		15.6	**46.3**	14.6
Visual representation				
Subject	Politicians	0.3	**39.9**	47.6
	Doctors/ health workers	0.3	**14.1**	6.6
	Individual/ group of people	8.6	**30.7**	1.1
	Mixed	1.6	9.7	**42.8**
	Other	**89.2**	5.6	1.9
Camera shot	Close-up	0	**22.0**	2.1
	Medium shot	0	**66.1**	39.9
	Long shot	0.2	9.5	**56.1**
	Not identical	**99.8**	2.4	1.9
Camera angle	Low angle	0	3.1	**12.2**
	Eye-level angle	0.7	**91.7**	70.5
	High angle	0.1	4.8	**16.2**
	Not identical	**99.2**	0.5	1.1
Semiotic sign	Iconic	**12.2**	0.5	0
	Indexical	19.7	21.1	**77.1**
	Symbolic	2.8	**8.3**	8.0
	Not identical	**65.3**	70.0	14.9

Note. Total *N* = 2,140. Proportion of category that belongs to the cluster DARK GRAY: message elements with at least 50% within the cluster; LIGHT GRAY: message elements between 30% and 50% within the cluster; **BOLD**: message elements that stand out in the cross-cluster comparison of relative frequencies.

Cluster 1: Person-Oriented Protective Message (N = 1,177)

This cluster is mainly visible in institutional crisis messages from the United Kingdom (41.1%) and the United States (35.9%). Textual content is characterized by emphasizing national (31.1%) and regional (2.8%) proximity, direct relevance (87.6%), links to multiple channels (59.0%), scientific explanation (28.0%), protective action (68.6%), and individual responsibility (43.7%). Visual content mainly uses illustrative or diagrammatic images (89.2%), so camera angle and camera distance are not identical. Iconic signs are prominent (12.2%), such as coronavirus symbols.

Cluster 2: State-Oriented Instructional Message (N = 587)

Most German Instagram posts (26.1%) fall into this message pattern, while some posts come from the United States (34.4%). Textual content emphasizes national proximity (42.8%), direct relevance (87.9%), differentiation of publics (e.g., at-risk groups) (30.5%), external links (53.7%), and protective measures (63.2%). Political explanation (50.1%) and institutional responsibility (46.3%) are very salient. Visuals represent politicians (39.9%), individuals or groups of people (30.7%), and doctors or health workers (14.1%). Close-up (22.0%), medium shot (66.2%), and eye-level angle (91.7%) are common stylistic techniques. More symbolic signs are visible (8.3%).

Cluster 3: Politicizing Crisis Messages (N = 376)

This cluster shows a pattern, with most posts from Türkiye (56.9%). Textual information underscores international (31.9%) and local (40.2%) proximity, more indirect relevance (84.3%), and protective action (63.6%). Visual information mainly shows politicians (47.6%) and politicians with a mix of people (42.8%). Medium shots (39.9%) and long shots (56.1%) are used more often, while the camera angle is mainly at the eye level (70.5%). Indexical semiotic signs are prominently visible (77.1%).

RQ2: Influence of Contextual Factors

Multinomial logistic regression revealed that both risk cultures and political systems have a significant influence on shaping the identified three clusters of multimodal crisis messages (Chi-Square = 462.41, AIC = 3,677.04, $df = 2$, $p < .001$). The Cox & Snell R-squared value suggests that the model explains approximately 23.48% of the variability in the outcome variable. The final model represents a significant improvement in fit over a null model: $\chi^2(6) = 572.59$, $p < .001$. The full set of predictors (both risk cultures and political systems) significantly shapes the patterns of crisis messages.

Table 4 shows the likelihood ratio tests of the overall contribution of contextual factors to the model. Risk cultures indicate a highly significant influence on the clustering results of crisis messages: $\chi^2(2) = 134.72$, $p < .001$. Thus, H1 is supported, as the types of risk cultures significantly influenced the cross-

national variations in the multimodal crisis message clusters. Meanwhile, political systems also present a significant effect on the formation of message patterns: $\chi^2(2) = 6.03$, $p < .05$. Therefore, H2 is also confirmed, as the categories of political systems have a significant influence on variations in crisis message patterns. In addition, risk cultures tend to have a more significant effect than political systems.

Table 4. Multinomial Logistic Regression of Contextual Factors.

Effects	Model fitting criteria			Likelihood ratio tests		
	AIC of reduced model	BIC of reduced model	−2 Log Likelihood of Reduced Model	Chi-Square	*df*	Sig.
Intercept	63.99	109.34	47.99 [a]			
Risk cultures	194.72	228.73	182.72	134.72	2	<.001
Political systems	66.03	100.04	54.03	6.03	2	0.049

Note. Total *N* = 2,140. (a) This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

Discussion

Governments and health institutions in Germany, the United Kingdom, the United States, and Türkiye adopted a multimodal approach to crisis communication on Instagram during the COVID-19 pandemic. Selected official accounts commonly used different combinations of textual and visual modes, including photos, illustrative images, data visualization, and videos. This is consistent with the multimodal turn (Jewitt et al., 2016; Ravelli et al., 2018) and shared interest in visual communication via social media (Russmann & Svensson, 2017).

In assessing the effectiveness of crisis communication, one notable practice was the active posting of instructional crisis messages by governmental accounts in four countries between 2020 and 2021. Timely information is important because it can raise awareness about risks and crises, reduce uncertainty, and demonstrate a commitment to credibility and transparency (Coombs & Holladay, 2010; Sellnow & Sellnow, 2019). Meanwhile, selected accounts frequently published preventive measures without significant cross-country differences. As suggested by the IDEA model, the rapid dissemination of instructional crisis messages can help reassure the public and counter misinformation (Sellnow et al., 2017). When confronting this global health crisis, these governments and health institutions studied generally met their communication goals and responsibilities as public sectors, striving to provide up-to-date messages, promote preventive measures, and build trust in authorities (Liu & Horsley, 2007; Strömbäck & Kiousis, 2011; Yang, 2018). Another finding was that United Kingdom government accounts published significantly more posts from March to August 2020 than afterward. This was due to the government adopting a different strategy for crisis management and communication in late 2020 (Hanson et al., 2021; Strange, 2022). The sudden reduction in the frequency of messages could lead to a misperception that the crisis is less serious; thus, preventive measures are seen as less necessary.

Increased digitization, particularly the prevalence of social media and Internet use, can quickly fill information gaps in crises (Austin & Jin, 2016; Eriksson, 2018; Jin et al., 2014), but also amplify harmful

messages (WHO, 2022). Existing literature has found that Instagram users have more misconceptions about the coronavirus (Meppelink et al., 2022). The IDEA model has suggested that communicators should ensure consistent messages from multiple sources and distribute them through different media channels to reach different audiences (Sellnow & Sellnow, 2019). In this study, we found that United States and German institutional accounts effectively communicated scientific explanations, translating technical jargon into understandable language. Furthermore, they collaborated with traditional channels by providing additional links to the websites of health institutions, which facilitated further information seeking. This evidence-based approach helped build resilience to misinformation (King & Lazard, 2020). However, given that Instagram is predominantly used by younger audiences, selected accounts fell short in incorporating interactive content, engaging with followers and viewers, and debunking misconceptions related to the coronavirus.

This comparative study contributes to the enrichment of the IDEA model by evaluating instructional risk and crisis messages in different countries and by suggesting a visual communication perspective. The HCPC analysis revealed three clusters of multimodal crisis messages, with salient variations across four national contexts. On the one hand, this finding is consistent with the theoretical consideration that sociocultural contexts and institutional complexes can lead to differentiations in crisis communication and instructional messages (Liu & Horsley, 2007; Löffelholz et al., 2013; Sellnow & Sellnow, 2019). On the other hand, this comparative study investigates how contextual factors shape holistic multimodal meaning (Jewitt, 2009; Jewitt et al., 2016). Multinomial logistic regression reveals that risk cultures and political systems significantly influence the formation of the three message clusters, with the effect of risk cultures being more significant. Figure 4 displays some examples for each cluster of multimodal crisis messages. Best practices and areas for improvement are discussed below.

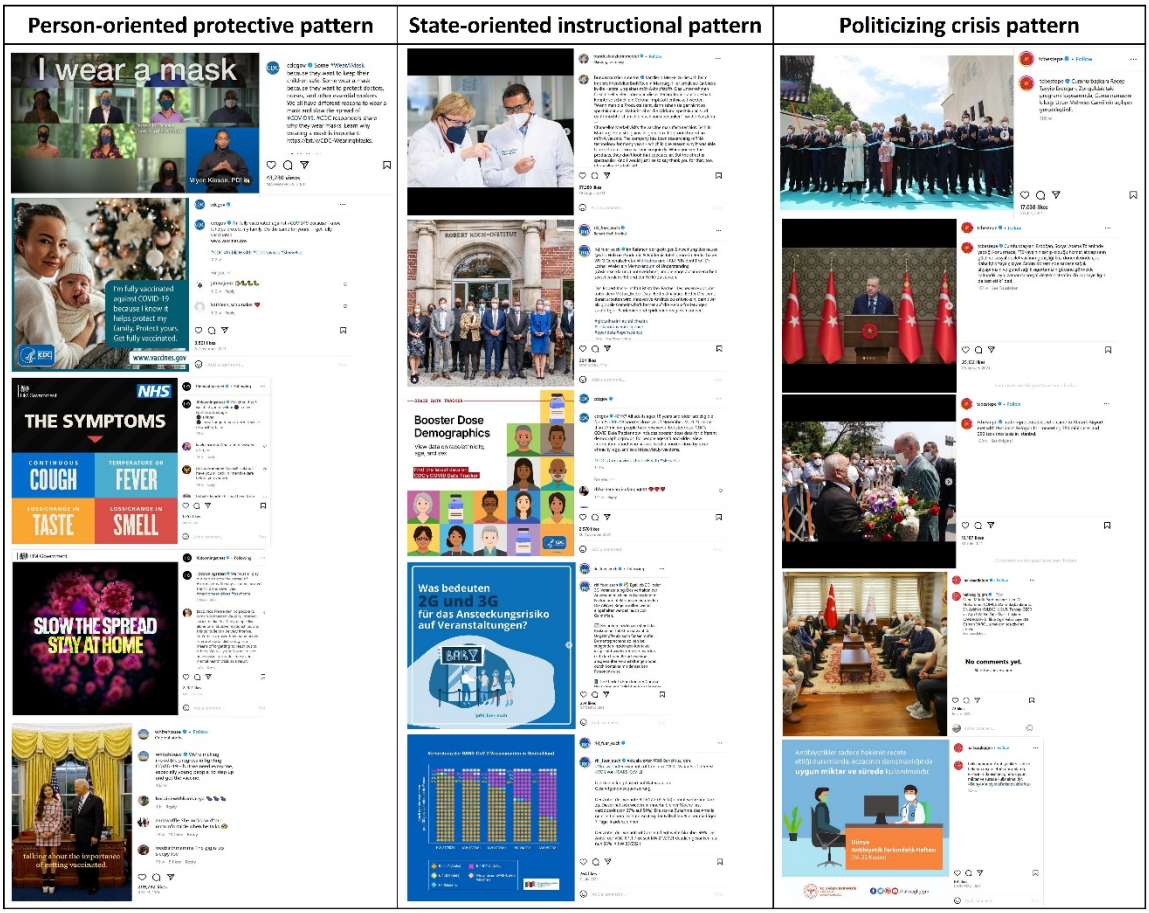

Figure 4. Examples of Instagram posts in three multimodal crisis message patterns.

Note. Instagram posts retrieved from Bundeskanzlerin a.D. Merkel (2021), Centers for Disease Control (2020, 2021a, 2021b), Halk Sağlığı Genel Müdürlüğü (2020, 2021), Robert Koch-Institut (2021a, 2021b, 2021c), T.C. Cumhurbaşkanlığı (2021a, 2021b, 2021c), UK Prime Minister (2020a, 2020b), and The White House (2021).

The person-oriented protective message pattern is characterized by emphasizing self-protective measures, the use of different media channels, and the placing of responsibility on individuals. The visuals depict individuals or groups of people, illustrative images, and mimetic symbols of the virus. Most United Kingdom and United States posts belong to this cluster. The individual-oriented risk culture (Cornia et al., 2016) suggests an influence on multimodal crisis messages in these two contexts, where people are expected to take responsibility for themselves and their families, and careless or negligent individuals are often blamed for the consequences of the crisis. The findings align with a critical discourse suggesting that the British government attributed the highest death toll in Europe to the supposedly reckless behavior of the British people (Strange, 2022). Similarly, survey research showed that United States citizens with individualistic worldviews (Liu & Yang, 2023) and local government officials with individualistic cultural

biases reported lower support for adopting COVID-19 mitigation measures (Dimitrijevska-Markoski & Nukpezah, 2023).

In addition to risk cultures, political systems are likely to shape government messaging on Instagram. The United Kingdom is an example of a majoritarian democracy where devolved governments enjoy a certain degree of autonomy (Hanson et al., 2021; Lijphart, 2012). While most government posts did not mention the magnitude of compliance measures, they did highlight the proximity of the crisis at the regional level. While both the United States and the United Kingdom are majoritarian democracies, the former's crisis messages emphasized the national proximity of the crisis and institutional responsibility slightly more. This may be explained by the federal system, where authority is constitutionally divided between regional state governments and Washington (Schmidt, 2015). This finding shows that governments and health organizations should consider messaging strategies that target specific cultural groups, such as individualists. Creators of instructional crisis messages should be aware of the decentralization of political power and provide a clearer signal of crisis proximity.

The state-oriented instructional message pattern is characterized by an emphasis on national proximity, institutional responsibility, legal or policy explanations, and differentiated target audiences. The visuals consist mainly of diagrams, illustrations, scientific experts, and politicians. Symbolic signs are visible, such as empty streets in closed areas and national landmarks. The results support that Germany represents a state-oriented risk culture (Cornia et al., 2016) that shapes the crisis messages of government and health institutions. As Hattke and Martin (2020) explained, Germany's 16 constituent states (Länder) and health institutions functioned together to manage cross-state issues and services, while the Robert Koch Institute provides epidemiological surveillance and research to support evidence-based policymaking at the national level. The positive impact is the desired cross-sectoral collaboration and unified response.

In addition, German and United States governmental accounts presented positive practices in using Instagram to reach public segments, such as the elderly, adolescents, and at-risk groups. Under greater public scrutiny, governments and health institutions are expected to provide information that is of interest to a diverse range of publics (Liu & Horsley, 2007; Strömbäck & Kiousis, 2011). This finding is evidence of an institutionalized consideration of diversity and inclusion in society (Hanson et al., 2021).

Germany is an example of a federally organized consensus democracy (Lijphart, 2012; Schmidt, 2015). Instructional crisis messages emphasize the explanation of compliance measures, political decision making, and the legislative process. Germany's federal and consensual system worked well during the first phase of the pandemic because policymakers agreed on the need to unite around common regulations implemented at the national level (Hattke & Martin, 2020). Additionally, the visuals depict German politicians using eye-level angles and medium and long shots, presenting political images in a neutral and dialogic manner. This visual stylistic technique demonstrates implications for presenting political imagery in instructional crisis messages.

The politicizing crisis message pattern is characterized by accentuating indirectly relevant information, more international and local proximity, and less scientific explanation. Turkish institutional

accounts did not clearly assign responsibility and used less diverse visual materials than the other three countries. Photographs focused on the president or him with a mix of people. Turkish Instagram posts tend to be shaped by a fatalistic risk culture (Cornia et al., 2016). This finding mirrors that of a previous study, in which Turkish road users reported more fatalistic beliefs and preferred written and audio information than visual signs (Nordfjærn et al., 2012).

It is very likely that the political context significantly influenced Turkish multimodal crisis messages. Although the European Union has played some role in the democratization of Türkiye, the dominance of the AK Party seemingly led to a partial majoritarian democracy with authoritarian tendencies (Keyman & Gumuscu, 2014; Lord, 2012). The weakening of democracy is reflected in the dominant appearance of President Recep Tayyip Erdoğan, or the leader being surrounded by a group of supporters. The stylistic techniques of high angles and long shots can visually create a hierarchy of political power. Baloglu (2021) found that Turkish news coverage was polarized by politics, as the causes and consequences of the COVID-19 pandemic were decontextualized through politically instrumentalizing and tabloidizing uses (Baloglu, 2021). This approach shows limited effectiveness in crisis communication, as an emphasis on politicizing messages and indirect relevance may reduce risk perceptions and appropriate behaviors.

Conclusion

Given the call to advance visual research to enhance crisis response and health communication during the pandemic (King & Lazard, 2020), this study contributes to the understanding of multimodal messages published by governments and health institutions. With the increasing popularity of visually based social media, textual and visual resources have manifested in all types of digital communication (Highfield & Leaver, 2016; Ravelli et al., 2018). Drawing on the concept of multimodality, this article proposes two theoretical considerations for deciphering the integration of textual and visual information elements and the influence of contextual factors. This framework may be useful for future empirical studies on crisis information and news coverage in multimodal media environments.

A quantitative content analysis was conducted to examine 2,140 Instagram posts from governments and health institutions in Germany, the United Kingdom, the United States, and Türkiye between 2020 and 2021. The selected official accounts met the common goals and responsibilities of the public sector in terms of timeliness, frequency, mobilization of appropriate actions, and use of visuals in their crisis communication. Governments and health institutions should use Instagram for more interactive and visually appealing strategies to engage younger audiences, debunk misinformation, and improve the effectiveness of crisis communication.

The HCPC method demonstrated its advantages in detecting clusters from textual and visual variables with multifaceted categories. Three clusters of multimodal crisis messages were identified: The person-oriented protective pattern (United Kingdom and United States) prioritized self-protective responsibility and provided multiple channels to facilitate individual information seeking; the state-oriented instructional pattern (Germany, partly United States) showed positive practices in explaining institutional responsibilities in caring for differentiated groups, explaining science and policy, and collaborating across sectors at a nationally consistent level; and the politicizing crisis pattern (Türkiye) tended to exaggerate

images of political leaders, thus reducing crisis relevance, scientific explanation, and attribution of unclear responsibilities. The findings point to best practices and failures that would be valuable in improving preparedness for future crises.

This article adds to the current literature on crisis communication by examining the influence of two contextual factors on cross-national variations in multimodal crisis messages issued by governments and healthcare institutions. Comparative findings suggest that cross-national differences are significantly shaped by risk cultures (individual-oriented, state-oriented, and fatalistic types) and political systems (consensual, majoritarian, and authoritarian-tended democracies). Researchers and practitioners can benefit from a comparative perspective to derive more applicable and generalizable messaging strategies across different systems and contextual parameters.

This research has limitations that may pave the way for future studies. First, textual-visual relationships can create broader multimodal connotations (Xu & Löffelholz, 2021). The interplay between textual and visual information needs further investigation. Second, other contextual factors, such as visual cultures, can shed light on how visually manifested cultural conventions can shape the construction of multimodal messages (Nordfjærn et al., 2012; Russmann & Svensson, 2017). Because of the different platform affordances, cross-platform comparisons of social media messages are a promising avenue for research. Third, scholars have recommended ways of using visual materials in risk and crisis communication (Lipkus, 2007). Future research could explore the motivations and strategies of governmental actors in producing multimodal or visual instructional messages. Fourth, quantitative visual analysis can capture representation and style but is limited in uncovering visual symbolism and ideologies. Researchers can delve into the connotative, symbolic, and ideological narratives in visual systems by combining quantitative and qualitative methods. Finally, many studies have examined the visual effects on people's perceptions of health information (Lazard et al., 2017; Zillmann, 2006). Further research could explore how the multimodal framing of instructional crisis messages influences recipients' emotions, perceptions, and behaviors (Geise & Baden, 2015).

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