DOI: 10.1111/1468-5973.12249

ORIGINAL ARTICLE

WILEY

Avoiding chaotic use of social media before, during, and after emergencies: Design and evaluation of citizens' guidelines

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Funding information
European Union, Grant/Award Number: FP7 No. 608352; German Federal Ministry of Education and Research, Grant/Award Number: BMBF No. 13N14351

Abstract

Social media have been established in many natural disasters or human-induced crises and emergencies. Nowadays, authorities, such as emergency services, and citizens engage with social media in different phases of the emergency management cycle. However, as research in crisis informatics highlights, one remaining issue constitutes the chaotic use of social media by citizens during emergencies, which has the potential to increase the complexity of tasks, uncertainty, and pressure for emergency services. To counter these risks, besides implementing supportive technology, social media guidelines may help putting artefact and theoretical contributions into practical use for authorities and citizens. This paper presents the design and evaluation (with 1,024 participants) of citizens' guidelines for using social media before, during, and after emergencies.

KEYWORDS
emergency management, guidelines for citizens, representative survey, social media

1 | INTRODUCTION

Social media are a part of everyday life and are also prevalent during crises, disasters, and emergencies. Reuter and Kaufhold (2018) summarized 15 years of social media use during natural disasters and human-induced crises, identifying different usage, role, and perception patterns between administrative and public stakeholders both in the real and in virtual realms. New opportunities have emerged for emergency services to alert and warn of crises (Brynielsson et al., 2017) and for social media analytics (Stieglitz, Mirbabaie, Ross, & Neuberger, 2018). Palen and Hughes (2018) conclude that social media also promote socio-technical innovations, such as citizen reporting, community-oriented computing, collective intelligence and distributed problem solving, and digital volunteerism. However, one remaining issue is that citizens' activities coordinated via social media have the potential to increase the complexity of tasks, uncertainty, and pressure for emergency services, for instance, if volunteers themselves are endangered (Perng et al., 2012). Given the risks of chaotic social media use (Kaewkitipong, Chen, & Ractham, 2012), guidelines may help authorities implement social media into their organizational culture (Reuter, Ludwig, Kaufhold, & Spielhofer, 2016) and encourage citizens to foster good practice and prevent misuse of social media during emergencies (Reuter & Spielhofer, 2017).

While there are plenty of guidelines for using social media in general or during emergencies from the perspective of organizations, few guidelines approach the citizens' perspective and none of them has been evaluated with citizens. Thus, our study aims to contribute to the design and evaluation of citizens' guidelines for using social media in emergencies, while the latter aspect of evaluation is the main focus of this paper. The aim of the guidelines is to approach various issues that occur with social media usage from citizens' perspective during crises and that are not adequately addressed by existing guidelines. Such issues include task complexity and uncertainty, information overload, the need for timely and trustworthy information, and the effective organization of volunteer groups and

help for emergency services. We will outline them in detail in the next section. Our main research question is: How do citizens perceive guidelines for social media use in emergencies (RQ1)? To guide the analysis of our results, we formulated further five sub-questions:

- To what extent do participants agree to the presented guidelines on social media behaviour before, during, and after emergencies (RQ1.1)?
- How consistent is the agreement with guidelines across the categories, that is, concerning the use of social media before, during, and after emergencies (RQ1.2)?
- To what extent is the attitude towards the guidelines affected by smartphone and social media usage in daily life and in emergencies (RQ1.3)?
- How do demographic factors influence the agreement with guidelines concerning the use of social media in emergencies (RQ1.4)?
- What are caveats and improvement suggestions towards the guidelines on social media in emergencies (RQ 1.5)?

Firstly, related work on the use and challenges of social media in emergencies and an analysis of existing guidelines for the use of social media will be discussed (Section 2). Based on this, we designed citizens' guidelines for evaluation (Section 3). To gather quantitative and qualitative feedback on our research questions, we then conducted a representative online survey in Germany in July 2017 (Section 4). The paper concludes with a short summary of results, discussion, and outlook for future research (Section 5).

2 | RELATED WORK: CHALLENGES OF SOCIAL MEDIA IN EMERGENCIES AND EXISTING GUIDELINES

Based on the potentials of social media in the emergency management cycle (EMC), comprising the phases of mitigation, prevention, response, and recovery (Baird, 2010), we present and discuss existing guidelines for the use of social media. In this paper, we use the term emergency as a state of collective disruption, caused by natural hazards (i.e., earthquakes, floods, hurricanes, and tsunamis) or human-induced disasters (i.e., accidents, attacks, shootings, terrorism, and uprisings) that are of a sudden and unexpected nature. Therefore, they threaten societal values and structures, and require authorities to make decisions during uncertain circumstances (Boin, Stern, & Sundelius, 2005).

2.1 | Use and challenges of social media in emergencies

For 15 years, the public has used social media in emergencies (Reuter & Kaufhold, 2018), with 2012 Hurricane Sandy being one of the most prominent cases (Caragea, Squicciarini, Stehle, Neppalli, & Tapia, 2014; Homeland Security, 2013; Kogan, Palen, & Anderson, 2015) but also the 2008 Sichuan earthquake (Li & Rao, 2010; Qu, Wu, & Wang, 2009) or 2013 European floods (Kaufhold & Reuter, 2016; Reuter & Schröter, 2015). Accordingly, a mixed-method study with authorities and citizens outlines that, in times of crisis, Facebook is perceived as a channel to reach the general public and where people debate and connect with family and friends, whereas Twitter is perceived as an elite channel which primarily serves as an early warning channel (Eriksson & Olsson, 2016). Research outlines a variety of potentials of social media use, that is, increasing the resilience of citizens (Jurgens & Helsloot, 2017). Panic, looting, and helplessness or dependency on external rescuers in crisis situations are rare, contrary to popular belief (Helsloot & Ruitenberg, 2004). Instead, self-organization and help are a common reaction: Citizens of affected areas assist emergency services by social aftercare for victims and relatives online (Mirbabaie & Zapatka, 2017), search for missing people by sharing and using information on microblogging platforms (Qu, Huang, Zhang, & Zhang, 2011), and coordinate and mobilize volunteers through social media (Albris, 2017; Kaufhold & Reuter, 2016).

Despite these potentials, research also outlines a variety of risks associated with the use of social media (Hiltz & Plotnick, 2013; Plotnick & Hiltz, 2016; Reuter et al., 2016). A study on the 2011 Norway attacks revealed that citizens' activities coordinated via social media increased the complexity of tasks, uncertainty, and pressure for emergency services, since volunteers endangered themselves by autonomous rescue attempts (Perng et al., 2012). Likewise, Kaewkitipong et al. (2012) report on the risks of chaotic social media use, including "information redundancy, information inconsistency, chaos and rumors among all social communities" (p. 13), that occurred during the 2011 Thailand flooding disaster. A further study on the 2010 Haiti earthquake highlights that uncertainty can be generated by unreliable information and mistakes due to chaotic and disorganized work of volunteers (Valecha, Oh, & Rao, 2013). During the 2013 floods in Dresden, Facebook groups such as "Fluthilfe Dresden" (Flood Help Dresden) distributed and spread out citizen volunteers successfully, that is, for filling and piling sandbags, although in some cases more people were mobilized than the response effort could accommodate (Albris, 2017). Thus, the convergence of volunteers led to suboptimal outcomes and authorities feared dilettante behaviour by citizen volunteers, indicating the need for guidance to improve citizens' behaviour both in real and in virtual spaces (Reuter, Heger, & Pipek, 2013). Accordingly, Schmidt, Wolbers, Ferguson, and Boersma (2017) outline the challenges of governing self-organization of citizens, connecting online platforms with on-site response initiatives, fostering inclusiveness, and managing information.

2.2 | Existing guidelines for the use of social media

Our search revealed that there are many existing guidelines concerning the use of social media in general and for use in emergency situations (see Section 9). We found no commonly accepted definition for social media guidelines in emergencies, but multiple aspects in terms of their applicability, domains, and goals are highlighted in different definitions. For instance, social media guidelines for emergencies intend to "enable citizens using new mobile and online technologies to actively participate in the response effort" (Belfo et

TABLE 1 List of guidelines for the use of social media in general

Title	Publisher
Verification Handbook—An ultimate guideline on digital age sourcing for emergency coverage (2014)	European Journalism Centre, EU
Social engagement handbook 2.0 (2012)	American Red Cross, US
Social media handbook (2014)	United States Army, US
Ein Leitfaden zum Umgang mit Social Media im DRK (2012)	Deutsches Rotes Kreuz (German Red Cross, DRK), DE
Social-Media-Guideline—Empfehlungen für einen sicheren Umgang mit sozialen Medien (2012)	Berliner Feuerwehr (Berlin Fire Department), DE
Verhalten in sozialen Netzwerken (2011)	Bundesanstalt Technisches Hilfswerk (Federal Agency for Technical Relief), DE
Das soziale ins Netz bringen—die Caritas und soziale Medien (2014)	Deutscher Caritasverband (German Caritas Association), DE
Social media guidelines for IFRC staff (2009)	International Federation of Red Cross and Red Crescent Societies (IFRC)
Social Media—Guidelines for Canadian Red Cross Staff and Volunteers (2013)	Canadian Red Cross, Canada
Rotkreuz-Social-Media-Policy (2010)	Österreichisches Rotes Kreuz (Austrian Red Cross), Austria
ACT Government Social Media Policy Guidelines (2012)	ACT Government, Australia
Social Media in der Hamburgischen Verwaltung—Hinweise, Rahmenbedingungen und Beispiele (2011)	Freie Hansestadt Hamburg (Free Hanseatic City of Hamburg), DE
Social Media Guidelines and Best Practices—Facebook (2012)	Centers for Disease Control and Prevention (CDC), US
Social Media Guidelines and Best Practices—CDC Twitter Profiles (2011)	
The health communicator's social media toolkit (2011)	
CDC's Guide to Writing for Social Media (2012)	

al., 2015) and to "enhance the safety and security of citizens by supporting both citizens, and public authorities, in their use of social media to complement their crisis management efforts" (Helsloot et al., 2015). Table 1 contains guidelines and handbooks from different institutional backgrounds, ranging from civil institutions, cities, and authorities to the military. In addition, organizations, companies, and authorities publish guidelines for the use of social media by their employees. These guidelines usually focus on the employee's private use of social media and rules regarding the company or authority, therefore lacking the use perspective of the citizens as public actors. The guidelines mostly point to law, behaviour, data security issues, and non-disclosure obligations. Yet, these handbooks do not concern social media usage with regard to the EMC.

As Table 2 shows, there are guidelines for the specific use of social media in emergencies. From our analysed set, only the guidelines of the European projects COSMIC and iSAR+ as well as the Emergency 2.0 Wiki cover the citizens' perspective. The COSMIC guidelines provide recommendations in terms of preparation, seeking aid and information, providing aid, mobilization, as well as recording and sharing (Helsloot et al., 2015). Over 14 pages, the different advices are illustrated by text, examples, pictures, and bullet points. In these guidelines, only the authorities' recommendations (represented by parenthetical crosses in Table 2) but not the citizens' guidelines refer to the EMC. In contrast, the iSAR+ guidelines provide three pages of "recommendations and explanations on how to prepare for a crisis situation, what to consider when the incident is about to happen, ongoing, and when it is over" (Belfo et al., 2015). The guidelines are divided into the phases of preparation, warning, acute incident, and aftermath, giving a short explanation and several bullet points with concrete advice for each. Similarly, the Emergency 2.0 Wiki (2015) provides "tips for the public" on how to behave before, during, and after emergencies, including a general introduction to social media, advice on finding and sharing information during the different phases, communicating with family and friends, or saving battery power. Both the iSAR+ guidelines and Emergency 2.0 Wiki organize their recommendations based on the EMC, although the mitigation phase is not included. These guidelines mostly use bullet points and pictures for advice and illustration, and they are distributed over different wiki pages.

2.3 | Research gap and objective

Despite the potentials of citizens' use of social media before, during, or after emergencies, their activities potentially increase the complexity of tasks, uncertainty, and pressure for emergency services (Perng et al., 2012), for instance, by irrelevant and inconsistent information, information overload, and mistakes due to chaotic and disorganized work of volunteers (Kaewkitipong et al., 2012; Valecha et al., 2013). Thus, guidelines may motivate citizens to foster good practice and prevent misuse of social media during emergencies (Reuter & Spielhofer, 2017). Previous research indicates that a variety of general or emergency-specific guidelines exist, but most of them focus on the authorities' or organizations' perspective of social media use. Only three guidelines explicitly contained recommendations for citizens before, during, and after emergencies, varying in length and media richness (Belfo et al., 2015; Emergency 2.0 Wiki, 2015; Helsloot et al., 2015). Considering feedback from

TABLE 2 List of guidelines for the use of social media in emergencies

Title	Publisher	ES	C	EMC
Guidelines for the use of new media in crisis situations (2015)	COSMIC project, EU	x	x	(x)
Warning and informing Scotland using social media in emergencies (2012)	Scottish Government, Scotland	x		
Social media for emergency management—a good practice guide (2014)	Wellington Region Emergency Management Office, New Zealand	x		(x)
Emergency 2.0 Wiki (2015)	Emergency 2.0 Wiki	x	x	x
Social Media in an emergency: Developing a Best Practice Guide Literature Review (2012)	Opus International Consultants Limited, New Zealand	x		(x)
iSAR+ Guidelines (2015)	iSAR+ Project, EU	x	x	x
Using social media for emergency notifications—7 questions for emergency managers to consider	Twenty First Century Communications, Inc., US	x		
Social Media in Emergencies—UNICEF Guidelines for Communication and Public Advocacy (2012)	United Nations Children's Fund (UNICEF)	x		
Smart tips for category 1 responders using social media in emergency management (2012)	Defense Science and Technology Laboratory (DSTL), UK	x		(x)
Crisis communications and social media—A best practice guide to communicating an emergency (2014)	International Air Transport Association (IATA)	x		
Next Steps: Social Media for Emergency Response (2012)	Homeland Security, US	x		
Using Web 2.0 applications and Semantic Technologies to strengthen public resilience to disasters (2013)	Disaster 2.0, EU	x		
Bevölkerungsschutz: Social Media (2014)	Bundesamt für Bevölkerungsschutz und Katastrophenhilfe (Federal Office of Civic Protection and Disaster Assistance, BBK), DE	x		
The Use of Social Media in Risk and Crisis Communication (2014)	Organization for Economic Co-operation and Development (OECD)	x		
Leitfaden Krisenkommunikation (2014)	Bundesministerium des Innern (Federal Ministry of the Interior, BMI), DE	x		

ES: emergency service guidelines; C: guidelines for citizens; EMC: emergency management cycle.

practitioners' workshops (Section 3), these guidelines were perceived as too extensive for reaching a broad audience, and, to our best knowledge, none of them was evaluated with citizens in terms of their practical value. Thus, besides presenting the design of concise citizens' guidelines that are suitable for distribution to large audiences before, during, and after emergencies, the main aim of this paper is the quantitative and qualitative evaluation of these guidelines according to our research questions.

3 | METHODOLOGY

This section describes the design and evaluation methodology of the citizens' guidelines for using social media before, during, and after emergencies.

3.1 | Design of citizens' guidelines

The citizens' guidelines were designed to convey general aspects while using social media and information on how to behave before, during, and after an emergency. Firstly, we conducted literature reviews on the potentials and challenges of social media from the perspective of citizens and then reviewed guidelines on the use of social media in general and during emergencies. The guidelines listed in Tables 1 and 2 were identified by searching in Google, scanning through related European projects on social media, and considering expert recommendations of an end-user advisory board (EAB) of our European project. The search focused on English guidelines, although the project consortium recommended a few German guidelines that were considered subsequently. Although all found guidelines were considered, only three contained recommendations for citizens in emergencies and thus were relevant for the analysis in this paper. For the design of our guidelines, no extensive comparative analysis was performed between these three guidelines, but their content was presented as input during an EAB workshop, comprising 18 participants from emergency services (O'Brien et al., 2016). Based on these guidelines, EAB members and practitioners prioritized the most important information that should be communicated to citizens with the intention to keep the guidelines concise. Under consideration of their input, further literature, and (revisiting of) guidelines, a first draft of the citizens' guidelines was created. The draft was presented at another EAB workshop, comprising 15 participants emergency services, to gather insights for the design of the final guideline versions (Gizikis, Susaeta, et al., 2017). Since the focus of this paper lies within the evaluation but not the design of the guidelines, please find additional information

TABLE 3 Social media guidelines

General Aspects	• Interact with respect and courtesy (Bundesanstalt Technisches Hilfswerk, 2011) • You are responsible for your writing, think of possible consequences (Bundesanstalt Technisches Hilfswerk, 2011) • Protect your privacy and check the privacy settings (Deutsches Rotes Kreuz, 2012) • Respect intellectual property rights, including pictures, graphics, audio and video files (Berliner Feuerwehr, 2012). Add references, make quotations marked (Deutscher Caritasverband, 2014), specify sources, and without approval, do not talk about a third person (Daimler, 2012) • Verify your information before posting (Helsloot et al., 2015) • Correct a mistake if you made one (Kaewkitipong et al., 2012)
Preparation	Be prepared • Know the social media accounts of your local and national ES and follow them. This will help find real-time information during an emergency (Helsloot et al., 2015) • Read what to expect from ES in social media. Are they always online? Do they reply to posts in social media (Reuter et al., 2016)? • Look for apps that ES provide and download them to stay informed during an emergency (Reuter et al., 2017) • Follow the information from ES on how to prevent and stay safe during emergencies (Helsloot et al., 2015)
Response	Stay up-to-date • Follow official accounts and local organizations to get information updates (Helsloot et al., 2015) Social media does not replace 112 • Remember you can use social media for information updates, but it does not replace emergency calls (Helsloot et al., 2015). If in danger, always call 112 first Be responsible and avoid spreading rumours! When you post information about an emergency in social media: • Always mention the ES account or include any already used hashtags. When possible report a location and use photos (Helsloot et al., 2015) • Tell only facts and don't send information you are not certain about (Helsloot et al., 2015) • Share only official and reliable information and avoid spreading rumours! The spreading of false information can threaten the smooth deployment of rescue teams and put you and your relatives at additional risk (Perng et al., 2012) • If you spot or shared false information, please correct it (Helsloot et al., 2015) • Forward received official messages to your contacts or share them (Helsloot et al., 2015) Volunteering initiatives • Look for emergent volunteer initiatives in Facebook groups, Google crisis maps, or trusted users in Twitter; they may help to increase the impact of your activities (Kaufhold & Reuter, 2016)! • If you intend to initiate your emergent volunteer initiative, please check for existing initiatives first and carefully chose the scope of your possible contribution
Recovery	• Follow official accounts and local organizations to get information updates (Helsloot et al., 2015). Communicate even after a crisis and use social media for the processing of the event • Give feedback to the authorities (Reuter et al., 2016) • Restore missing contact and ask for the welfare of family and friends (Qu et al., 2011) • Help others reconstructing/handling the event (Mirbabaie & Zapatka, 2017)

on a related project deliverable (Gizikis, O'Brien, et al., 2017). The resulting guidelines are presented in Table 3.

3.2 | Evaluation of the citizens' guidelines

We conducted a representative online survey (N = 1024) of the adult German population in July 2017, using the ISO-certified panel provider GapFish (Berlin). They guarantee panel quality, data quality, and security, as well as survey quality through various (segmentation) measurements for each survey within their panel of 180,000 active participants. Our overall survey covered also other topics from our research project. In this work, we are examining five of these (Q22–26), related to social media guidelines. Firstly, participants were asked closed questions on the perceived importance of the guidelines before (Q22), during (Q23), and after (Q24) an emergency ("How do you rate the following recommendations for usage of social media [on/during/after] an emergency?"), and general aspects while using social media (Q25: "How do you rate the following, general aspects for using social media in an emergency?"). The responses were measured using a five-point Likert scale ranging from "very important" to "not important at all." Secondly, we asked for open-ended criticism or improvement suggestions for the presented guidelines about the use of social media before, during, and after a crisis (Q26).

3.2.1 | Characteristics of survey participants

The sample of survey respondents (N = 1024) was adapted to the distribution of age, gender, region, education, and income according to the general German population (German Federal Agency for Civic Education, 2016; Statista, 2016; Statistisches Bundesamt (Destatis), 2016). Preselection of participants was carried out by the external survey panel provider (GapFish) so that we received the already adapted sample. Based on these statistics, our sample consisted of 49.5% female (n = 507) and 50.5% male (n = 517) respondents. They were between 18 and 64 years old, nearly half of them being 45 and older (n = 492, 48%). We recruited participants from every federal state of Germany,

where the largest sample came from North Rhine-Westphalia (n = 228, 22%) and Bavaria (n = 165, 16%). Only 1% (n = 9) of participants did not graduate from a school, while 15% (n = 160) held a degree from a university or college. Over two-thirds (n = 707, 69%) earned between 1.500€ and 3.500€. Concerning the smartphone usage, almost half of respondents indicated to use it daily (n = 500, 49%). A similar result could be found for daily usage of social media, namely Facebook (n = 475, 46%), instant messaging services (n = 449, 43%), and YouTube (n = 301, 29%). Another third stated an hourly usage of smartphones (n = 441, 43%) and instant messengers (n = 339, 33%), while 19% (n = 196) claimed to actively post in social media daily and an almost equal amount (n = 197) at least once a week. As for behaviour in crisis situations, over half of participants (n = 556, 54%) indicated to have used social media in such an event. Slightly more (n = 607, 59%) expected to see messages by critical infrastructure (CI) operators on social media in the case of an infrastructure failure.

3.2.2 | Quantitative and qualitative analysis

For the quantitative analysis, the survey data were extracted and analysed using IBM SPSS Statistics 23, a software package for analysing quantitative data (IBM, 2014). Microsoft Excel was used for qualitative coding and for the design of the diagrams showing relative amounts of participant responses (see Section 4). The analysis consisted of three key steps: (1) *preparing* the data including assignment of missing data values and combination of categories of demographic background variables. This occurred by excluding participants where an answer to a closed question was missing, which would have made quantitative analysis unreliable, thus reducing the number of participants from N = 1,069 to N = 1,024. (2) *Exploring basic frequencies* for each question. (3) *Using cross-tabulations* with chi-squared tests to explore any significant differences across different types of respondents in relation to gender, age, region, income, and education level, as well as smartphone and social media usage. (4) *Determining correlations* between ordinal items using Spearman's Rho.

The qualitative analysis of our open-ended survey question was based on the inductive approach of *grounded theory* (Strauss, 1987). We used *open coding* to derive categories from the more qualitative open-ended responses by carefully reading and aggregating categories. In a first iteration, to achieve a quick overview of the interesting and relevant topics, two coders went through the open-ended responses independently and proposed a set of preliminary categories. The categories were discussed in tandem to agree upon a shared set of category codes. The previously acquired knowledge from the literature review and quantitative analysis was used to increase theoretical sensitivity. In a second iteration, the coders independently assigned each open-ended response to one or multiple categories. Finally, the codes were jointly checked to reach an agreement between the coders. Each quotation is referenced with the participant's response identifier.

4 | RESULTS

This section presents the results of the quantitative and qualitative evaluation of citizens' attitudes towards the guidelines on social media use before, during, and after emergencies.

4.1 | Importance of individual recommendations of the guidelines

To what extent do participants agree to the presented guidelines on social media behaviour before, during, and after emergencies (RQ1.1)? Before an emergency (see Figure 1), interestingly, more than two-thirds highlighted the importance of knowing the social media accounts of local and national emergency services (ES) (70%) or following their information on how to prevent and stay safe during emergencies (66%). In contrast, only about half think it is essential to look for apps that emergency services provide and download them to stay informed during an emergency (52%). Even fewer participants agree to read what to expect from emergency services in social media (45%).

The guideline which participants consider as most important to follow during an emergency (see Figure 2) is the fact that social media do not replace the emergency call and should rather be used for information updates (82%). Seventy-nine per cent of the

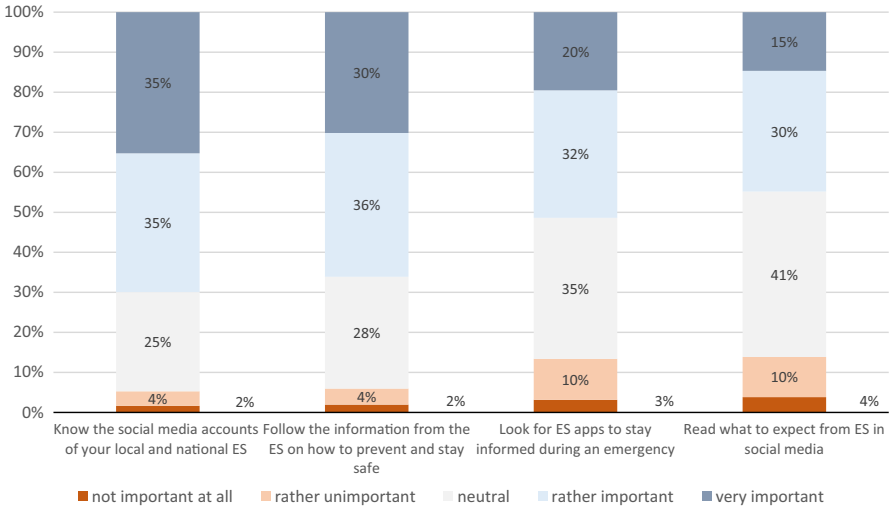

FIGURE 1 How do you rate the following recommendations for usage of social media before an emergency? (Q22)

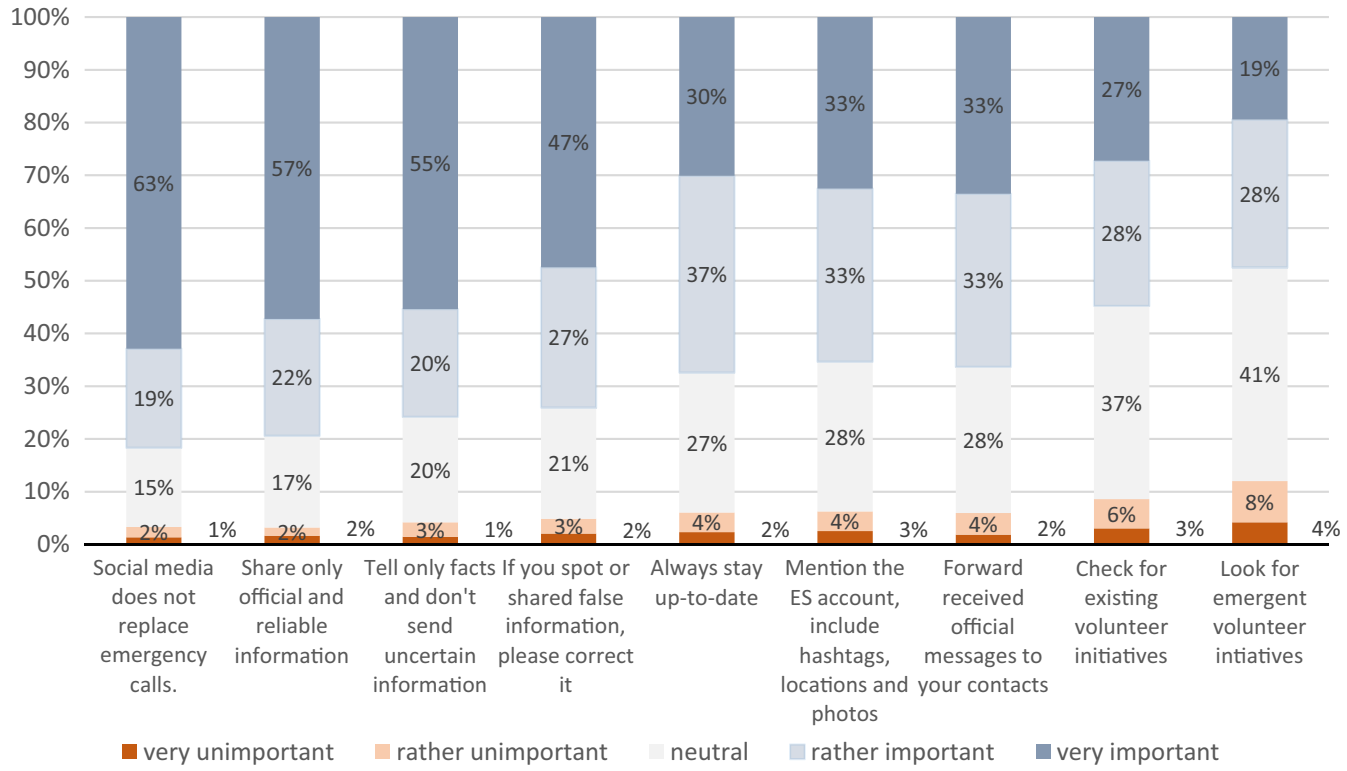

FIGURE 2 How do you rate the following recommendations for usage of social media during an emergency? (Q23)

participants think it is essential to share only official and reliable information and avoid spreading rumours. Moreover, three quarters agree it is vital to tell only facts and to not send unreliable information. Seventy-four per cent rate it as important to correct false information if they spot or share it, and 67% of the participants want to always stay up-to-date. Also, 66% find it essential to always mention the emergency service account or include any already used hashtags and forward received official messages to contacts or share them. More than a half of the respondents (55%) assume that checking for existing initiatives if they intend to initiate an emergent volunteer initiative is important. It is least, but still important for the respondents (47%) to look for emergent volunteer initiatives in Facebook groups, Google crisis maps, or trusted users on Twitter.

The question about the importance of different activities after an emergency (see Figure 3) received the most negative responses. However, about half of the participants still assume it is essential to give feedback to the authorities (54%). Also, over half of the respondents find it important to follow the official accounts and local organizations to get information updates and to communicate even after a crisis, as well as use social media for the processing of the event (57%). It is even more important for the participants to help others to reconstruct and handle the event, and to restore missing contacts and ask for the welfare of family and friends (61% each).

Besides the importance of guidelines during specific phases of an emergency, in terms of general aspects while using social media (see Figure 4), about four out of five of the participants find it very or

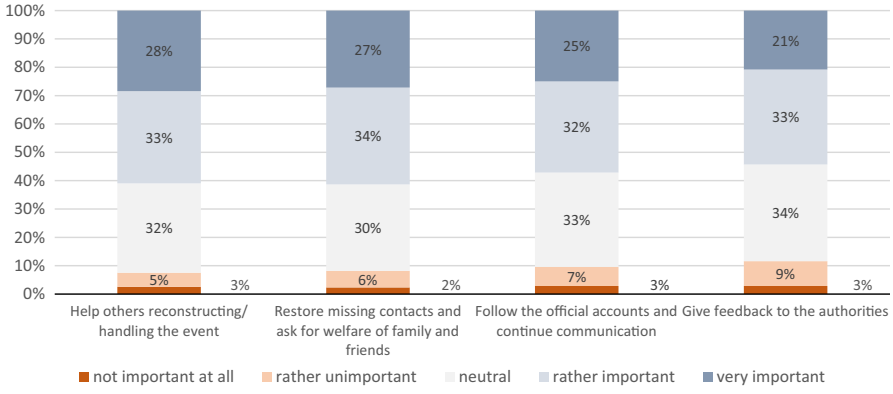

FIGURE 3 How do you rate the following recommendations for usage of social media after an emergency? (Q24)

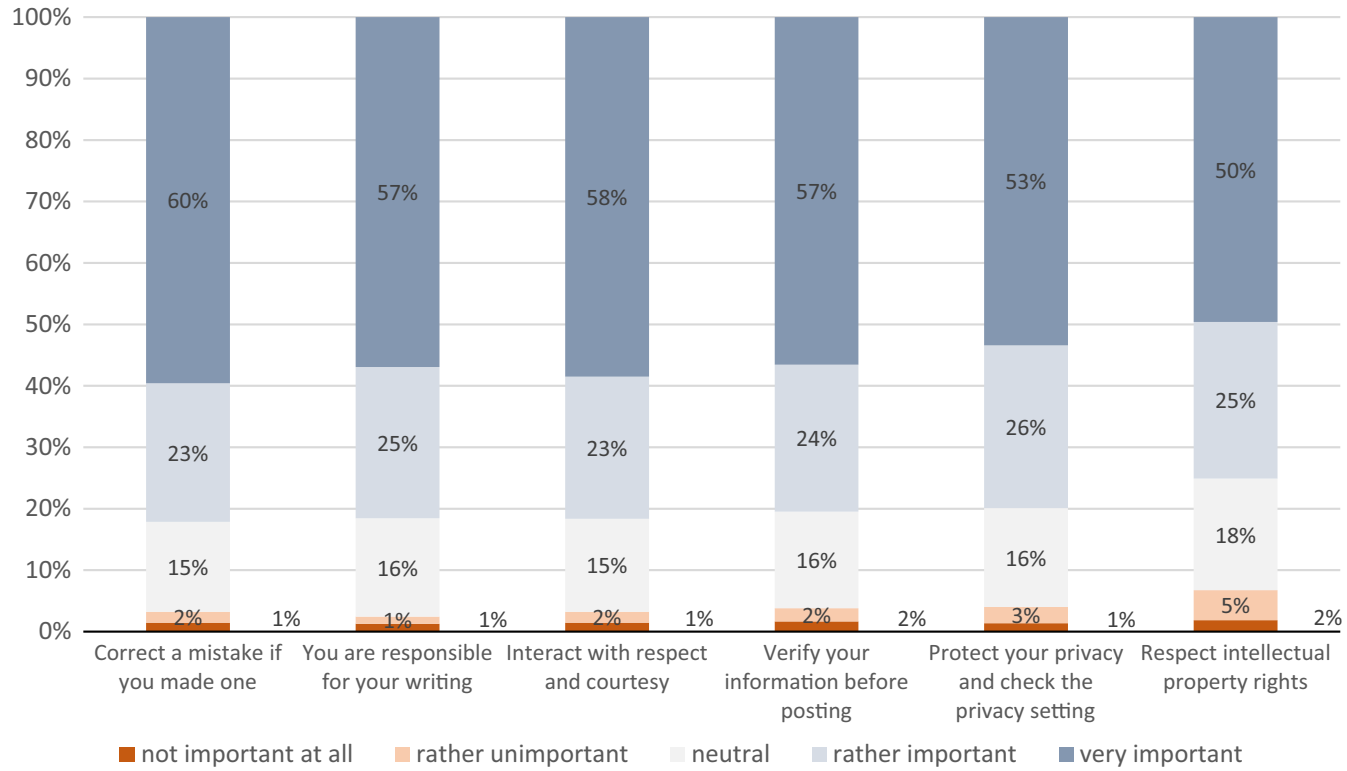

FIGURE 4 How do you rate the following, general aspects for using social media in an emergency? (Q25)

rather important to correct a mistake if they made one (83%), and to know it is important that they are responsible for their writing and that they should remember possible consequences (82%). Additionally, they agree it is essential to interact with respect and courtesy (82%) and to verify information before posting (81%). Participants also find it important to protect their privacy and check privacy settings (79%), as well as to respect intellectual property rights (75%).

How consistent is the agreement with guidelines across the categories, that is, concerning the use of social media before, during, and after emergencies (RQ1.2)? Taking a closer look directly at the questionnaire items concerning guidelines, we revealed a significant correlation (Spearman's Rho) between the responses for all guidelines ($p < 0.0001$), the values ranging between $r = 0.131$ and $r = 0.785$. For all correlations between the responses, see Table A1 in the Appendix 2. In the following, we will highlight a few significant findings to explore the research question mentioned above.

If we examine correlations within groups, we observe especially high significances over $r = 0.600$. The highest correlation coefficients were found between items of Q25 (general social media guidelines). Those who agreed to follow information provided by ES tended to agree with looking for ES apps to a higher degree ($r = 0.610$, $p < 0.0001$). There is also particularly high correlation of the guideline "tell only facts" with "share only official and reliable information" ($r = 0.778$, $p < 0.0001$). Furthermore, attitude towards the two guidelines on helping others and restoring contacts were especially highly correlated ($r = 0.718$, $p < 0.0001$). Opinions on verification and correction of own posts also showed a significant correlation ($r = 0.785$, $p < 0.0001$), as do respect, courtesy, and responsibility for own writing ($r = 0.740$, $p < 0.0001$).

To reveal the relationship between the individual categories we addressed in the questions, we also carried out Spearman correlations between the clustered items of each group (see Table 4). All groups were significantly related and showed a high correlation coefficient, mostly greater than $r = 0.600$. Only for Q25 (general guidelines), the relationship to guidelines before and after an emergency as slightly lower than $r = 0.500$.

4.2 | Influencing factors on the attitude towards the guidelines

Via chi-squared tests, we examined whether demographic factors as well as smartphone and social media usage habits, both in daily life

TABLE 4 Correlations between responses for the individual questions

	Q22: Before	Q23: During	Q24: After	Q25: General
Q22: Before		$r = 0.657$, $p < 0.001$	$r = 0.632$, $p < 0.001$	$r = 0.425$, $p < 0.001$
Q23: During	$r = 0.657$, $p < 0.001$		$r = 0.690$, $p < 0.001$	$r = 0.634$, $p < 0.001$
Q24: After	$r = 0.632$, $p < 0.001$	$r = 0.690$, $p < 0.001$		$r = 0.481$, $p < 0.001$
Q25: General	$r = 0.425$, $p < 0.001$	$r = 0.634$, $p < 0.001$	$r = 0.481$, $p < 0.001$	

and in crisis situations, were related to the responses. The factors have been derived from other questions included in our survey at an earlier point, where we asked for age and gender, education status and income, frequency of smartphone usage, social media usage and publishing posts therein, and familiarity with crisis apps. Similarly, we also considered the degree to which participants expected critical infrastructure operators to use social media in case an infrastructure failure occurs. To provide an overview of these influences, we clustered the response values for each question and carried out chi-squared cross-tabulations for the clustered values. Additionally, we used Spearman correlations to determine the direction of interesting correlations for a more detailed insight into trends. In Table 5, all chi-squared test results and correlations are presented. The dependencies between the demographic variables themselves have not been calculated.

To what extent is the attitude towards the guidelines affected by smartphone and social media usage in daily life and in emergencies (RQ1.3)? A higher smartphone usage influenced responses to questions Q23 (r = 0.083), Q24 (r = 0.059), and Q25 (r = 0.019), leaving out guidelines before an emergency. At the same time, the more the participants indicate to post in social media, the more they tend to agree to the statements in questions Q22 (r = 0.212), Q23 (r = 0.151), and Q24 (r = 0.169), namely guidelines before, during, and after an emergency. Similarly, for participants' usage of social media in crisis situations and CI operator communication expectations, we found significant effects for all questions:

The more the social media are used in a crisis, the more the participants agree to the proposed guidelines on it (r = 0.252; r = 0.162; r = 0.186, r = 0.010). The same is true for expectations from CI operators to use social media (r = 0.302; r = 0.282; r = 0.284; r = 0.202). In contrast to this, general social media and crisis app usage do not significantly influence the responses.

How do demographic factors influence the agreement with guidelines concerning the use of social media in emergencies (RQ1.4)? Gender and age only have a significant influence on the items in question Q25 (general aspects for the use of social media). Here, a Spearman correlation indicates that women tended to agree to the general guidelines to a higher extent as compared to men (r = 0.132). The same applies to older participants as compared to younger ones (r = 0.149).

We also found that the higher the income, the more participants tend to agree to statements in the question on guidelines before an emergency, Q22 (r = 0.030). In contrast to this, respondents with lower education show a greater tendency to agree with all statements on guidelines before (r = −0.035) and after an emergency (r = −0.007), while the opposite was true for general guidelines (r = 0.039) and those to be adhered to during an emergency (r = 0.052). However, while chi-squared tests show a significant influence of demographic factor, we could not determine the same for Spearman correlations, which means we cannot make a solid statement on a trend in this case. Region is the only demographic factor which does not have a significant influence on any of the questions.

4.3 | Citizens' attitudes and suggestions concerning the guidelines

What are caveats and improvement suggestions towards the guidelines on social media in emergencies (RQ1.5)? In Q25, the last item asked the participants about their overall opinion on the guidelines: "The presented guidelines are helpful." The participants generally agreed that the guidelines are generally appropriate and helpful, as 72% of participants gave a positive answer. However, the least amount of participants agreed with this item (37% compared to more than 50% of all other items in this question). Twenty-four per cent were neutral, and only two per cent each disagreed. To analyse the reasons for and opinions behind these responses, we further asked for open comments and present the qualitative results in the following.

The answers to our open-ended question Q26 "Which criticism or improvement suggestions concerning the presented guideline about the use of social media before, during, and after a crisis do you have?", responses were classified into ten meta-codes: (1) *fake news*, (2) *gazers*, (3) *no idea*, (4) *no answer*, (5) *no criticism*, (6) *presentation*, (7) *scepticism*, (8) *extent*, (9) *unnecessary*, and (10) *improvement suggestion*. The meta-codes are not mutually exclusive, and the responses coded within them may overlap. Firstly, there were two categories of less useful content for analysis. The meta-code *no answer* included answers which were not understandable and therefore not usable for the evaluation (n = 155). Respondents who did not know how to answer the question were classified into the meta-code *no idea* (n = 124), for instance: *"I don't know at the moment as these theses are absolutely new and I first have to process them"* (1354).

4.3.1 | Positive and thoughtful attitudes towards the guidelines

In summary, half of the participants' answers (50%) were classified into the meta-code *no criticism* (n = 515). That means that they, in total, agree with the guidelines and would not make many changes: "I think the presented guideline is very coherent and complete" (241) or "The guideline is very well elaborated. No further suggestions" (504). Many respondents are convinced of the guidelines: "I really like it. It should be short, give clear action hints and should not be too instructive" (281). Another participant also has no criticism, but he wants to be secured: "No criticism, it must be guaranteed that the mobile network is not dead in case of an emergency" (1801). However, some participants have doubts, for instance, on the distribution of smartphones: "You think that everyone owns a smartphone. What about the elder? People that reject smartphones due to mistrust? Etc. I really like the presented suggestions, but the question is what actually is realized in such situations" (177). Further participants are sceptical about the application of guidelines: "I don't have any criticism, but I don't think that all people will hold on to it" (262). In this context, it is also interesting that few respondents do not have any improvement suggestions, but they think of people

TABLE 5 Results of chi-squared tables for all questions, with correlations where appropriate

	Q22: Before	Q23: During	Q24: After	Q25: General
Gender	$\chi^2(15, 1024) = 16.33$, $p = 0.361$; $r = 0.069$	$\chi^2(30, 1024) = 33.25$, $p = 0.312$; $r = 0.061$	$\chi^2(15, 1024) = 10.35$, $p = 0.797$; $r = 0.028$	$\chi^2(20, 1024) = 45.80$, $p < 0.001$; r =0.132
Age	$\chi^2(75, 1024) = 65.99$, $p = 0.762$; $r = 0.002$	$\chi^2(150, 1024) = 127.10$, $p = 0.913$; $r = 0.016$	$\chi^2(75, 1024) = 74.33$, $p = 0.500$; $r = 0.012$	$\chi^2(100, 1024) = 126.26$, $p < 0.05$; $r = 0.149$
Education	$\chi^2(75, 1024) = 124.28$, $p < 0.001$; $r = -0.035$	$\chi^2(150, 1024) = 300.40$, $p < 0.001$; $r = 0.052$	$\chi^2(75, 1024) = 136.64$, $p < 0.001$; $r = -0.007$	$\chi^2(100, 1024) = 150.50$, $p = 0.001$; $r = 0.039$
Income	$\chi^2(45, 1024) = 88.26$, $p < 0.001$; $r = 0.030$	$\chi^2(90, 1024) = 89.21$, $p = 0.504$; $r = 0.042$	$\chi^2(45, 1024) = 50.71$, $p = 0.259$; $r = 0.036$	$\chi^2(60, 1024) = 79.69$, $p < 0.05$; $r = 0.066$
Region	$\chi^2(210, 1024) = 233.98$, $p = 0.123$	$\chi^2(420, 1024) = 410.58$, $p = 0.620$	$\chi^2(210, 1024) = 176.59$, $p = 0.955$	$\chi^2(280, 1024) = 279.38$, $p = 0.449$
Overall smartphone usage	$\chi^2(60, 1024) = 76.34$, $p = 0.076$; $r = 0.074$	$\chi^2(120, 1024) = 162.19$, $p < 0.01$; $r = 0.083$	$\chi^2(60, 1024) = 106.78$, $p < 0.001$; $r = 0.059$	$\chi^2(80, 1024) = 153.56$, $p < 0.001$; $r = 0.014$
Overall social media usage	$\chi^2(465, 1024) = 492.71$, $p = 0.181$; $r = -0.030$	$\chi^2(930, 1024) = 951.63$, $p = 0.304$; $r = 0.000$	$\chi^2(465, 1024) = 449.38$, $p = 0.690$; $r = 0.015$	$\chi^2(620, 1024) = 528.815$, $p = 0.997$; $r = 0.000$
Posting in social media	$\chi^2(60, 1024) = 96.49$, $p < 0.005$; $r = 0.212$	$\chi^2(120, 1024) = 164.73$, $p < 0.005$; $r = 0.151$	$\chi^2(60, 1024) = 100.98$, $p < 0.005$; $r = 0.169$	$\chi^2(80, 1024) = 76.03$, $p = 0.605$; $r = 0.028$
Use of social media in crisis situations	$\chi^2(30, 1024) = 95.04$, $p < 0.001$; $r = 0.252$	$\chi^2(60, 1024) = 100.76$, $p < 0.005$; $r = 0.162$	$\chi^2(30, 1024) = 64.09$, $p < 0.001$; $r = 0.186$	$\chi^2(40, 1024) = 65.06$, $p < 0.01$; $r = 0.010$
Use of crisis apps	$\chi^2(600, 1024) = 544.48$, $p = 0.949$; $r = -0.004$	$\chi^2(1200, 1024) = 1122.61$, $p = 0.945$; $r = -0.026$	$\chi^2(600, 1024) = 475.92$, $p = 1.000$; $r = 0.027$	$\chi^2(800, 1024) = 691.863$, $p = 0.998$; $r = 0.000$
Expectations of CI to use social media	$\chi^2(60, 1024) = 241.73$, $p < 0.001$; $r = 0.302$	$\chi^2(120, 1024) = 296.60$, $p < 0.001$; $r = 0.282$	$\chi^2(60, 1024) = 261.72$, $p < 0.001$; $r = 0.284$	$\chi^2(80, 1024) = 195.97$, $p < 0.001$; $r = 0.202$

Non-significant results are displayed on grey background.

who do not use social media: "I don't have any criticism, but there are still many people who do not use social media – like me" (876).

4.3.2 | Suggestions for improvement on content, extent, and presentation

Furthermore, participants elaborated a variety of constructive *improvement suggestions* (n = 78). Although other categories also include recommendations for improvement and thus responses may overlap, we distinguished this particular meta-code for a better overview of possible contributions to the improvement of our guidelines and further research. For instance, participants suggested to add further recommendations: "Only share correct and trustworthy information, if so, with giving the source. If you detect misinformation, make people aware of it" (70). Moreover, it is demanded that volunteers coordinate each other and distribute auxiliary goods usefully. One respondent also considers the question of time and has a suggestion: "I ask myself if I have time to use Twitter or Facebook in case of an emergency. I would like public terminals, which are readily accessible and located in a safe place" (391). Besides Internet and social media, one respondent makes clear that traditional media still should be used for the dissemination of information (1615).

Also, there are some recommendations for the presentation of the guideline (n = 26). For example, it should also be more understandable for children, foreign people, elder people, and disabled persons. One participant recommends add some pictures: "As a text, no one will really read it through" (697). In this context, the meta-code *extent* matters as several respondents think the guideline is too extensive (n = 36): "The guideline should be restricted to basic information and ignore norms that are simply nice or desirable" (410). One participant asks for a cheat sheet which summarizes the most important aspects of the guideline to have a compact overview. On the other hand, one interviewee even asks for more details: "For inexperienced users of social media, a more explicit guideline would be interesting, i.e., how I contact official entities via social media or where I have to search on Facebook or Twitter" (1093).

4.3.3 | Scepticism about fake news and the necessity of guidelines

As represented by the meta-code *scepticism* (n = 52), several people do not really trust the guideline as they have too many doubts concerning the use, design, or privacy. For instance, one participant has doubts about the usage type: "It should be emphasized VERY clearly that social media do NOT replace the official numbers and channels" (157). Additionally, privacy is an important factor for few participants: "Private content of a conversation and chat reports should not be investigated if there's no reason as we wouldn't have any privacy in society" (507). Furthermore, *gazers* were perceived as disturbing factor in case of an emergency by a few participants (n = 3): "If you don't want any gazers on the accident site, you shouldn't ask for photos. I generally find it inconvenient to post something about a catastrophe if the police don't ask for it. That quickly leads to the distribution of misinformation as people have misperceptions in such situations" (512).

Another meta-code which shows the respondents' doubts is the category *fake news* (n = 26). As said before, people worry about the dissemination of misinformation as there are much content and many rumours on the Internet and social media: "I think, in case of an emergency, social media are crap. You simply can create too much fake news, and everyone thinks something happens" (463). For this case, one participant suggests: "Actually none. Maybe Facebook, Twitter and co. could develop bots which detect fake news or evaluate user ratings (many dislikes) and automatically delete postings" (1087). In summary, only nine people rate the guideline as *unnecessary* (n = 9): "Why do we need it? Are there concrete reasons? Such a guide can spread fear and feed speculations" (644). They are very sceptical and do not believe that the guideline is very helpful in case of an emergency: "It generally is totally unnecessary and a waste of time as every normal human-being, who thinks about it a bit, will decide correctly in the concrete situation. And if not, a 'guideline' will not discourage him" (122).

5 | DISCUSSION AND CONCLUSION

In this paper, we outlined the risks of chaotic social media use (Kaewkitipong et al., 2012; Perng et al., 2012; Valecha et al., 2013) and presented guidelines for the use of social media in general and in emergencies, revealing that most of them focus on the perspective of emergency services or organizations. Only three guidelines considered the perspective of citizens before, during, and after emergencies (Belfo et al., 2015; Emergency 2.0 Wiki, 2015; Helsloot et al., 2015), and none of them was evaluated in terms of practical value with a larger sample of citizens. That, firstly, led us to the design of guidelines for citizens. Secondly, this paper contributes to the qualitative and quantitative evaluation of the citizens' guidelines based on a representative sample for Germany (N = 1024) stratified for gender and age, but also ensuring a wide spread of the survey sample in terms of region, education, and income. Considering our research question RQ1: "How do citizens perceive guidelines for social media use in emergencies?", we have divided our results into five separate research questions, which we will summarize in the following.

To what extent do participants agree to the presented guidelines on social media behaviour before, during, and after emergencies (RQ1.1)? Our results indicate that all proposed guidelines for social media in crisis contexts achieve a high acceptance rate exceeding 50%. It is only slightly lower than 50% for anticipating the type of information shared before a crisis and for helping and volunteering in case an emergency occurs. The present guidelines are also rated as helpful by over two-thirds of respondents (72%).

How consistent is the agreement with guidelines across the categories, that is, concerning the use of social media before, during, and after emergencies (RQ1.2)? Concerning the relationship between responses to the individual guidelines, most participants tended to agree to guidelines related to each other. In total, there is a

significant and high correlation between agreements to the specific categories. We can conclude that perception of the guideline importance is consistent across the stages (before, during, and after), while responses to the general category, which show the highest agreement, were not as highly correlated with the others (below $r = 0.500$).

To what extent is the attitude towards the guidelines affected by smartphone and social media usage in daily life and in emergencies (RQ1.3)? The more often the individuals use their smartphone, post in social media, or tend to use them in crisis situations, the more they agree to our guidelines. Additionally, the agreement is consistent with the expectation to read messages by CI providers in social media during crises. However, overall social media or crisis app usage does not have an effect on the responses. Therefore, guidelines appeal most to active mobile social media users and those who rely on them during emergencies.

How do demographic factors influence the agreement with guidelines concerning the use of social media in emergencies (RQ1.4)? Demographic factors have only a partial influence on the responses, namely education and income, and to a small degree gender and age. We can therefore conclude that they are generally reasonable for most demographic groups, where age or economic situation is not a strongly determining factor, although it might have an influence on overall technology usage.

What are caveats and improvement suggestions towards the guidelines on social media in emergencies (RQ1.5)? Most participants had a positive reaction to the presented guidelines (see RQ1.1), however, some improvements based on participants' suggestions had to be done to make the guidelines more relevant, concise, appealing, and applicable for everyone. A reason for criticism, among others, lies in the mode of presentation, which is often considered too long and text based, as well as containing information that is not vital in this context.

Our qualitative responses reflect the agreement previously observed in RQ1.1: Half of the participants agree with the guidelines as they are, while many also point out that these were not relevant for people who do not use smartphones or social media, or if there is no time or network for this in case of an emergency. These last two comments are especially similar to results by Sutton, Woods, and Vos (2017), who identified the time and effort invested into information search as well as the technological access to reliable information as hurdles to an effective crisis communication via social media or websites. Therefore, it is suggested to expand the scope and apply the guidelines to mass media as well. According to the social-mediated crisis communication model (Jin, Liu, & Austin, 2014), the media channel, along with information source and origin of the crisis, is important for recipients' perception of the crisis and the affected organization. Generally, citizens tend to use personal conversations and social media mostly for communication about a crisis, but traditional media is still perceived as most trustworthy and generates most positive attitudes (Austin, Liu, & Jin, 2012; Liu, Lin, & Austin, 2013). In terms of our concrete recommendations, the highest importance lies on reliability of sources and correctness when reading and sharing information (Kaewkitipong et al., 2012), as well as using social networks only as supplement to other media like the emergency call. Another concern was fake news with the potential to cause panic and harm, and gazers that could be drawn to the site of emergency.

The results of our study informed the final visualization of the citizens' guidelines (see Figure A1 in the Appendix 1). Firstly, the content was reduced: The gathered feedback suggested to even reduce the amount of text, that is, to omit general norms, and the recommendations for social media use after emergencies received the least consent of citizens. Secondly, some illustrations were used to increase the overall presentation quality of the guideline.

5.1 | Limitations and future work

In future emergencies, the guidelines may be distributed in social media, that is, Facebook and Twitter, to observe and analyse their reception by citizens. Although the guidelines were evaluated with a large sample representative for Germany, intercultural differences could lead to different perceptions on the relevance of specific recommendations. For instance, prior research identified different risk cultures across Europe, such as individual-oriented, state-oriented, and fatalistic risk cultures, which shape the behaviour and perception of citizens (Dressel, 2015; Dressel & Pfeil, 2017). Despite disasters are common (Höppe, 2015), the number of German citizens who already experienced a crisis is relatively low (Reuter, Kaufhold, Leopold, & Knipp, 2017). Therefore, this evaluation is based on a hypothetical scenario in contrast to a case study, and the results could be influenced by this fact. A specific case study could examine whether participants who use social media already (partially) apply the strategies addressed in the guidelines before, during, and after an emergency, and how. Apart from an attitude towards the guidelines, we could further analyse to what extent citizens would apply and adhere to them in an actual crisis scenario.

Furthermore, guidelines for the use of social media for emergency services were developed in our project. Despite the feedback of emergency managers during EAB workshops, no evaluation was performed on the final guidelines. However, the specific needs and perceptions of emergency managers in terms of citizens' behaviour and content creation in social media (Flizikowski, Hołubowicz, Stachowicz, Hokkanen, & Delavallade, 2014; Reuter et al., 2016) are important precursors to optimize the interplay between authorities and citizens during emergencies, and the design of both guidelines.

ACKNOWLEDGEMENTS

The research project "EmerGent" was funded by a grant of the European Union (FP7 No. 608352). The research group "KontiKat" was funded by the German Federal Ministry of Education and Research (BMBF No. 13N14351). We would like to thank all members of our projects for their remarks and for distributing our survey.

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How to cite this article: Kaufhold M-A, Gizikis A, Reuter C, Habdank M, Grinko M. Avoiding chaotic use of social media before, during, and after emergencies: Design and evaluation of citizens' guidelines. *J Contingencies and Crisis Management*. 2018;00:1–16. https://doi.org/10.1111/1468-5973.12249

APPENDIX

VISUALIZATION OF THE GUIDELINES

FIGURE A1 Visualization of the Guidelines

APPENDIX

CORRELATIONS BETWEEN RESPONSES FOR ALL GUIDELINES

TABLE A1 Correlation coefficients (Spearman's Rho) between responses for all guidelines ($p < 0.001$)

	Q22.1	Q22.2	Q22.3	Q22.4	Q23.1	Q23.2	Q23.3	Q23.4	Q23.5	Q23.6	Q23.7	Q23.8	Q23.9	Q24.1	Q24.2	Q24.3	Q24.4	Q25.1	Q25.2	Q25.3	Q25.4	Q25.5	Q25.6	
Q25.6	0.344	0.131	0.270	0.438	0.335	0.529	0.358	0.573	0.582	0.560	0.441	0.215	0.318	0.303	0.281	0.378	0.391	0.622	0.668	0.606	0.574	0.785		Q25.6
Q25.5	0.373	0.160	0.297	0.480	0.368	0.545	0.376	0.597	0.609	0.564	0.464	0.234	0.366	0.321	0.310	0.387	0.409	0.660	0.713	0.653	0.673		0.785	Q25.5
Q25.4	0.329	0.185	0.268	0.376	0.311	0.423	0.370	0.448	0.496	0.432	0.392	0.289	0.371	0.306	0.275	0.372	0.382	0.528	0.605	0.625		0.673	0.574	Q25.4
Q25.3	0.324	0.192	0.254	0.393	0.333	0.460	0.324	0.478	0.478	0.452	0.402	0.211	0.302	0.265	0.288	0.348	0.362	0.613	0.695		0.625	0.653	0.606	Q25.3
Q25.2	0.367	0.160	0.288	0.462	0.388	0.545	0.367	0.592	0.597	0.545	0.441	0.233	0.390	0.326	0.305	0.381	0.400	0.740		0.695	0.605	0.713	0.668	Q25.2
Q25.1	0.388	0.169	0.300	0.433	0.412	0.510	0.360	0.558	0.538	0.512	0.439	0.229	0.383	0.355	0.312	0.387	0.383		0.740	0.613	0.528	0.660	0.622	Q25.1
Q24.4	0.434	0.339	0.393	0.453	0.428	0.356	0.431	0.383	0.406	0.432	0.501	0.439	0.480	0.498	0.531	0.718		0.383	0.400	0.362	0.382	0.409	0.391	Q24.4
Q24.3	0.431	0.373	0.401	0.444	0.447	0.319	0.432	0.374	0.400	0.396	0.500	0.440	0.461	0.520	0.557		0.718	0.387	0.381	0.348	0.372	0.387	0.378	Q24.3
Q24.2	0.412	0.379	0.401	0.400	0.422	0.268	0.399	0.316	0.310	0.390	0.452	0.434	0.435	0.533		0.557	0.531	0.312	0.305	0.288	0.275	0.310	0.281	Q24.2
Q24.1	0.568	0.494	0.486	0.461	0.587	0.295	0.495	0.362	0.343	0.373	0.492	0.539	0.531		0.533	0.520	0.498	0.355	0.326	0.295	0.306	0.321	0.303	Q24.1
Q23.9	0.421	0.413	0.411	0.450	0.490	0.363	0.497	0.437	0.435	0.452	0.520	0.658		0.531	0.435	0.461	0.480	0.383	0.390	0.302	0.371	0.366	0.318	Q23.9
Q23.8	0.394	0.486	0.426	0.370	0.422	0.237	0.503	0.289	0.294	0.342	0.510		0.658	0.539	0.434	0.440	0.439	0.229	0.233	0.211	0.289	0.234	0.215	Q23.8
Q23.7	0.472	0.332	0.421	0.473	0.495	0.468	0.531	0.555	0.579	0.596		0.510	0.520	0.492	0.542	0.500	0.501	0.439	0.441	0.402	0.392	0.464	0.441	Q23.7
Q23.6	0.392	0.209	0.304	0.440	0.411	0.570	0.453	0.689	0.672		0.596	0.342	0.452	0.373	0.390	0.396	0.432	0.512	0.545	0.452	0.432	0.564	0.560	Q23.6
Q23.5	0.397	0.201	0.309	0.480	0.418	0.608	0.483	0.778		0.672	0.579	0.294	0.435	0.343	0.310	0.400	0.406	0.538	0.597	0.478	0.496	0.609	0.582	Q23.5
Q23.4	0.390	0.209	0.334	0.495	0.419	0.630	0.488		0.778	0.689	0.555	0.289	0.437	0.362	0.316	0.374	0.383	0.558	0.592	0.478	0.448	0.597	0.573	Q23.4
Q23.3	0.440	0.425	0.431	0.462	0.532	0.469		0.488	0.483	0.453	0.531	0.503	0.497	0.495	0.399	0.432	0.431	0.360	0.367	0.324	0.370	0.376	0.358	Q23.3
Q23.2	0.395	0.183	0.282	0.471	0.428		0.469	0.630	0.608	0.570	0.468	0.237	0.363	0.295	0.268	0.319	0.356	0.510	0.545	0.460	0.423	0.545	0.529	Q23.2
Q23.1	0.614	0.451	0.494	0.534		0.428	0.532	0.419	0.418	0.411	0.495	0.422	0.490	0.587	0.422	0.447	0.428	0.412	0.388	0.333	0.311	0.368	0.335	Q23.1
Q22.4	0.593	0.442	0.610		0.534	0.471	0.462	0.495	0.480	0.440	0.473	0.370	0.450	0.461	0.400	0.444	0.453	0.433	0.462	0.393	0.376	0.480	0.438	Q22.4
Q22.3	0.539	0.564		0.610	0.494	0.282	0.431	0.334	0.309	0.304	0.421	0.426	0.411	0.486	0.401	0.401	0.393	0.300	0.288	0.254	0.268	0.297	0.270	Q22.3
Q22.2	0.545		0.564	0.442	0.452	0.183	0.425	0.209	0.201	0.209	0.332	0.486	0.413	0.494	0.379	0.373	0.339	0.169	0.160	0.192	0.185	0.160	0.131	Q22.2
Q22.1		0.545	0.539	0.593	0.614	0.395	0.440	0.390	0.397	0.392	0.472	0.394	0.421	0.568	0.412	0.431	0.434	0.388	0.367	0.324	0.329	0.373	0.344	Q22.1
	Q22.1	Q22.2	Q22.3	Q22.4	Q23.1	Q23.2	Q23.3	Q23.4	Q23.5	Q23.6	Q23.7	Q23.8	Q23.9	Q24.1	Q24.2	Q24.3	Q24.4	Q25.1	Q25.2	Q25.3	Q25.4	Q25.5	Q25.6	