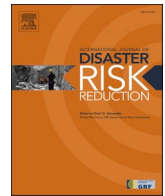




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Policing in pandemics: A systematic review and best practices for police response to COVID-19

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ABSTRACT

The COVID-19 pandemic has created a range of unforeseen and unprecedented challenges for police departments worldwide. In light of these challenges, the goal of this review is to understand the potential short- and long-term effects of disasters and public health emergencies on policing organisations and officers. A total of 72 studies were eligible for inclusion, based on their focus on policing and police work during and in the aftermath of natural disasters and public health emergencies. Through an extensive review, we compile and analyse the most common issues and best practices identified in the literature, and discuss 'what works' in the context of policing such emergencies. The literature reveals four categories of issues predominantly raised in this context, namely police-community relations, the mental health and wellbeing of officers, intra-organisational challenges, as well as inter-agency collaboration and cooperation. Based on our review and analysis, we offer a list of recommendations relevant for policing the current COVID-19 outbreak. The findings of this review have immediate implications for policing *during* COVID-19 but also cover long-term effects, providing valuable recommendations for *after* the crises has passed.

1. Introduction

The ongoing COVID-19¹ pandemic has infected millions and killed several hundred thousand people worldwide [1]. The pandemic has, however, not only created unforeseen and in many ways unprecedented challenges for the public health sector but also for law enforcement agencies [2,3]. Police officers and staff are often directly or indirectly involved in the pandemic response and have thus a higher risk of getting infected [4]. In addition, many governments have taken emergency measures to protect their population and slow the spread of the virus. Such actions, including lockdowns, travel bans, and social distancing rules are often controlled and enforced by the police, creating additional service demand for law enforcement agencies [5]. This comes on top of existing duties as the police are expected to maintain order and continue neighbourhood policing operations [6], all while under a greater strain on resources [7,8].

To successfully understand and manage the plethora of challenges that emergency situations such as COVID-19 create, first responders such as the police need to learn from other agencies and from past

experiences with similar scenarios. A key mechanism for this is the review and academic analysis of disaster management practice and policies. The literature on law enforcement and disaster management, and specifically research focusing on public health emergencies, however, is often not practical enough and little is known about how COVID-19 may impact policing in the short- and long-term [9].

This systematic review seeks to address this gap by assessing the implications that pandemics and public health emergencies (PHEs) can have for policing. In doing so, it seeks to identify best practice, and offers recommendations for policing the current COVID-19 outbreak. The evidence base and resulting recommendations can help police organisations and leaders design adequate public health emergency preparedness and operational protocols during PHEs. Furthermore, this review provides a list of relevant literature that can be consulted for a more in-depth look at these extremely complex issues (see [Tables 1–4](#)). Given the growing interest in researching on and strengthening the intersections between law enforcement and public health, this review provides a novel contribution in terms of developing this area and facilitating new ways of thinking about the role of police officers during

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¹ COVID-19 refers to disease caused by the virus referred to as SARS-CoV-2, or more commonly simply 'coronavirus'. As such, while it may in some ways be more correct to speak of a SARS-CoV-2 pandemic, we opt to use COVID-19 as it is most commonly used in academic literature and media.

public health emergencies [78–80]. Because our review includes experiences from various international cases and is not tailored to a specific national context, experiences of police departments may vary. As such, practitioners may not be able to relate to every issue listed in our paper or find every recommendation useful.

To make it easier to navigate our review, we split the discussion along the four predominant themes emerging from existing research on the effects of natural disasters and PHEs on policing. These include (1) police-community relations, (2) the psychological and mental wellbeing of police officers, (3) intra-organisational challenges (such as resource allocation or staffing issues), as well as (4) inter-organisational collaboration and cooperation. In the following sections, we will briefly introduce our methods and findings, before discussing and analysing each of the four themes in detail. Each thematic section will introduce the challenges and best practices identified in that particular area, based on which we offer specific recommendations for policing during the COVID-19 pandemic in the last section of this paper.

2. Methods

It is key for any systematic review to follow a number of pre-defined steps. These include four broad stages: (a) identifying a research question and agreeing on core definitions, (b) defining structured search and selection criteria and data sources, (c) setting and executing diligent filtering stages and ensuring inter-rater reliability, and (d) synthesising and analysing the findings [81]. These stages are discussed in the following.

2.1. Research aim and definitions

This systematic review seeks to explore the short- and long-term effects of epidemics on policing. In doing so, it aims to compile a list of issues as well as best practices from existing literature. Because the field of policing public health emergencies is in many regards under-researched, we incorporated a broader approach and reviewed diverse and multidisciplinary studies, drawing upon research on a variety of natural disasters. As such, it is essential to break down our research question and define key terms. The primary question guiding this review is: How do natural disasters and public health emergencies impact police supply, demand, and practice? The following definitions explain some of the key terms relied upon:

- **Natural disasters:** For this paper, natural disasters refer to those geophysical, meteorological, hydrological, climatological, and biological disasters that can cause death, injury, property and environmental damage, suffering and disruption to affected communities and daily life, and overwhelm the existing capacities of institutions.
- **Public health emergencies:** A public health emergency (PHE) refers to a threat or natural hazard that cannot be responded to by ordinary, existing resources and procedures, and thus extraordinary measures are needed to be taken to address the threat it poses to public health.
- **Epidemic:** An epidemic describes an outbreak of a disease which spreads quickly and affects many individuals at the same time over a large geographical area. A pandemic is a type of epidemic with a greater range and coverage (i.e. continental or global spread). We opted to use the former as it allows for the consideration of national disease outbreaks [82].
- **Police supply and demand:** While there is no universal definition of the term police demand [5], we use the terms to refer to the need for and availability of police resources (i.e. officers or patrol units). As such, this goes beyond the demand generated by calls for service.

2.2. Search terms

Scoping searches were used to find relevant search terms that were suitable to identify studies related to the impact of epidemics on

policing. Two categories of search terms were used:

- Terms related to epidemics, including 'epidemic', 'pandemic', 'public health emergencies', 'quarantine', as well as references to specific epidemics such as 'Ebola', 'EVD', 'SARS', 'corona virus', 'COVID-19', 'MERS', 'Swine Flu', 'H1N1', or 'smallpox'

AND.

- Terms related to policing, including 'police', 'policing', 'police demand', and 'law enforcement'

After a preliminary review of the results, the search terms were refined to exclude results related to 'terrorism', 'domestic violence', 'digital surveillance', 'police brutality', or manmade or transportation disasters. This was done to simplify the searches which yielded an overwhelming number of results related to the previously mentioned categories.

2.3. Search process and databases

Searches were carried out across three databases, namely Scopus, Web of Science, and ProQuest. In addition, grey literature search engines (British Library EThOS and Open Grey) were searched for grey literature. Furthermore, backward/forward searches were carried out in order to compliment the results and to ensure all relevant studies were included [83–85].

The sifting process was managed using the EPPI Reviewer 4 software. After removing the duplicates, the papers were pre-screened using the integrated Lingo3G clustering engine, which generated a coded map of the studies based on the titles and abstracts. While every reference was still evaluated individually, this thematic clustering allowed for a faster pre-screening of titles and abstracts. The remaining papers were then scanned in two stages (first title and abstract and then full text) against pre-defined selection criteria to ensure only relevant studies were included in the final selection [86].

2.4. Inclusion/exclusion criteria

The results were screened against the following pre-set inclusion and exclusion criteria:

- Only literature since 1990 was included to ensure practical relevance to contemporary policing realities.
- Only literature available in English was included for practical reasons.
- Literature that was otherwise unobtainable or missing full-text or abstract was excluded. Where possible, however, full texts were requested.
- Grey literature was only included where it adhered to certain quality criteria to ensure an 'unbiased collection of high-quality empirical work aimed at answering the research question' [87]:3).

In addition to these basic criteria, the following set of hierarchically layered selection criteria was used for sifting:

- Articles had to have thematic relevance for the field of policing or emergency services.
- Articles had to relate to the management or aftermath of public health emergencies (either as such, i.e. epidemics, or as the aftermath of a natural disaster).
- Articles had to focus on the effect of public health emergencies or disasters on police demand or practice or the management of emergency services or public security.

2.5. Inter-rater reliability (IRR)

To avoid personal bias in the selection of the studies, coding results of the last two steps were verified by four additional coders. Each coder was assigned a sample of 10% of the overall included studies ($n = 165$). This sample size allowed coders to become familiar with the relevant selection criteria [88].

Overall, there was a 91% agreement between external coders and the initial coding by the authors. Disagreements were discussed in the group and final decisions agreed upon by a majority of the coders. In some cases, additional (disputed) cases were allocated to a third coder for verification. The discrepancy in the coding highlighted that some of the selection criteria could have been defined more narrowly. This goes especially for the selection on relevance for public health emergencies. Here disagreements about what would constitute such an emergency had to be reconciled by team discussion.

Chance agreement was removed from the estimation of reliability by

calculating the κ -statistic [89]. A κ -score of 0.80 was calculated, indicating substantial agreement between the coders, thus strengthening the reliability and validity of this review [90].

2.6. Synthesis approach

The analysis was limited to peer-reviewed academic papers and grey literature that was in accordance with quality standards to ensure academic rigour and to maintain an academic focus [75,91]. Overall, the review followed standard procedures for literature reviews [92–94].

As many of the included studies included in-depth case studies and were generally of qualitative nature, the review followed the analysis methods discussed by Thomas and Harden [86]. As such, the synthesis of the findings was conducted in three stages: the coding of the results and the extraction of relevant issues and best practices, the clustering of these in descriptive themes, and the construction of analytical categories [86,92]. Because our review included a variety of studies rather than

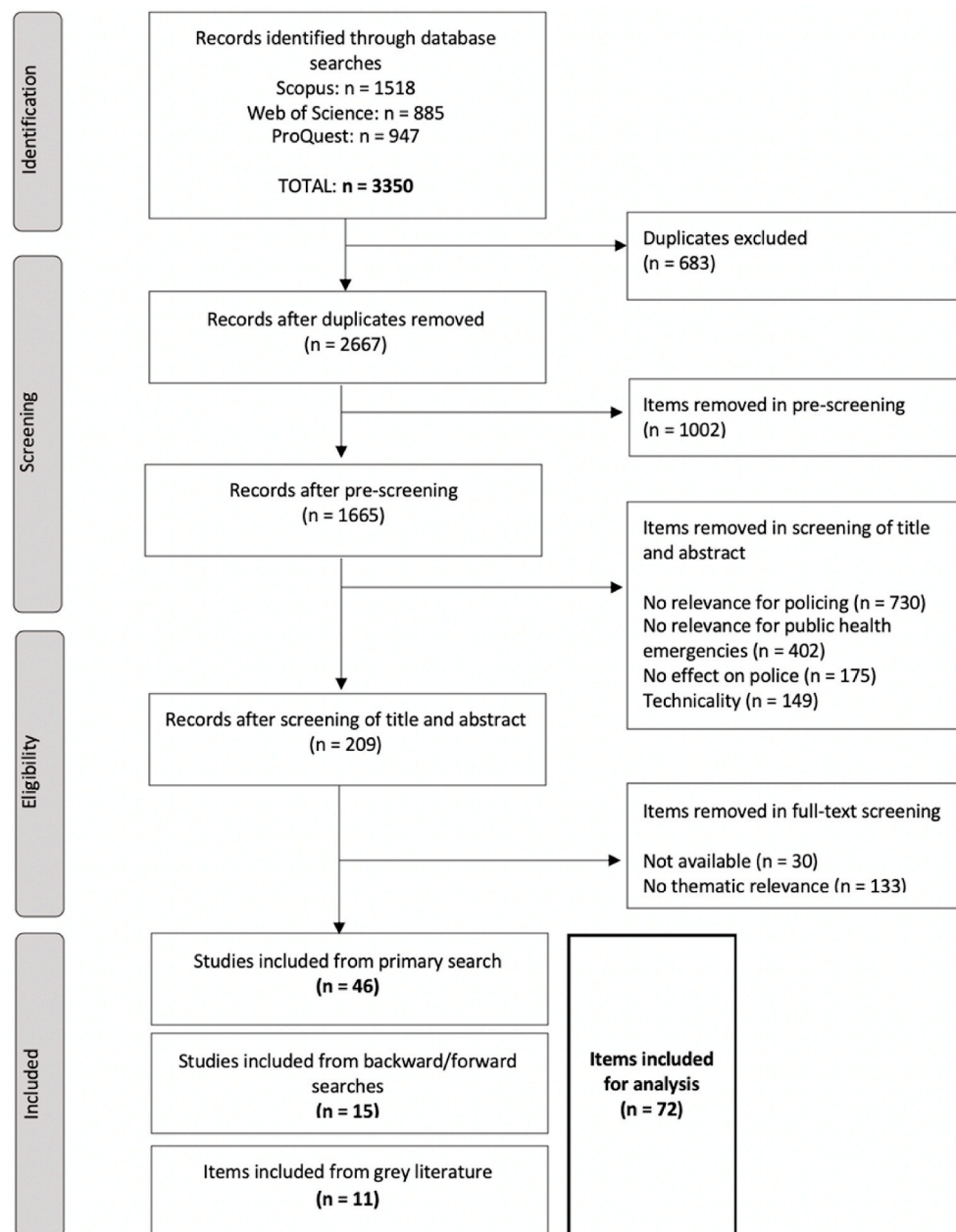


Fig. 1. Search stages and results of the systematic review.

exclusively qualitative ones, findings were at times assigned multiple codes as some studies were relevant for more than one cluster/category [95,96]. The step of creating distinct analytical categories and ‘going beyond’ the content of the original studies [95] was at times rather difficult, as many of the topics were highly interconnected and influencing one another [86].

3. Findings

As previously mentioned in the introduction, there is limited literature that explores the impact of pandemics or more generally public health emergencies on policing. While the lack of academic literature on the effect of COVID-19 on policing can certainly be attributed to the ongoing nature of the current pandemic, there is little academic or grey literature exploring the impact of previous pandemics on police work. This is echoed by Jones et al. [3] who provide an initial evidence scan on the possible impacts of COVID-19 on the New Zealand police. Because the literature on the effect of pandemics on policing operations is scarce, this review uses other natural disasters as proxy. While this may seem problematic in some regards, Ricciardi, Palmer, and Yan [97] argue that disease outbreaks should be treated as other natural disasters and in fact, many challenges are the same. Overall, the review found that the literature in the field is limited but that especially the nexus of policing and public health is an emerging field with many promising studies.

In the end, 72 items were included in the final review. A detailed key to inclusion and exclusion stages can be found in Fig. 1. Included items were then analysed which resulted in the creation of four main analytical categories: police-community relations (see Section 4), psychological health and wellbeing (see Section 5), the impact on internal organisation and resourcing (see Section 6), and inter-organisational communication and collaboration (see Section 7). Based on the findings from the literature, we provide a discussion of recommendations and best practices for policing during pandemics. In the following, these categories will be discussed and core problems as well as best practices will be listed. Relevant studies for each section are listed in Tables 1–4, which summarise the core characteristics of each study as well as the type of incident they focus on.

4. Police-community relations

Emergency situations such as pandemics can have a significant impact on police-community relations and public trust in the police [3]. While effective and successful police response to disasters and emergency events can put people out of harm’s way and ensure public safety and well-being, ineffective police response can undermine public trust and confidence in the police [11]. This review found nine studies that discussed how disasters and emergencies may affect police-community relations (see Table 1).

4.1. Ensuring compliance

One of the primary challenges in pandemic policing is maintaining relations with the community while ensuring compliance with new regulations and restrictions [6]. Because both citizens and officers are often under increased stress [98], police-citizen encounters during a period of a crisis can be particularly challenging [6]. This is especially the case if citizens refuse government guidelines, do not wear PPE, or deliberately break measures as a form of political dissent [99,100].

The style of policing that officers and departments adopt can, however, depend upon citizens’ responses and reactions to emergencies, which may vary depending on the scale, nature and stage of the disaster. It is therefore important for the police to understand citizens’ behaviours in order to best ensure citizen compliance [6,11].

The analysis suggests that civilian distress and grievances after disasters may disproportionately affect socio-economically disadvantaged communities, leading to violent confrontations between police and

Table 1

Relevant literature related to police-community relations.

Author (Year)	(Health) Emergency	Findings
Ames and Busch [10]	Flooding	Examines the emergency calls made to first responders during a flooding incident in Australia, finding that mismatched expectations between callers and call-takers impacted communication.
Bonkiewicz and Ruback [11]	Flooding	Analyses police response to Hurricane Katrina and recommends that police departments change their styles of policing before, during, and after a disaster, to accommodate the needs, expectations and priorities of affected communities.
Bonkiewicz and Ruback [6]	Hurricane	Proposes a model for law enforcement agencies to follow during a disaster that takes into account changes in citizens’ priorities, expectations and behaviours at different stages of a disaster.
Bruns et al. [12]	Flooding	Analyses the online communication behaviour of the Queensland Police Service in Australia during flooding incidents, finding that the police used social media to provide situational information, advice, and to tackle misinformation.
Caluori and Clements [13]	COVID-19	Surveys British public perceptions of police response to lockdowns during the COVID-19 emergency, finding that overall the public supported the police’s approach but with some limits.
Chauhan and Hughes [14]	Hurricane	Studies trends in social media usage of first responders during Hurricane Sandy, finding an increase in the use of online communication during the disaster.
Hughes et al. [15]	Hurricane	Studies online communication styles of first responders during Hurricane Sandy and recommends flexibility in online communication strategies and practices during emergencies and disasters.
Reicher and Stott [16]	COVID-19	Considers the impact of the COVID-19 outbreak on collective disorder.
Yang and Stewart [17]	Hurricane	Studies police use of the social media platform, Twitter, by the Houston Police Department during Hurricane Harvey and recommends a three-phase strategy for emergency responders that publicly communicates their preparedness, response and recovery efforts.

communities [101]. This is especially the case for contexts that have seen the militarisation of policing (e.g. in form of the deployment of armed forces for policing duties during a public health emergency) [46, 102]. The securitisation of Ebola, for example, led to neighbourhood quarantines and the criminalisation of public gatherings, legitimising police use of force and encouraging the militarisation of police interventions [46]. Initial reports indicate that similar issues have occurred during the COVID-19 pandemic [102]. The literature suggests that practices and responses that result in the criminalisation of communities and civilians affected by a virus – such as COVID-19, hamper containment efforts and hurt public compliance, leading to resistance against the police [46,51].

4.2. Different roles for police

In terms of police-community relations, the literature also considers how officers may be required to switch between different and diverse responsibilities such as enforcing lockdown restrictions, crime control and response, and public order maintenance [6,42]. In the case of PHEs, the police might also play a significant role in harm reduction activities to prevent the spread of infection [49].

Bonkiewicz and Ruback [6] have discussed how police departments can prioritise between these responsibilities and engage in three

different styles of policing: the 'legalistic', the 'watchman' and the 'service oriented'. In a legalistic style of policing, rules and regulations restrict officer discretion so that disaster-related policies can be enforced impartially [6]: 142). In a watchman style of policing, maintenance of public order is prioritised and there is greater officer discretion [6]: 142). In a service-oriented style of policing, both legalistic and watchman styles are combined but public service is prioritised, thus enabling cooperation and collaboration between police and communities [6]: 142). Bonkiewicz and Ruback [6] recommend that to increase the effectiveness of police response, departments and officers should change their policing styles and strategies at various stages of disasters to accommodate the different priorities, behaviours, and expectations of affected citizens and communities. This requires training police officers to be cognizant of changes in public expectations and recognise the social impact of disasters and PHEs [6,11]. It is unclear, however, to what extent police officers may be able to change their style of policing during a crisis, especially in developing countries where police may be under-resourced and inadequately trained. Abuse of power.

Police-community relations in the context of PHEs have received limited attention in the literature. However, several studies analysed police officers' fears and anxieties, as well as prejudice and discrimination, and how these contribute to the mistreatment and stereotyping of people believed to be infected [42,49]. Although in most cases during an emergency, citizens will comply with official orders, there may be a variety of reasons for which they refuse to comply – such as the welfare and security of their families [6]. In addition, police department's shortcomings and individual abuses of power by police officers may also be highlighted in the media, thus having an adverse impact on public perceptions of the police beyond individual cases [42].

Research focusing on the militarised police responses to public health emergencies – such as Ebola – has stressed the importance of sensitising police officers towards affected communities and towards their own roles during complex crises [46]. For fair and indiscriminatory treatment of people suspected of having contracted infections or viruses, policies should be implemented on departmental levels and adequate training be provided to educate police officers on humanely treating affected persons and raise awareness about public health issues and the occupational dangers they may create for police officers [46,49].

These findings are echoed in grey literature and policy documents for law enforcement agencies. Policing organisations increasingly provide employees and officers training on influenzas, viruses and diseases and PHE-related guidance so that members of the workforce can protect themselves and their families, manage the expectations and concerns of the communities they serve through appropriate channels of communication, work with other stakeholders and community agencies to support each other and be cognizant of different demographic groups in the areas they serve [45].

4.3. Communication

Crisis communication is considered to be an important role played by police departments during emergency management [12]. However, maintaining communication with citizens can be challenging and potentially problematic, especially when the police have to interact with those under severe distress [10]. Over the last few years, police departments have increasingly turned to online communication and social media (e.g. Twitter and Facebook) to convey messages and respond to public inquiries, provide situational information and advice to the public, and tackle misinformation [12]. Social media has thus become another platform through which police response can shape public trust in the police [14].

Several studies such as Chauhan and Hughes [14] and Bruns et al. [12] reported how fire and police departments' use of social media increased during disasters, emphasising how new accounts were created by many agencies. In many instances, these accounts were meant to reply to citizen requests, tackle misinformation, and push correct

information forward [12]. Yang and Stewart [17]; however, found that Twitter use by police departments, and other first responders, largely focused on protocol, reassurance and community resilience. This discrepancy is echoed by Hughes, St. Denis, Palen, and Anderson [15] who stress that online communication practices differ across departments and across media types and no standardised procedures are available. While there should be some flexibility so that police departments can vary their communication strategies depending on the needs of the public during and in the aftermath of an emergency [14,15], research suggests that more standardised rules and procedures for online communication might improve police communication with the public [12,15].

The recommendation for flexibility is echoed in grey literature designed specifically for police departments and crisis communication [12]. Yang and Stewart [17] have further recommended that departments design communication strategies in different phases of the crisis – preparation, response phase, and recovery – to adequately communicate with affected citizens based on their needs. These sources suggest that official police accounts use transparency and accountability in these times to maintain public trust in the police [15] and establish 'two-way, trust-based' communication with the public to ensure a cooperative response to the emergency [45]. However, the literature fails to make recommendations on how police departments should best manage or respond to public criticism and especially misinformation, the latter being even more essential during pandemics such as COVID-19 [103–105].

Overall, the literature identifies a number of important issues. The COVID-19 pandemic, however, highlights several shortcomings in the current academic debate, especially with regards to the intentional disregard of safety measures by citizens and policing efforts in the later stages of a pandemic. Communication with the community and building trust not only in short emergency situations but also over prolonged periods of crisis situations are some of the areas that need to be explored in future research.

5. Psychological health and well-being

Another primary theme emerging from the literature is the effect of external stressors on the psychological health and well-being of police officers (see Table 2). Such external stressors, also referred to as 'acute extra organisational stressors' are known to adversely impact both police employees and organisations [21]. In the context of COVID-19, officers' proximity to infected persons in some parts of the world could result in heightened anxiety, especially in the global South where lockdowns have been ineffective and where public compliance with health restrictions and the police has been limited. However, research on how the pandemic affects officers psychologically and emotionally is scarce. We therefore take an approach similar to that of Stogner et al. [8] by exploring how comparable emergencies have impacted officer wellbeing.

From our final sample, 24 studies discussed how during disasters and emergencies, and in their aftermath, police officers, and other first responders, are at high risk for developing psychological problems, such as symptoms of post-traumatic stress disorder (PTSD) [24,28,31,32,41], acute stress disorder [35], as well as psychological distress [27], trauma [29], anxiety and depression [31,41], fear and substance abuse [22,25,28,34].

Because police officers are often first responders during disasters and emergencies, they are often faced with a whole array of new tasks. Post-disaster or emergency-related duties for police officers may include crowd control and maintenance of public order, retrieval and removal of bodies, transporting and aiding affected civilians - some of whom may be hostile towards police officers [33], and maintaining communication with their communities through limited infrastructural capacity.

As such, not only are officers prone to physical and personal risks such as the risk of infection, loss of property and family members [26,41,

Table 2

Relevant literature related to psychological health and wellbeing of police officers during disasters.

Author (Year)	(Health) Emergency	Findings
Adams et al. [18]	Hurricane	Explores the coping strategies and methods that first responders adopt to foster resilience during a crisis and recommends communication strategies that allow police officers to maintain contact with co-workers and families.
Bakker et al. [19]	Training exercises	Studies the importance of social support for rescue workers from co-workers and leaders and recommends that preventing training be offered to first responders to create a buffer between their exposure to critical incidents and their mental health.
Berger et al. [20]	Multiple	Presents a review of the literature on the prevalence of PTSD on rescue workers, including police officers.
Biggs et al. [21]	Flooding	Examines the impact of exposure to acute extra-organisational stressors on work-related individual and organisational outcomes in police officers and stresses the importance of work culture support and organisational support for ensuring employee wellbeing.
Boscarino [22]	Multiple	Presents a review of articles included in a special issue on the impacts of different disasters and emergencies on affected communities and police officers.
Guilaran et al. [23]	Multiple	Presents a review of the literature on the psychological outcomes in first responders and the effects of social support, recommending further research on the different forms and sources of social support available to first responders.
Haugen et al. [24]	Multiple	Presents a review of the literature on the effects of PTSD on first responders, recommending further research on the exposure to stress after treatment – or re-exposures and new exposures – that can complicate PTSD treatment and interventions.
Heavey et al. [25]	Hurricane	Examines the use of alcohol by police officers involved in the Hurricane Katrina response, finding significant association between heavy involvement in disaster relief and alcohol abuse, and recommends targeted interventions for police officers involved in disasters to overcome the stress experienced.
Jenkins [26]	Hurricane	Examines the impact of social support and coping strategies on first responders during Hurricane Andrew.
Kerswell et al. [27]	Flooding	Analyses the mental health outcomes in the Queensland Police Service in the aftermath of flooding incidents and finds that some of the officers showed higher levels of general distress and PTSD and that civilian staff reported significantly higher distress and PTSD than police officers.
Klimley et al. [28]	Multiple	Presents a review of the literature on the prevalence of PTSD among emergency dispatchers, including police officers and firefighters.
Kowalski [29]	Multiple	Explores the role of police leadership – including supervisors – on supporting frontline officers exposed to traumatic events with recommendations for police leaders and organisations.
Leppma et al. [30]	Hurricane	Investigates the development of posttraumatic growth among police officers working in New Orleans during Hurricane Katrina and finds that gratitude, satisfaction with life, and social support can moderate the relationship between trauma exposure and posttraumatic growth.
Mao et al. [31]	Multiple	Presents a review of the literature on the psychological problems facing rescue workers

Table 2 (continued)

Author (Year)	(Health) Emergency	Findings
Martin et al. [32]	Multiple	in the aftermath of a disaster deployment and recommends interventions for mitigating psychological consequences and fostering resilience. Finds that social support offered by colleagues to police officers affected by disasters can be a significant protective factor from PTSD and distress and offers recommendations for screening and training.
McCanlies et al. [33]	Hurricane	Examines the association between resilience, life satisfaction, posttraumatic growth, and symptoms of PTSD in police officers, and finds that resilience, life satisfaction and gratitude may help mitigate the symptoms of PTSD.
Osofsky et al. [34]	Hurricane	Finds that first responders had significant levels of PTSD, depression, alcohol use and partner conflict in the aftermath of a disaster and recommends providing not just mental health services for first responders but also designing adequate plans before disasters strike.
Regehr et al. [35]	Multiple	Presents a review of the literature on mental health symptoms in police officers in the aftermath of their exposure to traumatic events and finds that other rescue workers had higher levels of PTSD than police officers, perhaps due to their training.
Smith et al. [36]	Hurricane	Studies the effects of critical incident stress debriefings in a police department in South Carolina and finds these to help alleviate symptoms of PTSD among police officers.
Snell et al. [37]	Earthquake	Analyses the coping measures adopted by police officers in New Zealand in the aftermath of the Canterbury earthquakes and how resources losses and gains can shape officers' abilities to adjust and cope during and in the aftermath of disasters.
Stephens et al. [38]	Multiple	Finds that lower social support from peers and supervisors after traumatic exposures can lead to a higher likelihood of developing PTSD symptoms.
Stephens and Long [39]	Multiple	Highlights the importance of positive communication between police officers, supervisors, and peers for buffering symptoms of stress and trauma in police officers.
van der Velden et al. [40]	Earthquake	Studies the effects of the Haiti earthquake on first responders and finds that good team functioning, recognition and job satisfaction may prevent PTSD symptoms among police officers.
West et al. [41]	Hurricane	Studies the relationship between work-related stress and personal factors and the onset of PTSD and depression symptoms in police officers in the aftermath of Hurricane Katrina, with recommendations for treatment, counselling, social support and other interventions.

49], but also acute stress [18], that may be exacerbated by their extended work hours with an increased workload [8,19]. In addition, officers may face a lack of rest, resources and provisions [21,37], distance from their families and social networks, depriving them of social support [18,39,41], as well as duress and 'occupational stress overload' as expectations increase [10,26]. Other problems identified have been officers' fear at the time of crisis, for instance fear of infection such as in the case of HIV, that can contribute to work-related stress and 'emotional exhaustion' [49].

Demographic variables such as age and gender can also influence the extent of impact on the mental health of police officers [27,28]. For example, in a study looking at the effects of a natural disaster on police officers and support staff in Australia, female officers were found to be more likely to suffer from distress than their male counterparts, but the

same was not reported for post-traumatic stress symptoms [27]. The same study found that age did not have an impact on general distress felt by officers but did affect the severity of PTSD symptoms [27]. The following sections examine these issues further and discuss best practices for police organisations to reduce the psychological impact of disaster situations on their employees.

5.1. Resilience and coping strategies

In spite of their vulnerability to external stressors, out of all first responders, police officers were found to be less vulnerable to PTSD symptoms as compared to ambulance personnel. This is understandable given that, on average, ambulance personnel respond to crises more frequently than police officers. However, the literature suggests that police officers' resistance to PTSD can also be attributed to the selection criteria applied by law enforcement agencies, the screening processes that police officers are subject to, and the training they receive (especially for handling firearms), as well as the notion of 'brotherhood' within police organisation, and their 'personality hardness' [20,24,32,35,41]. Collectively, these are some of factors that enable resiliency in serving police officers during a crisis.

Resilience in police officers has also been compared to that of civilian police staff which, in one study, was found to have reported greater psychological stress and post-traumatic stress symptoms than police officers in the aftermath of a natural disaster [27]. This supports the view that police culture, which sustains the idea of 'brotherhood' and police fraternity, provides a protective barrier for police officers that may not necessarily be present for others [27,32].

Literature has further examined resilience among police officers and the coping practices and strategies adopted in the face of emergencies [18,20,26]. In an initial study on coping amongst police officers, Jenkins [26] investigated the effects of social support coping among police dispatchers in the context of a hurricane, during which 'dispatchers found themselves unable to help people, incapacitated in their coordinating function, and subjected to many urgent demands for which they could not send help' [26]: p.220). They found that deficits in social networks available to police dispatchers can result in higher distress in general, but not necessarily cause PTSD symptoms. Similar findings were reported in a study conducted by Stephens, Long, and Miller [38] who found that lower social support from peers and supervisors can lead to increased symptoms of PTSD. Detachment, spiritual practices and communication with their family members were also found to be additional coping strategy adopted during the disaster [18].

5.2. Social support

One of the key strategies found to help police officers during and in the aftermath of disasters and emergencies has been communication with peers and co-workers [18] as well as social support [23,28], a supportive work culture in general [21] and the provision of leadership following a traumatic event or emergency [29]. This is echoed by other authors such as Snell et al. [37] and Martin et al. [32] who found that peritraumatic social support can provide significant protection against symptoms of PTSD.

Social support has been recognised as 'one of the cornerstones of psychological recovery' in the aftermath of disasters [23], and one of the most successful protective factors against PTSD [32,33]: 'An officer's ability to cope with stressful factors (that diminishes their risk of PTSD) appears to be associated with social support, individual resilience, satisfaction with life, gratitude, and posttraumatic growth, with social support as one of the most significant protective factors' [28].

Although studies vary in terms of the extent to which social support can serve as a barrier or buffer to negative psychological outcomes in police officers following disasters, they are consistent in their appreciation for social support as a 'sustainable form of psychosocial intervention for buffering the negative consequences of disasters in

responder groups' [23].

These findings were complimented by those of McCanlies et al. [33] and Leppma et al. [30] who found that in addition to social and interpersonal support, gratitude (feeling appreciation and thankfulness) and individual judgements about satisfaction with life can buffer the effects of stressful life events on posttraumatic growth and help mitigate the symptoms of posttraumatic stress disorder. In addition, social support was found to have a positive effect on job satisfaction and work engagement in the aftermath of disasters [23].

These findings are, however, not uncontested as Bakker et al. [19] found that social support from peers and superiors is not a buffer between exposure to critical incidents and mental health issues. Furthermore, the benefits of social support have been found to vary depending upon the psychological outcomes following disasters, the type of responders examined, the types of communication that were included in social support practices, as well as the material losses suffered by police officers during or after the emergency [23,38,39]. In addition, gratitude and life satisfaction scores have been found to be lower in ethnic and racial minority police officers, indicating variations in the way social support, gratitude and life satisfaction can help police officers cope during and in the aftermath of disasters and emergencies [33]. The effects of social support in the context of COVID-19 is thus likely to vary depending on how a police department is impacted by the infection in different countries and to what extent the organisation can support affected police officers.

5.3. Substance abuse, fear and underreporting

While many of the coping strategies mentioned in the previous section contribute to a higher wellbeing, others might be more destructive. Studies suggest that the risk for police officers to abuse substances to cope are disproportionately higher after extreme events [18,25,33]. Heavey et al. [25] investigated whether or not different characteristics such as marital status or previous military training could serve as a buffer against alcohol use. However, their study found no association with regards to the latter and could only identify a limited role of marital status depending upon the scale and nature of the crises confronting police officers and the level of exposure they have had to the disaster [25]. The use of alcohol was also found to decrease the levels of resilience in police officers [33].

5.4. Pre-crisis training

Studies have stressed the importance of training as an efficient way of preventing and managing mental health problems in the aftermath of disasters. They recommend that such training facilitates social support networks for police officers [19,25] and focuses on building and enhancing resilience in police officers [31]. This is further stressed to reduce the risk of depression and substance abuse [40].

Efficiency of training and maintaining resilience amongst the force can further be facilitated by adhering to stringent employment processes and selection criteria [31]. In addition, mental health screening and support services should be updated regularly [27] and police supervisors should be trained to better lead their frontline officers during a crisis [29]. These practices are congruent with those discussed in the section on organisational dynamics below.

5.5. Support and leadership

Police officers require additional, and often tailored, support from their organisations, especially their frontline supervisors, in the aftermath of a disaster or emergency. The role of police leadership is thus essential when planning for protecting the mental health and wellbeing of the workforce [29] and good team functioning, recognition and job satisfaction have been found to serve as protective factors as well [40].

Efforts of peer support can be supported by organisations and

superiors through Critical Incident Stress Debriefings (CISD) or Critical Incident Stress Management (CISM) which are crisis management techniques to help first responders cope with stress during and after their exposure to disasters or traumatic incidents [26,28]; Smith, C, & De, 1994), and mitigate the risks of psychological distress and PTSD. CISM and CISD can help organisations educate police officers about the crises on hand and about the best methods available to them for coping through these crises. Debriefing exercises can help police officers cope with the support of group leaders and police trainers [36]. However, participation in these is voluntary and studies did not find enough evidence for their effectiveness in preventing the onset of PTSD or reducing psychological distress [26,28]. As such, research on the effectiveness of psychological interventions for police officers exposed to hazards and disasters has provided mixed results and is fairly limited [28].

Kowalski [29] further recommends establishing an evidence base for supervisors on trauma response, expanding the capabilities of police supervisors through new training initiatives, and developing appropriate policies and approaches for supervisors to reduce stigma attached to post-disaster trauma.

Organisational support can provide resources and adequate provisions for police officers during a crisis and also allow officers to cope better, thus maintaining job satisfaction and lowering turnover [21]. Such interventions should be targeted to those officers most vulnerable to the adverse effects of extra organisational stressors so that adequate support can be provided [21]. Follow-up interventions may also be necessary to help officers in the aftermath and maintain a healthy workforce in the long-term [31,35]. Such interventions may involve family members, community members and the organisation more generally [37,41]. In this, law enforcement agencies should avoid a one-size fits all approaches and instead designing social support structures and policies for police officers in their operational realities [23,39]. Overall, the literature stresses that creating an organisational culture, with support from supervisors and the organisation at large, social support (both within and outside the police organisation), and material support (e.g. money, resources) is essential to reduce stress on the workforce and effectively and efficiently manage a public health emergency [21,37,40]. Nevertheless, there are several gaps in the literature that should be addressed in the future. This goes especially for the effect disaster events have on female officers, and whether any variations are found depending upon the age, gender and ethnicity, the level of experience, and the exposure to a crisis or disease [27,28].

Due to the unfolding nature of the COVID-19 pandemic, the literature on its impact on the mental health and wellbeing of officers is in its infancy and the academic debate relies to a large extent on comparative examples and lessons learned in other emergencies [8]. Nevertheless, this emerging research and the studies analysed above provide important lessons and guidance for law enforcement agencies and officers serving during the pandemic.

6. Impact on intra-organisational dynamics

This review identified 22 sources related to challenges in the internal organisation and resourcing during disasters (see Table 3).

6.1. (Lack of) pre-disaster planning

A lack of or rather inadequate pre-disaster planning is often the first potential hurdle identified in the literature on policing and PHEs [9,56]. Studies find that it is imperative that police departments have detailed plans and capacities for disaster response [75] that anticipate organisational and functional disruptions to normal routines [9,57,106,107]. While experience shows that even the best disaster plans will come under stress and may break down, it is still critical to have them in place to avoid unnecessary ad-hoc reactions [9,48,108].

Even though the literature on best practices is scarce, there is an abundance of records of suboptimal disaster response in the past [91,

Table 3

Relevant literature related to challenges in internal organisation, demand, management, and decision making.

Author (Year)	(Health) Emergency	Findings
Adams and Stewart [42]	Hurricane	Provides a comprehensive account of police work after a major disaster, suggesting new partnerships with other policing authorities, new communication sources, and changes to pre-disaster protocols as best practices.
Alison et al. [43]	Training exercises	Explores the decision making of experts during critical incidents.
Bienstock and Zenteno Langle [44]	Epidemic	Presents methodologies for managing the impact on workforce absenteeism on the operational continuity of public services during an epidemic.
Brito et al. [45]	Epidemic	Presents a detailed list of benchmarks for developing a law enforcement pandemic flu plan.
Brooks and Lopez [2]	COVID-19	Discusses new challenges for law enforcement agencies presented by COVID-19 and presents recommendations for fulfilling public safety functions during the pandemic.
Chirambwi [46]	Ebola	Analyses the militarisation of policing during the Ebola outbreak in Sierra Leone.
Cowan and Davis [47]	Disease	Explores the dangers of an outbreak of an infectious disease amongst police recruits, providing recommendations for strengthening public health and prevention aspects.
Deflem and Sutphin [48]	Hurricane	Reviews the policing experience before, during, and after Hurricane Katrina.
Flavin [49]	HIV/AIDS	Examines police officers' fear and risk of occupational HIV transmission and individual and departmental responses to this fear. The study stresses the importance of policy and education to reduce fear and risk and to ensure compassionate and fair treatment of people with HIV/AIDS.
Gellert et al. [50]	HIV/AIDS	Explores the knowledge and training police officers have about HIV/AIDS and finds that more diligent training is required to reduce the occupational hazard for officers.
Hoffman [51]	Ebola	Discusses quarantine measures after the Ebola outbreak in Liberia and ramifications of the transference of policing powers to the military and other partner agencies.
Jessop et al. [52]	Hepatitis	Examines infection prevention policies and practices amongst police departments and recommends better reporting to improve such policies.
Jones et al. [3]	COVID-19	Provides an overview over initial evidence on the possible impact of COVID-19 on police demand.
Landahl and Cox [53]	No specific emergency	Explores the human component of emergency response, finding that in many instances it has been neglected and suggesting a shift in preparedness efforts to focus on the underlying conditions that impact emergency responders' willingness to work.
Luna et al. [54]	Epidemic	Explores case studies and presents a list of recommendations and best practices for police planning for flu pandemics.
Ochieng [55]	HIV/AIDS	Analyses how the performance of police officers is affected by HIV/AIDS.
Richards [56]	General	Provides recommendations for police planning for public health emergencies.
Rojek and Smith Michael [44]	Hurricane	Looks at response efforts by the police department after Hurricane Katrina for organisational learning during disaster management.
Roman [57]	Hurricane	

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Table 3 (continued)

Author (Year)	(Health) Emergency	Findings
Riley [58]	Hurricane	Provides a comprehensive review of the acute and lasting impact of Hurricane Katrina on the criminal justice system of New Orleans. Testimony of the former superintendent of the New Orleans Police Department before the US Senate. Highlighting the hardships, the department and individual officers faced.
Sonder et al. [59]	Disease	Evaluates the level of occupational exposure to bloodborne viruses in the Amsterdam Police Force, finding that a comprehensive and effective protocol should be instated to minimise exposure.
Walton and Falkner [60]	COVID-19	Explores crime trends and effects on police during the COVID-19 pandemic.

109,110]. Luna, Brito, and Sanberg [54] discuss various case studies and condense a short list of recommendations for emergency police planning as well as specific benchmarks for pandemic planning (for the latter see Ref. [45]. Whenever possible, planning procedures should be supported by subject matter experts [45,54]. Not only is this relevant to gain an in-depth understanding of the situation but also to anticipate future developments that could negatively impact resource and staffing levels further. This includes recognising that a pandemic could come in multiple waves, hitting police services more than once [45]. Furthermore, it is essential to set realistic expectations of the police's role in PHEs, taking abilities and (physical and human) resources into account [45, 54]. The latter should include a strategic determination of how staffing losses may impact the functioning of operations as well as the availability of specialized skills and knowledge [45,54,75]. Additionally, emergency plans should be kept up-to-date, both in terms of threats as well as available technological and non-technological mitigation tools [45,54]. To this extent, Deflem and Sutphin [48] suggest that disaster plans need to, at a minimum, include the coordination of communications and the organisation of transport.

6.2. Staff shortage and absenteeism

The second important hurdle law enforcement agencies face during a pandemic, is the diminished strength of the workforce due to infections and illness of officers and their families [56]. Bienstock and Zenteno Langle [44] emphasise the importance of anticipating different waves of the pandemic and corresponding staff shortages. The study gives insights into optimal robust strategies and presents practical rules of thumb that can be applied [44].

A lack of available personnel due to absenteeism and illnesses places additional stress on the pool of available officers and can become a limiting factor for even the simplest police operations [54,56]. In addition, working with a diminished force can severely impact officers' performance and professional standards. Additional workload for healthy officers thus adds to the already existent psychological and physical stress on officers [9].

To counteract this, police forces must take any special physical or mental health needs of officers into account when redistributing workloads [48]. However, adjustments to this extent also have ramifications for operational planning and it may be difficult to find the balance between viable operational planning and maintaining the wellbeing of the workforce. Assuring the latter can include the consideration of adequate resting periods and support mechanisms for officers and their families in emergency practices [9].

To minimise staff shortages during a pandemic, flexibility and new staffing models are key. While the literature shows that organisations often rely on established practices of operations during disasters and

unprecedented events [111–113], some authors emphasise that especially management practices need to be flexible and non-linear, including staffing practices and a value system that can overcome barriers [42,114].

Though relying on standard operating protocols provides a sense of control and stability [42], it is imperative to question the effectiveness of these protocols and to review operational practices to reflect new developments, especially since PHEs can develop rapidly [42].

Best practices include creating new staffing rotations with smaller self-contained teams on separate shifts and only requiring those scheduled to work to report to their command post [42]. However, such measures can complicate routine policing and should be implemented on a case-by-case basis while keeping operational realities in mind.

6.3. Professional standards and performance

The literature suggests that losing a percentage of officers due to sickness will not only impact the immediate force strength, but also the flow of operations as teamwork and established procedures are compromised when officers with different skillsets replace those who absent [55].

Ochieng [55] studied the policing of HIV/AIDS and suggested that knowledge and experience of police work, as a largely practice-oriented profession, is often concentrated with longer serving officers who are, however, in all likelihood more vulnerable in case of a PHE. As such, it is critical to instate flexible leave policies that encourage (where possible) vulnerable employees to work from home or allow those who are infected not to report to work [54].

Officer performance may also be impeded by the additional physical and psychological stress PHEs can have [115,116]. Such stressors may also include personal circumstances that might affect police officers' performance much more during a natural disaster or epidemic [53]. This is highlighted in the testimony of the former superintendent of the New Orleans Police Department, Warren J. Riley [58]. In his testimony, Riley stresses the hardships many officers faced and the uncertainty they were confronted with, leading to a conflict between protecting their loved ones and serving the communities affected by a disaster [58]. Authors such as Landahl and Cox [53] stress the need to focus more on the human component and to ensure families of emergency workers are safe during crisis events. Their study finds that the decision of emergency workers to report for duty often depends on the safety and wellbeing of their families rather than available protective equipment or previous training [53]. As such, this is a relevant factor to consider when planning or assessing the performance of officers during an emergency.

The decline of professionalism within an organisation can also impede decision-making and adversely impact organisational dynamics, leading to an increased administrative demand and failure demand within an organisation [5,75]. Crichton et al. [116] find for example that decisionmakers under stress tend to apply standard procedures as reactive measures rather than anticipating future challenges. In response, some studies suggest that to maintain a functioning organisation, stress reduction and workload management should be prioritised during a disaster [75,115].

6.4. Training

A decline in available staff and the erosion of decision-making and organisational abilities can be mitigated by adequate training and established practices. Training and education can regulate how a new threat is perceived amongst officers. While some level of fear (or risk awareness) may be beneficial to encourage necessary precautions and vigilance, overwhelming uncertainty and stress can impact officers' ability to perform [49,117,118]. As such, providing adequate knowledge and training for officers about a PHE, e.g. a disease and its transmission, and how police practices should change in response to such emergencies is critical to policing during pandemics.

The knowledge of the threat can be a valuable tool for officers to educate the population but also to ensure they can protect themselves and their families [50]. Both are important as interactions with the public may be strained and generally different from pre-emergency encounters (see Section 5).

This need for training does, however, not only apply to officers with neighbourhood policing duties but to the entire workforce. Ames and Busch [10] for example stress that call handlers need to be specifically trained for disaster situations because a breakdown in communication between call handlers and callers can have serious consequences and potentially harm police-community relations in the long-run [10].

Furthermore, the literature suggests that it is critical for officers to receive adequate training about the dangers of contracting a disease as an occupational hazard [50]. This is echoed by Flavin [49] and Jessop, Del, Solomon, Mullen-Fortino, and Rogers [52] who explore the training of police officers and the prevention practices amongst police departments. These studies find that even though training and education are critical aspects of effective prevention strategies [49], it is often inadequate and policies leave room for improvement [50,52]. In addition, Jessop et al. [52] and Sonder et al. [59] highlight the necessity to better report potential occupational exposures to diseases to improve the understanding of the infection transmission risk. The latter includes incorporating education and planning for epidemics and other emergencies as a regular part of departments' activities [56].

Providing protection to officers may also include providing and controlling vaccinations to all possible illnesses that an officer might be exposed to Ref. [47,59]. This is, however, a topic of controversy and other studies argue that such a practice could potentially increase resistance against these measures amongst the workforce [56]. Richards [56] for example suggests that it would be more beneficial to instate a free occupational health and safety programme that includes vaccinations and to generate incentives rather than imposing a mandatory vaccination regime.

In addition, educational practices may have further positive effects. The literature suggests that in many instances, it is not the objective risk of contracting a disease but rather the uncertain and unpredictable nature of police work along with a lack of knowledge and guidance that fuels fears amongst officers [49]. As such, adequate training in appropriate protective measures can help officers to cope with anxiety about personal risks and overall improve officer morale [50].

6.5. Equipment and supplies as a limiting factor

The availability of physical resources is essential for policing during a PHE. While the type of necessary equipment may vary contextually, a lack of it can quickly cripple the response capacity of the police [9,48,56]. A lack of personal protective equipment (PPE) such as masks or gloves, for instance, can create serious issues for law enforcement agencies [9,54]. Since it is not always possible to reduce physical contact, police officers need PPE to prevent risking their health [56]. Cowan and Davis [47] warn that outbreaks amongst the police can have devastating consequences for readiness of the force. Adequate equipment for police is not only important for the sake of self-protection but is fundamental to the efficiency of the organisation as a whole [9,48,119,120]. As such, pre-disaster planning should not only include the creation of adequate emergency protocols but also the acquisition of physical equipment that can be stored and used in case of emergency [48,56]. In addition, it is critical to stock supplies in staggered purchase patterns to ensure items with limited shelf-life will not expire all at once [54]. Changes in service demands.

Another important issue for police practice is that demands and priorities for law enforcement agencies will change fundamentally. In the short term, two dynamics are primarily at play. On the one hand, officers may be occupied with crisis-related tasks such as enforcing public health restrictions, securing healthcare facilities, controlling crowds, and protecting critical goods such as stockpiles of vaccines or

medicines [9,56]. As a result, the overall style of policing may change along with the day-to-day tasks of individual officers [6,11].

On the other hand, crime patterns can change too. While some incidents such as traffic violations may reduce, other crimes might surge, and some new crimes might emerge [60,121]. This can lead to increased stress on specific units (e.g. in the case of cybercrime or domestic violence), while neighbourhood policing and everyday service demands should still be addressed out in order to 'maintain the peace' [56,60]. Especially with regards to new crime types, it is important for police departments to clearly communicate their prevention efforts to the population. Walton and Falkner [60] suggest, for example, a large campaign offering guidance and advice to prevent online fraud.

Furthermore, because physical contact with suspected offenders or members of the community may be unavoidable, even seemingly routine operations can require additional time and resources [2]. While some studies suggest normal policing operations involving such measures should be suspended during a PHE [2], this is in many regards an impractical (or rather impossible) solution, especially in geographies prone to high crime and violence. Instead, it is critical to equip officers with protective gear, to train and educate them better, and to plan with sufficient contingency resources to absorb additional demand as best as possible [50,52]. In addition, these challenges require an operational setup that allows police forces to shift back and forth between special emergency-specific and average crime control situations [48].

In addition, police may face a backlog of other work and delays in investigations that began before or during an epidemic [9]. This can increase the cost of such investigations and amplify the already existing strain on resources [122]. Administrative delays and ancillary bureaucratic efforts further increase service demand. Furthermore, coordination and communication with external partners and the implementation of a data-driven approach can lead to a sharp increase in organisational demand [3,5,54].

6.6. Outsourcing policing duties

The literature shows that staff shortages can be bridged by using other organisations such as the military or private security companies to respond to additional demand for service. This, however, is not without controversy because neither adhere to the same professional standards and accountability that civilian policing organisations do.

The findings by Chirambwi [46] suggest that using the military to support the police can eventually lead to (or at least expedite) the militarisation of policing, and has the potential of creating institutional competition between different policing providers [123]. Especially in the Global South, there is tendency to use a harsher and more militarised approach to enforcing restrictive measures during PHEs [51]. Not only are professional standards lowered but the core duties of police and law enforcement agencies are given to surrogate agencies and partners such as the military [46,51]. While these issues may not be a primary concern in most liberal democracies, they are certainly not unprecedented [48] and should still serve as a cautionary tale of enabling emergency powers and giving core law enforcement capabilities to non-police entities.

7. Inter-agency collaboration and coordination

Emergency events such as epidemics are complex, dynamic, and high-stakes environments that require not only intra-agency collaboration (e.g. within a police organisation) but also coordinated operations on an inter-agency level (e.g. between police, public health organisations, and civil society) [69,73]. Studies suggest that collaborative emergency management networks are needed to 'eliminate the waste of resources' [71] and improve efforts via communication, coordination, establishing partnerships and interoperability [48]. Multi-agency responses are also crucial as the challenges PHEs and other disasters pose are often too complicated for a single agency to manage [44,73,124].

Our review identified 17 studies related to issues and best practices

for collaboration and coordination between different agencies in emergency situations (see Table 4). One key finding of the literature was that it is essential to develop an effective risk communication strategy and plans for collaboration between multiple agencies [66]. However, creating a collaborative environment is often challenging and brings about ambiguity and discontinuity [77]. With regards to the overall state of the literature, Steigenberger [75] finds that while the literature on multi-agency disaster response and collaboration is rich in in-depth case studies, there is little cross-case learning and only rarely a more general evaluation of best practices. This fragmentation and lack of theory is a problem for both practitioners and academics [125].

7.1. Structure and hierarchy

A first step in any coordination and planning effort is deciding on the setup of adequate structures and hierarchies. Arklay [62], who analyses differences in institutional setup and leadership in emergency services between two disasters, finds, that there can be significant obstacles to a more coherent and collaborative structure. Not only can restructuring agencies create uncertainty and division amongst the staff and further power imbalances between agencies, it can also lead to overt rejection by staff and long-term failure of restructuring measures [62]. The latter can especially be problematic, if restructuring efforts cause additional workloads or financial or resource strain [62].

In addition, the literature also stresses that long-term planning is essential because knowledge, routines, and communication practices cannot change overnight [67,74] or as Dynes and Tierney [126]: 150) put it: '[T]he best predictor of [organisational] behaviour in emergencies is behaviour prior to the emergency'.

Behaviour prior to emergencies is not the only predictor and requirements for collaborative networks can be modelled in anticipation [68]. This can reduce the time needed for the integration process itself and allow emergency services to maintain control throughout the disaster. Modelling of requirements and forecasting potential issues will also greatly decrease the amount of flexibility needed to create a collaborative environment [63,75].

In response to such concerns, the literature stresses that collaborative environments need to be built over time and emergency planning should be based on everyday working practices to maintain familiarity with the procedures and allow for a smoother transition into emergency protocols [67]. However, while familiarity can further the efficiency of systems, it is important to set up adequate superstructures for communication and coordination of resources. The setup of such superstructures can be problematic and may depend on the type of emergency, with options ranging from more centralised approaches to ones with maximum independence for all services and agencies involved.

Central coordination provides the potential for a common operational picture and a fast response and resource deployment [75]. When requesting outside assistance, it is important to have planning structures to ensure the bigger (national) picture is considered while no local force is placed at a disadvantage [44]. Centralised communication structures have proven useful in multi-agency collaboration [127], they also create bottlenecks for information flows which can have substantial negative consequences for operational performance [128,129].

In addition, some studies suggest that while hierarchical structures are by default how emergency services operate, modern services should aim to incorporate a high degree of flexibility to be able to adjust plans and practices as needed in rapidly developing situations [67,130]. Authors such as House, Power, and Alison [70] suggest that hierarchical and centralised structures inhibit effective decision-making in multi-agency environments. Instead, they suggest a non-hierarchical and decentralised, yet interoperable major incident management network [70]. This is supported by further studies that find that a more decentralised approach provides more room for local efforts which might be hampered or overwritten by a central approach [131]. However, decentralisation may cause a loss of capacity for strategic and

Table 4

Relevant literature related to communication and collaboration between different agencies.

Author (Year)	(Health) Emergency	Findings
Andersson and Lindström [61]	Training exercises	Explores collaboration during an emergency training exercise, finding that boundaries were often along institutional lines.
Arklay [62]	Flooding	Compares institutional and leadership differences within emergency services between two disasters.
Berlin and Carlström [63]	Multiple	Examines learning during collaboration exercises, suggesting that challenges to collaboration are present in all multi-agency environments.
Brito et al. [64]	General	Grey Literature. A guide for how to communicate (inter-agency and with communities) during public health emergencies.
Carter and Rip [65]	General	Discusses information sharing practices between law enforcement and public health bodies in the United States, coming to the conclusion that efforts have been helpful but fall short of creating tangible mechanisms.
Covello et al. [66]	Epidemic/ Pathogen release	Applies risk communication models to the West Nile virus epidemic in New York City in 1999 and 2000, providing practical information on how perceptions of risk and communication challenges can be best managed.
Davis [67]	Multiple	Discusses challenges for crisis support teams in the UK and provides insights into collaboration between different agencies to formulate adequate crisis response.
Fortier and Volk [68]	Hurricane	Explores the need for defining requirements for components of ad-hoc coalitions formed during disaster response.
Gbla [69]	Ebola	Discusses the manifestation of hybrid security governance in practice, considering constraints and analysing the sustainability.
House et al. [70]	General	Presents a review of the literature on multi-agency interoperability during emergencies, finding that hierarchical command structures may inhibit effective decision making, and recommending decentralised approaches to crisis management.
Kapucu et al. [71]	General	Presents a review of the literature, discussing collaborative emergency management and emphasising the effective use of resources in collaborative networks.
Kristiansen et al. [72]	Training exercises	Compares perceived collaboration between different emergency response agencies during an exercise and a crisis, finding that collaboration was more evident during incidents than exercises.
Power [73]	Multiple	Focuses on how emergency teams operate in high-risk and complex environments for disaster management, offering a row of solutions and suggestions for better teamwork.
Sharma and Hossain [74]	Multiple	Examines the scope of collaboration between law enforcement agencies and public health institutions during and after emergencies, providing a list of recommendations for improvement.
Steigenberger [75]	Multiple	Presents a review of empirical studies on the multi-agency coordination of disaster response operations.
Waring et al. [76]	Training exercises	Presents naturalistic observations conducted during two large-scale live

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Table 4 (continued)

Author (Year)	(Health) Emergency	Findings
Wolbers et al. [77]	Multiple	disaster response exercises, finding that participants frequently either revert to gathering information rather than progressing to take action, or take action without deliberately considering options, powers, and policies to form a plan. Analyses the coordination between agencies and organisations for emergency management (inter-organisational coordination), showing the development of effective methods of communication and collaboration.

coordinated action [132–135]. To consolidate the different institutional setups, Steigenberger [75] suggests to include clearly defined roles for agencies and individual units as well as a command structure that is ‘as decentralised as necessary and as centralised as possible’.

7.2. Including formal and informal actors

In addition, disaster response often requires the cooperation and coordination of many stakeholders. These range from formal actors such as emergency response services to informal ones such as civil society organisations, community groups, and NGOs [71]. As such, coordination demands not only clear structures for the former, but also a hybrid mechanism and a coherent yet flexible communication structure [69, 136]. An example of such hybrid structures of formal and informal institutions is the 2014 Ebola outbreak in Sierra Leone, where not only state structures but also community groups, volunteers, and religious groups were involved in delivering a response [69]. The all-out collaborative response was in part motivated by capacity problems of public institutions, as well as growing distrust in the government [69].

7.3. Joint exercises, trust, and informal structures

Fundamental for these structures is that the hierarchy must be well recognised and accepted by all agencies and that there is a clear understanding of the capabilities and resources each partner has at their disposal [71,137,138]. Collaborative multi-agency environments depend to a large extent on the willingness of agencies to share information and coordinate their response with others. This can be especially difficult when political or competing strategic interests are at play [75, 139]. These hurdles are intensified by the fact that agencies in question often do not interact in their daily operations [75].

Even though some authors argue that disaster response plans should be as lean as possible to allow for their successful implantation without lengthy or expensive training [130], the literature suggests that a remedy for a lack of trust between agencies can be the establishment of strategic partnerships for disaster response and frequent joint exercises over time to build inter-agency trust [140–142]. In their review of case studies on the multi-agency coordination of disaster response operations² Steigenberger [75] highlight the importance of training, expertise, planning and implementation, leadership, and personal relationships.

In any collaborative effort, it is crucial to build on existing relationships to leverage working structures and interpersonal relationships for effective collaboration [54,119,139,143–145]. Unlike the setup of organisational structures, joint training and exercises maintain relevance regardless of the scenario they seek to simulate. Berlin and Carlström [63] find that challenges to collaborate transcend different

contexts of individual disasters. As such, the value of such exercises does not only lie in the practicing of exact emergency protocols but also in facilitating inter-agency personal relationships and informal structures, and ‘learning a common language’ [72]. Furthermore, exercises facilitate the creation of a collaborative culture and help with the development of formal and informal institutional procedures that improve the ability of emergency response agencies to collaborate in a disaster [63, 72].

Establishing key partnerships with other policing authorities and local public health agencies to foster mutual aid and knowledge exchange goes, however, far beyond occasional joint exercises [42]. Instead best practices would be a more casual integration in day-to-day operations. A way to enhance the education of police officers for example is to form partnerships with local hospitals and healthcare providers [56].

While this may be challenging considering that PHEs can cause mass casualties that require response plans with local morgues and coroners [56], partnerships with hospitals can help to ensure a more practice-oriented response and create interpersonal connections between law enforcement and public health officials which will be critical during emergency situations and epidemics [56,139,144,146]. To this extent, Sharma and Hossain [74] make a number of suggestions to improve the collaboration between law enforcement agencies and public health institutions during and after emergencies. These include creating evidence-based standard operating procedures and clear guidance on financial aspects, the coordination and implementation of protocols, and potential follow-ups [74]. These suggestions are of course practical considerations for practitioners but can at the same time serve as starting points for further research.

7.4. Transference of duties

In many instances, authors such as Alison et al. [43] emphasise that there should be a continuous sharing of resource information between partners, a collaborative decision making about invoking schemes for interagency decision-making, and an ongoing review of the needs of civilians.

However, in their study of collaborative work during training exercises, Andersson and Lindström [61] find that most practitioners only operated within their field of expertise and that boundaries were to a large extent drawn along institutional lines. The work stresses the importance of collaborative elements in training to enhance exchange and allow for a better preparation for real emergencies [61]. However, it also serves as a reminder that in many instances truly collaborative work that transcends institutional boundaries is not possible or feasible.

Thus, instead of creating grounds for collaboration and integration, emergencies may create fragmentation [77]. This, however, may not be a deficiency of the process and can have important virtues that can be harnessed when transferring duties to the most capable agency [77]. As several agencies may be involved in similar roles, it is critical to identify leads early and distribute tasks and coordinate efforts in order to create a coherent response [67]. As such, in the wake of a PHE, for effective collaboration between different agencies, it is not only critical to ensure the sharing of information and division of resources but it may also be necessary to redistribute duties [67]. An example of this is social work and psychological help for victims or the general population [67].

7.5. Communication structures and means

Lastly, communication between individuals and agencies is a critical aspect of any collaborative effort [68]. Rojek and Smith Michael [9]; discussing the impact of Hurricane Katrina on the police, stress the need for clear communication. In fragmented systems, it is essential to have a national communication mechanism for law enforcement agencies. This should include both structures and physical capabilities.

Because it is the bedrock of coordinated emergency response,

² The 80 individual studies are not listed in this review but can be found in the original publication.

creating tangible mechanisms for information sharing and coordination during PHEs should be the ultimate goal of planning efforts [68]. Carter and Rip [65] find in their assessment of practices in the United States that while helpful as an initial step, communication procedures often fall short of tangible mechanisms, leaving emergency protocols in many instances insufficient. While creating communication channels with partnering organisations and even restructuring internal procedures before a pandemic might cost resources and take time, it should be considered a priority [65].

Unlike many other disasters, epidemics do not necessarily destroy the physical communication infrastructure [75]. Nevertheless, it is critical to establish communication plans and hierarchies and to keep them updated at all times. If contact information is outdated or roles and personnel changes occur, they should be updated immediately, otherwise well-designed plans may become a liability [147,148].

It is also important to recognise that collaboration in emergency response constitutes a unique communication environment that presents its own challenges to individuals and organisations. For example, practitioners may need to shift attention between within-group, intra-team processing, and between-group, inter-team coordination [43]. In a collaborative environment for multi-agency emergency response, police officers operate with their 'intra-agency' police colleagues along with their 'interagency' emergency response colleagues (e.g., fire and ambulance services), who have both cohesive and conflicting goals depending on the incident and required outcome, ultimately affecting communication between the individuals and organisations [43].

In another example, Waring, Moran, and Page [76] find that especially in collaborative environments, groups reverted back to information-finding rather than implementing decisions and taking action. As a possible solution, the study highlights the importance of strong leadership for steering groups and clear guidelines and time plans to enhance effectiveness and efficiency [76].

As such, it is not only critical to have appropriate infrastructure and procedures in place but also to have guidelines for staff to ensure communication is appropriate and efficient [64]. Such guidelines can target internal communication planning, inter-agency communication, communication with the public, as well as communication with the news media [64]. Communication patterns should be clear and well defined for individual emergencies and respective stages [44,64].

Furthermore, the perception of the communication and any occurring issues can vary between individuals and agencies [72]. In their study comparing the perception of collaboration during an exercise and a crisis event, Kristiansen et al. [72] for example find that the evaluation differed greatly, ranging from 'harmonious interaction' to 'power struggles' and 'fragmented decision making and ambiguity'.

While there is no single solution to these factors and one may have to accept that emergency response simply constitutes a challenging environment, Fortier and Volk [68] explore the need for defining requirements for these ad-hoc coalitions of different emergency and non-emergency services in disaster response. The study finds that these 'systems of systems' are often disjointed and do not operate well for collaboration [68]. Fortier and Volk [68] offer a solution to this by using a system of systems engineering approach and system level design language to improve communication between different emergency services.

8. Implications for COVID-19

Our review examined existing academic research on the effects of natural disasters and public health emergencies, such as disease epidemics, on policing. We found four broad thematic categories emerging from the literature, namely the challenges they presented for *police-community relations*; the effects of such crises on the *mental health and wellbeing of police officers*; their disruptions to *intraorganizational dynamics* of police departments; and their impact on *inter-agency cooperation*, communication and collaboration. Based on this categorisation, we

were able to analyse in detail how such crises specifically affect policing, including police demand, supply, and practice.

Our findings have critical and novel implications for current academic and policy debates on police response to COVID-19, that has been declared a public health emergency of international concern, and its effects on policing in return. Based on our review, a number of recommendations can be made for policing during COVID-19, and the public health restrictions being enforced by the police (see Table 5). While the applicability of these recommendations may vary between national and local contexts, they apply both during and in the aftermath of the COVID-19 pandemic.

First, we found that police-community relations can be adversely affected during a public health emergency. Tensions on both sides may be heightened because officers have to enforce measures that infringe upon civil liberties. A lack of knowledge and understanding of a disease or virus such as COVID-19 may also result in discrimination and mistreatment of infected persons on the part of the police. Police response during and in the aftermath of COVID-19 should adapt to the changing expectations and demands of citizens at various points of the outbreak and adopt different styles of policing during and after lockdowns (and other restrictions). Police organisations should also design adequate messaging and social media strategies to efficiently use online communication to interact with affected citizens and ensure compliance with public health restrictions.

Especially in this regard, the COVID-19 pandemic has shown new unprecedented issues for compliance and community relations. Unlike other public health emergencies, COVID-19 and the ensuing counter measures have led to the spread of misinformation and demonstrations in countries such as Germany, the UK and the US. These demonstrations often combine a number of different ideologies, ranging from far-right

Table 5
Recommendations for policing during COVID-19.

Police-Community Relations
<ul style="list-style-type: none"> Adapt to the changing expectations and demands of citizens at various points of a the COVID-19 outbreak and adopt different styles of policing during and after lockdowns. Design adequate messaging and social media strategies to efficiently use online communication to interact with affected citizens and ensure compliance with public health restrictions. Educate, inform and raise awareness about COVID-19 so that officers do not engage in discriminatory or militarised practices against affected civilians and communities.
Mental Health Support
<ul style="list-style-type: none"> Institutionalise pre-crisis training policies to develop the skills and competencies needed for officers to prevent mental health problems Encourage and enable the adequate reporting of mental health complaints, and facilitate communication between first responders, peers, and supervisors, through supportive organisational practices. Provide appropriate interventions and treatments, such as counselling services, to officers and staff affected by COVID-19. Dedicate adequate resources to police officers and their families during and in the aftermath of COVID-19 to address officers' fears and anxieties.
Intra-Organisational Dynamics
<ul style="list-style-type: none"> Consult experts and plan for further waves of the pandemic. Determine minimum staff levels and create staffing procedures to maintain them. Where possible, work-from-home policies should be allowed for officers in risk groups to protect their health and alleviate administrative burdens. Communicate crime prevention efforts clearly to the public to reduce the additional demand from COVID-19-related crimes. Triage additional activities and ensure tasks are prioritised to ensure additional demand is met.
Multi-Agency Collaboration
<ul style="list-style-type: none"> Maintain a national communication infrastructure that allows for intra- and inter-agency communication and facilitates collaboration. Take stock of collaborative efforts and the most frequent interactions with partner agencies to allow for exercises and a strengthening of the relationships after the crisis. Critically assess shortcomings and issues of inter-agency collaboration and communication.

hooligans to esoteric anti-vaxxers and conspiracy theorists, but share the common theme of rejecting public health measures and government guidelines [99,100,149]. The collective refusal of the protesters to wear PPE, puts police officers maintaining public order at great risk, especially since physical altercations are not uncommon since protests may become towards police officers [150].

While the demonstrations are a short-term symptom of this growing movement, it is imperative for police and security services to closely monitor this movement and the spread of COVID-19-related conspiracies and misinformation as this may possibly endanger public order in the future [99,100,149]. On this note, it is also imperative for researchers to investigate how public protests and demonstrations during pandemics further strain police-community relations, especially when these protests are organised in response to police abuse and malpractice during a crisis. This has been seen during the COVID-19 pandemic in the case of the Black Lives Matter protests in the US, UK and other countries, as well as in protests against police violence against citizens violating lockdowns in South Africa.

Second, our review highlighted multiple ways in which PHEs may increase the likelihood of police officers to suffer from psychological stress, posttraumatic stress, depression and anxiety. Police culture can become a barrier between mental health problems and getting support through counselling, therapy, and other interventions. Police leaders and state representatives should make concerted efforts to acknowledge the work of police officers to increase job satisfaction, provide social support and maintain officer wellbeing. Additionally, pre-crisis training policies should be institutionalised to develop the skills and competencies needed for officers to prevent mental health problems in similar PHEs in the future. Moreover, supportive organisational practices should be encouraged to enable the reporting of mental health complaints, facilitate communication between first responders, peers, and supervisors, and destigmatise the effects of PHEs on mental health. Appropriate interventions and treatments should be designed and made accessible to officers during and in the aftermath of the COVID-19 pandemic, and resources should be procured and provided to affected officers and their families, to address officers' fears, anxieties, and dissatisfaction with the job. Further research is needed, however, into how mental health problems are stigmatised and to what extent such stigmatisation prevents police officers from seeking help during and in the aftermath of a crisis.

Furthermore, we found that PHEs such as COVID-19 can test the limits of existing emergency plans. They may also create resource and staff shortages, while increasing service demand. As such, it is essential that policing organisations consult experts and plan for further waves of the pandemic. This includes shifting from a reactive response to the first shock to a more proactive planning strategy. Police departments should also consider allowing flexible work arrangements, especially for officers and staff in risk groups. While our review suggests that PHEs can increase service demands in a number of ways, police departments should find low-cost, high-impact strategies to prevent this. One of these strategies may be to communicate crime prevention efforts clearly to the public to reduce additional demand from COVID-19-related crimes. Police departments should also triage additional activities and ensure tasks are prioritised to meet increasing demand.

Last but not least, we found that poor communication and a lack of trust between organisations (e.g. because of competing strategic interests) can delay or impede the necessary collaboration between different agencies. In the context of COVID-19, policing organisations should identify the shortcomings of cooperation as well as opportunities for joint training and exercises after the pandemic to improve preparedness for future emergencies. Police organisations should actively seek to create interpersonal connections, especially with agencies in the public health sector. Furthermore, inter-agency communication and collaboration may benefit from a national communication infrastructure that facilitate intra- and inter-agency information sharing.

The recommendations provided here are not exhaustive, but they can

initiate further academic research and debate. There are multiple internal and external challenges that the post-pandemic world will create for police departments worldwide, not least because of changes in crime patterns and the socio-economic fallouts of lockdowns. Police departments will need to strategize and plan for these changes, especially when resources need to be diverted to specific departments (e.g. cybercrime and domestic abuse, crimes that have seen a surge during lockdowns). Furthermore, as lockdowns ease, police departments may find it difficult to enforce social distancing measures and public health restrictions (such as the mandatory wearing of facemasks in certain areas), potentially resulting in a lack of compliance and conflict between citizens and police officers. This conflict may also be witnessed in instances of public disorder caused due to economic and financial crises. Our findings and recommendations may thus help strengthen the evidence base upon which policing organisations can construct future strategies and policies.

Lastly, we would like to mention the inadequacies in the current academic debate and the opportunities that our review creates for further research. As discussed in the introduction, we sought to provide an evidence base for further research on policing and pandemics (especially COVID-19). Rather than undertaking a standard literature review, we highlighted concrete practical considerations and best practices and provided recommendations for police response to COVID-19. Nevertheless, throughout this paper, we also identified a number of shortcomings in the literature and potential starting points for further research, most of which pertain to COVID-19 and the long-term impact it may have on policing and police-community-relations. We hope this paper facilitates further research and academic inquiry.

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Declaration of competing interest

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Appendix A. Supplementary data

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References

- [1] Johns Hopkins University, COVID-19 Case Tracker. Coronavirus Resource Center, 2020. Retrieved from, <https://coronavirus.jhu.edu>.
- [2] R. Brooks, C. Lopez, Policing in a Time of Pandemic: Recommendations for Law Enforcement, 2020. Retrieved from, <https://ethics.harvard.edu/files/center-for-ethics/files/whitepaper7a.pdf>.
- [3] R. Jones, C. Jones, C. Cantal, COVID-19 and Policing. Performance and Research Insights, Evidence Based Policing Centre. Initial Evidence Scan, 2020.
- [4] J. Bates, Police Departments, Sheriffs' Offices across the U.S. Grapple with COVID-19's Impact on Public Safety—And Their Own. TIME, 2020. Retrieved from, <https://time.com/5812833/coronavirus-police-departments/>.
- [5] J. Laufs, K. Bowers, D. Birks, S.D. Johnson, Understanding the concept of 'demand' in policing: a scoping review and resulting implications for demand management, Policing and Society (2020) 1–24, <https://doi.org/10.1080/>

- 10439463.2020.1791862. <https://www.tandfonline.com/doi/full/10.1080/10439463.2020.1791862>, 2020.
- [6] L. Bonkiewicz, R.B. Ruback, The role of the police in evacuations: responding to the social impact of a disaster, *Police Q.* 15 (2) (2012) 137–156, <https://doi.org/10.1177/1098611112442808>.
 - [7] W.C. Kennedy, M.T. Brooks, S.M. Vargo, The Police Department in Natural Disaster Operations, 1969.
 - [8] J. Stogner, B.L. Miller, K. McLean, Police stress, mental health, and resiliency during the COVID-19 pandemic, *Am. J. Crim. Justice* (2020) 1–13.
 - [9] J. Rojek, R. Smith Michael, Law enforcement lessons learned from hurricane katrina, *Rev. Pol. Res.* 24 (6) (2007) 589–608, <https://doi.org/10.1111/j.1541-1338.2007.00301.x>.
 - [10] K. Ames, G. Busch, Disaster talk: roles, responses, and expectations in a triple zero call during the 2011 Queensland Floods, *Aust. J. Commun.* 40 (1) (2013) 71–85.
 - [11] L. Bonkiewicz, R.B. Ruback, Policing Iowa's katrina: law enforcement response in flood disasters, *Policing: J. Pol. Pract.* 4 (4) (2010) 373.
 - [12] A. Bruns, J.E. Burgess, K. Crawford, F. Shaw, #Qldfloods and @QPSMedia: Crisis Communication on Twitter in the 2011 South East Queensland Floods, 2012.
 - [13] J. Caluori, J. Clements, Policing the COVID-19 Lockdown - what the Public Thinks, 2020. Retrieved from, <https://www.crestadvisory.com/post/policing-the-covid-19-lockdown-what-the-public-thinks>.
 - [14] A. Chauhan, A.L. Hughes, Facebook and Twitter Adoption by Hurricane Sandy-Affected Police and Fire Departments, 2015, 2015.
 - [15] A.L. Hughes, L.A. St Denis, L. Palen, K.M. Anderson, Online Public Communications by Police & Fire Services during the 2012 Hurricane Sandy, 2014, 2014.
 - [16] S. Reicher, C. Stott, Policing the coronavirus outbreak: processes and prospects for collective disorder, *Policing: J. Pol. Pract.* (paaa014) (2020), <https://doi.org/10.1093/police/paaa014>.
 - [17] S. Yang, B. Stewart, @Houstonpolice: an exploratory case of twitter during hurricane harvey, *Online Inf. Rev.* 43 (7) (2019) 1334–1351, <https://doi.org/10.1108/OIR-09-2018-0279>.
 - [18] T. Adams, L. Anderson, M. Turner, J. Armstrong, Coping through a disaster: lessons from hurricane katrina, *J. Homel. Secur. Emerg. Manag.* 8 (1) (2011) 16.
 - [19] A.H.M. Bakker, A.W.K. Gaillard, V. van, Mjpm, R. Hertogs, The impact of critical incidents on mental health: an exploratory pilot study into the moderating effects of social support on the impact of adverse events in Dutch rescue workers, *Policing-a J. Pol. Pract.* 10 (2) (2016) 102–112, <https://doi.org/10.1093/police/pav038>.
 - [20] W. Berger, F. Coutinho Evandro Silva, I. Figueira, C. Marques-Portella, P. Luz Mariana, C. Neylan Thomas, V. Mendlowicz Mauro, Rescuers at risk: a systematic review and meta-regression analysis of the worldwide current prevalence and correlates of PTSD in rescue workers, *Soc. Psychiatr. Psychiatr. Epidemiol.* 47 (6) (2012) 1001–1011, <https://doi.org/10.1007/s00127-011-0408-2>.
 - [21] A. Biggs, P. Brough, J.P. Barbour, Exposure to extraorganizational stressors: impact on mental health and organizational perceptions for police officers, *Int. J. Stress Manag.* 21 (3) (2014) 255–282, <https://doi.org/10.1037/a0037297>.
 - [22] J.A. Boscarino, Community disasters, psychological trauma, and crisis intervention [editorial], *Int. J. Emerg. Mental Health Hum. Resilience* 17 (1 Supplement) (2015) 369–371, <https://doi.org/10.4172/1522-4821.1000e180>.
 - [23] J. Guilaran, T. de, K. Kaniasty, C. Stephens, Psychological outcomes in disaster responders: a systematic review and meta-analysis on the effect of social support, *Int. J. Disaster Risk Sci.* 9 (3) (2018) 344–358, <https://doi.org/10.1007/s13753-018-0184-7>.
 - [24] P.T. Haugen, M.R. Evces, D.S. Weiss, Treating posttraumatic stress disorder in first responders: a systematic review, *Clin. Psychol. Rev.* 32 (5) (2012) 370–380, <https://doi.org/10.1016/j.cpr.2012.04.001>.
 - [25] S.C. Heavey, G.G. Homish, M.E. Andrew, E. McCanlies, A. Mnatsakanova, J. M. Violanti, C.M. Burchfiel, Law enforcement officers' involvement level in hurricane katrina and alcohol use, *Int. J. Emerg. Ment. Health* 17 (2015) 267–273.
 - [26] S.R. Jenkins, Coping and social support among emergency dispatchers: hurricane andrew, *J. Soc. Behav. Pers.* 12 (1) (1997) 201–216.
 - [27] N.L. Kerswell, E. Strodl, L. Johnson, E. Konstantinou, Mental health outcomes following a large-scale potentially traumatic event involving police officers and civilian staff of the queensland police service, *J. Police Crim. Psychol.* 1 (2019), <https://doi.org/10.1007/s11896-018-9310-0>.
 - [28] K.E. Klimley, H. Van, B. V. A.M. Stripling, Posttraumatic stress disorder in police, firefighters, and emergency dispatchers, *Aggress. Violent Behav.* 43 (2018) 33–44, <https://doi.org/10.1016/j.avb.2018.08.005>.
 - [29] C. Kowalski, Leadership of first-responders following trauma, *J. Bus. Continuity Emerg. Plan.* 13 (1) (2019) 81–90.
 - [30] M. Leppma, A. Mnatsakanova, K. Sarkisian, O. Scott, L. Adjero, E. Andrew Michael, C. McCanlies Erin, Stressful life events and posttraumatic growth among police officers: a cross-sectional study, *Stress Health* 34 (1) (2018) 175–186, <https://doi.org/10.1002/smi.2772>.
 - [31] X. Mao, O.W.M. Fung, X. Hu, A.Y. Loke, Psychological impacts of disaster on rescue workers: a review of the literature, *Int. J. Disaster Risk Reduct.* 27 (2018) 602–617, <https://doi.org/10.1016/j.ijdrr.2017.10.020>.
 - [32] M. Martin, A. Marchand, R. Boyer, N. Martin, Predictors of the development of posttraumatic stress disorder among police officers, *J. Trauma & Dissociation* 10 (4) (2009) 451–468, <https://doi.org/10.1080/15299730903143626>.
 - [33] E.C. McCanlies, A. Mnatsakanova, M.E. Andrew, C.M. Burchfiel, J.M. Violanti, Positive psychological factors are associated with lower PTSD symptoms among police officers: post Hurricane Katrina, *Stress Health* 30 (5) (2014) 405–415, <https://doi.org/10.1002/smi.2615>.
 - [34] H.J. Osofsky, D. Osofsky Joy, J. Arey, E. Kronenberg Mindy, T. Hansel, M. Many, Hurricane katrina's first responders: the struggle to protect and serve in the aftermath of the disaster, *Disaster Med. Public Health Prep.* 5 (S2) (2011) S214–S219, <https://doi.org/10.1001/dmp.2011.53>.
 - [35] C. Regehr, M.G. Carey, S. Wagner, L.E. Alden, N. Buys, W. Cornell, M. . . Fleischmann, A systematic review of mental health symptoms in police officers following extreme traumatic exposures, *Police Pract. Res.* (2019), <https://doi.org/10.1080/15614263.2019.1689129>.
 - [36] Smith Jr., L. C. C. De, Critical incident stress debriefings for crisis management in post-traumatic stress disorders, *Med. Law* 13 (1–2) (1994) 185–191.
 - [37] D.L. Snell, L.J. Surgenor, M.J. Dorahy, E.J.C. Hay-Smith, Coping and adjustment in New Zealand Police staff 12–18 months after the Canterbury earthquakes: a directed qualitative content analysis, *N. Z. J. Psychol.* 43 (3) (2014) 5–13.
 - [38] C. Stephens, N. Long, I. Miller, The impact of trauma and social support on posttraumatic stress disorder: a study of New Zealand police officers, *J. Crim. Justice* 25 (4) (1997) 303–314.
 - [39] C. Stephens, N. Long, Communication with police supervisors and peers as a buffer of work-related traumatic stress, *J. Organ. Behav.* 21 (4) (2000) 407–424, [https://doi.org/10.1002/\(sici\)1099-1379\(200006\)21:4<407::Aid-job17>3.0.Co;2-n](https://doi.org/10.1002/(sici)1099-1379(200006)21:4<407::Aid-job17>3.0.Co;2-n).
 - [40] P.G. van der Velden, P. van Loon, C.C. Benight, T. Eckhardt, Mental health problems among search and rescue workers deployed in the Haiti earthquake 2010: a pre-post comparison, *Psychiatr. Res.* 198 (1) (2012) 100–105.
 - [41] C. West, B. Bernard, C. Mueller, M. Kitt, R. Driscoll, S. Tak, Mental health outcomes in police personnel after Hurricane Katrina, *J. Occup. Environ. Med.* 50 (6) (2008) 689–695.
 - [42] T.M. Adams, L.D. Stewart, Chaos theory and organizational crisis: a theoretical analysis of the challenges faced by the new Orleans police department during hurricane katrina, *Publ. Organ. Rev.* 15 (3) (2015) 415–431, <https://doi.org/10.1007/s11115-014-0284-9>.
 - [43] L. Alison, N. Power, H. van den, M. Humann, M. Palasinski, J. Crego, Decision inertia: deciding between least worst outcomes in emergency responses to disasters, *J. Occup. Organ. Psychol.* 88 (2) (2015) 295–321, <https://doi.org/10.1111/joop.12108>.
 - [44] D. Bienstock, A.C. Zenteno Langle, Models for Managing the Impact of an Influenza Epidemic, 2012.
 - [45] C.S. Brito, A.M. Luna, E.L. Sanberg, Benchmarks for Developing a Law Enforcement Pandemic Flu Plan, Bureau of Justice Assistance, US Department of Justice, 2009.
 - [46] K. Chirambwi, Militarizing police in complex public emergencies, *Peace Rev.* 28 (2) (2016) 171, <https://doi.org/10.1080/10402659.2016.1166743>.
 - [47] J.B. Cowan, T.S. Davis, Varicella outbreak among afghan national civil order police recruits-herat regional military training center, herat, Afghanistan, 2010, *Mil. Med.* 177 (8) (2012) 924–927, <https://doi.org/10.7202/MILMED-D-11-00145>.
 - [48] M. Deflem, S. Sutphin, Policing katrina: managing law enforcement in new Orleans, *Policing: J. Pol. Pract.* 3 (1) (2009) 41–49.
 - [49] J. Flavin, Police and HIV/AIDS: the risk, the reality, the response, *Am. J. Crim. Justice* 23 (1) (1998) 33–58.
 - [50] G.A. Gellert, R.M. Maxwell, K.V. Higgins, R. Barnard, B. Page, AIDS and prehospital personnel: knowledge and prevention of occupational exposure, *Prehospital Disaster Med.* 11 (2) (1996) 112–116, <https://doi.org/10.1017/S1049023X00042758>.
 - [51] D. Hoffman, Geometry after the circle: security interventions in the urban gray zone, *Curr. Anthropol.* 60 (S19) (2019) S98–S107, <https://doi.org/10.1086/699879>.
 - [52] A.B. Jessop, B. Del, G. Solomon, M. Mullen-Fortino, J.M. Rogers, Police exposure to infectious agents: an audit of protective policies, *Occup. Med. (Oxf., Engl.)* 64 (7) (2014) 546–548, <https://doi.org/10.1093/occmed/kqu112>.
 - [53] M. Landahl, C. Cox, Beyond the Plan: Individual Responder and Family Preparedness in the Resilient Organization, 2009.
 - [54] A.M. Luna, C.S. Brito, E.A. Sanberg, Police Planning for an Influenza Pandemic: Case Studies and Recommendations from the Field, 2007.
 - [55] D.O. Ochieng, Effects of HIV and AIDS in the performance of duty by the Kenya police service, *Hum. Resour. Manag.* 3 (9) (2016) 14–29.
 - [56] E.P. Richards, The Role of Law Enforcement in Public Health Emergencies: Special Considerations for an All-Hazards Approach, US Department of Justice, Office of Justice Programs, Bureau of Justice, 2006.
 - [57] C.G. Roman, After Katrina: Washed Away?: Justice in New Orleans, 2007.
 - [58] W.J. Riley, Testimony of Warren J. Riley Superintendent of the New Orleans Police Department before the Senate Committee on Homeland Security and Governmental Affairs, February, 2006.
 - [59] G.J. Sonder, L.P. Bovée, R.A. Coutinho, D. Baayen, J. Spaargaren, A. van den Hoek, Occupational exposure to bloodborne viruses in the Amsterdam police force, 2000–2003, *Am. J. Prev. Med.* 28 (2) (2005) 169–174.
 - [60] R. Walton, S. Falkner, The Challenges of Maintaining Law and Order during the Coronavirus Response, 2020. Retrieved from, <https://policyexchange.org.uk/wp-content/uploads/Policing-a-Pandemic.pdf>.
 - [61] A. Andersson, B. Lindström, Making collaboration work – developing boundary work and boundary awareness in emergency exercises, *J. Workplace Learn.* 29 (4) (2017) 286–303, <https://doi.org/10.1108/JWL-05-2016-0039>.
 - [62] T. Arklay, What happened to queensland's disaster management arrangements?: from 'global best practice' to 'unsustainable' in 3 years, *Aust. J. Publ. Adm.* 74 (2) (2015) 187–198, <https://doi.org/10.1111/1467-8500.12122>.

- [63] J.M. Berlin, E.D. Carlström, Learning and usefulness of collaboration exercises: a study of the three level collaboration (3LC) exercises between the police, ambulance, and rescue services, *Int. J. Mass Emergencies Disasters* 33 (3) (2015).
- [64] C.S. Brito, A.M. Luna, E.L. Sanberg, C. Fischer, Communication and Public Health Emergencies: A Guide for Law Enforcement, 2009.
- [65] J.G. Carter, M. Rip, Homeland security and public health: a critical integration, *Crim. Justice Pol. Rev.* 24 (5) (2013) 573–600.
- [66] V.T. Covello, R.G. Peters, J.G. Wojtecki, R.C. Hyde, Risk communication, the West Nile virus epidemic, and bioterrorism: responding to the communication challenges posed by the intentional or unintentional release of a pathogen in an urban setting, *J. Urban Health* 78 (2) (2001) 382–391.
- [67] H. Davis, Contextual challenges for crisis support in the immediate aftermath of major incidents in the UK, *Br. J. Soc. Work* 43 (3) (2013) 504–521, <https://doi.org/10.1093/bjsw/bcr197>.
- [68] S.C. Fortier, J.H. Volk, Defining Requirements for Ad Hoc Coalition Systems during Disasters, 2006.
- [69] O. Gbla, Hybrid security governance responses to crises: the case of the ebola response in Sierra Leone, *Stability* 7 (1) (2018), <https://doi.org/10.5334/sta.612>.
- [70] A. House, N. Power, L. Alison, A systematic review of the potential hurdles of interoperability to the emergency services in major incidents: recommendations for solutions and alternatives, *Cognit. Technol. Work* 16 (3) (2014) 319–335.
- [71] N. Kapucu, T. Arslan, F. Demiroz, Collaborative emergency management and national emergency management network, *Disaster Prev. Manag.* 19 (4) (2010) 452–468, <https://doi.org/10.1108/09653561011070376>.
- [72] E. Kristiansen, J. Fredrik Håland, E. Carlström, When it matters most: collaboration between first responders in incidents and exercises, *J. Contingencies Crisis Manag.* 27 (1) (2019) 72–78, <https://doi.org/10.1111/1468-5973.12235>.
- [73] N. Power, Extreme teams: toward a greater understanding of multiagency teamwork during major emergencies and disasters, *Am. Psychol.* 73 (4) (2018) 478–490, <https://doi.org/10.1037/amp0000248>.
- [74] R. Sharma, M.M. Hossain, Strengthening public health partnerships in India: envisioning the role of law enforcement during public health emergencies, *Indian J. Community Med.* 44 (3) (2019) 188–192, https://doi.org/10.4103/ijcm.IJCM_110_19.
- [75] N. Steigenberger, Organizing for the big one: a review of case studies and a research agenda for multi-agency disaster response, *J. Contingencies Crisis Manag.* 24 (2) (2016) 60–72.
- [76] S. Waring, J.L. Moran, R. Page, Decision-making in multiagency multiteam systems operating in extreme environments, *J. Occup. Org. Psychol.* 93 (3) (2020) 629–653, <https://doi.org/10.1111/joop.12309>.
- [77] J. Wolbers, K. Boersma, P. Groenewegen, Introducing a fragmentation perspective on coordination in crisis management, *Organ. Stud.* 39 (11) (2018) 1521–1546, <https://doi.org/10.1177/0170840617717095>.
- [78] M. Punch, S. James, Researching Law Enforcement and Public Health, Taylor & Francis, 2017.
- [79] A. van Dijk, N. Crofts, Law enforcement and public health as an emerging field, *Pol. Soc.* 27 (3) (2017) 261–275.
- [80] A.J. van Dijk, V. Herrington, N. Crofts, R. Breunig, S. Burris, H. Sullivan, N. Thomson, Law enforcement and public health: recognition and enhancement of joined-up solutions, *Lancet* 393 (10168) (2019) 287–294.
- [81] G. Berry, P. Briggs, R. Erol, L. van Staden, The effectiveness of partnership working in a crime and disorder context: a rapid evidence assessment, in: H. Office (Ed.), Research Report, 2011, p. 52.
- [82] J.N. Hays, Epidemics and Pandemics: Their Impacts on Human History: Abc-Clio, 2005.
- [83] S. Hinde, E. Spackman, Bidirectional citation searching to completion: an exploration of literature searching methods, *Pharmacoeconomics* 33 (1) (2015) 5–11.
- [84] S. Jalali, C. Wohlin, Systematic literature studies: database searches vs. backward snowballing, in: Paper Presented at the Proceedings of the 2012 ACM-IEEE International Symposium on Empirical Software Engineering and Measurement, 2012.
- [85] D.B. Wilson, Missing a critical piece of the pie: simple document search strategies inadequate for systematic reviews, *J. Exp. Criminol.* 5 (4) (2009) 429–440.
- [86] J. Thomas, A. Harden, Methods for the thematic synthesis of qualitative research in systematic reviews, *BMC Med. Res. Methodol.* 8 (1) (2008) 45.
- [87] J. Laufs, H. Borrión, B. Bradford, Security and the smart city: a systematic review, *Sustain. Cit. Soc.* 55 (102023) (2020) 102023, <https://doi.org/10.1016/j.scs.2020.102023>.
- [88] J. Belur, L. Tompson, A. Thornton, M. Simon, Interrater reliability in systematic review methodology: exploring variation in coder decision-making, *Socio. Methods Res.* (2018), 0049124118799372, <https://doi.org/10.1177/0049124118799372>.
- [89] G.C. Feng, Inter-coder reliability indices: disuse, misuse, and abuse, *Qual. Quantity* 48 (3) (2014) 1803–1815.
- [90] J.R. Landis, G.G. Koch, The Measurement of Observer Agreement for Categorical Data, *Biometrics*, 1977, pp. 159–174.
- [91] T.A. Birkland, Disasters, lessons learned, and fantasy documents, *J. Contingencies Crisis Manag.* 17 (3) (2009) 146–156.
- [92] C. Moon, Meta-synthesis of qualitative case studies: an approach to theory building, *Organ. Res. Methods* 16 (4) (2013) 522–556.
- [93] O. Jones, C. Gatrell, The future of writing and reviewing for IJMR, *Int. J. Manag. Rev.* 16 (3) (2014) 249–264.
- [94] D. Tranfield, D. Denyer, P. Smart, Towards a methodology for developing evidence-informed management knowledge by means of systematic review, *Br. J. Manag.* 14 (3) (2003) 207–222.
- [95] N. Britten, R. Campbell, C. Pope, J. Donovan, M. Morgan, R. Pill, Using meta ethnography to synthesise qualitative research: a worked example, *J. Health Serv. Res. Pol.* 7 (4) (2002) 209–215.
- [96] M. Fisher, H. Qureshi, W. Hardyman, J. Homewood, Using Qualitative Research in Systematic Reviews: Older People's Views of Hospital Discharge, 2006.
- [97] A. Ricciardi, M.E. Palmer, N.D. Yan, Should biological invasions be managed as natural disasters? *Bioscience* 61 (4) (2011) 312–317.
- [98] S. Galea, R.M. Merchant, N. Lurie, The mental health consequences of COVID-19 and physical distancing: the need for prevention and early intervention, *JAMA Int. Med.* 180 (6) (2020) 817–818, <https://doi.org/10.1001/jamainternmed.2020.1562>.
- [99] D. Freeman, F. Waite, L. Rosebrock, A. Petit, C. Causier, A. East, S. Mulhall, Coronavirus conspiracy beliefs, mistrust, and compliance with government guidelines in England, *Psychol. Med.* (2020) 1–30.
- [100] R. Imhoff, P. Lamberty, A Bioweapon or a Hoax? the Link between Distinct Conspiracy Beliefs about the Coronavirus Disease (COVID-19) Outbreak and Pandemic Behavior, 2020.
- [101] S. Reicher, C. Stott, On order and disorder during the COVID-19 pandemic, *Br. J. Soc. Psychol.* 59 (3) (2020) 694–702.
- [102] A. Faull, State Abuses Could Match the Threat of COVID-19 Itself, 2020. Retrieved from Pretoria, <https://issafrica.org/iss-today/state-abuses-could-match-the-threat-of-covid-19-itself>.
- [103] S. Laato, A. Islam, M.N. Islam, E. Whelan, Why Do People Share Misinformation during the COVID-19 Pandemic?, 2020 arXiv preprint arXiv:2004.09600.
- [104] C. O'Connor, M. Murphy, Going viral: doctors must tackle fake news in the covid-19 pandemic, *BMJ* (2020) 369.
- [105] K. Sharma, S. Seo, C. Meng, S. Rambhatla, A. Dua, Y. Liu, Coronavirus on Social Media: Analyzing Misinformation in Twitter Conversations, 2020 arXiv preprint arXiv:2003.12309.
- [106] K. Falk, New Orleans gets a 'do-over': storm devastation can't kill the creative spirit of the new Orleans police department, *Law Enforc. Technol.* 34 (10) (2007) 7883.
- [107] W. Hicks, Hurricane katrina: law enforcement, social disorganization, and the altruistic community: an ethnographic study, in: Paper Presented at the Law Enforcement Executive Forum, 2007.
- [108] L. Clarke, Mission Improbable: Using Fantasy Documents to Tame Disaster, University of Chicago Press, 1999.
- [109] T.L. Moe, P. Pathranarakul, An integrated approach to natural disaster management, *Disaster prevention and management* 15 (3) (2006) 396–413, <https://doi.org/10.1108/09653560610669882>.
- [110] S.K. Schneider, Administrative breakdowns in the governmental response to Hurricane Katrina, *Publ. Adm. Rev.* 65 (5) (2005) 515–516.
- [111] R.R. McDaniel, Strategic leadership: a view from quantum and chaos theories, *Health Care Manag. Rev.* 22 (1) (1997) 21–37.
- [112] T.L. Sellnow, M.W. Seeger, R.R. Ulmer, Chaos theory, informational needs, and natural disasters, *J. Appl. Commun. Res.* 30 (4) (2002) 269–292.
- [113] K.E. Weick, The collapse of sensemaking in organizations: the Mann Gulch disaster, *Adm. Sci. Q.* (1993) 628–652.
- [114] A. Farazmand, Crisis and emergency management: an introduction, in: A. Farazmand (Ed.), Handbook of Crisis and Emergency Management, CRC Press, 2001, pp. 1–9.
- [115] M. Connelly, IMERT deployment to baton rouge, Louisiana in response to hurricane katrina, september 2005, *Disaster Manag. Response* 4 (1) (2006) 4–11.
- [116] M.T. Crichton, C.G. Ramsay, T. Kelly, Enhancing organizational resilience through emergency planning: learnings from cross-sectoral lessons, *J. Contingencies Crisis Manag.* 17 (1) (2009) 24–37.
- [117] F.T. Cullen, B.G. Link, L.F. Travis, T. Lemming, Paradox in policing: a note on perceptions of danger, *J. Pol. Sci. Admin.* 11 (4) (1983) 457–462.
- [118] J.M. Jermier, J. Gaines, N.J. McIntosh, Reactions to physically dangerous work: a conceptual and empirical analysis, *J. Organ. Behav.* 10 (1) (1989) 15–33.
- [119] B.L. Garrett, T. Tetlow, Criminal justice collapse: the constitution after Hurricane Katrina, *Duke Law J.* 56 (1) (2006) 127–178.
- [120] B. Sims, 'The day after the hurricane' infrastructure, order, and the new Orleans police department's response to hurricane katrina, *Soc. Stud. Sci.* 37 (1) (2007) 111–118.
- [121] G. Mohler, A.L. Bertozzi, J. Carter, M.B. Short, D. Sledge, G.E. Tita, P. J. Brantingham, Impact of social distancing during COVID-19 pandemic on crime in Los Angeles and Indianapolis, *J. Crim. Justice* (2020) 101692.
- [122] A. Malm, N. Pollard, P. Brantingham, P. Tinsley, D. Plecas, P. Brantingham, B. Kinney, A 30 Year Analysis of Police Service Delivery and Costing, International Centre for Urban Research Studies (ICURS), 2005.
- [123] Z. Waseem, 'Brothers in Arms'? A Police-Paramilitary Partnership in Karachi, Policing and society, 2019, pp. 1–17.
- [124] I.M. Shaluf, A.M. Said, A review of disaster and crisis, *Disaster Prev. Manag.* 12 (1) (2003) 24–32, <https://doi.org/10.1108/09653560310463829>.
- [125] C. Lalonde, The potential contribution of the field of organizational development to crisis management, *J. Contingencies Crisis Manag.* 15 (2) (2007) 95–104.
- [126] R.R. Dynes, K. Tierney, Disasters. Collective Behaviour, and Societal Organisation, Associated University Presses, Cranbury, London, 1994.
- [127] C.T. Butts, M. Petrescu-Prahova, B. Remy Cross, Responder communication networks in the World Trade Center disaster: implications for modeling of communication within emergency settings, *Math. Sociol.* 31 (2) (2007) 121–147.

- [128] T. Okumura, K. Suzuki, A. Fukuda, A. Kohama, N. Takasu, S. Ishimatsu, S. Hinohara, The Tokyo subway sarin attack: disaster management, Part 1: community emergency response, *Acad. Emerg. Med.* 5 (6) (1998) 613–617.
- [129] M. Schweinberger, M. Petrescu-Prahova, D.Q. Vu, Disaster response on September 11, 2001 through the lens of statistical network analysis, *Soc. Network.* 37 (2014) 42–55.
- [130] D.P. Moynihan, The network governance of crisis response: case studies of incident command systems, *J. Publ. Adm. Res. Theor.* 19 (4) (2009) 895–915.
- [131] D.E. Alexander, The L'Aquila earthquake of 6 April 2009 and Italian Government policy on disaster response, *J. Nat. Resour. Pol. Res.* 2 (4) (2010) 325–342.
- [132] S.S. Cheng, Crisis communication failure: a case study of typhoon Morakot, *Asian Soc. Sci.* 9 (3) (2013) 18.
- [133] P. Kilby, The strength of networks: the local NGO response to the tsunami in India, *Disasters* 32 (1) (2008) 120–130.
- [134] B. Phillips, D. Neal, T. Wickle, A. Subanthore, S. Hyrapiet, Mass fatality management after the Indian Ocean tsunami. *Disaster Prev. Manag.* 17 (5) (2008) 681–697, <https://doi.org/10.1108/09653560810918685>.
- [135] C. Thévenaz, S.L. Resodihardjo, All the best laid plan conditions impeding proper emergency response, *Int. J. Prod. Econ.* 126 (1) (2010) 7–21.
- [136] B. Shrestha, P. Pathranarakul, Nepal government's emergency response to the 2015 earthquake: a case study, *Soc. Sci.* 7 (8) (2018), <https://doi.org/10.3390/socsci7080127>.
- [137] M. Stephenson, Bridging the organizational divide: a comparative institutional analysis of United States and international humanitarian service delivery structures, *Voluntas Int. J. Voluntary Nonprofit Organ.* 18 (3) (2007) 209–224.
- [138] C.R. Wise, Organizing for homeland security after Katrina: is adaptive management what's missing? *Publ. Adm. Rev.* 66 (3) (2006) 302–318.
- [139] A.M. Olejarski, J.L. Garnett, Coping with Katrina: assessing crisis management behaviours in the big one, *J. Contingencies Crisis Manag.* 18 (1) (2010) 26–38.
- [140] T.E. Beck, D.A. Plowman, Temporary, emergent interorganizational collaboration in unexpected circumstances: a study of the Columbia space shuttle response effort, *Organ. Sci.* 25 (4) (2014) 1234–1252.
- [141] N. Kapucu, Interagency communication networks during emergencies: boundary spanners in multiagency coordination, *Am. Rev. Publ. Adm.* 36 (2) (2006) 207–225.
- [142] D.J. Saab, A. Tapia, C. Maitland, E. Maldonado, L.-M.N. Tchouakeu, Inter-organizational coordination in the wild: trust building and collaboration among field-level ICT workers in humanitarian relief organizations, *Voluntas Int. J. Voluntary Nonprofit Organ.* 24 (1) (2013) 194–213.
- [143] T.E. Drabek, The Professional Emergency Manager: Structures and Strategies for Success Program on Environment and Behavior Monograph, vol. 44, US University of Colorado. Institute of Behavioral Science, 1987.
- [144] I.M. Nolte, S. Boenigk, Public–nonprofit partnership performance in a disaster context: the case of Haiti, *Publ. Adm.* 89 (4) (2011) 1385–1402.
- [145] W.L. Waugh Jr., G. Streib, Collaboration and leadership for effective emergency management, *Publ. Adm. Rev.* 66 (2006) 131–140.
- [146] W.L. Waugh Jr., EMAC, katrina, and the governors of Louisiana and Mississippi, *Publ. Adm. Rev.* 67 (2007) 107–113.
- [147] K.A. Cyganik, Disaster preparedness in Virginia hospital center-arlington after Sept 11, 2001, *Disaster Manag. Response* 1 (3) (2003) 80–86.
- [148] R.A. Fakhru'L, I.M. Shalu, M.S. Aini, Review of an incident at a petrochemical plant, *Disaster Prev. Manag.* 12 (2) (2003) 85–90, <https://doi.org/10.1108/09653560310474197>.
- [149] D. Allington, B. Duffy, S. Wessely, N. Dhavan, J. Rubin, Health-protective behaviour, social media usage and conspiracy belief during the COVID-19 public health emergency, *Psychol. Med.* (2020) 1–7.
- [150] Deutsche Welle, Protests in Germany: 45 Officers Injured at Berlin Rally against Coronavirus Curbs, 2020. Retrieved from, <https://www.dw.com/en/protests-in-germany-45-officers-injured-at-berlin-rally-against-coronavirus-curbs/a-54402885>.