Managing Pandemics—Demands, Resources, and Effective Behaviors Within Crisis Management Teams

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Pandemics, such as the COVID-19 crisis, are very complex emergencies that can neither be handled by individuals nor by any single municipality, organization or even country alone. Such situations require multidisciplinary crisis management teams (CMTs) at different administrative levels. However, most existing CMTs are trained for rather local and temporary emergencies but not for international and long-lasting crises. Moreover, CMT members in a pandemic face additional demands due to unknown characteristics of the disease and a highly volatile environment. To support and ensure the effectiveness of CMTs, we need to understand how CMT members can successfully cope with these multiple demands. Connecting teamwork research with the job demands and resources approach as starting framework, we conducted structured interviews and critical incident analyses with 144 members of various CMTs during the COVID-19 pandemic. Content analyses revealed both perceived demands as well as perceived resources in CMTs. Moreover, structuring work processes, open, precise and regular communication, and anticipatory, goal-oriented and fast problem solving were described as particularly effective behaviors in CMTs. We illustrate our findings in an integrated model and derive practical recommendations for the work and future training of CMTs.

INTRODUCTION

The ongoing COVID-19 pandemic has changed our work life in many ways (e.g., Kniffin, Narayanan, Anseel, Antonakis, Ashford, Bakker, Bamberger, Bapuji, Bhave, Choi, Creary, Demerouti, Flynn, Gelfand, Greer, Johns, Kesebir, Klein, & Lee, 2020; Rudolph, Allan, Clark, Hertel, Hirschi, Kunze, Shockley, Shoss, Sonnentag, & Zacher, 2020), and, for epistemic reasons and to derive practical support strategies, a growing number of studies are addressing the psychological implications of this pandemic. However, while extant research has focused on multiple groups of workers, such as hospital staff, grocery clerks, teleworkers, and delivery drivers (e.g., Bartsch, Weber, Büttgen, & Huber, in press; Brooks, Dunn, Amlôt, Rubin, Greenberg, 2018; Carillo, Cachat-Rosset, Marsan, Saba, & Klarsfeld, 2020; Lissoni, Del Negro, Brioschi, Casella, Fontana, Bruni, & Lamiani, 2020), so far no study has focused on the task forces that have been installed to *manage* the pandemic situation. Crisis management teams (CMTs) at the municipal, district, state, and national levels coordinate various prevention, mitigation, and response activities—and they are required to operate quickly and appropriately in an ambiguous, risky, and constantly changing environment. They must execute political decisions and safety measures while taking into account multiple interests and citizens' expectations, particularly by fostering commitment and trust from those they aim to serve (Christensen & Lægreid, 2020). In doing so, CMTs must combine vastly different competencies and disciplines, including administration and law, emergency response and medical care, logistics and supply management, as well as press and public relations. However, because these teams rarely face real operations, they lack routines and team experience, which can only partially be approximated in regular trainings. Consequently, general benefits of teamwork, such as mutual support and integration of complex information, are presumably limited in CMTs.

The current study addresses and empirically explores the demands, resources and effective work strategies of CMTs during the COVID-19 pandemic from a psychological perspective. Based on a connection of established job demands and resources models and teamwork research as guiding framework, we conducted structured interviews with 144 CMT members involved in the COVID-19 pandemic. The obtained findings contextualize our integrated framework, but also extend this framework in several aspects.

The study contributes to extant research in several ways. First, the study provides a more thorough understanding of demands (triggered by specific characteristics and challenges of the pandemic) and resources within CMTs, which is useful both epistemically and for practical applications. Second, the study theoretically expands established models of job demands and resources by team-level processes. Third, by focusing on CMTs, we address

a unique type of teamwork in high-risk contexts, in which infrequent training and infrequent (anticipated) operation times make the development of "soft" team factors more difficult as compared to other safety and emergency response teams. Finally, the results of this study provide specific suggestions for CMT training and development, and for how these teams can maintain high commitment, trust, and motivation.

THEORETICAL BACKGROUND

Crisis Management and Crisis Management Teams (CMTs)

The main phases of disaster and crisis management are generally known as prevention/mitigation, preparation, response, and recovery (Heath, 1998). Established structures and procedures exist for managing major disasters such as wildfires, floods, earthquakes, and terrorist attacks with multidisciplinary (and sometimes international) CMTs (Bigley & Roberts, 2001; Heath, 1998). In the beginning of a crisis, CMTs are quickly deployed, organized in pre-existing general structures and assigned to handle challenging management processes with the delegated authority to act on behalf of the affected jurisdiction (Moon, Sasangohar, Son, & Peres, 2020). As such, CMTs are confronted with complex, highly dynamic, and often non-transparent situations. However, global pandemics, such as the COVID-19 crisis, present additional problems for crisis managers at different levels and in different organizations. Based on the dimensionality of extreme contexts introduced by Hannah, Uhl-Bien, Avolio, and Cavarretta (2009), we propose that pandemics cause the following general challenges:

1. *(Lack of) Temporal limitation*. Long-term duration and an unforeseeable end of a pandemic make it difficult to distinguish and identify preparation, response and recovery as main phases of crisis management. Hence, CMTs must address a temporally unconfined situation. At the same time, they have to continuously assess the consequences of their previous work to learn from it and to prepare for possible future developments (e.g., a second wave).
2. *Magnitude and probability of consequences*. Pandemics can rapidly escalate, with serious consequences such as exponentially increasing infection and death rates. Additionally, potential side effects of crisis management measures, such as economic losses and business difficulties during a lockdown, further increase demands on CMTs and can lead to strong reactions (e.g., fear, anger, desperation) from affected persons. Moreover, CMTs also have to address and deal with public media scrutiny.

3. *Proximity*. By definition, pandemics are not restricted to one location, so crisis managers are also personally affected by risks and the counter-measures. For the COVID-19 pandemic, measures taken to decrease infection rates, such as spatial distancing, also applied to CMT members themselves. Thus, communication and collaboration methods established in previous CMT trainings had to be adapted, for instance, with regard to digital communication and virtual collaboration.

4. *Form of threat*. In pandemics, dangers and risks are often diffuse and speculative, and scientific knowledge is incomplete. As such, crisis managers face a high degree of uncertainty when assessing the situation, forecasting developments, and making decisions.

In order to address these specific challenges of a pandemic at the municipal, district, state, and national levels, *teams* of experts are employed that integrate different fields of expertise and professional backgrounds. Such crisis management teams (CMTs) usually consist of various sub-teams organized in different subject areas,[1] each responsible for specific aspects, such as *situation analysis*, *action planning*, *operations*, *logistics and supply*, *finance and administration*, or *press and media relations* (Bigley & Roberts, 2001; Heath, 1998; Son, Sasangohar, Neville, Peres, & Moon, 2020). Moreover, public CMTs are organized through civil protection and disaster control structures and are headed by top-level managers of the organization, sometimes even by mayors, county administrators, district commissioners or prime ministers themselves. Integrating these different competencies in such interdisciplinary teams provides considerable benefits to successfully address the complex problems during a pandemic. Initial research exists outlining the different phases and strategies of crisis management in such a situation (e.g., Christensen & Lægreid, 2020; Moon, 2020).

However, one central but so far neglected precondition of successful CMT work during a pandemic is that the team members are well-prepared and supported to cope with the various demands of their work. Teamwork in general is quite appropriate for complex problem solving and mutual support, but specific characteristics of CMTs might impede full leverage of such benefits. For example, since major disasters and especially pandemics are rare events, most CMT members have little hands-on experience with such incidents. Thus, in case of a crisis, work structures must be established under strong time pressure, and CMTs have to react to a continuously changing situation (McMaster & Baber, 2012; Perry & Lindell, 2003). During the COVID-19

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[1] For example, in countries such as the USA, Canada and the UK, the organizational structure of many CMTs is based on the Incident Command System (ICS), which was originally developed in the field of firefighting (Bigley & Roberts, 2001). The ICS consists of a standard management hierarchy and fixed procedures for coping with temporary emergency situations.

pandemic, even CMTs in countries with modern health care systems were struggling with unforeseen and sudden problems, such as central coordination of lockdown measures or reduced supply of infection control equipment, respirators, and testing equipment (Christensen & Lægreid, 2020). Further, CMT members (at least before the COVID-19 pandemic) rarely expect to operate in a real mission, which not only impedes learning processes but also prevents teams from forming strong bonds and a common identity. In addition, in CMTs, most members are employed in addition to their regular job, leading to multiple role enactment. Although membership in multiple teams can offer certain benefits, it can also create additional demands due to work overload and time conflicts. In any case, there is a risk that this could lead to inadequate preparation: While standing CMTs are required to train on a regular basis and to simulate responses to different crisis scenarios, these trainings are not as frequent as, for instance, for operative rescue forces—and sometimes trainings are even canceled due to the high daily workloads of the involved persons (see also McConnell & Drennan, 2006).

As another challenge, CMTs are often large (15 to 25 members) and purposely composed of members with heterogeneous experience, hierarchy/status, knowledge, and backgrounds (e.g., Jehn & Techakesari, 2014; Moon et al., 2020). Such multidisciplinary, diverse teams are required for optimal adaptability to new situations and, therefore, are key to successful CMT work (Kendra & Wachtendorf, 2003; Son et al., 2020). However, because of this high disciplinary diversity, CMTs often have difficulties with communication and team processes (e.g., Bui, Chau, Degl'Innocenti, Leone, & Vicentini, 2019; Jehn & Techakesari, 2014; Joshi & Roh, 2009). During the COVID-19 pandemic, for example, CMTs consist of experts from administration, emergency response, health and medicine, IT, law, logistics, supply management, communication, and press relations fields. In addition, CMTs are also heterogeneous with respect to hierarchical positions represented in the team, ranging from top management levels, such as national top officials or even country ministers, down to low-ranking clerks who are responsible for auxiliary tasks, e.g., processing messages or supplying stationery. Moreover, the typical organizational structure of CMTs in specific subject areas leads to subgroups within the main team, partly organized based on similar competencies of their members. Thus, team members interact within (a partly homogenous) subgroup and between (heterogonous) subgroups as well as with the CMT leader and other staff members. This is challenging both for a team's collective cognitive functioning (Moon et al., 2020) and for its emotional processes such as team trust (Breuer, Hüffmeier, & Hertel, 2016; Moynihan, 2009). Yet, a CMT's success depends particularly on optimal sharing and processing of information and on valid mental models of the situation (McLennan, Holgate, Omodei, & Wearing, 2006; Moon et al., 2020; Son et al., 2020; van Knippenberg, De Dreu, & Homan, 2004).

Finally, in their response, CMTs need to interact with other teams—such as executing agencies, equivalent units, or higher-level organizations—and, in doing so, even when all involved groups share the same strategic goals, operational conflicts are often bound to arise (McMaster & Baber, 2012). Such inevitable conflicts lead to high psychological demands and stressful experiences, which, in turn, negatively influence information processing and decision-making within the CMTs (Jehn & Techakesari, 2014; Weisæth, Knudsen, & Tonnessen, 2002). During the COVID-19 pandemic, structural conflicts arose, for instance, between political leaders and professional experts, and between central authorities and local municipalities (Christensen & Lægreid, 2020).

Together, teamwork can provide specific resources to address the complex and serious challenges of a pandemic. Yet, the structural characteristics of CMTs, their work tasks, and their operating environments might partly prevent full leverage of teamwork benefits, and even cause additional demands and strain for CMT members (e.g., Jehn & Techakesari, 2014; Weisæth et al., 2002). In order to understand the potential strengths and challenges in CMTs more systematically, we connect a job demands and resources perspective with concepts from team research as guiding theoretical framework of our study.

Job Demands and Resources During Teamwork

Following the seminal job demands and resources framework (e.g., Bakker & Demerouti, 2007; Bakker, Demerouti, & Sanz-Vergel, 2014), stress-related features of teamwork can be generally categorized into challenging and beneficial aspects. Both groups of aspects can have main effects on team members' strain experience as well as moderating effects by buffering or amplifying other influences on team members' strain. For instance, beneficial aspects of teamwork can decrease team members' strain directly and can also buffer negative effects of time pressure or rapidly changing environmental demands. Indeed, teamwork is often discussed in terms of its potential beneficial effects on individuals' motivation and strain.

Perhaps most prominently, *social support* is potentially high in work teams (e.g., Consiglio, Borgogni, Alessandri, & Schaufeli, 2013; Hüffmeier & Hertel, 2011) and has been demonstrated (although not unequivocally) to buffer negative effects of work demands in individual settings (e.g., Dormann & Zapf, 1999; Halbesleben, 2006). Based on a systematic review of social and occupational factors associated with psychological outcomes in health care employees during the SARS outbreak, Brooks et al. (2018) recommended that the most effective support strategies, in addition to adequate training and communication, were team cohesion and social support. Moreover, mutual

helping and social support in teams (also from team supervisors) can increase team members' affect and motivation even beyond the level of individual work (e.g., Hüffmeier, Wessolowski, van Randenborgh, Bothin, Schmid-Lortzer, & Hertel, 2014). One central mechanism for this effect is that team members experience to be significant or meaningful to others (Hertel, Nohe, Wessolowski, Meltz, Pape, Fink, & Hüffmeier, 2018; Igou, Blake, & Bless, 2020).

In addition to social support as affective and motivational resource, teams also offer *resources for cognitive processes and decision-making* by providing additional information for the task at hand (e.g., Mesmer-Magnus, & DeChurch, 2009). These resources can also be relevant for strain experience and stress management, for instance, because more information available increases experiences of control and self-efficacy (e.g., Consiglio et al., 2013). Although the optimal sharing of information within a team is not guaranteed and can be hampered by various team dynamics (e.g., Brodbeck, Kerschreiter, Mojzisch, & Schulz-Hardt, 2007), the fact that teams potentially combine various expertise and perspectives as well as offer greater information capacity due to "more heads" is one main reason teams are implemented.

Moreover, teamwork provides specific work characteristics that can be considered resources for coping with stress. In line with the classic Job Characteristics Model (e.g., Hackman & Oldham, 1980), such task structures include *skill variety*, *task significance*, *task identity*, *feedback*, and *autonomy* (Van Mierlo, Rutte, Kompier, & Doorewaard, 2005). For instance, autonomy has been established as buffer of stressful demands in individual work (e.g., Karasek, 1979), and it can be well realized in teams by providing members with discretion about work processes and sharing of leadership functions (e.g., D'Innocenzo, Mathieu, & Kukenberger, 2016; Wang, Waldman, & Zhang, 2014). Finally, *team identification* has been shown to buffer negative effects of job stress on individual members (Häusser, Kattenstroth, van Dick, & Mojzisch, 2012).

On the other hand, teamwork can also be a stressor itself. In particular, escalating *social conflicts* due to task-related or interpersonal dissent and controversies can cause severe strain and demotivation among team members (e.g., De Dreu, & Weingart, 2003). Moreover, teamwork comes with *coordination and communication demands*, for instance, keeping everybody informed about recent developments, which increases the workload of at least some team members and requires appropriate social skills in addition to task-related knowledge (e.g., Stevens & Campion, 1994). Notably, both conflicts and coordination/communication demands are particularly high in teams that have a high diversity of (disciplinary) standards, expectations, and interaction routines.

Interestingly, even though a cooperative climate and social support might be seen as beneficial effects of teamwork for effectively managing high work demands (e.g., Halbesleben, 2006; Hüffmeier & Hertel, 2011), these processes can also increase rather than decrease the effects of team-level stressors on individual members. For instance, talking about stressors and related experiences within the team might cause other team members to make *negative stress appraisals*, or it may trigger *emotional contagion* among other members who listen and provide support (Dunbar, Ford, & Hunt, 1998; Westman, Bakker, Roziner, & Sonnentag, 2011). Indeed, in a longitudinal study of employment agency teams, Westman et al. (2011) found negative effects of team-level job demands on members' emotional exhaustion only in teams with high levels of cohesiveness and social support. Thus, pro-social processes in teams not only support effectiveness and well-being but can also increase negative consequences of stressors under certain conditions.

Finally, the fact that CMT members are usually employed in other contexts and that CMT work is done in addition to other occupational activities means that members of CMTs are often *active in multiple teams*, saddling them with additional demands but also providing additional resources (Pluut, Flestea, & Curşeu, 2014). Among the potential resources are the opportunity to perform multiple roles and related access to privileges, support, and opportunities for self-enhancement, which might compensate deficits in other team contexts. For instance, in a normal work context, an individual might have rather low autonomy, whereas on a CMT that individual might adopt a central or even leadership role. In this case, the CMT role might compensate for deficits in the normal work context. However, being a member of multiple teams might also increase strain by making individuals shift between roles, face conflicting expectations, and deal with additional challenges due to fragmented work and less recuperation time (Pluut et al., 2014). Whereas a first empirical study by Pluut et al. (2014) with IT company workers only provided evidence that being on multiple teams negatively impacts strain, the situation for CMTs is unclear because CMTs offer more possibilities for diverse roles and, thus, potentially more benefits.

Demands on and Resources of Crisis Management Teams during a Pandemic

As outlined above, pandemics are large emergencies with specific demands on those who are responsible for managing the crisis. The current research focusses on both specific demands and resources for members of crisis management teams during a pandemic. In doing so, we expand the established demands and resources perspective to the team level of analysis, following recent research calls in this respect (Bakker & Demerouti, 2017).

Notably, CMTs during a pandemic differ from other health and safety-related rescue teams, high-reliability teams, or command units in extreme work environments, such as firefighting or military brigades (e.g., Moynihan, 2009; Nassif, Start, Toblin, & Adler, 2019). For instance, during a pandemic, CMT members and their families and friends are also at risk. For CMTs that are used to leading from a safe, distant position, being at risk is a new burden that may increase individual strain. In addition, CMTs are highly dependent on political decisions (e.g., Christensen & Lægreid, 2020; Di Mascio, Natalini, & Cacciatore, 2020), which are partly determined by political constellations, goals and attitudes—and these can change rapidly. The decisions CMTs make during a pandemic, are far reaching and intensely affect private, public and economic life. Thus, it is important to better understand the work dynamics of CMTs and their members' coping strategies. Except for initial analyses of individual countries' handling of the crisis (e.g., Christensen & Lægreid, 2020; Di Mascio et al., 2020; Moon, 2020), no psychological studies have looked at COVID-19 CMTs and how they can be supported and improved. Thus, even though the combination of the job demands and resources model with concepts from teamwork research provides an initial theoretical framework, we believed that the pioneering character of our research requires an explorative strategy in order to contextualize our initial framework and to better understand the work experiences of CMT members from a psychological perspective. In particular, we address the following three main research questions:

1. From the perspective of CMT members, how does the COVID-19 pandemic differ from other crises?
2. Which specific demands do CMT members face, and what resources are perceived to be important in this situation?
3. What behaviors are perceived to be effective/ineffective for the work of CMTs during the pandemic?

Additionally, we explored lessons learned from the current pandemic, as reported by CMT members, that can be applied to future CMT trainings.

METHODS

Research Approach

Considering the pioneering nature of this research, we conducted structed interviews to address our research questions. To answer the first two research questions, we compiled a comprehensive description of working conditions of CMTs during the COVID-19 pandemic; in doing so, we used specific open questions that directly targeted our aspects of interest. To address our third

research question, we applied the Critical Incident Technique (Flanagan, 1954), which is a widely used method to collect effective and ineffective behaviors based on the experience reports of involved persons (Breuer, Hüffmeier, Hibben, & Hertel, 2020; Butterfield, Borgen, Amundson, & Maglio, 2005; FitzGerald, Seale, Kerins, & McElvaney, 2008). Here, such persons identify and analyze situations that they perceived to be crucial for the success or failure of the specific task. Finally, we also asked participants directly about their personal conclusions relating to their CMT work during the COVID-19 pandemic.

We conducted structured in-depths interviews in German, either via telephone or via an online questionnaire. Leading questions were the same in both interview types. The telephone interviews allowed follow-up and clarification questions, thereby gathering detailed in-depth information. The parallel online questionnaire complemented the study with a larger number of participants from a variety of different CMTs, ensuring breadth of content and ecological validity. The study was approved by the ethics committee of the Faculty of Psychology & Sports Science of the University of Münster (ID 2020-26-MT). We pre-registered our research questions, the planned analysis procedure, and further materials with OSF (see https://osf.io/p4wda/).

The procedure for data collection was oriented on the principles of Grounded Theory (Glaser & Strauss, 1967). Therefore, the sampling, data collection, and data analysis were conducted in parallel and influenced each other. The aim was to identify the point of theoretical saturation at which new data no longer contained new information (Glaser & Strauss, 1967; Saunders, Sim, Kingstone, Baker, Waterfield, Bartlam, Burroughs, & Jinks, 2018). We achieved theoretical saturation after 29 in-depth interviews and 115 participants in the online survey; thus, we stopped data collection at that point.

Sample

Recruiting.   The study was open to all active members of CMTs managing the consequences of the COVID-19 pandemic. Such CMTs were responsible for different issues according to their deployment level: While CMTs at the national and state levels developed guidelines for combating the pandemic, committees at the municipal and district levels actually executed these guidelines, thus performing time-consuming and tedious tasks such as contact tracing (identifying all the people who came in contact with an infected person). CMTs of relief organizations focused on providing assistance, while CMTs of organizations in supply-critical areas focused on maintaining their services. For our study, we directly sourced participants from all kinds of CMTs at various institutions by contacting public authorities, project partners, and personal networks. Additionally, we called for participation via a social

media post by the Fire Service Institute of the German state of North-Rhine Westphalia (the largest fire academy in Germany). All participants had the opportunity to either schedule a personal interview via telephone or complete the online questionnaire.

Sample.   A total of 144 CMT members was included into the analyses, 29 resulting from telephone interviews[2] and 115 resulting from the online questionnaire.[3] Of the participants, 83 per cent were male and 17 per cent were female, they were on average 43.83 years old (SD = 10.78, Min = 21, Max = 67), and they had various professional backgrounds (see Appendix Table A3, available via http://doi.org/10.5281/zenodo.4288512), mainly in administration and civil service (23%) or as a fire department official (21%). The rate of those who completed a command unit training was 65 per cent, which was completed on average 11.88 years (SD = 8.98, Min = 1, Max = 40) ago. Participants had been CMT members for an average of 11.29 years (SD = 7.81, Min = 0.5, Max = 35) and had served in 8.07 (SD = 9.58, Min = 1, Max = 50) actual crisis deployments. Still, 43 per cent of participants stated that the current COVID-19 CMT was their first real mission. The sample included CMT members from various deployment levels (e.g., government, administration, disaster control, business, education), with different roles within the crisis team (see Appendix Table A4), and with various levels of experience and training.

Data Collection

Telephone Interviews.   We conducted semi-structured interviews between April 27 and July 2, 2020. Prior to the interview, participants sent a scan of their signed informed consent form via e-mail. All interviews were audio recorded and conducted by the same interviewer. The procedure is illustrated in Figure 1; the complete interview guide is available online at http://

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[2] In the telephone interviews, 18 different CMTs were represented, 15 of them by only one member, the remaining 3 CMTs by two, three, and nine members, respectively. Some high-ranking experts worked in more than one CMT, in the interview we only recorded the CMT of the main employer. In the online questionnaire, individual CMTs were not identified due to anonymity reasons (an overview of the type of CMTs can be found in Appendix Table A1, characteristics of the CMTs in Table A2, both available via http://doi.org/10.5281/zenodo.4288512).

[3] Initially 313 persons started the online survey. A total of 46 participants gave no consent, 100 dropped out during answering, and 52 person were excluded because they have not answered the open questions at all or not in terms of content (answers such as "no idea"). We carefully checked on differences between included and excluded subjects/drop-outs with respect to age, gender, educational level, or completion of command unit training. There was only one significant difference: Participants included in the study were slightly older (M = 43.83 vs. M = 40.34, $t(245.63)$ = 2.63 $p < .01$, d = .32).

Telephone Interviews   **Online Questionnaire**

Demographic Data

CMT experience, Role in the CMT, Type of the CMT

Further Characteristics of the CMT

1) Working Conditions
a) What is different in the current COVID-19 situation in terms of CMT work than in other situations?
b) What are the special requirements for you as a member of the CMT in the current COVID-19 situation?
c) What helps you meet these requirements? Where do you draw strength from?
d) What do you personally experience as a particular demand in CMT work at the moment?
  ➢ All in all, how stressed do you feel personally? – 1 *not stressed at all*, ..., 5 *extremely stressed*
e) What motivates you personally in your CMT work?

2) Work Behavior
Please recall a situation in which you have worked particularly effectively and successfully [… a situation that you have found to be inefficient or in need of improvement]. Please describe the situation and your behavior as detailed as possible. What were the circumstances that led to this behavior? What was particularly effective [ineffective] about this behavior? What were the consequences of your behavior?
➢ How important is the situation you have described for the successful and efficient performance in the CMT? [How important is it for the successful and efficient performance that this situation does not occur?] – 1 *very unimportant*, ..., 5 *extremely important*
➢ How often has the situation you described occurred since the COVID-19 CMT started working? – 1 *at least once in the entire period*, …, 6 *several times a day* [negative CIs: absolute frequency].

3) Lessons Learned
a) Which factors are central to successful CMT work in the COVID-19 pandemic?
b) Would you like additional resources, and if so, which ones?
c) In the course of your work in the COVID-19 CMT, were there any changes in the way your CMT works?
d) What should be changed or given special consideration in the training or organization of CMTs in the future?

online

Demographic Data

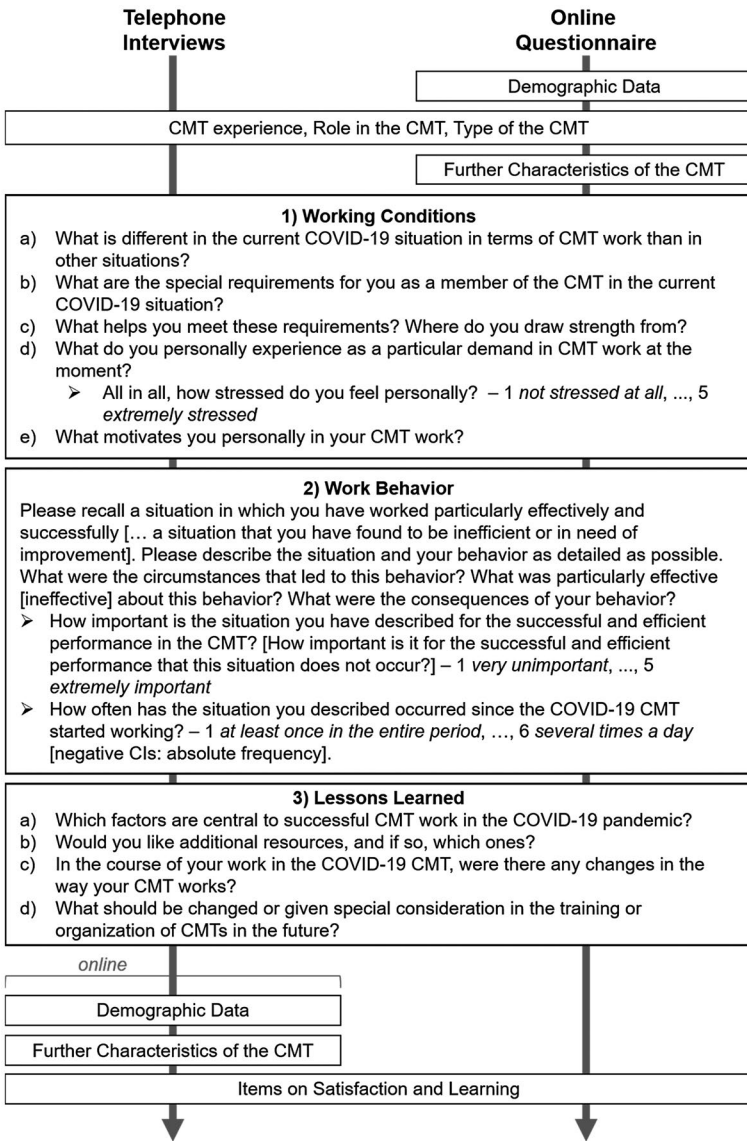Further Characteristics of the CMT

Items on Satisfaction and Learning

FIGURE 1.   Procedure of the telephone interviews and the online questionnaire. CMT = Crisis Management Team.

doi.org/10.5281/zenodo.4288512. After welcoming the participants and explaining the procedure, the interviewer asked them to briefly describe their CMT background. Then, the interviewer went on to the main part of the

interview, which consisted of open questions and prompts to describe critical incidents (Figure 1).

In the section on work behavior, the interviewer asked the participants to recall situations in which they had perceived their work as particularly effective (positive critical incidents) or particularly ineffective (negative critical incidents), and to describe these situations with as much detail as possible. If the participants did not describe the situations in sufficient detail, the interviewer asked further open questions, for example about persons involved, motives, thoughts and feelings. All in all, participants were asked to describe one to two positive and one to two negative situations. At the end of the interview, participants were thanked and had the opportunity to exclude their data from the subsequent analysis. Additionally, they could provide their e-mail address (for privacy reasons, stored separately) for a results report and a possible follow-up survey.

The interviews were on average about 40 minutes long. After the personal interview, we sent the participants a link to an additional short online questionnaire where they provided demographic data and answered items on satisfaction with their work and on learning experiences (based on Thielsch & Hadzihalilovic, 2020). Two student assistants transcribed the critical incident sections and summarized the answers to the open questions in key points using the transcription software *f4transkript*.

Online Questionnaire.   The questionnaire was online between May 4 and July 2, 2020. It started with a greeting, instructions, and the informed consent form (see http://doi.org/10.5281/zenodo.4288512). Step by step, we presented the same questions as in the personal interviews (Figure 1). The median time participants needed to answer all questions was 24 minutes ($M = 41$ min, $SD = 54$ min).

Data Analysis

Critical Incidents.   Our analysis initially focused on the in-depth interview-based critical incidents, as these were described in more detail than the online-based critical incidents. Two coders (both among the authors) analyzed the critical incidents using the analysis software *f4analyse*. One of the coders also conducted the interviews, and the other one constantly monitored the incoming online data; this was to ensure different perspectives on the data and to increase immersion in the content (Corbin & Strauss, 2008; Wilhelmy, Kleinmann, König, Melchers, & Truxillo, 2016). Following the inductive approach of the qualitative content analysis (Mayring & Fenzl, 2014), the analysis consisted of five main steps: (1) *Development of an initial coding scheme*. After the first six interviews had been conducted, each

coder analyzed three of them. They identified passages in which behavior was described, divided them into short sections of meaning, and named these sections according to their content. From these codes, each coder developed an individual, preliminary coding scheme. Then the coders met, discussed their individual coding schemes, and formed a common coding scheme. (2) *Formative reliability check*. The two coders applied the common coding scheme to the interviews they had not previously coded. They then met again and adjusted the coding scheme together. In the following, the coders analyzed the further interviews. (3) *Joint coding meetings*. In regular meetings, they discussed the coding scheme and adapted it further. They began to form abstract, higher-order categories and to relate them to each other. Additionally, based on both interview-based and online-based critical incidents, they discussed whether the point of theoretical saturation was already reached. (4) *Refining the coding scheme*. After the end of data collection, the two coders used the coding scheme to independently code the online-based critical incidents. They then discussed their results and again refined the coding scheme. (5) *Summative reliability check*. Two graduate student assistants received the final coding scheme and rated the interview-based critical incidents, and potential misunderstandings were discussed between them in a second round. Based on their rating, we calculated Cohen's Kappa (κ) for interrater reliability.

Open Questions.   Regarding the answers to the open questions, we started the analysis with the data from the online survey. The answers were evaluated separately for each question. After the data collection was finished, a coder categorized the answers using *f4analyse*. First, the coder inductively developed a system of categories into which he placed all answers. Most of them were available in keywords. In the next step, he simplified the category system by creating root categories and merging strongly overlapping sub-categories. Finally, he applied the resulting category system to the interview data and refined it on this basis. Again, to calculate Cohen's Kappa, two graduate student assistants received the final category system and rated the online-based answers again.

RESULTS

Characteristics of the COVID-19 Pandemic and Resulting Challenges for CMTs

First, we examined how, from the perspective of CMT members, the COVID-19 pandemic differs from other crises (research question 1), and from this we gleaned the resulting challenges for CMTs. Based on 81 statements from

CMT members who also had experiences with other CMT missions, we found six distinctive characteristics (Cohen's $\kappa = .86$):

1. *Duration*. The pandemic is characterized by its long-term nature. It is not clear when it will end.
2. *Extent*. The pandemic is a supra-regional problem. Additionally, it affects many areas of society.
3. *Different dynamics*. The beginning of the pandemic was characterized by especially rapidly changing situations. As the pandemic progressed and the infection numbers decreased, these dynamics slowed and the pandemic became more controllable. However, probabilities remain high that the dynamics will increase again in the near future (second wave, etc.).
4. *Novelty of threat*. The various threats are not easy to anticipate and understand, and they remain partly theoretical. Medical-epidemiological knowledge is relevant but rare. As the pandemic is new, routines are lacking.
5. *Personal affectedness*. The COVID-19 pandemic is perceived to be qualitatively different from other crises because CMT members and their friends and family are threatened by the virus, too, and have to follow strict hygiene and spatial distancing rules.
6. *Unclear legal and political framework*. The legal conditions are changing rapidly. This ranges from official orders that change daily to basic rights being restricted. Moreover, the political responsibilities are partly unclear. We assume that this point is a consequence of the pandemic's extent and novelty in combination with the highly dynamic situation in the beginning.

In the next step, we analyzed the challenges for CMTs that result from the pandemic's characteristics. Therefore, we focused on the questions on perceived differences, special requirements and particular demands of the situation. In doing so, we analyzed 337 statements of CMT members.

High Uncertainty.   Planning and decision-making were characterized by a high degree of uncertainty, also with respect to the consequences of decisions. Sources of uncertainty can be divided into three groups: First, the situation itself caused uncertainty due to the lack of knowledge about the behavior of the virus and the disease it caused. Second, CMTs were generally not well prepared for a pandemic and had to adjust their work to an unknown situation. Third, it was difficult to predict the reactions of politicians, the public media, and various stakeholders.

Coordination of Stakeholders.   Due to the pandemic's extent, many stakeholders had to be coordinated, some of them with no experience in working with CMTs. First, superior authorities (e.g., governmental agencies, local politicians, top management) gave instructions to the CMTs that were

often contradictory or were revoked shortly thereafter (especially in the early phase of the pandemic). Second, many different organizations collaborated with the CMTs (e.g., health agencies, hospitals, managers), and some did not consider or even accept the principles of crisis management. For example, municipal administrations did not provide CMTs with necessary information in a timely manner, and managers of an organization did not consider that the CMT temporarily bundled the leadership processes of the organization. Third, certain groups of people were affected by the measures taken by the CMT (e.g., patients of hospitals and their relatives, employees of a company), and often these people did not know about the orders and measures enacted by the CMT, even though they were affected by them. Further, some people did not recognize why the CMT's orders were necessary.

Risk of Infection for Team Members.   The spatial distancing rules also applied to the CMTs and impeded face-to-face work in teams. In some cases, the CMT meeting rooms turned out to be too small to maintain the necessary distance between team members, so that CMTs had to switch rooms. The new and larger rooms, however, often did not provide the necessary equipment, such as tools for visualizing the situation. Other solutions included new but untrained virtual or hybrid teams in correspondingly large crisis rooms (for an example of increased space requirements see Figure 2).

Long-Term Operational Readiness.   During the COVID-19 pandemic, CMTs were deployed for unusually long periods of time. This resulted in several requirements: First, measures had to be taken to reduce the risk of infection for the members, to prevent the CMT from failing due to illness. Moreover, the structure of the CMT and the teamwork routines had to be adapted to the current situation. For example, a major challenge in the early phase of the pandemic was procuring medical supplies (e.g., protection masks), and some supplies were limited by global demand. Therefore, in some CMTs, the members responsible for supply and logistics were supported by other members.

These results show that from the perspective of CMT members, the pandemic was significantly different from other crises, and the interaction of the six characteristics posed particular challenges for crisis management. Overall, the pandemic was a complex situation that placed unusual demands on CMTs.

Demands and Resources of CMT Members

In the second research question, we asked specific demands CMT members faced and what resources they perceived to be important for this pandemic situation. At the time of the study, participants felt moderately stressed by the

FIGURE 2.   Illustration of increased space requirements of a COVID-19 CMT due to spatial distancing rules. [Colour figure can be viewed at wileyonlinelibrary.com]

situation ($M = 2.67$, $SD = 0.99$, $Min = 1$, $Max = 5$). To investigate demands and resources in detail, we examined questions from the interview section on working conditions.

Demands.   Of the participants, 123 gave an answer to the question about their personal experiences regarding particular demands. We clustered these answers in 13 categories (see Table 1). Besides the general characteristics of the pandemic and the resulting challenges for CMTs described above, the following points were mentioned:

As the pandemic led to a continuous workload over several weeks, participants mentioned it was particularly demanding to have to be constantly available and to work outside of usual working hours. Some team members reported additional demands due to role conflicts, as they had to work their regular jobs in addition to the CMT. Further, participants shared insecurities and fears about the pandemic escalating, they described feeling overwhelmed, and they felt the pressure of expectations from the public. Additional factors that negatively affected CMTs' work were the low expertise of team members (e.g., due to infrequent training) and unclear objectives. Finally, ineffective cooperation with stakeholders led to frustration.

Resources.   To investigate the relevant resources, we asked participants what they drew strength from and what motivated them personally. All in all, the 267 answers were clustered in eleven categories that could be assigned to three higher-order categories: *work-related resources*, *resources outside of work*, and *personal resources* (see Table 2). Notably, work-related resources were almost exclusively described as particularly motivating. Resources outside of work and personal resources were primarily described as relevant for maintenance and restoration of energy reserves.

Critical Incidents—Effective and Ineffective Behaviors

As the third main research question, we asked participants which behaviors they perceived to be effective or ineffective for the work of their CMT during the pandemic. On average, participants were satisfied both with the performance of their CMT ($M = 5.71$, $SD = 1.25$, $Min = 2$, $Max = 7$) and with their individual performance ($M = 5.74$, $SD = 0.90$, $Min = 3$, $Max = 7$). Overall, we collected 239 critical incidents, equaling 1.66 reported incidents per participant ($SD = 1.00$). We excluded 20 incidents based on the reporting participant's rating as being unimportant and very rare. The remaining 219 critical incidents were assessed as very important for the work of the CMT ($M = 4.35$, $SD = 0.72$, $Min = 3$, $Max = 5$). The participants reported 124 positive incidents (effective work situations) and 95 negative incidents (ineffective work situations). Of the reported positive incidents a quarter of cases occurred only once, but in more than half of the cases the events were weekly or more frequent (26.5% *at least once during the whole period*, 17.3% *at least once a month*, 28.6% *at least once a week*, 13.3% *several times a week*, 8.2% *at least once a day*, 6.1% *several times a day*). Negative incidents occurred on average 9.22 times in total since the CMT started its work ($SD = 16.00$, $Min = 1$, $Max = 100$, $Med = 4$). Based on the critical incidents collected in the second section of the interview, we extracted behaviors that have turned out to be effective under the conditions of the COVID-19 pandemic.

We identified three higher-order categories with ten behavioral categories (see Table 3): (1) *Structured working*. The first higher-order category describes how a functional work structure can be established. While the behavioral category *creating and maintaining structures* is rather unspecific, the crucial point was that structures were deliberately introduced and enforced, regardless of how exactly these structures looked. (2) *Communication*. This higher-order category comprises behaviors that are vital for the effective exchange of information. While *open and proactive communication* and *precise explanations* refer to the communication among CMT members, the other two behavioral sub-categories here reflect regularly recurring actions and are part of the working structure. Thus, *communication* seems to benefit from behaviors

TABLE 1

Reported Demands of CMT Work during the Pandemic

Category	Description	Number of mentions
Characteristics of the situation		
Long duration and uncertainty	The duration of the mission is very long and the further development is unclear. This causes uncertainty.	23 (18.7%)
High dynamic	High frequency of measures and new orders, so that the situation quickly becomes confusing. A large amount of information has to be processed.	20 (16.3%)
Pandemic-caused complications	Particularities of the pandemic situation (virtual work, contact restrictions, shortage of materials, etc.) make staff work more difficult.	11 (8.9%)
Problems inside the CMT		
Lack of proficiency	CMT members work unprofessionally, e.g., due to a lack of training or a lack of understanding of roles.	12 (9.8%)
Unclear goals	There is no clear direction for the CMT work.	4 (3.3%)
Interaction with stakeholders		
Counterproductive behavior of superior authorities	The inefficient working methods of higher-level authorities, combined with changing legal requirements and carrying out political issues, place a burden on CMT work.	16 (13.0%)
Lack of understanding among stakeholders	Lack of understanding of CMT work among stakeholders. This often goes hand in hand with a lack of acceptance for the principles of CMT work.	12 (9.8%)
Communication of the measures to the concerned persons fails	Regulations do not reach the concerned persons or are not understood. Often the necessity of measures or the seriousness of the situation is not recognized.	11 (8.9%)
Partial knowledge and overreactions	Staff members have to deal with stakeholders' unfounded assessments of the situation and resulting disproportionate actions.	7 (5.7%)
Personal demands		
Constant workload	Over a longer period of time, the daily expenditure of time is high and sometimes exceeds the usual working hours.	24 (19.5%)
Double burden	There are double burdens, since other important tasks (daily business) have to be postponed or continued in addition to the staff work.	14 (11.4%)
Fears and overload	The situation causes more or less concrete fears and leads to overstraining.	11 (8.9%)
Perceived pressure of expectation	Public expectations and the pressure of responsibility are high.	5 (4.1%)

Note: T^he results are based on the answers of a total of 123 participants to the question what the CMT members experienced as particular demands. The percentages reflect the share of answers that contained a respective mention. Cohen's κ = .70.

TABLE 2
Resources Reported by CMT Members

Category	Description	Number of mentions
Work-related resources		
Team	Teams that served as a resource were characterized by cohesion, mutual trust, competence, and experience.	101 (37.8%)
Task significance	The CMT work pursued a meaningful goal and offered the opportunity to overcome the pandemic by contributing their own strengths.	64 (24.0%)
Task variety	The CMT work during the pandemic was exciting. It represented a challenge that awakened personal ambition and provided learning experiences.	59 (22.1%)
Efficacy	The effectiveness of the work was shown not only in success (which became visible when measures were implemented and proved to be effective), but also in an efficient work process.	59 (22.1%)
Feedback	The work received appreciation and positive feedback from other CMT members, stakeholders or the public.	21 (7.9%)
Information and network	Valid information on the situation was a valuable resource. A good network with stakeholders, which had already been established in advance, facilitated them.	19 (7.1%)
Structure	Clearly structured work processes, especially an elaborate working time system, made work easier.	18 (6.7%)
Resources outside work		
Leisure activities	Leisure activities, especially sports, strengthened the CMT members.	18 (6.7%)
Relaxing	Switching off from work in the form of free time, rest, and sleep was important. Also, short breaks during work were relevant.	17 (6.4%)
Social environment	The social environment provided support and backing. The family played an especially central role.	15 (5.6%)
Personal resources		
Education and experience	A good education and a lot of experience provided security and enabled a systematic approach. Also training and experience without direct reference to crisis management could be helpful (e.g., medical education).	29 (10.9%)
Sense of duty	The members felt highly committed to the CMT work.	16 (6.0%)
Positive attitude	The basic attitude was characterized by hope and optimism.	7 (2.6%)

Note: The number of mentions refers to the 267 answers given to the questions regarding what the CMT members drew strength from and what motivated them personally. The percentages reflect the share of statements that contained a respective mention. Cohen's $\kappa = .77$.

subsumed under *structured working*. (3) *Problem solving* includes those behaviors that reflect the core mission of the CMT. Most sub-categories, for example *prioritizing and goal-oriented action*, require both a functioning work

TABLE 3
Effective Behaviors

Category	Description	Number of Statements
Structured working		
Creating and maintaining structures	Effective CMT structures (e.g., workflows or the composition of the CMT) are created and maintained. Measures are agreed upon to make the CMT structure functional and maintain it.	42 (25.6%)
Assigning responsibilities	Concrete tasks or task packages are assigned to persons or groups. Commitment is created by defining the responsibility.	14 (8.5%)
Communication		
Open and proactive communication	Information and also critical contributions are communicated early, openly and transparently to the CMT and to stakeholders.	11 (6.7%)
Precise explanations	Relevant information (e.g., about the situation or the CMT work) is communicated in a precise and appropriate manner for the target group; especially when many details are given, also with the support of aids (e.g., graphics, handouts).	9 (5.5%)
Regular coordination	Regular exchange with the relevant stakeholders. This includes requesting and distributing relevant information to ensure everyone is always up to date.	9 (5.5%)
Bundling and documentation of the information flow	Information relevant to the work of the CMT is bundled. The CMT's work steps and decisions are documented so that this information can be easily understood by others.	9 (5.5%)
Problem solving		
Anticipating problems	Thinking ahead and paying attention to possible future problems, so that measures can be taken early.	16 (9.8%)
Taking the initiative	Becoming aware of one's own responsibility for a task or problem, actively taking or demanding responsibility for it. Concentrating on working on it and persisting when difficulties arise.	10 (6.1%)
Prioritizing and goal-oriented action	If different interests collide or several approaches are possible, the interests are weighed against each other or a consensus is reached. From this point, the CMT members work together towards a common goal and subordinate themselves to this goal without putting personal sensitivities in the foreground.	20 (12.2%)
Making quick and binding decisions	Decisions are made quickly and bindingly, so that corresponding action can be taken.	24 (14.6%)

Note: The number of statements refers to the statements extracted from the interview-based critical incidents. Most critical incidents from the online questionnaire, in which no clarification questions could be asked, were only vaguely described and left room for interpretation. Hence, to reduce subjectivity, we did not assign the questionnaire-based critical incidents to single categories of this scheme. Nevertheless, they were, of course, included in the categorization to determine the theoretical saturation, ensuring that no new content was overlooked. Cohen's $\kappa = .77$.

structure and effective communication. Hence, both *structured working* and *communication* seem to play a crucial role for successful problem solving.

Lessons Learned—Personal Conclusions of the CMT Members

In the questions on learning outcomes, most participants attested that they had learned a lot from their deployment in the COVID-19 CMT (see Table 4).

To further examine the lessons learned, we analyzed 327 personal conclusions regarding CMT work during the pandemic. When asked what has changed in CMT work during the course of the pandemic, participants answered that routines and structures developed from initial uncertainty, which (at least partly) included switching to a virtual CMT work. These learnings increased the effectiveness of CMT work. Furthermore, as the pandemic's dynamics slowed, the frequency of meetings was reduced, and several CMTs were reduced in size in accordance with the workload. When asked what additional resources participants would have liked to have, the main answers were a better IT infrastructure and trained staff that was more quickly available. As suggestions for future CMT training, participants mentioned that CMT training should focus explicitly on long-term missions with the respective requirements for the number of personnel, shift systems, and the stamina of CMT members. In this context, future training should convey the image of CMTs as long-term coordination groups that act as interfaces between politics, various stakeholders and affected groups—in contrast to the common image of CMTs as short-term intervention forces. Further, participants stated that CMTs should be trained to adapt the CMT's structure more flexibly to the dynamics of a situation, for instance by forming subgroups that deal with specific problems or by reducing the number of CMT members. Finally, CMT training should also include persons who do not belong to traditional security organizations (e.g., fire departments) but hold important positions in public life (e.g., school principals). The collected success factors as named by the participants of this study are illustrated in Figure 3.

TABLE 4
Learning Experiences through the Deployment in a COVID-19 CMT

Scale	*Items*	*M*	*SD*
Acquisition of competencies	4	5.03	1.10
Transfer to other situations	2	5.72	0.99
Global assessment ("I have learned a lot.")	1	5.54	1.37

Note: A 7-point Likert scale (ranging from 1 = *strongly disagree* to 7 = *strongly agree*) was used. $N = 102$ (due to missing values).

FIGURE 3.   Success factors mentioned by the participants (based on 100 answers to the question about success factors). The font size is proportional to the number of mentions (Min = 3, Max = 20). [Colour figure can be viewed at wileyonlinelibrary.com]

DISCUSSION

The current research focused on Crisis Management Teams (CMTs) as a unique form of teamwork, characterized by specific challenges and resources for their members. These teams are entrusted with difficult and highly responsible tasks, such as managing the impact of a global pandemic. CMTs have to overcome unique obstacles, such as a critical lack of routine, high urgency and related time pressures, a high degree of team diversity combined with high team interdependence, and team members that are involved in CMT activities in addition to their main jobs. Moreover, CMT work is characterized by dynamic, complex and partly non-transparent situations, resulting in additional sources of psychological strain for CMT members. We integrated these various processes by applying a job demands and resources perspective to team-level processes, following recent calls in this respect (e.g., Bakker & Demerouti, 2017). While prior stress research has considered single team-related demands or resources (e.g., Consiglio et al., 2013; Pluut et al., 2014), our findings offer a broad view on multiple team-related demands and resources.

We investigated CMTs in the context of the COVID-19 pandemic, addressing specific characteristics of the pandemic from the perspective of CMT members (research question 1), resulting challenges and associated effects on demands and resources of CMT members (research question 2), and effective behaviors of CMTs based on critical incident analyses (research question 3). The interview data support our theoretical assumptions based on Hannah et al. (2009) regarding general demands of a pandemic: duration,

extent, novelty, and proximity in terms of personal affectedness. However, two additional factors appeared to characterize the COVID-19 pandemic situation: First, unclear legal and political conditions that hampered potential measures to mitigate the pandemic's impact. Second, the temporal dynamic of a pandemic, with a rapid outbreak at the beginning, a decaying phase with constant risk, and potential major and even more severe new outbreaks. This specific dynamic, together with the long-term duration and global interdependencies, is different from other major disasters. In addition, the effectiveness of measures taken by a CMT becomes apparent only after a substantial time lag, which further complicates planning and increases the pressure on the CMTs from stakeholders and public media.

The characteristics of a pandemic lead to corresponding challenges in the work of CMTs, posing specific demands on the CMT members and the teams as a whole. Some of these demands can be addressed by active coping strategies of the CMTs, for example, by making stakeholder coordination functional. However, other demands cannot be easily changed, such as structural problems due to lack of expertise and role conflicts, or affective implications, such as pressures due to public media surveillance or lacking scientific insights about the virus. Therefore, in line with the job demands and resources framework (Bakker & Demerouti, 2007; Bakker et al., 2014), resources are crucial for coping with the negative effects of demands. With regard to CMT resources, some can be actively generated through effective teamwork. *Problem solving* plays an important role here. The experienced work progress after decisions are made has a motivating effect, particularly when these measures show success. Of course, identifying suitable success indicators is not easy in a pandemic. Resources outside of the work context (e.g., family, recreation sports) cannot easily be increased, however, CMT members can increase their *access* to these resources, for instance, by structuring the day and using elaborated working time systems. Other resources must be developed over time, such as personal experience and a sense of duty.

The critical incident analyses also showed that CMT members reported *structured working* and *communication* to be essential during a pandemic. For example, active communication is needed to explain measures taken and to coordinate the different stakeholders. Active communication also counteracts high levels of uncertainty. Regular coordination with the relevant sources ensures that required information is shared on time, and systematic information processing enables CMTs to consider all relevant information when decisions must be made. Further, a considerate work structure tailored to the specific requirements was perceived to be central to long-term operational readiness. Clear rules facilitate the work under difficult conditions, for example, when the risk of infection makes virtual work necessary.

In summary, Figure 4 illustrates the relationships between the key research variables, and shows how characteristics of the pandemic might lead to specific demands in CMTs, which in turn can be addressed through effective work behaviors and work-related and personal resources. Particularly noteworthy are the effects of team-level processes on job demands and resources. Our results stress the importance of support structures within the CMTs, a collegial spirit, and mutual trust within CMTs. These results are well in line with more general findings in teams (e.g., Breuer et al., 2016; Hüffmeier & Hertel, 2011) and high reliability contexts (e.g., Brooks et al., 2018): For instance, trust has been recognized as an important resource for operational firefighter teams (Burtscher, Meyer, Jonas, Feese, & Tröster, 2018). The findings of our study suggest that trust is also central in CMTs, which operate rather strategically, have a long-term perspective, and lead at distance from a command center. In addition, CMTs seem to provide specific task structures that can be considered as resources (e.g., Hackman & Oldham, 1980), such as *task significance*, *task identity*, and *feedback*. Moreover, additional resources were mentioned by interviewees at the level of professional and private networks as well as through personal activities to recover from CMT work.

In line with our theoretical framework, team processes in CMTs not only provide resources but can also pose additional strain on the team members. However, in contrast to extant research arguing that high team cohesion and contagion of negative experiences might be a major problem within the teams (Westman et al., 2011), the sources of additional team demands reported by CMT members in our study were mainly task oriented. Specifically, participants mentioned particularly the result of low levels of perceived professionalism and, relatedly, a lack of appropriate crisis management training (see
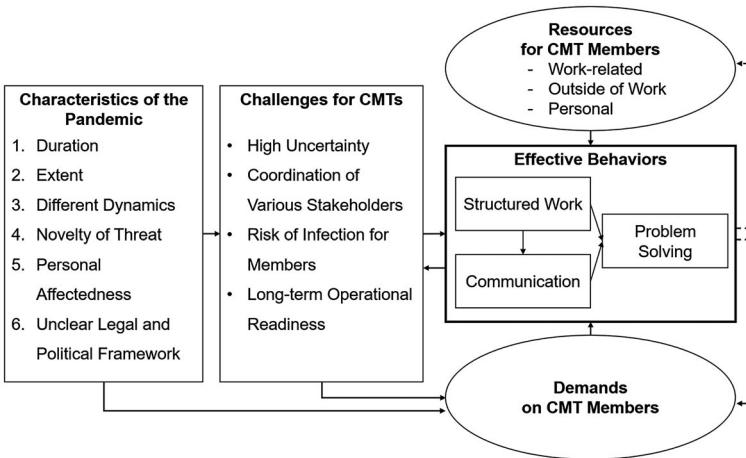

FIGURE 4.   Integrated model of the main results.

also McConnell & Drennan, 2006; Perry & Lindell, 2003). Thus, while the development of training material and routines for pandemic crisis management is challenging due to the specific characteristics of such crises, appropriate trainings are nevertheless highly needed for these important tasks.

Finally, the COVID-19 CMT members in our study reported multiple role enactment as rather negative demand, which is in line with the findings of Pluut et al. (2014). Whereas Pluut et al. (2014) examined members of IT teams in the same company, our CMT study includes members from diverse organizations (with different cultures and support structures) and with very diverse hierarchical positions in these organizations. Still, we found no evidence for the idea, that a higher diversity of roles in the different work contexts might have provided more potential for benefits arising from being on multiple teams (e.g., when individuals take over more central or even leading positions in a CMT that usually work on lower hierarchical positions in their regular job).

Practical Implications

Based on our study, we derive initial practical implications for CMTs in the context of a global pandemic. Here we have identified several problem fields with regard to demands, resources and work behaviors. The critical incident analyses revealed the importance of three core aspects of teamwork in the COVID-19 pandemic (see Table 3): an effective and concrete *work structure*, open, precise and regular *communication*, and foresighted, goal-oriented and fast *problem solving*. These aspects are directly connected to practical implications that fit well with the existing literature on emergency management. Practical recommendations based on our findings for the work of CMTs in a pandemic are summarized in Table 5.

The specific characteristics (see Figure 4) of a pandemic should also be taken into account in the future training of CMTs. In response to our direct questions, interviewees placed special emphasis on the technical skills to switch to virtual teamwork, and on flexible reactions to dynamic, long-term situations. One CMT member aptly summarized this by saying "We are trained for a sprint, but now we have to run a marathon." Here, team research provides valuable suggestions on how teams can be trained to react adaptively to new situations (e.g., Gorman, Cooke, & Amazeen, 2010; Marks, Zaccaro, Mathieu, Gessner, Klimoski, Sanchez, & Vi, 2000) to ensure a better preparedness of CMTs. In order to achieve optimal quality and learning success, CMT trainings should be generally evaluated (see Thielsch & Hadzihalilovic, 2020).

TABLE 5
Summary of Practical Recommendations for CMT Work in a Pandemic

Scope	Problem field	Recommendations
Challenges and demands	Coordination difficulties between CMT and stakeholders *Problems may arise in coordination with superior authorities, cooperation partners or the groups affected by the taken measures.*	• Build networks (in advance) and use them. • Exchange information actively. • Justify and explain taken measures. • Balance the stakeholders' different interests (for a positive example in handling the COVID-19 pandemic, see Christensen & Lægreid, 2020).
Challenges and demands	Risk of infection of CMT members *Members may fall ill themselves and may be absent for longer periods.*	• Build up redundancies in all areas of the CMT. • Make sure that the redundant CMT teams do not have physical contact with each other. • Exercise virtual CMT work. • Maintain a working information flow between the redundant CMT teams (→ Insufficient documentation).
Challenges and demands	Public relations *PR work is of enormous importance and should be a central part of CMT work throughout.*	• Establish clear structures and communication channels on how information and inquiries can be centrally collected and then forwarded or answered. • Carefully weigh what is communicated and how. • Ensure comprehensibility and avoid information overload.
Challenges and demands	Prevention paradox (Rose, 2001) *The prevention paradox describes the fallacy that measures are no longer necessary because the situation seems to have calmed down. In reality, however, the situation has only calmed down because of the measures.*	• Stick to effective measures even under public pressure (→ Public relations). • Proceed cautiously and step by step when rolling back measures.

(Continues)

TABLE 5
(Continued)

Scope	Problem field	Recommendations
Resources	Poor team climate *The CMT members should appreciate each other and treat each other as colleagues. This is important for a good team climate.*	• Carry out joint exercises in advance so that most CMT members already know each other. • Encourage CMT members to talk openly about both their strengths and weaknesses. • Do not blame CMT members for mistakes; instead, consider mistakes as learning opportunities. • Encourage CMT members to give each other appreciative feedback.
Resources	Loss of motivation *The CMT work should be designed in such a way that it is also motivating in the long term.*	• Give the CMT members tasks according to their skills and abilities. • Emphasize explicitly that the work of each member contributes to fighting the pandemic. • Establish—if possible—a well-structured rotation system within the CMT in order to enhance task variety and enable continuous learning. • Communicate even small successes of the team's work (e.g., processes that are working). • Share positive feedback from stakeholders with the CMT members.
Resources	Lacking access to resources outside of work *The high expenditure of time can mean that important resources like leisure activities are only sparsely available.*	• Establish an elaborate working time system that gives CMT members enough time to recover from work. • Encourage CMT members explicitly to do sports in their free time, spend time with close social contacts or just relax. • Make sure that the CMT leader also takes time to relax, as the leader has a role model function.

(Continues)

TABLE 5
(Continued)

Scope	Problem field	Recommendations
Resources	Poor personal resources *Education and experience in the CMT context as well as a sense of duty and a positive attitude help to meet the challenges of CMT work.*	• In advance, build up a large pool of persons who have received CMT training. • When selecting people for CMT training, consider sense of duty and willingness to help as selection criteria.
Work behaviors: Structured work	Lack of understanding of CMT work *It is of the highest importance that all members of the CMT as well as the stakeholders internalize the principles of CMT work.*	• Make clear that the CMT functions and acts independently from line organization. • Create clear rules and adhere to them yourself (e.g., for the structure of a CMT meeting). • Define areas of competence and clarify responsibilities. • Do not discuss in the plenum the decisions that have already been made in the responsible areas of the CMT. • Separate clearly between CMT work and tasks or areas of responsibility in the line organization (hierarchies from the line structure no longer count in the CMT).
Work behaviors: Structured work	Lack of expertise and competencies *The complexity of the pandemic requires a wide range of expertise and competencies that is not always available among the CMT members.*	• Integrate technical advisors into the CMT: experts with the necessary knowledge and decision-makers in their areas. • Give technical advisors without CMT training timely information on how the CMT works. • Recognize that the technical advisors are experts in their field. • Consider that technical advisors have a consulting function and that the decisions have to be made by the responsible CMT members. • Dismiss technical advisors when their expertise is no longer needed in order to maintain a manageable number of team members.

(Continues)

TABLE 5
(Continued)

Scope	Problem field	Recommendations
Work behaviors: Communication	Imprecise communication *An equal understanding of the current status quo among all CMT members is a requirement for good decisions.*	• Use visualizations for more complex information. • Prepare the information so that everyone present can understand it.
Work behaviors: Communication	Absence of informal communication *A lot of informal communication within the CMT and with stakeholders can be lost through virtual work, which can lead to coordination problems.*	• Schedule regular times for informal updates within the team (e.g., a virtual coffee break). • Establish regular exchange with stakeholders, even if it does not seem immediately necessary.
Work behaviors: Communication	Flood of information *A clear picture of the situation is important for good decision-making.*	• Review and process incoming information quickly. • Entrust well-trained CMT members with the review and processing information. • Reinforce the responsible personnel if necessary.
Work behaviors: Communication	Insufficient documentation *In shift systems, different teams work on the same tasks. Particularly, in a pandemic it is probable that team members leave (for a time) or new members join. Hence, good documentation is crucial.*	• Ensure written documentation of all decisions, tasks, and assignments. • Describe them in such a way that they are comprehensible for everyone not involved in the process, even after a certain time interval.
Work behaviors: Communication	Holding back constructive criticism *In order to work effectively, CMT members should not spare critical questions and comments.*	• Speak openly but respectfully about problems, e.g., in the organization of the staff. • Mention it if you think that a discussion is going in the wrong direction.

(Continues)

TABLE 5
(Continued)

Scope	Problem field	Recommendations
Work behaviors: Problem solving	Lagging behind the development *The CMT should try to be one step ahead of the development of the situation.*	• Start at the earliest possible time to go through possible pandemic scenarios and future challenges (ideally before an outbreaking disease becomes a pandemic). • Constantly monitor the situation and try to forecast the development. • Start with regular CMT meetings before the situation is acute. • Assign the responsibility for specific problems to CMT members so that they can devote their full attention to problem solving (→ Structured work). • Do not interfere in the work of these members unless they ask for help or are obviously overextended. • Make quick and binding decisions so that you don't have to spend too much time on partial aspects.
Work behaviors: Problem solving	Inefficient plenary discussions *Plenary discussions often take too long and are not goal oriented.*	• Discuss only major issues that are relevant to all CMT members in the plenum. • Clarify the goal of a discussion beforehand. • Moderate discussions strictly by preventing repetitive or off-topic contributions and long monologues. • If you reject suggestions from CMT members, justify this with objective arguments and make it clear that it is not a disregard of their competence.
Work behaviors: Problem solving	Making difficult decisions *CMT work may involve making far-reaching decisions.*	• Justify considerations and decisions both within the team and with stakeholders. • Make sure that decisions are supported by all team members so as not to endanger the cohesion. • Stand behind the team's decisions, also externally.

(Continues)

Limitations and Future Research

Some limitations should be considered when interpreting our findings, but these limitations also offer avenues for future research. First, in the current study the CMT members surveyed came from German-speaking countries, mostly from Germany itself. This could represent a bias, in that Germany is a rich country with a strong health care system and has so far handled the COVID-19 crisis well above average (which, however, is also a result of good crisis management). Thus, results are certainly transferable to other comparable countries, but the extent to which they apply under completely different conditions would have to be investigated in future studies (see also Bapuji, Patel, Ertug, & Allen, 2020; Wong, Koh, Alikhan, Abdul Aziz, & Naing, 2020).

Second, due to its novelty, the topic required a qualitative-explorative approach. This has advantages regarding the depth of the analysis, in that the chosen combination of personal and online interviews resulted in a comparatively broad and large sample of interviewed experts. Nevertheless, future studies are needed to validate and quantify the found relationships.

Third, it turns out that the reported critical events are described in more detail in personal interviews, but more critical content is reported in the online survey. Thus, it seems that online might be a lower interviewer bias, or that particularly stressed CMT members prefer the online survey mode, which was easier to complete and a little shorter. Even though interview partners from known critical COVID-19 hot spots took part in the study, we suspect that members from CMTs that are in enormous demand did not have the time to participate. This issue can only be solved by a subsequent retrospective study after the pandemic has subsided.

Finally, our results emphasize the importance of structured work within a CMT and in cooperation with other stakeholders. However, the question of which specific methods and tools are particularly helpful to structure the work of a CMT could not be addressed in this study—this offers an opportunity for further research.

CONCLUSION

The current study has given voice to the teams and their members tasked with managing the COVID-19 pandemic. This pandemic harbors special characteristics and challenges, but they can be mastered with proven structures of teamwork as well as creative and foresighted problem solving. To cope with demands, the CMT members not only have their own resources at their disposal, but they can also be supported by the team, the leader and by preparation and training. The findings are not only of interest to CMTs but can

also inform all high-responsibility teams that need to (re)structure during the COVID-19 pandemic and make decisions under pressure.

CONFLICT OF INTEREST

The authors declare that they have no competing interests. One of the authors (C. Lamers) was active in the crisis management team of his organization and acted as a consultant for a CMT on the county level. Both activities provided additional insights into the daily work of such teams.

ETHICS APPROVAL STATEMENT

The study was approved by the ethics committee of the Faculty of Psychology & Sports Science of the University of Münster (ID 2020-26-MT).

DATA AVAILABILITY STATEMENT

Quantitative data as well as interview guideline and online questionnaire are available at http://doi.org/10.5281/zenodo.4288512.

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