A Review of the Literature on Community Resilience and Disaster Recovery

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Abstract

Purpose of Review The concept of resilience continues to grow in influence and prominence in national and international programs seeking to improve individual and collective capacity to prepare for and respond to disasters. This review of the literature published in 2018 examines how disaster scholars and professionals are conceptualizing and applying the concept of community disaster resilience.

Recent Findings Three trends in the literature on community disaster resilience are observed: (1) advancements in the measurement of resilience continue to refine the concept and its related mechanisms using both primary and secondary data, (2) social capital continues to be a central mechanism through which community resilience reduces disaster impact and enhances recovery, and (3) programs across the globe are advancing the practice of improving resilience through community interventions to enhancing adaptive capacities.

Summary Community disaster resilience offers much promise as a guiding paradigm for the promotion of disaster risk reduction and the enabling of disaster recovery through attention to, and investment in, local capacities for adaptation to a changing and uncertain environment. However, there remains work to be done in the clarification of the concept and the operationalization of the mechanisms leading to enhancing community capacity for resilience.

Keywords Community · Resilience · Disaster · Recovery · Social capital · Measurement · Intervention

Introduction

The concept of resilience is increasingly being used in academic and policy circles related to the field of environmental health. While definitions of the concept of resilience are also increasingly diverse, when applied to people and their environments, "resilience" is most often utilized as a metaphor for the capacity of system to return to some equilibrium state after a crisis through processes of both resistance and adaptation [1]. The concept of resilience is applied broadly across scales, ranging from individual characteristics supporting personal capacities for coping with stressors to entire social-ecological systems that consider the integrated capacity of

both communities and the environments upon which they depend to adapt to an ever-changing context. Today in the USA, national and local governments and research programs are increasingly call for the integration of plans to increase community resilience into disaster risk reduction policies and interventions involving planning and enhancing adaptive capacities [2]. Internationally, policy initiatives such as the 2015 Sendai Framework for Disaster Risk Reduction have further elevated the role of resilience in academic and professional settings [3]. Today, the theory of how resilience can be improved and enhanced, otherwise referred to as resilience thinking, is increasingly being expanded into the realm of local and community settings—given rise to an important opportunity to critically examine how concepts and measures traditionally utilized in the natural sciences can be applied or modified to help us understand the dynamics of resilience at the community level [4].

Conceptually, community disaster resilience derives from the broader literature on social-ecological resilience that is traditionally associated with Holling's seminal work on ecological resilience that has since been broadly expanded to

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include individuals, communities, infrastructure, and nation-states [5]. When applied to social systems as opposed to natural systems, resilience has typically focused more on questions of governance related to disaster mitigation and preparedness, engineering the built environment, and the social organization of communities. One particular definition of community resilience from the work of Norris and colleagues, broadly captures its emerging usage as "a process linking a set of adaptive capacities to a positive trajectory of functioning and adaptation after a disturbance" that often at the scale of the community [1]. Thus, the multitude of approaches to examining resilience can accommodate attention to various "adaptive capacities" that operate at a systems-level to reduce the impact of disasters, reducing recovery times and efforts, and reducing future vulnerabilities.

In contrast to the concept of social vulnerability, which has until late been a more popular field for the examination of the differential effects of disasters on individuals and communities, resilience thinking has tended to emphasize the potential for stakeholders (individuals, communities, states) to become more adaptable to uncertainty and change through practices such as disaster risk reduction, mitigation, and planning [6]. Tiernan et al. highlight the significance of the increased attention to the more social aspects of resilience in the recent academic literature, which in their opinion tends to blame stakeholders for a lack of preparedness or adaptability over more structural factors such as a lack of resources, heightened ecological vulnerability, or a problematic system of disaster governance [7]. The potential consequences of this shift away from thinking about the unequal distribution of disaster vulnerability across the globe to the potential actors, across scale, to adapt to those vulnerabilities within the context of resilience are significant. While many of the applications of resilience thinking to community adaptive capacity reviewed here highlight improvements in the ability of societies and states to respond to a changing environment, there remains a lack of overt attention to pre-existing conditions that determine whether communities can even begin to start down the road of resilience. This general tendency to ignore the social vulnerabilities shaping pre-disaster conditions produces what we might refer to as an "equity gap" in the contemporary resilience literature. The critique that resilience thinking tends to downplay the role of social inequality and power in most of its applications is not new, yet there remains little progress in conceiving an approach to equitable resilience. Where more mainstream considerations of the factors that might improve the resilience of ecological systems are likely to occur absent consideration of critical appraisals of unequal resource distributions, asymmetries in access to information, and conflicts over power, any approach to developing interventions to enhance social, or community, resilience needs to think about the potential for systemic change that can address fundamental social inequalities in the pursuit of enhancing adaptability [8•].

In this review, I examine the scholarly literature published between January 2018 and January 2019 on the topics of community disaster resilience and recovery. Two databases, *Web of Science* and *PubMed*, were utilized to examine more than 120 articles published in a variety of academic journals ranging from scholarship on disasters, community health, and the social sciences. While this review is not intended to be a comprehensive account of every article published in the previous year, here, I employ an appraisal methodology to summarize trends in the community disaster resilience paradigm. Based on searches combining the search terms "community resilience" and "disaster" or "community recovery" and "resilience" and "disaster," I generated a roster of academic papers intended to focus on the concepts of resilience and recovery occurring at the social group level. Papers were screened for relevance based on their titles and abstracts and if deemed relevant, were thematically coded following a text analysis. This analysis produced a grouping of three general categories of scholarship: (1) the measurement of community resilience and recovery, (2) the linkages between social capital and community resilience and recovery, and (3) the practice of enhancing community resilience and recovery.

Measurement of Community Resilience

Assessing community's recovery from disasters over time and across specific cases, regions, and timeframes remains a major challenge for academics and practitioners alike. Identified by the National Academies of Science as an imperative in the advancement of the goal for making the nation more resilient to disaster, developing and validating a set of standards for measurement remains an essential but challenging task. Without an objective means of measuring resilience, "it would be impossible to identify priority needs for improvement, to monitor challenges, to show that resilience has improved, or to compare the benefits of increasing resilience with the associated costs" [2]. While most recent articles in this category highlight the development of new indicators of resilient outcomes, or refinements of existing ones, there have also been innovations in the usage of new datasets. Here, we see increased attention to "big data" and patterns of resilience, such as through the mining of millions of Twitter data points being combined with more traditional approaches to survey victims post-disaster.

In this past year alone, multiple new indicators were proposed to better account for urban dynamics of resilience and recovery [9, 10], those that seek to better model the interface between social and ecological systems [11, 12], and improving our conceptualization of those social systems [13]. Simultaneously, scholars and practitioners have also called for the use of more subjective, or ground-up, assessments of the dynamics of resilience. Here, we see increased attention to the subjective perceptions of household recoveries following

disaster [14], neighborhood values and functions [15], and of social and ecological systems interactions [16]. As neither objective nor subjective data can fully replace the other, it is likely that we continue to see ongoing debates on their relative strengths and the continued expansion of potentially relevant secondary indicators and proxies as qualitative examinations reveal new and previous hidden dynamics of community resilience.

Multiple systematic literature reviews on the topic of resilience measurement from several distinct fields appeared in the last year [7, 10]. Given the broad range of academics studying community disaster recovery and resilience and practitioners in various institutions and settings, defining the overall universe in which distinct measurements are occurring remains quite complex. For the most part, recent review pieces focus only on a specific field. For example, Serfilippi and Ramnath examine institutional definitions and assessments of resilience by comparing and contrasting multiple international agencies' usage of the term resilience [17•]. They found that despite some agreement around terminology stemming from the United Nation's (UN) 2015 Sustainable Development Goals Target 1.5 "build the resilience of the poor and those in vulnerable situations," most of the major international institutions ranging from the United States Agency for International Development (USAID) to the UN Food and Agriculture Organization (FAO) use distinct conceptual and measurement definitions of resilience and frequently fail to offer pragmatic guidelines about how to optimally collect data and measure progress towards the successful implementation of resilience programs (see Table 1).

Likewise, in focusing more on scholarly examination of resilience, Cai et al. utilized the *Web of Science* search engine to capture 174 articles published between 2005 and 2017 and found that 45% proposed their own quantitative resilience indices, while only 10.3% used empirical methods to validate those proposed indices [22]. For those that attempted to validate their indices, the types of indicators were limited to very common measures such as income, employment, age, and education—a very narrow approach to resilience with considerable overlap with other concepts such as social vulnerability.

To assess the practicality of assessing community disaster recovery using longitudinal and systemically collecting data, a review of resilience metrics for tracking progress with disaster recovery employed the University of North Carolina's Coastal Hazards Center of Excellence disaster recovery tracking tool, which provides 79 individual metrics organized into 4 themes (finance, process, social, and public sector) [23••]. In this comparison of six disaster case studies across the state of Texas, USA, which included hurricanes, wildfires, and an industrial accident, multiple challenges were encountered in the effort to calculating the 79 individual metrics, suggesting that even the most qualified disaster practitioners would likely face serious impediments in collecting sufficient data to complete such a detailed assessment. Instead of focusing on such a broad assessment, the authors argue for a more flexible set of basic metrics combined with greater training for practitioners in both pre- and post-disaster settings would lead to a greater enhancement of community capacity for measuring recovery and progress towards resiliency.

At the frontier of both the theoretical and applied approaches to community resilience are the linkages between the social and ecological factors that influence the vulnerability and recovery capacity of community disaster recovery. Assessing these relational mechanisms can be particularly challenging, as the complex feedback loops between the free decision-making of individuals, community, and state actors and the systems-level components of ecosystems and related environmental services requires attention to multiple levels, scales, and temporalities of effects and outcomes.

Table 1 International program definitions of resilience

Institution	Definition of resilience
United Nations Development Programme (UNDP)	The ability of a system, community, or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions [18].
U.S. Agency for International Development (USAID)	For USAID, resilience is the ability of people, households, countries, and systems to mitigate, adapt to, and recovery from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth [19].
Food and Agriculture Organization of the United Nations (FAO)	Resilience is the ability of people, communities, or systems that are confronted by disasters or crises to withstand damage and to recover rapidly [20].
Rockefeller Foundation 100 Resilient Cities	Urban resilience is the capacity of individuals, communities, institutions, businesses and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience [21].

Another emerging frontier in the measurement of community disaster resilience can be found in the field of big data. Researchers are now beginning to turn to social media for access to massive datasets to develop alternative measures of resilience process and outcomes and analyses. These datasets grant better access to scale and temporality in considering the micro-behaviors of individuals as they respond to crises. For example, the use of Twitter in the wake of 2012's Hurricane Sandy provides new opportunities to examine how individuals sought out aid by utilizing only four search terms (hurricane, Sandy, flood, and storm) to obtain some 170,000 geotagged tweets to examine geographic patterns of impact and resilience [24]. Here, usage of Twitter data to guide individual behaviors seen as more resilient was more common in geographic neighborhoods of higher socioeconomic status, suggesting that while access to social media can help improve resilient outcomes, preexisting inequalities continue to shape social vulnerability to disaster. In a similar fashion, more than twelve million records from New York City's 3-1-1 service request system made during the aftermath of Hurricane Sandy were utilized to validate a "Resilience to Emergencies and Disasters Index (REDI)," a geospatial benchmark of relative neighborhood resilience capacity for urban settings [25]. The 24-item index tracked well with the frequency of 3-1-1 complaints, which was conceived of as representing resilience as a function of the interaction between individuals and their municipal service providers. However, the authors attempting to measure the REDI indicator reported challenges in accessing the full range of data necessary to complete the index and suggest there exists a high threshold for the availability and accessibility of fine-grain data that larger-scale assessments of community resilience continue to struggle with. New York City's 3-1-1 service request system has also been used by other scholars to examine community resilience measured as the average lag time in response to service calls before and after Hurricane Sandy, where damage to municipal infrastructure like traffic and street lights experienced greater lag time than immediate rescues [26].

Attention to urban resilience, as evidenced in the multiple new approaches developed in response the Hurricane Sandy's impact on New York City, has also been a central theme relevant to advancements in resilience measurements. Here, recent researchers are paying attention to aspects of resilience especially applicable to urban communities such as population density, public infrastructure, and complex governance systems [9, 10]. Resilience to urban flooding in response to climate change and sea level rise, with a particular emphasis on cities' existing flood management infrastructure, also has driven recent attention to measurement issues [27, 28].

Social Capital and Community Resilience and Recovery

The linkages between social capital and community disaster resilience continue to provide researchers with potential mechanisms explaining a variety of post-disaster outcomes. In the post-disaster context, social capital is seen as an important resource that enables individuals, households, and potentially even communities to obtain and mobilize additional sources of support through pre-existing and emergent social networks. Social capital research on disaster recovery and resilience has focused on a multitude of outcomes and processes ranging from improving physical and mental health recovery, utilizing social media to access information, mobilizing key material resources, and influencing formal decision-making [29]. Yet, even with the continued growth in the examination of social capital's role in promoting community disaster resilience and recovery, there remain core challenges largely tied to the lack of theoretical anchoring and highly varied operationalizations of both resilience and social capital. Nonetheless, the scholarship on the relationship between them in the past year has led to several significant advancements worth consideration.

For example, in the aftermath of the 2011 Great East Japan Earthquake, elderly survivors who rated their community connections prior to the catastrophe as robust tended to suffer less cognitive disabilities from the disaster than their peers who previously perceived more social isolation [30]. Furthermore, those earthquake survivors who interacted more with other victims after the event also experienced improved mental health compared with those that had fewer social interactions—a known risk for vulnerable disaster victims who may have fewer sources of social support. This natural experiment provides persuasive evidence for enhancing disaster resilience through increasing informal social relationships both as pre-disaster preparedness and as a mechanism for improving recovery.

Although lacking the same opportunity to examine post-disaster recovery, a similar case study to the one in Japan allowed to further determine which specific components of social capital contribute to disaster preparedness among vulnerable women in Ethiopia [31•]. In evaluating the potential of an economic empowerment intervention for women, the researchers break the concept of social capital down into four components, social network support, emotional support, collective action, and trust, and attempt to assess which of these dimensions were more likely to enhance an individual's perception of disaster preparedness. Whereas most approaches to social network analyses of resilience potential focus on a functionalist framework of mobilizing resources, the Ethiopian women participating in this disaster-readiness intervention found greater value in the emotional support derived from their personal social networks. This finding is an important

contribution to the literature on social capital and disaster resilience, as it attempts to delve further into the specific functions of social capital that might lead to resilient outcomes rather than using the concept broadly as the majority literature still tends suffer from.

However, not all forms of social capital is created equal [32]. In examining how victims recovered from the 2013 Southern Alberta Flood in Canada, most residents experienced negative declines in important post-disaster recovery measures such as place attachment despite some expansion of personal social networks following the events of the crisis. More theoretical takes on how resilience thinking could better consider the function of social capital challenges researchers to think more deeply about the potential mechanisms linking social capital to resilience by demonstrating that its most common form, bonding capital, can indeed have a "dark side" through entrenchment in traditional social institutions leading to conflicts, patronage networks, and constrained access to vital resources [33]. Findings like these continue to expand on our understandings of the mechanisms linking social capital and disaster recovery, as well as the limits on those effects.

From Resilience Thinking to Resilience Practice

Despite the significant growth in the scholarship of resilience thinking and practice, studies of resilience practice remain comparatively scarce [34]. As the scholarship on resilience, both conceptually and in measurement, is increasingly being advanced, so too are applications of resilience thinking in disaster preparedness and planning. There are likely countless more applications of the concept than we are able to witness through scholarly publications. With major international programs such as the United Nation's Sendai Framework for Disaster Risk Reduction 2015–2030 and the Rockefeller's 100 Resilient Cities program launching in recent years, we should expect to see a further increase in case studies from around the world. At this point in time, we can still glimpse several emerging trends into best practices and opportunities for further advancement.

A central element of the recent literature on the practice of resilience is the pursuit of authentic community partnerships and the importance of collaboration in establishing effective capacity-enhancing programs. From utilizing community-based participatory methods in the assessment of patterns of resilience [35, 36] to the inclusion of nontraditional partners such as schools [37, 38], finding new ways of building and utilizing partnerships between on-the-ground practitioners and academics continues to drive interest in resilience and recovery programs. At the same time however, it also remains important to recognize the significance of context and complexity in specific case studies and that no "one-size-fits-all" model can address every locality's needs [39]. Resilience-building interventions are often unlikely to work outside the

community they were designed for due to challenges including "regional differences, jurisdictional differences, linguistic differences, cultural differences, as well as differences in risk perception, and governmental capacity" [40]. Attention to these contextual differences, while ideal for crafting the "best" resilience program for each locale, can make generalization on lessons learned and implementation of best practices especially challenging.

One study published in 2018 partially addresses this challenge through a novel experiment that compares the growth trajectories of 16 community coalitions organized around either community resilience or emergency disaster preparedness in Los Angeles, California, as part of the work of the Los Angeles County Department of Public Health [41]. The more traditional approach to emergency disaster preparedness training emphasized planning, addressing the needs of special populations, and strategies for linking with community groups while the community resilience training introduced stakeholders to the concept of resilience and the importance of partnerships with diverse stakeholders. Although the conceptual grounding in building community resilience was initially met with less trust than the traditional emergency preparedness approach, over time, the training activities emphasizing community resilience such as capacity building and enhancing diversity led to greater growth in those coalitions, even across geographic regions.

Other single case study assessments of program building can yield similarly useful findings. For example, a qualitative assessment of the dynamics of a long-term resilience-building project in Australia concerned with the sustainable management of land, vegetation, and water that helps natural resource management organizations develop long-term strategic plans concluded with four lessons that could be applicable to any setting: (1) collaboration with entrepreneurs, interpreters for including diverse populations, and networks is essential, (2) context matters, especially in terms of time and funding, (3) engaging internal and external actors is essential, and (4) be prepared for complexity and uncertainties [34].

Conclusions

Today, resilience thinking can be found anywhere one looks, from self-help guides on coping with hardships to major international agendas on reducing impacts from climatic change. From its humble origins as a mechanism to explain plant community's patterns of returning to an equilibrium state, resilience has come quite far. Yet, with its rapid rise to scholarly and policy prominence has come a fair amount of conceptual confusion and misapplication. This review of the literature published in 2018 on community resilience finds continued attention to the importance of social connectedness and the networks that help individuals, organizations, and

state share information and resources that can improve our ability to adapt and cope with crises. Concepts like social capital are increasing utilized to examine how individuals connect with each other, as well as their communities and governments, to determine what decisions are likely to lead to more resilient outcomes and processes. Occasionally, scholars have attempted to refine the concept of social capital to examine specific mechanisms such as trust and emotional connection that may make individuals and their communities more resilient in the long-term.

Yet, even with this continued emphasis on refining concepts like social capital, improving measurement of resilient outcomes, and discovering new means of applying resilience-building to diverse settings, there remains something of an "equity gap" in current conceptualizations and applications of resilience to the field of community disaster preparedness and recovery. Although several of the new indicators and datasets help refine the scale at which we can observe resilience processes and outcomes, more could be done to consider pre-existing inequalities that contribute to disaster vulnerability and inhibit preparedness and response and how investments in aspects of resilience such as social trust, diverse partnerships, and cooperation improve not only the capacity to be more resilient in the future but also core socioeconomic factors that are likely to be limiting that capacity in the first place. Assessments of resilience of this type might prioritize measures of social equity as foundations of that capacity to be resilient into the future and identifying mechanisms through which a more just society contributes to improved disaster preparedness and response.

The growing field of community resilience holds much promise for promoting systemic change in how we prepare for future disasters. At its core, the social connections that bind community members together and to social institutions provide the foundations for the evolving field. As we continue to examine the effects of disasters on individuals and their communities, we increasingly are able to observe the mechanisms that reduce risks and improve recoveries and translate these findings into action, and based on those mechanisms, new approaches to enhancing community resilience of resilience are being developed and applied across the globe in efforts to build social networks linking diverse stakeholders and encouraging resource managers and policymakers to invest in adaptive capacities for coping with our ever-changing environments.

Compliance with Ethical Standards

Conflict of Interest The author declares that he has no conflicts of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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