



Linking resilience, vulnerability, social capital and risk awareness for crisis and disaster research

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Abstract

Crisis and disaster research has extensively contributed to theoretical, conceptual, methodological and empirical advances in the understanding of resilience, vulnerability, social capital and risk awareness. These concepts identify complex social phenomena, which are intensified, in both positive and negative terms, by crises and disasters. However, the accumulation of knowledge about these notions has produced a vast range of definitions, which affects the way they are used in the study of crises and disasters. This paper sets a research agenda, by promoting a conceptual model to help simplify and make more researchable these complex concepts. This model stems from a triangulation of methods, with the goal of providing more researchable definitions of these notions and of illustrating linkages among them, seldom addressed in the way this model suggests, in the context of the crisis management cycle.

KEYWORDS

concepts, crisis, links

1 | INTRODUCTION

The aim of the paper is to set a research agenda, by promoting a conceptual model to help simplify and make more researchable some central but often complex concepts used in crisis and disaster research.¹

Terms such as 'resilience', 'vulnerability', 'social capital' and (risk) 'awareness' are recurrent in political discourse, media outlets and scholarly research, each time a pandemic, earthquake, flood or terrorist attack affects our societies. In the political realm, these terms are used to generate political responses and practical solutions. Media outlets mainly apply them to investigate crises' contexts and challenges. Scholarly research into crises and disasters usually uses these concepts to describe, explain and analyse societal phenomena such as: how societies, groups, communities, individuals or organizations respond to negative events; which social, economic or political consequences crises provoke; and

what changes are needed in the fabric of a society to avoid, prevent or mitigate a crisis. Indeed, crises frequently question resilience and social capital, confirm known vulnerabilities, reveal unknown ones and disclose the extent to which societies are aware of risks.

Crisis and disaster research has contributed to a better understanding of resilience, vulnerability, social capital and risk awareness through theoretical, conceptual, methodological and empirical advances. Several perspectives, paradigms, critiques and debates have provided an abundance of widely varied scientific research on conceptual developments, their practical relevance, the dynamics among them and the interplay between theoretical perspectives and empirical phenomena. The meaning of social capital (Adler & Kwon, 2002; Bhandari & Yasunobu, 2009) and resilience (Brand & Jax, 2007; Manyena, 2006; Woods, 2015) in crises and disasters has been extensively explored. Studies on resilience and reliability (Kruke & Olsen, 2005; Pettersen &

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Schulman, 2019), resilience engineering (Hollnagel et al., 2006) and risk, disaster and resilience (Tierney, 2014) have promoted new ways of explaining resilience in crises and disasters. In disaster theory and practice (Wisner, 2001; Wisner et al., 2004), vulnerability (Bankoff et al., 2007) has been studied in its links with risk, hazards and disasters (Blaikie et al., 1994; Renn, 2008a). The same notions of crisis and disaster have been debated. For instance, scholars have contributed to the conceptualization of crisis and crisis response patterns, in terms of disaster (Quarantelli, 1998), creeping crisis (Boin et al., 2020), crisis development and termination patterns (Boin & 't Hart, 2001), crisis predictability and influenceability (Gundel, 2005), public behaviour in disaster situations (Auf der Heide, 2004; Tierney et al., 2006), situational awareness (Endsley, 2015), crisis communication (Coombs, 2010) and possibilistic thinking regarding extreme events (Clarke, 2008). This scholarly research is highly interdisciplinary and has borrowed these concepts from other disciplines, such as sociology, psychology, development studies and public administration. This borrowing has boosted the conceptual development of these terms and several attempts to transform them into measurable variables: a positive indicator of scientific growth.

Nonetheless, the vast array of definitions and operationalizations has made these concepts more complex to understand and explain than the empirical phenomena they are applied to. Indeed, Staupe-Delgado and Kruke have correctly pointed out a major challenge in this field of research: namely, 'an apparent absence of terminological and theoretical coherence' (Staupe-Delgado & Kruke, 2018, p. 213). This paper calls for a more precise set of definitions and the identification of links, which will spur additional research.

The paper is organized as follows. First, we provide the method that led our study; second, we present a synthesis of various definitions of the four key concepts from crisis and disaster research, proposing a more researchable definition for each concept, based on this synthesis; third, we present a conceptual model, linking 'resilience', 'vulnerability', 'social capital' and 'risk awareness', to generate assumptions about their relationships within the three phases of a crisis. The paper concludes with a short summary of results and the outlook for future research.

2 | METHOD

To achieve this paper's goal, triangulation of methods has been applied. Using a snowballing approach, the paper first drew on a wide scoping review (see Arksey & O'Malley, 2005) to assess the literature on the four concepts. This was followed by a semisystematic review and an iterative simplified Delphi process (see Fletcher & Marchildon, 2014), all presented below. The rationale for choosing a combination of methods was to start with a study on theoretical approaches to the concepts used in crisis and disaster research, but from a variety of disciplines, then to narrow down the work to the understanding of these concepts in crisis and disaster research and, finally, to discuss the findings with experts in a simplified Delphi process.

In line with Mays et al. (2001, p. 194), the scoping review's goal was 'to map ... the key concepts underpinning a research area and the

main sources and types of evidence available'. The field of crisis and disaster research is transdisciplinary, and the terms 'resilience', 'vulnerability' and 'social capital' are borrowed concepts. Therefore, the first stage of the research involved a scoping review, to examine a wide range of theories, frameworks, conceptual components and methods related to these concepts outside the limits of crisis and disaster research but, rather, within the disciplines that generated them and contributed to their scientific advance (sociology, psychology, engineering, etc.). This was followed by a semisystematic review, to assess the state of knowledge on these concepts in crisis and disaster research. The semisystematic review looked at how research into our key notions has progressed over time, by identifying theoretical and empirical contributions that focus on one or more of them, their underpinning attributes, their referent objects and the relationships between two or more of these concepts. The third method applied was an iterative simplified Delphi process over a 5-month period, consisting of workshops and questionnaires, with the goal of receiving feedback on the conceptual model's development and the definitions of the concepts from a total of 22 experts (mainly academics and stakeholders working with crisis and disaster management). From the synthesis of conceptualizations and definitions of the four notions, stemming both from the scoping and the semisystematic reviews, we isolated the most frequently occurring characteristics. Through the iterative simplified Delphi process, we raised questions about their relevance within the three phases of a crisis. Definitions, agreed for each notion, and the model were the outcome of the Delphi process. The definitions do not pretend to be exhaustive but, rather, to encourage reflection among researchers on how resilience, vulnerability, social capital and risk awareness can be 'measured' and which relationships are the most relevant in the crisis phases.

The iterative simplified Delphi process followed these stages:

Stage	Activity	When
S0	Academics and stakeholders, experts in crisis and disaster management, were invited by email to contribute	01.2020
S1	Experts' validation workshop on model's development and definitions of concepts; 11 experts involved—in situ	02.2020
S2	Online workshop with project's internal partners (mix of academics and stakeholders) to discuss workshop outcomes	02.2020
S3	Launch of the Howspace platform (questionnaire and discussion on model's development and definitions of concepts) 11 new experts involved—online	03.2020
S4	Analysis of content of the Howspace platform vis-à-vis the semisystematic review by project's internal partners (mix of academics and stakeholders)	04.2020
S5	Online workshop with project's internal partners (mix of academics and stakeholders) to discuss and refine findings	05.2020

Stage	Activity	When
S6	Presentation of findings in online academic colloquium	06.2020

In the first workshop (Stage 1), the model and definitions of the concepts were generally discussed, while, in the Howspace workshop (Stage 3), the new expert panel was presented with the model and definitions of the concepts stemming from the first workshop, which, in turn, was based on the semisystematic review. The model was first presented without explanation and then with a short explanatory text. The experts were invited to engage in questions such as:

On their own expertise

- What is resilience or vulnerability or social capital like?
- How do people act as regards risk awareness?
- How do public institutions act in crises?
- What features suggest that one individual or group or a community is resilient, while another is vulnerable?
- How does an individual or a group behave when a crisis unfolds?

On definitions

- Are you satisfied with the definition?
- Is the definition clear?
- How would you improve it?

On the model

- What do you think this model describes?
- Is it easy to understand?
- Do you have suggestions on how to improve the model and the linkages therein?
- Do you have suggestions on how to improve the explanatory text?
- Do you have suggestions on new linkages?

The Howspace platform was organized in such a way that experts could write their comments and suggestions, answering the series of questions, and could see comments from the other experts and eventually interact with them but without being identified, to mitigate bias.

3 | BUILDING BLOCKS FOR THE CONCEPTUAL MODEL

3.1 | The crisis management cycle as research context for the key concepts

The work of the semisystematic review was guided by a precise understanding of crises and disasters (see Roux-Dufort, 2007). Firstly, we endorsed the approach of Boin and his colleagues to crises: treating them as a more general dimension, which also includes disasters (Boin et al., 2018; Perry, 2018). In addition, we reviewed the four concepts according to Rosenthal et al.'s definition of crises as 'periods of upheaval and collective stress, disturbing everyday patterns and threatening core values and structures of a social system in unexpected, often unconceivable, ways' (Rosenthal et al., 2001, p. 6). Finally, we argued that, to understand crisis development and termination patterns, we need to consider the causes leading to the crisis, the characteristics and consequences of the crisis, and the recovery processes, including the learning aspects. Thus, we need



FIGURE 1 Crisis as a circular process (Kruke, 2012, p. 8)

to study all phases of that event, according to the examples of crisis management, disaster management or emergency management cycles provided by researchers (see Boin et al., 2005; Kruke, 2012; Olson, 2000; Turner, 1976) and by national and international agencies (see FEMA, 2021; United Nations [UN], 2009). They propose four-phase (mitigation, preparedness, response, recovery) or five-phase (mitigation, preparedness, prevention, response, recovery) models. Research also criticises the term 'phases', since it oversimplifies often complex phenomena (see, for instance, Coetzee & van Niekerk, 2012; McEntire et al., 2002; Neal, 1997). Both Turner (1976) and Kruke (2012) addressed these criticisms by proposing a circular model, in which we return to a new normal situation in the precrisis phase (which includes preparedness and prevention), after an acute (response) and a postcrisis phase (recovery and learning). The new normality should hopefully be more robust than the previous one, which led to an acute crisis. The figure below follows crisis development through the three interrelated phases, each containing the main activities of the crisis management cycle (Figure 1).

Starting from the precrisis phase, a crisis can simmer long before its manifestation in the acute phase—a slow-burning or creeping crisis (Boin et al., 2020)—or it can be fast-burning (Boin & 't Hart, 2001). When a crisis occurs, prevention and preparedness activities from the precrisis phase are displayed in the management of the acute crisis. In the postcrisis phase, it is not only recovery, such as restoration, reconstruction and the implementation of disaster risk reduction measures, that is important but also learning activities. Lessons learned may contribute to a better understanding of why that particular crisis occurred, to improve the quality of the response in the acute phase and to avert or contain consequences in the next crisis. Both recovery and learning activities should aim to achieve greater resilience, in terms of both prevention and preparedness, if/when the next crisis strikes. The following section presents the four concepts (resilience, vulnerability, social capital and risk awareness).

3.2 | The four concepts of the model

3.2.1 | Resilience

The original meaning of 'resilience' lies in the Latin verb *resilire*, which means to bounce back or jump back (see Alexander, 2013). The accumulation of knowledge on resilience is impressive and varied, but there is little consensus as to its nature and substance (see Dunn

Cavelty et al., 2015). The scoping review showed that the main reason for this is the fact that conceptualizations and analyses on resilience cut across several disciplines: engineering sciences, ecology, organizational studies, sociology, political science, international relations, security studies, geography, economics and psychology, to name a few. Even within disciplines, there are different understandings.

In crisis and disaster research too, our semisystematic review uncovered a plurality of definitions and attributes for resilience. These, inevitably, have different implications, especially when resilience is promoted in policies such as disaster risk reduction (ECHO, 2020; UN, 2015). The referent objects for resilience are also several: individuals, groups, communities, institutions, infrastructures, the whole of society, while shocks or disturbances, which jeopardize the normal functioning of a society and its components, can take the shape of a risk, a hazard, a crisis or a threat, ranging from the unknown to the uncertain. Resilience has been described as the ability or capacity to adapt (see Chandler, 2012), such as a process of 'coping' (O'Malley, 2010, p. 488), of adaptation (Kaufmann, 2013), of 'patterned adjustments' (Bourbeau, 2018, p. 13) or 'of preparing and responding' (Brunner & Giroux, 2009, p. 6). It has also been defined as a 'protective strategy against unknown or highly uncertain hazards' (Renn, 2008b, p. 179). Some scholars argue that resilience should be considered a boundary object (Brand & Jax, 2007; Tierney, 2019). This leaves resilience more like a general approach or attitude than a concept, as Joseph (2018) argues. Influenced by Foucault, Joseph relates resilience to liberal or neoliberal forms of governance, with an emphasis on awareness, learning and adaptation (Evans & Reid, 2013; Joseph, 2013, 2016; Neocleous, 2013; Walker & Cooper, 2011; Zebrowski, 2013). Chandler (2014) argues that resilience is, in fact, indicative of a postliberal paradigm because of its focus on adapting to external problems or threats rather than trying to change them.

One of the most diffuse definitions of resilience is promoted by the UN, which describes resilience as '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' (UN, 2009, p. 24). In this definition, resilience is a skill, possessed by a system, a community or a society, to respond to a shock in an effective manner. However, this definition can be criticized for being too conservative in its wording: 'resist', 'preservation' and 'restoration' suggest a return to a status quo ante, which is not always the case, if the conditions that existed before the crisis actually led to the crisis itself (Kruke & Morsut, 2015).

This plurality of definitions points out that resilience mainly concerns reactive or proactive behaviours in a society or community (Hills, 2000). On one side, resilience can be displayed as a reactive capacity or ability, which can be understood as a form of self-organization, a spontaneous reallocation of energy and action to achieve a collective goal in a changing environment (Comfort

et al., 1999) or an ability to both bounce back from errors and handle surprises in the moment (Wildavsky, 1991). As such, an individual, society or community relying on reactive resilience seeks to manage the unknown by strengthening the status quo ante and making the present system resistant to change (Klein et al., 2003, p. 39). On the other side, a proactive, resilient society or community accepts the inevitability of change and tries to create a system that can monitor changes and adapt to new conditions and imperatives, through processes of adaptation and adaptive management (Comfort et al., 1999; Wise, 2006). In both cases, there is a need to understand which societal structures allow individuals and groups to become resilient. Societies should strengthen existing capacities and promote new ones, as well as enabling individuals and groups to develop them, since resilience needs to be fostered through societal engagement (Krüger, 2019).

Resilience represents the first building block of the conceptual model. During the iterative simplified Delphi process, it was extensively discussed together with vulnerability, since, in the most rigid understanding of the term within physical and engineering sciences, resilience has been studied as the antonym of vulnerability (see Hollnagel et al., 2006). Nonetheless, a consensus was reached to define resilience as *processes of proactive and/or reactive patterned adjustment, adaptation and change enacted in everyday life but, particularly, in the face of risks and crises*. By using the term 'processes', we aim, on one hand, to make its operationalization more feasible. On the other hand, we promote vulnerability and resilience as not mutually exclusive.

3.2.2 | Vulnerability

Vulnerability indicates susceptibility to harm and has become central in crisis and disaster research, as it unveils the social aspects of a crisis. Vulnerability has been subject to many studies stemming from several disciplines, ranging from sociology and psychology to behavioural sciences (Bankoff et al., 2007; Blaikie et al., 1994; Buckle, 1995; Olsen & Lindøe, 2009; Wisner et al., 2004, 2012). Our semisystematic review uncovered two main perspectives on vulnerability in crisis and disaster research. On one side, vulnerability is treated as an intrinsic and stable characteristic of an individual, group or community (Begg, 2018; Box et al., 2016; Parthasarathy, 2018; UN, 2013). This perspective promotes an essentialist or static understanding of vulnerability. For instance, certain social groups, due to their personal conditions, such as being poor or old, are ontologically susceptible to harm. This essentialist understanding is, to some extent, plausible, as vulnerable groups, such as the poor or elderly, are similar all over the world and throughout a diversity of crises. On the other side, the existentialist or dynamic perspective takes a situational approach to vulnerability. In this reading, vulnerability is situational and relative and, thus, dynamic (Hilhorst & Bankoff, 2004). This understanding encompasses three aspects: personal conditions, external circumstances and actual exposure (Tierney, 2019;

Wisner et al., 2004). Their interplay results in situational vulnerability. First, account must be taken of personal conditions, such as race, gender, age, disability, education, previous experience, social networks and societal status, to name a few. These conditions influence vulnerability but do not necessarily lead to it. They intertwine with other factors, like the social context, with its societal power hierarchies, discrimination and the existence or not of social support services, all of which have a strong effect on vulnerability. Furthermore, while all these factors mutually interact, a crisis can unfold, leading to a higher risk of becoming vulnerable due to actual exposure.

The dynamic perspective of vulnerability reveals two important aspects: firstly, vulnerability is dependent on the actual exposure to the crisis; secondly, vulnerability changes over time. Hence, one should talk about vulnerabilities in the plural form. In addition, the dynamic perspective helps to better grasp the diversity within social groups, such as the elderly, persons with disabilities, people that are part of a minority, as their condition is embedded in a social context which discriminates against or disadvantages them. Tierney summarises this perspective: '[...] social vulnerability has temporal, spatial, and situational dimensions. It exists at particular points in time and in particular locations; while disaster vulnerability is shaped by historical trends, conditions can also evolve and vary in ways that make individuals and groups more or less vulnerable, both in terms of impacts and in terms of outcomes' (Tierney, 2019, p. 125). As such, vulnerability can better be understood as a result of intersectional and interdependent factors that produce socially differentiated impacts (Bolin & Kurtz, 2018; Kuran et al., 2020). In this vein, all members of society have sources of resilience and vulnerability that ultimately serve to prefigure their ability or inability to prepare for or cope with a crisis (Hewitt, 2013; Lindley et al., 2011).

Based on this dynamic understanding of vulnerability, we added this second block to the model, close to the resilience block, since we defined vulnerability as *entities' (individuals, groups, society) dynamic characteristic of being susceptible to harm or loss, which manifests as situational inability to access adequate resources and means of protection to anticipate, cope with, recover and learn from the impact of natural or man-made crises.*

3.2.3 | Social capital

Scholars such as Coleman (1988), Putnam (1993), Bourdieu (1997) and Lin (2001) have greatly contributed to the diffusion of this concept. Bourdieu explains social capital as one of four types of capital, alongside economic, cultural and symbolic capital, defining it as 'the aggregate of the actual or potential resources which are linked to a durable network of more or less institutionalised relationships of mutual acquaintance or recognition' (Bourdieu, 1997, p. 51). According to Bourdieu, the volume of social capital is mainly determined by the amount of capital in other forms that an individual possesses (Bourdieu, 1997); therefore, it is always unequally distributed in the social space, enabling hierarchies.

Despite its growing popularity, social capital is still widely debated, both as a concept and regarding how it should be correctly operationalized. Aldrich argues that research on social capital has struggled to determine whether the concept constitutes 'the data about, reputations of, and information flowing between members of a group or if it is the network of relationships and connections' (Aldrich, 2012, p. 29). He suggests that some scholars focus on social capital as the wires 'through which information and resources run', while others highlight social capital as the electricity 'running through those wires, that is, the information and resources that are passed back and forth' (Aldrich, 2012, pp. 29–30). Putnam belongs to the first group, defining social capital as the 'trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions' (Putnam, 1993, p. 167). His definition entails three facets of social capital: horizontal networks of interpersonal communication and norms of reciprocity that together foster social trust (Putnam, 1993, pp. 171, 173). Lin (2001) belongs to the second group, defining social capital as 'resources embedded in social networks accessed and used by actors for action' (Lin, 2001, p. 25). He suggests that 'bridges' within social networks facilitate flows of information and influence (Albrecht, 2017, p. 21). Close ties commonly hold the same type of information, while new information and resources are provided by individuals outside their close network (Albrecht, 2017).

In crisis and disaster research, resilience and vulnerability have been increasingly studied together with social capital (see Aldrich & Meyer, 2015; Norris et al., 2008; Wickes et al., 2015; Wisner et al., 2004).

Aldrich's research on social capital builds on Lin's network view that envisions social capital 'as the resources available through bonding, bridging, and linking social networks along with the norms and information transmitted through those connections' (Aldrich, 2012, p. 33). Bonding, bridging and linking social capital (Falk, 2015, p. 29) play an important role in the phases of a crisis. Bonding social capital refers to relations between individuals who are similar to each other and emotionally close, such as friends or family, and proves useful for social support and assistance, especially during and after a crisis (Aldrich & Meyer, 2015, p. 259). Bridging social capital allows for 'linkage to external assets and for information diffusion' (Putnam, 2000, p. 22), connecting individuals across various ethnic and racial groups, bringing together different communities (Aldrich, 2011, p. 83). Linking social capital connects regular citizens with those that hold positions of authority and power (Aldrich, 2011, p. 84).

Almost all the studies in the semistructured review consider social capital to have some positive effects, in terms of increased resilience or decreased vulnerability. For instance, social capital influences households' preparedness. At the same time, the reviewed studies indicate that people may be both vulnerable and resilient at the same time, since the composition of their capital is complex, and its relevance depends on several social and economic components. MacGillivray (2018) refers to the 'dark side' of social capital, to describe social capital that is fostered by ethnic hostility and patronage

networks. In this sense, social capital can reinforce existing systems of discrimination and justify public programmes that provide benefits locally but without helping those at the margins of society (Aldrich, 2012). Indeed, discrimination and inequality make access to and the generation of social capital more difficult. In general, neglecting to consider the negative aspects of social capital in crises can reinforce the argument that individuals and groups are responsible for their own ways to respond to and recover from a crisis. Therefore, social inequalities, of which social capital is a *reinforcer*, are not taken into account by the same authorities, which, on the contrary, should fight against them.

We considered social capital as a concept influencing resilience and vulnerability in positive and negative ways before, during and after a crisis. As such, we defined it as: *norms, values, trust and networks, embedded in societies and their inequalities, that entities (individuals, groups, society) may have available and which may offer resources for mutual support and for facilitating coordination and co-operation in the face of risks and crises.*

3.2.4 | Risk awareness

The semisystematic review provided most of the knowledge about this concept, revealing that scholarly research has studied risk awareness from three broad perspectives: (1) as a synonym for risk perception, (2) as a component of risk perception, together with risk preparation and worry or (3) as a concept differing slightly from risk perception, often associated with communication about risks, worry, knowledge and the assumption of proper behaviour.

As for (1), some scholars use the term 'risk awareness' interchangeably with risk perception, a well-known concept thanks to 60 years of research. Generally, risk perception refers to the subjective, intuitive and contextual mental constructions about a risk, based on cognitive and affective factors (see Lechowska, 2018; Slovic, 1987). For instance, in a study about natural hazards, Wachinger et al. (2013) found that risk awareness was used as a synonym for risk perception by authors like Burningham et al. (2008), Pagneux et al. (2011) and Stanghellini and Collentine (2008). However, individual risk perception does not necessarily lead to a willingness to prepare for adverse events and thus to build resilience (Wachinger et al., 2013). As for (2), a second group of scholars considers that risk perception is characterized by risk awareness, worry and preparedness. Risk awareness is described in terms of knowledge or consciousness about a risk (see Raajmakers et al., 2008). Regarding (3), a third group of scholars associates risk awareness with public initiatives to make people aware or more aware about risks, to foster the right behaviour to enhance resilience. For instance, in a study about flood losses, Ridolfi et al. (2020) do not offer any definition of risk awareness but use the term to describe activities promoted by the authorities to focus attention on the flood risk. In a study about risk awareness of earthquakes in Portugal, Vicente et al. (2014) associate risk awareness with authorities' risk and crisis communication strategies such as risk awareness campaigns. Other studies stress the importance of risk

communication to increase risk awareness (Bakker et al., 2018; Haer et al., 2016; Keller et al., 2006). Scolobig et al.'s (2012) study on flood risk awareness in the Alpine region observes that risk awareness is associated with the worry people have about the risk and the way they behave by assuming precautionary measures. However, the willingness to take protective action against risks has been more strongly attributed to how others expect individuals, groups or communities to act (i.e., prescriptive norms) and the perceived efficacy of acting (van der Linden, 2015; Xie et al., 2019). Some studies also equate risk awareness with the concept of knowledge, as in Hori and Shaw (2013, p. 80), where awareness of local climate-related disaster risk is defined as 'the extent of knowledge in practice about risks due to climate-related hazardous impacts such as intense rains, floods, and landslides that may affect communities'.

In its use of the term 'awareness', the UN often associates it with risk, hazard and the public. The definition of public awareness provided by the UN seems the one best encompassing what we argue are the main characteristics of risk awareness, such as knowledge, proper behaviour and risk communication: 'the extent of common knowledge about disaster risks, the factors that lead to disasters and the actions that can be taken individually and collectively to reduce exposure and vulnerability to hazards' (UN, 2009, pp. 22–23). In addition, the UN points out that 'Public awareness is a key factor in effective disaster risk reduction. Its development is pursued, for example, through the development and dissemination of information through media and educational channels, the establishment of information centres, networks, and community or participation actions, and advocacy by senior public officials and community leaders' (UN, 2009). In particular, risk communication is not limited to official and public risk communication but also includes individuals' communicative behaviour: how they interact with each other and the authorities, seek information, send and receive messages, use communication, and react to warnings or other relevant information (Hansson et al., 2020). Through social media platforms, such as Facebook and Twitter, crowdsourcing has rapidly become a relevant tool for risk (and crisis) communication among the people (Schimak et al., 2015; Sutherlin, 2013) and for government agencies (Harrison & Johnson, 2016). Risk communication has changed as a result of the increased use of social media, which has made the process more dynamic between authorities and citizens, in both positive and negative terms. On one hand, people can easily communicate with the authorities, providing, for instance, useful information about a crisis. On the other hand, there are challenges concerning the credibility of information sources and the reliability of information.

We treated risk awareness as the other concept influencing resilience and vulnerability and we defined it as *collective acknowledgement about a risk and potential risk prevention and mitigation actions, fostered by risk communication*. In addition, we considered the relationship between social capital and risk awareness. The semisystematic review revealed that there is a stronger relation between social capital and risk awareness, than vice versa. From the studies we analysed, it is difficult to conclude the extent to which risk awareness may influence social capital.

4 | PROPOSING A CONCEPTUAL MODEL LINKING RESILIENCE, VULNERABILITY, SOCIAL CAPITAL AND RISK AWARENESS

Based on the above definitions, we drew a conceptual model, which shows the relations between the four key concepts in the pre-, acute and postcrisis phases. This conceptual model was discussed during the iterative simplified Delphi process and adjusted according to the suggestions of the experts. We argue that these relations are not linear: they interact and exemplify very complex social phenomena, starting from the assumption that resilience and vulnerability coexist, intertwined, and are mutually interdependent. As such, we have represented them in a sort of yin and yang dyad. Resilience and vulnerability's relationship with social capital and risk awareness is exemplified by the arrows; the relation between social capital and risk awareness is stronger than vice versa, as the research has pointed out.

The process of adaptation and adjustment, typical of resilience, can also take a negative step, by contributing to vulnerability if, for instance, forms of social capital (organized or informal networks, levels of trust, etc.) are not known, supported or strengthened by authorities through proper policy measures. If there are individuals or groups that are unable to count on resources through their social networks, relying on these same networks for resilience may increase vulnerabilities (Figure 2).

Here, an outline of relevant linkages follows. First, social capital in the precrisis phase may encourage the entity to respond properly and promptly to the acute crisis phase, thus strengthening resilience. In addition, social capital becomes particularly important in the postcrisis phase, especially when central values or particular ties have been at stake in the acute crisis phase. The positive effects of social capital may: improve the efficiency of society, by facilitating coordinated actions (Putnam, 1993) in the acute and postcrisis phases; be an informal security net that assists people to access resources during and after a crisis (Masterson et al., 2014, p. 36); and constitute a crucial asset in the recovery phase following severe events (Albrecht, 2017, p. 23). However, social capital can affect vulnerability, for example when the strengths and bonds of individuals in a

network reinforce the status quo, keeping other individuals or groups out and thus more exposed to a crisis, with more challenges to face in the postcrisis phase. In particular, bonding social capital can be very strong in the precrisis phase, but, when the crisis unfolds, family or neighbours can become unavailable, leading to vulnerability. Bridging social capital can also slow or halt rebuilding for those with fewer social resources if the links with external assets are weak or non-existent. Finally, linking social capital does not help if, for instance, groups or communities are a priori excluded by the authorities, thereby reinforcing their vulnerability and leaving them even worse off (Kerr, 2018).

Second, social capital and vulnerability share the same roots in societal circumstances, such as hierarchies, discrimination and allocation of resources. They are both dependent on social structures and power relations in their interaction with personal conditions and specific situations. Thus, in general, by studying social capital, we gain an indication of the vulnerability and resilience of individuals, groups, communities or societies regarding adverse events (see Cutter et al., 2003, 2008; Folke, 2003; Paton et al., 2000). In this perspective, strengthening social capital is one way of tackling existing injustices provoked by power relations. However, there is a risk of increasing the vulnerability of those whose needs and constraints are not considered when designing means to enhance social capital. In addition, social capital and vulnerability are highly complex concepts, influenced by several endogenous and exogenous factors. In attempting to reduce this complexity, intersectional perspectives should be introduced and explored, to avoid a one-dimensional and deterministic explanation (Kuran et al., 2020). Furthermore, the emphasis on social capital runs the risk of reinforcing neoliberal tendencies that shift the burden of becoming resilient onto the individual, by commodifying personal relationships and declaring the individual responsible for enhancing networks, for instance.

Third, whenever risk awareness in a precrisis phase is at an 'acceptable' level, so that the entity acknowledges the risk and knows how to behave if the crisis unfolds, there is a high probability of the response during the crisis fostering resilience. However, if risk awareness is 'low' or nonexistent, the chances of vulnerability being exacerbated or displayed are much greater. Knowledge and beliefs

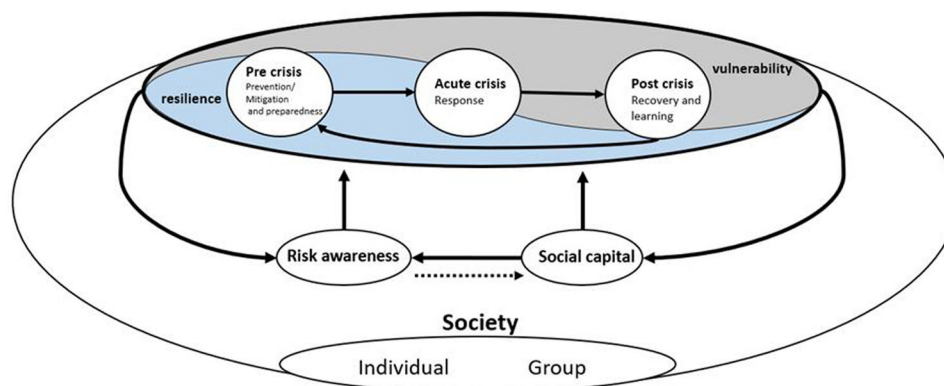


FIGURE 2 Conceptual model illustrating the relations among the concepts

about norms are shaped by communication, in the form of personal interactions with others (in person or via traditional and social media) and the consumption of media content (newspapers, television programmes, movies, books, social media platforms, etc.).

This leads to the fourth consideration regarding the correlation between social capital and risk awareness and how they relate to resilience and vulnerability. Being part of a network, accepting the same norms and trusting each other or the authorities, establishes interactions that also concern the understanding of a risk, through information sharing, for instance, in the precrisis phase. Social capital may provide sources of information, which can, in turn, improve risk awareness. In addition, how the members of a social network behave in the face of a crisis is influenced by both their risk awareness and trust-relationships. In particular, bonding social capital may keep memories about past crises alive, while bridging social capital may spread risk awareness. In this way, social capital may influence the degree to which vulnerability and resilience are displayed in both the precrisis and acute phases.

On the other hand, 'poor' social capital may also have negative effects. For instance, if a certain network lacks resources or is not as supportive as it should be, this can hamper risk awareness, due to insufficient knowledge and/or understanding of the risk, with negative consequences in the acute and postcrisis phases. To complicate the matter, it is not always the case that an entity, despite knowing the risk, is prone to changing its behaviour; thus, the same entity can become vulnerable during the crisis and face challenges in adapting and changing in the postcrisis phase. In addition, if the source communicating about the risk is not considered trustworthy or reliable, this can lead to biased risk awareness that, in turn, influences resilience and vulnerability. Social capital can significantly modify the influence of information on knowledge and beliefs regarding risks, particularly the willingness to take protective measures. Thus, one can speculate on the extent to which authorities could use shared norms, values, trust and existing networks to influence risk awareness. This is an important issue, especially when there is a lack of trust, or even distrust, between authorities and citizens who rely only on their own social networks in the acute crisis phase.

5 | CONCLUSION

This paper developed a model, linking complex concepts often studied in crisis and disaster research, but seldom addressed in the way this model suggests, in the context of the crisis management cycle. This model stems from a triangulation of methods, which resulted in more researchable definitions of these notions. Despite theoretical, conceptual, methodological and empirical developments in crisis and disaster research, there remains a need to study these concepts and their implied connections more systematically. Research challenges lie in the extent to which the linkages of the model mirror the reality, to find out whether we can 'weigh' one concept against others or where, in the phases of a crisis, crisis management efforts should be best directed to improve resilience. We call for more research that

indicates practical ways to build resilience by reinforcing components of social capital, such as trust and social networks, and risk awareness, such as risk prevention and mitigation actions, through ad hoc policy measures. Perhaps the most important implication is to make research more aware of the dynamic relationship between vulnerability and resilience and of constantly approaching these two concepts together with social capital and risk awareness when studying empirical phenomena. This can encourage policy measures that do not overlook the capacities of the individual or group and look beyond socioeconomic conditions.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available at <https://buildersproject.eu/>.

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ENDNOTE

¹Since there is no consensus on how to indicate the corpus of scientific literature which explores emergencies, crises, crisis management, risk management and disaster risk reduction (see Kuipers et al., 2019; Kuipers & Welsh, 2017; Rodriguez et al., 2018; Staupe-Delgado and Kruke, 2018), we use the label 'crisis and disaster research' throughout the paper.

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