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Abstract

Despite the ubiquity of disaster and the increasing toll in human lives and financial costs, much research and policy remain focused on physical infrastructure-centered approaches to such events. Governmental organizations such as the Department of Homeland Security, United States Federal Emergency Management Agency, United States Agency for International Development, and United Kingdom's Department for International Development continue to spend heavily on hardening levees, raising existing homes, and repairing damaged facilities despite evidence that social, not physical, infrastructure drives resilience. This article highlights the critical role of social capital and networks in disaster survival and recovery and lays out recent literature and evidence on the topic. We look at definitions of social capital, measurement and proxies, types of social capital, and mechanisms and application. The article concludes with concrete policy recommendations for disaster managers, government decision makers, and nongovernmental organizations for increasing resilience to catastrophe through strengthening social infrastructure at the community level.

Keywords

community resilience, social capital, disaster recovery, mortality, public policy, disaster

Catastrophes and disasters regularly affect more people around the world than highly publicized, but rarer, events such as terrorist attacks. In March 2011, the 9.0 magnitude earthquake, tsunami, and nuclear meltdowns in Tohoku, Japan, killed more than 18,500 people and displaced nearly half a million. In November 2013, Typhoon

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Yolanda ripped through the Philippines killing 6,000 people and causing hundreds of millions of dollars in damage. Disasters like these disrupt the fabric of community life and stress social systems (Fritz, 1961). Large-scale crises and catastrophes sit in the category of *wicked policy problems* as they have no technical solution, involve multiple stakeholders, and create ripple effects. Unfortunately, more individuals and property are at risk from disaster each year. Population growth, increasing inequality, migration, and development in hazard-prone areas, such as coastal regions, place more people and property in harm's way (Crossett, Culliton, Wiley, & Goodspeed, 2004). Anthropogenic climate change will bring rising sea levels and create the potential for more intense storms, droughts, and floods (Field et al., 2007). A common policy response to such risks has been strengthening physical infrastructure, building up seawalls, raising buildings on stilts, and ratcheting up building codes. However, no amount of investment in physical infrastructure will be able to reduce all risk and eliminate vulnerability. Furthermore, spending on disaster preparation moves with political cycles, not necessity (Healy & Malhotra, 2009). An alternative approach to predisaster mitigation, which also influences the recovery process, rests on strengthening social infrastructure, like social capital, that affects community resilience.

Community resilience describes the collective ability of a neighborhood or geographically defined area to deal with stressors and efficiently resume the rhythms of daily life through cooperation following shocks (Aldrich, 2012c). Many academic fields, including psychology (Bonanno, 2004; Masten, 2001), sociology (Mileti, 1999), socioecological systems (Adger, Hughes, Folke, Carpenter, & Rockstrom, 2005; Folke, 2006; Nelson, Adger, & Brown, 2007), and disaster research (Norris et al., 2008; Bruneau et al., 2003; Manyena, 2006), draw on the concept of group or community resilience. With rising disaster losses, disaster management experts have adopted various forms of resilience as a way to address losses and rebound from the impacts. For example, the U.S. Federal Emergency Management Agency's National Disaster Recovery Framework (FEMA, 2010), the Whole Community Approach to Emergency Management (FEMA, 2011), the United Nations Making Cities Resilient Campaign (UNISDR, 2012), the Hyogo Framework for Action (UNISDR, 2005), and the National Health Security Strategy (NHSS, 2009) all incorporate resilience in their frameworks. The Federal Emergency Management Agency (FEMA, 2011) suggested that local and national responders build and maintain partnerships among emergency management, community sectors, and organizations; empower local action through increased social capital and civic activity; and leverage and strengthen existing social infrastructure, networks, and assets. Similarly, the Australian Red Cross has developed a new manual for first responders focused on social capital (Australian Red Cross, 2012), and a number of new nongovernmental organizations (NGOs) formed in Tohoku, Japan post-3/11 have generating social capital as their core function (e.g., <http://www.ibasho.org>).

Disaster research has long recognized that communities regularly work together to survive and recover from catastrophic impacts (Fischer, 2008; Quarantelli & Dynes, 1977). While disaster situations may typically call forth images of trained professionals and formal rescue operations, scholarship has shown that informal ties, particularly

neighbors, regularly serve as actual first responders. Neighbors check on the well-being of others nearby and provide immediate lifesaving assistance. Following the 1995 Kobe earthquake, for example, the majority of individuals who were pulled from the rubble of their collapsed homes were saved by neighbors, not firefighters or rescue workers (Aldrich, 2012b; Horwich, 2000; Shaw & Goda, 2004). Following the March 2011 earthquake, tsunami, and nuclear meltdowns, survivors in Japan indicated that many of the elderly and infirm were saved from the incoming tsunami not by their own actions but by the assistance of neighbors, friends, and family (Aldrich site visits 2014).

Individual and community social capital networks provide access to various resources in disaster situations, including information, aid, financial resources, and child care along with emotional and psychological support (Elliott, Haney, & Sams-Abiodun, 2010; Hurlbert, Haines, & Beggs, 2000; Kaniasty & Norris, 1993). Despite the evidence about its efficacy, resilience research and disaster management practice have yet to fully embrace social capital as a critical component. Perhaps because scholars have agreed on fewer metrics for social capital than other economic or demographic factors (Meyer, 2013; Ritchie, n.d.), practitioners have underutilized social cohesion and social networks in disaster planning and management (Aldrich, 2010; Wisner, 2003).

In this article, we review the definition of social capital and its application to community resilience before, during, and after disasters, illuminating methods for capturing it qualitatively and quantitatively. We then move to empirical evidence for the significant role social capital plays in disaster response and recovery and conclude with policy recommendations for enhancing disaster resilience through deepening reserves of social capital.

Definition and Theories of Social Capital

Nearly a century ago, Louis Hanifan (1916) identified social capital as good will, fellowship, mutual sympathy, and social intercourse among a group of individuals and families who make up a social unit. Since then, multiple disciplines have adopted the concept, which, broadly speaking, identifies how involvement and participation in groups can have positive consequences for the individual and the community (Portes, 1998). Bourdieu defined social capital as one of four types of capital, along with economic, cultural, and symbolic, that collectively determine social life trajectories. In his definition, social capital is the aggregate of the actual or potential resources that are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition (Bourdieu, 1985). Coleman (1988) and Lin (1999a, 1999b) have drawn on Bourdieu's definition to focus on the effect of social capital for individual outcomes. Coleman (1988) focused on how social capital and social structures of relationships could be actualized into concrete resources for use by individuals. Lin further tied social capital to networks of relationships, defining it as resources embedded in one's social networks, resources that can be accessed or mobilized through ties in the networks (Lin, 2001). Robert Putnam (1995, 2000)

popularized this concept through an article in the *Journal of Democracy* titled "Bowling Alone," which he then expanded into a book by the same name. He focused on the role of social capital in generating benefits beyond individuals at the neighborhood and community level. In his earlier work on the differences between northern and southern Italy (which he traced to levels of civic engagement and civil society), Putnam (1993) defined social capital broadly as the features of social organizations, such as networks, norms, and trust that facilitate action and cooperation for mutual benefit.

There are multiple ways to try to measure social capital, and social scientists remain divided on ways of capturing it through objective measures. One set of proxies builds on the *attitudinal and cognitive* aspects of social capital. For example, surveys commonly measure general trust as an aspect of social capital by assessing the levels of agreement with statements such as "Most people can be trusted" or "Most people are honest" (Putnam, 2000, p. 91). Also, levels of trust can be measured in relation to certain groups, such as local government officials, national government representatives, first responders, neighbors, and relatives, such as trust that others will not go egotistically ("Do you trust others not to take advantage of you?") and trust in neighbors ("What level of trust do you have in those who live near you?"; Nakagawa & Shaw, 2004).

Another measurement approach looks instead at the *behavioral manifestations* of social capital in daily life, asking questions about—among other topics—leaving doors unlocked, the number of hours volunteered, membership in horizontal associations (such as homeowners' associations, sports clubs, and NGOs), and the number of names of known neighbors. For example, analysts ask respondents about their use of free time ("How many times have you donated blood in the last month?") and about the depth of their social connections ("With how many friends and contacts do you discuss your problems?"). The National Social Capital Benchmark Community Survey from Harvard University (2000, 2006) is the largest and most commonly used survey of social capital. It assesses individuals' sense of belonging in community and friend groups; participation in public meetings, political events, community projects; membership in religious, social, recreation, and NGOs; frequency of visiting with neighbors and friends; and volunteering.

Beyond the divide between cognitive and behavioral approaches, many researchers have begun trying to capture levels of social capital through experimental methods. Some have undertaken laboratory experiments (Cardenas & Carpenter, 2008) whereas others have undertaken experiments out in the field (Levitt & List, 2009). Field experiments may take advantage of natural conditions (called natural experiments) or they may actively divide subjects into control and experimental groups through field randomized control trials. Laboratory experiments facilitate studying the role of particular measures of social capital in isolation. Such experiments include providing currency or other material benefits to participants and having them play out classic rational-choice scenarios such as the Prisoner's Dilemma, Dictator Game, and Trust Game. Findings from these experiments show that in the place of formal institutions, social norms, and preferences manage behavior and that these informal institutions may

outperform formal rules and institutions (e.g., Ostrom, 1990). Rather than adopting purely rational, self-centered behaviors, for example, many field experiment participants chose to treat their partners with altruism.

Researchers have conducted research on social capital in real disasters using a wide variety of approaches including quantitative surveys, in-depth interviews, field observations, and statistical indicators from publicly available data. Based on evidence from different disasters, three separate projects recently generated indices to quantify disaster resilience, each of which included social capital (Cutter, Burton, & Emrich, 2010; Peacock et al., 2010; Sherrieb, Norris, & Galea, 2010). All three included data on participation in nonprofit, religious, and civic/political organizations, the number of registered voters, and voter participation. Other factors included in the indices are business and professional associations, owner-occupied units, census response rates, recreational organizations, migration rates and creative class employment, population residing in state in which they were born, ratio of two-parent households, and crime rates. With so many potential indicators more research is needed to understand how to weight these indicators within quantitative measures. While some researchers have begun to embrace social capital in their research, much work is needed to fully understand how social capital interacts with other forms of capital, how different forms of social capital contribute to disaster resilience, and how well different preevent measures of social capital predict postdisaster recovery.

Types and Applications of Social Capital

Some scholars now separate social capital into three main types: bonding, bridging, and linking (Aldrich, 2012a; Kawachi, Kim, Coutts, & Subramanian, 2004; Szreter & Woolcock, 2004). Each type identifies variation in strength of relationships and composition of networks and thus different outcomes for individuals and communities. *Bonding social capital* describes the connections among individuals who are emotionally close, such as friends or family, and result in tight bonds to a particular group (Adler & Kwon, 2002). Bonding social capital is commonly characterized by homophily (i.e., high levels of similarity) in demographic characteristics, attitudes, and available information and resources (McPherson, Smith-Lovin, & Cook, 2001; Mouw, 2006). The strong connection makes this type of social capital good for providing social support and personal assistance, especially in times of need such as disaster (Hurlbert et al., 2000).

In contrast, *bridging social capital* describes acquaintances or individuals loosely connected that span social groups, such as class or race. These ties are more likely to display demographic diversity and provide novel information and resources that can assist individuals in advancing in society. The classic example comes from Granovetter's (1983) work on the strength of weak ties, in which bridging ties provided more employment opportunities than bonding ties. Bridging social capital often comes from involvement in organizations including civic and political institutions, parent-teacher associations, and sports and interest clubs along with educational and religious groups (Small, 2010).

The third type of network connection is *linking social capital*, which connects regular citizens with those in power. Scholars have defined this type of network as embodying norms of respect and networks of trusting relationships between people who are interacting across explicit, formal, or institutionalized power or authority gradients in society (Szreter & Woolcock, 2004). Many local residents in the coastal villages of Tamil Nadu, India, for example, had never met a representative of their governments at any level. But some had met the collector—a sort of ombudsman—and that connection allowed them to get on the map for disaster aid following the 2004 Indian Ocean tsunami (Aldrich, 2012c).

Empirical Evidence of Social Capital in Disaster Settings

Disaster researchers have built up a strong body of evidence about the role of social cohesion and networks during and after catastrophe. Disaster scholars have used social capital to understand the trajectory of individuals (based on what resources are accessed through social networks) as well as communities (based on levels of trust, collective action, and other public goods). Social networks provide financial (e.g., loans and gifts for property repair) and nonfinancial resources (e.g., search and rescue, debris removal, child care during recovery, emotional support, sheltering, and information). Isolated individuals with few social ties are less likely to be rescued, seek medical help, take preventative action such as evacuate, and receive assistance from others, such as shelter (Dynes, 2005, 2006). In Klinenberg's (2003) study of the 1995 Chicago heat wave, isolated, elderly individuals were the most likely to die and not be found for days. Additionally, these deaths were more likely in a poor, African American community that had less public organizational space and less social capital than an equally poor, neighboring Hispanic community.

The first and most common form of social network available to disaster-affected individuals is *bonding social capital* (Norris et al., 2002). Deeper reservoirs of bonding social capital allow individuals to receive warnings, undertake disaster preparation, locate shelter and supplies, and obtain immediate aid and initial recovery assistance (Hawkins & Maurer, 2010; Heller et al., 2005). In disasters, family ties are central to resilience because kin commonly serve as the first providers of assistance (Drabek & Boggs, 1968; Garrison & Sasser, 2009; Haines, Hurlbert, & Beggs, 1996; Hurlbert et al., 2000). Individuals assume family members, especially immediate family of parents/stepparents, children, and siblings, will support each other in disasters, with 85% identifying at least one family member and 36% identifying *only* family members among their social capital networks for disaster assistance (Meyer, 2013). Bonding social capital can reduce individuals' likelihood of seeking formal aid from organizations during disasters (Beggs, Haines, & Hurlbert, 1996) and increase the likelihood of emergent social action to respond to disaster victims' needs (Shepherd & Williams, 2014). For example, Tse, Wei, and Wang (2013) found that Chinese households with larger Spring Festival networks—a social network that meets for yearly celebrations—increased the likelihood that the household would rebuild their home after the 2008 earthquake.

Higher levels of bonding social capital can translate into greater levels of trust and more widely shared norms among residents. Nakagawa and Shaw's (2004) study of the Gujarat and Kobe earthquakes uncovered that communities with high trust, norms, participation, and networks were able to more quickly recover from disaster. Even though the communities differed in cultural and economic characteristics, communities with higher social capital and community leadership showed the highest satisfaction with community rebuilding and quickest recovery. Feelings of mutual trust and dependence increased awareness of disaster management and volunteer opportunities and responsibilities, which in turn support disaster preparedness (Hausman, Hanlon, & Seals, 2007), collective response and recovery (Brunie, 2010), and adaptation and collective decision making for risk and recovery (Adger, 2003).

Similarly, Chamlee-Wright and Storr (2009) followed the recovery of a low income, Vietnamese immigrant community in New Orleans that was severely flooded during Hurricane Katrina. The tight-knit Village de L'Est was able to return and rebuild more efficiently than less damaged and richer neighborhoods based on both bonding social capital and the role of the Catholic Church in the community. Particularly, the local church was able to share goods that supported coordination in the community for recovery and political action to protect the area from outside redevelopment and zoning changes.

Although bonding social capital is the most commonly available social resource available, research has shown that bridging ties also alter the recovery trajectory. *Bridging social capital* has been shown to provide similar benefits in disaster contexts as it does in daily life—opportunities and information to access novel resources that assist in long-term recovery (Hawkins & Maurer, 2010). Ties to social organizations provide both connection to an organization that can provide support through institutional channels (e.g., a church collecting money for a family in need) and potential informal ties to individuals who may not be accessible through bonding social capital (e.g., friendships developing between church members from different socioeconomic backgrounds). For example, Haines, Hurlbert, and Beggs (1996) found that members of social groups received more support following Hurricane Andrew. Bridging ties contributed to resilience of the Mary Queen of Vietnam community through charitable action by local and national organizations, which brought in external resources and commercial cooperation between businesses and community members that provided resources and labor (Airriess, Chia-Chen, Leong, Li, & Keith, 2008; Chamlee-Wright, 2006).

Other studies have confirmed the role of bridging connections. Pre-World War II ties through voluntary associations and nonprofit groups provided strong resilience in Japan following the massive destruction of the war. While many of that nation's 47 prefectures struggled to rebuild schools, homes, and other institutions, communities with higher levels of bridging connections did so more efficiently (Kage, 2011). Aldrich (2012a) found that voter turnout and number of political gatherings at the community level were better indicators of population growth after the 1923 Tokyo earthquake than economic indicators, population density, or amount of damage. Number of nongovernmental organizations, clubs, and social groups have also been shown to positively correlate with postdisaster population recovery (Aldrich, 2012b).

Bonding and bridging social capital work in complementary but distinct ways during and after crises, and communities regularly have more of one type than the other. Elliott et al. (2010) compared disaster outcomes for residents of two communities in New Orleans, the Lower Ninth Ward, a poor, majority African American community, and Lakeview, an affluent, majority White community. They found that while Ninth Ward residents relied on bonding social capital for informal support during Hurricane Katrina, they received less support overall, including less sheltering assistance from social ties and less contact with neighborhood ties (bridging social capital) in the year following the event. The authors concluded that a lack of bridging social capital to people outside the affected area and ties with individuals with more resources resulted in reduced resilience for Ninth Ward residents compared with those in Lakeview. Hawkins and Maurer (2010) used qualitative interviews with Hurricane Katrina survivors and found that while bonding social capital from family and friends was important for immediate disaster needs, bridging social capital allowed networks to gather information and supplies from other races and economic strata. In contrast, Reininger et al. (2013) found that higher feeling of trust and perceptions of fairness in the community (measures for bonding social capital) were related to increased household preparedness, whereas organizational membership (a proxy for bridging social capital) had no effect.

While much research has investigated how predisaster levels of social capital affect postdisaster recovery, disasters can affect social cohesion especially when people are displaced or a majority of the community experiences losses. For example, Brouwer and Nhasengo (2006) found a complicated relationship with trust and reciprocal relationships to disaster resilience. Residents of Mozambique villages with higher social capital did provide more support following the 2000 floods to fellow villagers, but that support was limited to small items, such as food and supplies. The large scale of the disaster also reduced the number of residents involved in reciprocal sharing of farm labor and supply relationships, diminishing the village's overall level of social capital. Tobin-Gurley, Peek, and Loomis (2010) found that single mothers, who are more likely to rely on reciprocal favors in nondisaster settings, had difficulty recovering when displaced away from their social networks after Hurricane Katrina. Ritchie (2012) describes how the Exxon Valdez oil spill impacts and litigation required so much time and effort from Cordova, Alaska, residents that social capital activities, such as participation in public meetings and socializing with neighbors, declined. While Takeda, Tamura, and Tatsuki (2003) found that survivors in Japan expressed greater interest in civic activities and involvement following the earthquake, this finding existed among those with fewer losses or who recovered more quickly. From their research on technological disasters such as oil spills, Ritchie and Gill (2007) argued that social capital provides the theoretical umbrella to organize the social effects of these disasters such as declines in community cohesion, loss of trust in institutions, and less participation in social activities.

Finally, social capital is commonly viewed as positively affecting disaster resilience. Yet social cohesion—primarily bonding social capital—can also bring negative consequences in disasters. As a public good, social capital can be used to resist various disaster recovery needs. Following Hurricane Katrina, neighborhoods with higher

voter turnout before the storm were more likely to successfully resist the placement of temporary trailer housing in their neighborhood (Aldrich & Crook, 2008). In Tamil Nadu following the 2004 Indian Ocean tsunami, *uur panchayat* [caste councils] controlling the aid distribution process left off dalits, Muslims, and widows from the lists because they saw them as peripheral to the community (Aldrich, 2011). Decision makers need to recognize the potential “dark side” from strong in-group cohesion during and after disasters.

Policy Recommendations

Given the importance of social capital in determining resilience to shocks, NGOs and government agencies have adopted a number of policies and programs shown to increase reservoirs of trust and deepen networks. The various methods use existing networks and community activities as spaces for incorporating disaster issues and resilience actions or create whole new networks and activities focused specifically on disaster issues (Meyer, 2013). Some of these interventions include time banking, focus groups, social events, and redesign of physical and architectural structures to maximize social interactions.

One proven way to increase levels of social capital in communities has come from the practices of *time banking* and *community currency* (Lietaer, 2004). Both of these systems provide incentives or rewards for those who volunteer; in exchange for an hour of labor in a communal garden or at a school, for example, participants can receive an hour of moving aid or currency (such as Ithaca Dollars) redeemable at local merchants. By drawing out local residents who may otherwise not have volunteered and then connecting them with local small-scale merchants this approach creates a “virtuous cycle.” One study of 160 participants found both physical and mental health improvement from involvement in a time banking program (Lasker et al., 2011). Another study of community currency in a town in Japan found that “community currency involvement increases general trust, which demonstrates that it is possible to institute government programs that create social capital” (Richey, 2007, p. 69). Several disaster-affected communities including Onagawa, Japan, and Lyttleton, New Zealand, have adopted community currency programs or time banking systems and have claimed strong material and mental health benefits as a result (Aldrich site visit to communities, 2013).

A second way to increase trust and social cohesion comes from *focus group meetings* and *social events*; this approach includes general social activities such as parades, fairs, and block parties along with moderator-led discussions of topics such as the environment and school choice (Aldrich, 2010). Field experiments in Nicaragua and South Africa have demonstrated that regular meetings of neighborhood-level groups can create higher levels of trust not only in group participants but in society as a whole (Brune & Bossert, 2009; Pronyk et al., 2008). One small town affected by a tornado adopted various community volunteering projects such as a community garden and a mentoring program along with children’s activities including local sports leagues and after school programs (Meyer site visit, 2014). Similarly, the Neighborhood

Empowerment Network in San Francisco brings neighbors and stakeholders together to develop plans and actions for disaster preparedness and response (<http://www.empowersf.org>). Other programs, such as the Texas Target Cities initiative from Texas A&M University, utilize academics' expertise to engage community and organizational leaders in collaborative emergency planning activities. In Seattle, Emergency Managers and the Department of Neighborhoods joined to create Community Emergency Hubs in the existing community gardens as organizing spaces to provide disaster information, food and water, and preparedness training to the local community. In Wellington, New Zealand, the local government provides funding for social events to increase social trust and cohesion.

A final way to increase social capital is through the deliberate and careful *planning of community layout and architectural structures*. The physical layout of communities, neighborhoods, and even housing complexes affect creation and maintenance of social capital. For example, interaction can occur in areas where residents can meet and spend time—however short—together. One scholar labeled these meeting areas as “Third Places” because they are not residential locations, which are private, or work spaces, where specific activities are required (Oldenburg, 1999). Coffee shops, bookstores, bars, hair salons, public squares, and libraries serve as third places for social capital to be generated and regenerated. Following the Tohoku disaster in Japan, many NGOs have worked to create spaces where displaced residents can socialize (e.g., <http://www.ibasho.org>). Other environmental effects on social capital include incorporating spaces or activities that encourage community members to participate in their maintenance. The classic example is Ostrom's (1990) common pool resources thesis, in which years of working together to maintain a harbor created informal social mechanisms that prevented overharvesting by any one member. Another example comes from Newman's (1996) *Defensible Space* approach to city planning in which urban communities are reorganized so that residents have control over the areas around their homes, including lobbies, streets, and grounds. Such communities where residents feel connected to their space and to their neighbors have lower rates of crime and higher levels of bridging social capital.

Conclusions

This article has sought to draw attention to an underutilized resource that strongly influences resilience at the communal level, namely, social capital. Decision makers continue to spend money on physical infrastructure and urge residents to prepare in purely materialistic ways, for example, having 3 days of food and water. While these preparations are important, creating strong ties with neighbors, knowing the name of the block captain or local fire chief, and having experience working together with local NGOs could prove equally—if not more—important in crisis, and with rising economic inequality are vital to supporting vulnerable populations in disaster. Given that social capital, like other forms of capital, can be generated or degraded, our focus as individuals and as a nation should turn toward enhancing our social cohesion and deepening trust in our communities. With the potential for bonding social capital to reinforce patterns of discrimination, though, decision makers should invest in

programs that build bridges across groups in communities and up to those in authority (Aldrich & Sawada 2014). By seeking to build up connections within and among residents, such preparation will provide neighborhoods and communities with critical resilience in future crises.

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