

Before, Now, and After: Assessing Hurricane Katrina Relief

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Abstract We assess governmental and non-governmental responses to disasters using primary data of Hurricane Katrina survivors along the Mississippi Gulf Coast. Non-governmental sources include nonprofit relief groups, faith-based organizations, and survivors' self-identified social networks. We assess the impact of these governmental and non-governmental relief efforts on survivors' economic, psychological, physical, and social effects from the disaster. Our results show that social isolation significantly increases perceptions of disaster disturbance and decreases perceived rates of disaster relief. Additionally, survivors perceive that social networks provide greater sources of psychological, financial and social disaster relief than government sources. However, survivors' social networks decay sharply in the immediate aftermath of a disaster, and they do not appear to fully recover a year from the disaster. These social networks themselves are not fully resilient to a disaster.

Keywords Hurricane Katrina · Disaster relief · Social networks

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Introduction

According to most measures, Hurricane Katrina was the greatest natural disaster in American history. The geographic spread of the disaster stretched 90,000 square miles, roughly the size of Great Britain. In human terms, at least 1,836 people lost their lives. In economic terms, hundreds of thousands of Gulf Coast residents lost their homes and jobs. One authoritative source estimates economic losses at \$81.2 billion (and growing), nearly double the costs associated with the next most costly disaster, Hurricane Andrew.¹

Disasters present social scientists the opportunity to study human behavior at times in which social adaptation and instinct are often more clearly revealed. More importantly, though, social science research has potential value in mitigating disaster loss, improving disaster responses, and evaluating government performance.² In this study, we report results from a unique design and survey sample of Hurricane Katrina survivors along the Mississippi Gulf Coast. Our purpose is to assess survivors' perceived effectiveness of public, private, and informal sources of disaster relief and recovery. Do survivors perceive relief efforts by government, non-governmental organizations, and survivors' personal networks as effective in lessening disaster disturbance and promoting disaster relief and recovery?

Several studies have generally evaluated the governmental role in mitigating and responding to natural disasters (Platt 1999; Rodriguez et al. 2006). Birkland (2006) analyzes the political and policy changes brought about by different natural disasters. Atkeson and Maestas (2006) evaluate public attitudes and disasters, particularly whether the public attributes blame more to government, nature, or victims in the aftermath of Hurricane Katrina. Kettl (2007) analyzes the politics and consequences of bureaucratic reform on emergency management and response.

Other works focus on non-governmental determinants and responses to natural disasters (Rodriguez et al. 2006) Shughart (2006) cites the activities of Wal-Mart, Home Depot, and Fed-Ex as examples of the relative efficiency of private decision-makers in reacting to the natural disaster. Olavsky (2006) argues that non-governmental, particularly faith-based, organizations were significantly more effective in Hurricane Katrina relief efforts than government relief effort. He argues that less bureaucratic and more diffused private relief efforts provided by charities and faith-based organizations are more successful in providing immediate relief than government disaster aid.

Finally, social science research indicates the importance of social networks in public policy outcomes (Coleman 1990; Portes 1998; Putnam 2000). Relevant to our study, social networks are important during unexpected events such as hurricanes. Hurlbert et al. (2000, 2002) conclude that size and strength of social networks contributed to recovery in the aftermath of Hurricane Andrew. Another recent study finds that social embeddedness is related to mental health recovery after an emergency (Kirschenbaum 2004).

¹ United States Department of Commerce. Hurricane Katrina Service Assessment Report (PDF). Retrieved on December 14, 2006.

² For an exhaustive review of the disaster-related research, see Rodriguez et al. (2006).

We build on this previous disaster relief research by measuring Hurricane Katrina survivors' perceptions of disaster disturbance, relief and recovery. We provide temporal measures of social networks and disaster effects using primary data of Hurricane Katrina survivors along the Mississippi Gulf Coast. These measures provide nuanced findings regarding individual and community effects of a disaster. Our social network measures allow us to measure changes in the nature and size of survivors' personal and group networks before, immediately following, and a year after the disaster.

We test how these changes in social networks affect survivors' assessments after the disaster. Particularly, our measures of survivors' post-disaster assessments separate perceptions at different stages: disaster disturbance (the change between 1 year before and 5 months after the disaster), short-term disaster relief (the change from the immediate-aftermath of the disaster to one and half years later), and long-term disaster recovery (the change in perceptions from before the disaster to a year and half later). In addition to assessments at different stages, our study also assesses different dimensions of relief and recovery. Notably, we assess survivors' economic, psychological, physical, and social status before, immediately following, and after the disaster.

Finally, we also measure the size and durability of networks through the three stages of Hurricane Katrina. Our social network measures allow us to assess changes in the nature and size of survivors' personal and group networks before, immediately following, and a year after the disaster. Our results empirically support claims that social networks significantly lessen perceptions of disaster disturbance and increase perceived rates of disaster relief. Specifically, survivors with larger social networks perceive greater psychological, social, and financial disaster relief. In fact, our results indicate that this informal support affects perceptions more than governmental aid.

Despite media framing of Hurricane Katrina's aftermath emphasizing anti-social behaviors—criminal activity, racial and economic conflict, public ambivalence—our results show the significance of pro-social behaviors brought upon by the disaster. Still, our results also indicate that survivors' social networks decay sharply in the immediate aftermath of a disaster, and they do not appear to fully recover a year and half after the disaster. These networks themselves are not fully resilient to the disaster. In the next section, we present some context for the study and pose hypotheses.

Social Networks and Disasters

Social network analysis incorporates work by sociologists, political scientists, psychologists, public health researchers, and economists assessing how the informal relationships, or social networks, between individuals affect social outcomes (Scott 1991). Social network analysis generally describes the composition and intensity of these social ties or relationships. These studies also demonstrate how these informal social structures affect individual and collective outcomes.

Earlier works have investigated why social networks may be important factors in disaster recovery and relief. As noted earlier, Hurlbert et al. (2000, 2002) conclude that size and strength of social networks contributed to recovery in the aftermath of

Hurricane Andrew. More recently, Hurlbert et al. (2005) argue that the urban poor are less likely than their more affluent counterparts to have participated in optimal networks prior to Hurricane Katrina. They may also be less likely to maintain their pre-Katrina network structures. These findings and arguments suggest an individual's social embeddedness within a community affects the individual's disaster recovery independent of a survivor's socio-economic profile, physical vulnerability to the disaster (e.g., prior health), or economic loss (e.g., property damage).

We assess these arguments in this study of Hurricane Katrina survivors' perceptions of disaster disturbance, relief, and recovery. Five months after Hurricane Katrina, an interdisciplinary team of social scientists conducted a housing census and field survey of Katrina survivors in Hancock and Harrison counties, the two hardest hit counties in the Mississippi Gulf Coast region.³ The housing census involved a complete count of surviving, temporary, and destroyed housing stock compared to Census 2000 data on a block-by-block basis in six Census tracts. We also conducted a representative (stratified, multi-stage cluster design) field survey of Katrina survivors within the affected population. A team of researchers visited surviving or temporary homes in the South Mississippi communities of Pass Christian, Bay St. Louis, Long Beach, and Waveland. Eighty-one census blocks out of a total of 540 were selected using a random start cluster sample. Researchers canvassed on foot these 81 blocks resulting in 425 completed surveys of Katrina survivors.

The central question of our field survey study was to assess the independent effect of governmental, non-governmental, and social network relief efforts on survivors' perceptions of disaster disturbance, relief, and recovery. Specifically, how important are these non-governmental and social network relief efforts relative to federal and state government aid? Given the problems associated with governmental relief, understanding the attributes of these informal (non-governmental) networks could prove valuable in both preparing for and recovering from future natural disasters.

The survey instrument posed many questions regarding sources, constraints, and assessments of Hurricane Katrina relief and recovery. Our dependent variables in the eventual analysis are the differences in a survivor's responses of her economic, health, and social status. Respondents were asked to retrospectively and prospectively assess their satisfaction-levels in addition to stating their current perceptions.

The proposed measures and survey design poses limitations to the analysis. A panel design study would clearly have been preferable to retrospective and prospective assessments of networks and disaster assistance (disturbance, relief, and recovery). Respondents' decaying memories and incorrect projections present validity threats and measurement error. Disaster research, though, requires both an immediacy (given the ephemeral nature of disaster perceptions) and a willingness to overcome less-than-ideal study conditions (e.g., depleted social infrastructure, transient living conditions). For these reasons, a panel design was not feasible. However, the differences between retrospective, current, and prospective assessments provide a rough gauge of survivors' fears (disturbance) and hopes (relief and recovery).

³ "Perceptions of Disaster Relief and Recovery: Analyzing the Importance of Social and Kinship Networks among Hurricane Survivors of the Mississippi Gulf Coast." National Science Foundation Grant #0555136.

The survey instrument also allows us to control for other variables affecting post-disaster assessments. These variables include the level of property loss, access to insurance, the amount and sources of governmental relief (FEMA, National Guard, state and local emergency management), and ascribed and achieved characteristics (age, income, education). Controlling for these alternative explanations, we propose to test four specific hypotheses:

- (1) A person embedded in a larger social network will perceive *lower* levels of *disturbance* in her economic, health, and social status.

Disturbance refers to the difference in responses from before the hurricane to immediately after the hurricane. Social networks can have an immediate impact in lessening disturbance by helping people maintain their status quo levels of economic, health, and relationship measures.

Social networks also provide immediate relief in rebuilding housing, personal finances, psychological well-being, and personal and professional relations. Controlling for alternative explanations, we propose to test a second set of relief hypotheses:

- (2) A person embedded in a larger social network will have *higher* levels of short-term *relief* in her economic, health, and social status.

The “relief” variables measure perceptions of economic, health, and social relational satisfaction between “now” (5 months after the event) and “a year from now.”

The effects of social networks are not limited to diminishing the immediate shock of the event. The effects of social networks extend to longer-term relief efforts, what we refer to as “recovery.” We hypothesize:

- (3) A person embedded in a larger social network will have *higher* levels of long-term *recovery* in her economic, health, and social status.

Social networks can be especially relevant to long-term rebuilding efforts and psychological health. The “recovery” variables measure perceptions of long-term change in the economic, health and social status of survivors between “before” and “a year from now” (about 18 months after the event). This final temporal change measure captures the extent of a post-event return to status-quo levels.

Finally, we hypothesize that the social networks themselves change over the course of a disaster event. Specifically, we hypothesize the following:

- (4) The size of social networks will decay over time by disaster stage—before, immediately following and after the hurricane.

To some extent, social networks rely on routine patterns of behavior and organization. While some social networks may emerge or temporarily exist due to the disaster event, more durable social networks take seed and grow under stable social conditions. Generally, we assert that social networks are more readily established and maintained when people have stable social structures. For instance, individuals who attend the same church on a regular basis, routinely interact with family and friends, or have regularly scheduled social outings, are more likely to

have bigger and stronger social networks. Networks depend on physical locations to enable people to meet and require established, stable communication systems. We, therefore, expect networks to decay over time as the hurricane disrupted these routine patterns of interaction and damaged many of the physical structures on which networks rely.

Results

We analyze survey data of Hurricane Katrina survivors' perceptions of disturbance, relief and recovery efforts. Before reporting analyses of our hypotheses, we present descriptive measures of Katrina survivors' perceptions of disaster aid and social networks. Particularly, we provide descriptive accounts of survivors' perceived importance of different sources of disaster aid, as well as size and composition of their social networks.

Figures 1, 2 and 3 show the distribution of survivors' self-reported sources and amount of aid at different stages of the disaster aftermath. Figures 1 and 2 present data on the short-term (immediately following Katrina) and intermediate-term (after the Hurricane but before basic economic activity resumed). Figure 1 presents data on the sources of *most* aid, and Fig. 2 presents data on the source of *any* aid. What is most striking about the two figures is that religious organizations and friends and relatives are the predominant sources of aid. As shown in Fig. 1, only 25% of the respondents identify a government agency (federal, 15%; military, 9%; state or

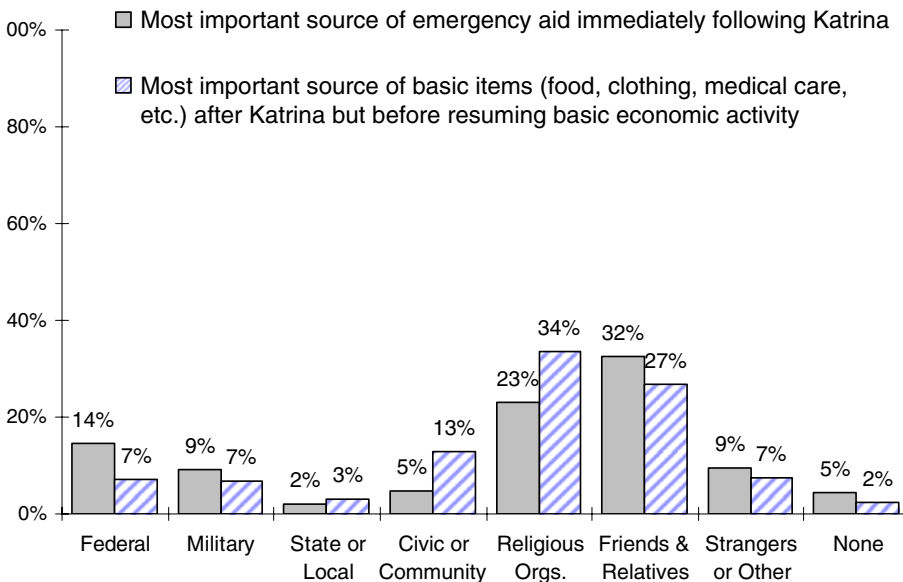


Fig. 1 Percent of respondents identifying source as providing the most aid (Note: Respondent is asked to “check only one of the following”)

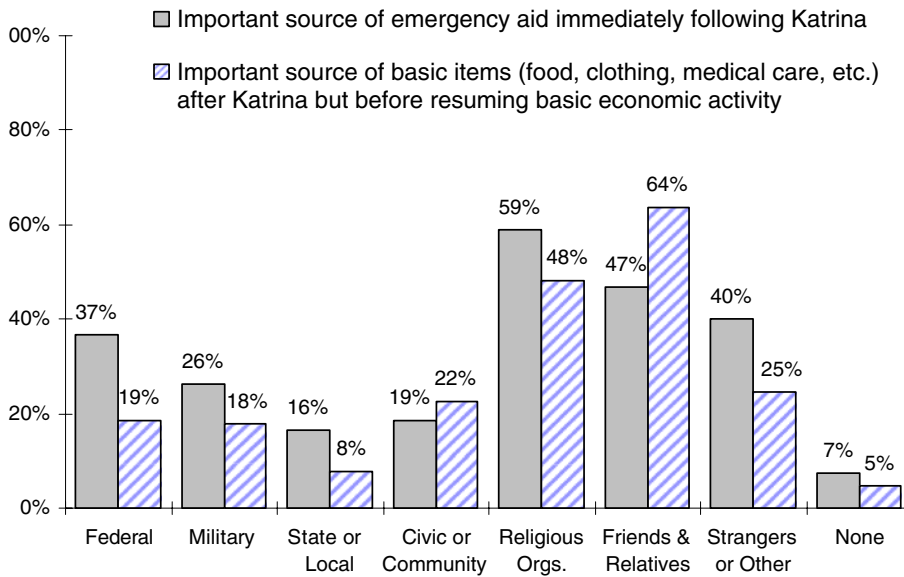


Fig. 2 Percent of respondents identifying source as providing any aid (*Note:* Respondent is asked to “check all that apply”)

local, 2%) as the source of most emergency aid, and only 14% identify a government agency as the source of basic items before economic activity resumed (federal, 7%; military, 7%, state or local, 3%). The corresponding percentages for religious organizations and friends and relatives are 55% of respondents immediately following the disaster and 61% in the intermediate stage. These data underscore the perception that private, non-profit, and/or volunteer relief outperformed government agencies in the wake of this disaster.

Figure 3 presents data for the longer-term period of relief and recovery. Surprisingly, long after bureaucratic delays or “FEMA fiascos” or the like, and long after the peak of non-profit and volunteer activity, government agencies are still perceived as something of part-time players. That is, 20 weeks after Katrina, when homes are being rebuilt, business reopening and economic recovery underway, only a quarter (federal, 23%; military, 2%; state or local, 1%) of the respondents identifies government agencies as providing the most assistance in recovery and rebuilding. About the same amount identifies religious groups and organizations (24%) or friends and relatives (26%) as the source of most assistance.

Our data also provides a descriptive account of social isolation or embeddedness among Hurricane Katrina survivors. Particularly, the data underscores that the size and intensity of social networks are not uniform across the affected population. Gender, race, employment, and church attendance are correlated with the size of group and personal networks. Females and Caucasians average about twice as many group connections as males and racial minorities. Employment increases personal networks by about a third. Increasing church attendance contributes to higher levels

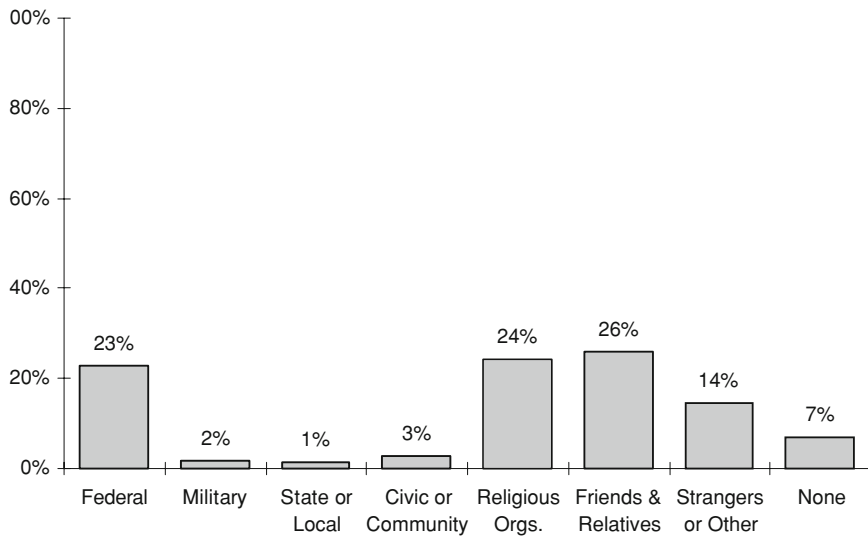


Fig. 3 Percent of respondents identifying source as providing the most long-term aid (*Note: The survey was conducted approx. 20 weeks after Katrina. Respondent is asked to identify which source “has provided you with the most assistance in trying to recover rebuild following Hurricane Katrina”*)

of group membership. Those who attended church on a monthly or weekly basis had more group connections than those who rarely attended church. Those who attended church more than once a week had on average about four times larger group networks than those who did not attend. As indicated in Table 1, these group differences of network size are all statistically significant.

The data also describes the general composition of these survivors’ networks. About 90% of survivors’ self-reported networks are “friends,” “immediate family” or “extended family members.” These results confirm other studies indicating that “core” networks are most important to disaster relief. Hurlbert et al. (2000) find that the structures of survivors’ core networks affect the degree to which these individuals activate ties from those networks to gain other informal support. Specifically, they found that “individuals embedded in higher-density core networks, core networks with more gender diversity, and networks that contain higher proportions of men, kin, and younger individuals, activated core network ties for informal support to a greater degree than did individuals embedded in core networks lacking these characteristics” (Hurlbert et al. 2000, p. 598).

Given the evident variation in the size and composition of survivors’ social networks, we next report results of survivors’ perceptions of Hurricane aftermath. Again, the dependent variables in our analysis are perceived assessments of disaster disturbance, relief, and recovery. Additionally, we report results from five disaster dimensions of well-being: personal financial, general economy, physical health, psychological health, professional and business relationships. The first two dimensions include both a personal and a collective (sociotropic, communal)

Table 1 Statistical significance of social network variables

Variable	Group network size	N	Significance
Male	.64	137	.001
Female	1.14	233	
White	1.00	331	.040
Minority	.5	32	
<i>Attend church</i>			
Never or yearly	.55	137	.000
1–2 times a month	1.09	65	
Weekly	1.21	119	
More than once a week	2.17	29	
Variable	Personal network size	N	Significance
Male	4.83	137	.007
Female	5.91	233	
White	5.62	331	.083
Minority	4.56	32	
Employed	6.35	197	.000
Unemployed	4.57	170	

assessment of economic well-being.⁴ The third and fourth dimensions include personal assessments of the respondent's physical health and psychological health respectively.⁵ A final disaster effect dimension involved survivors' assessment of professional/business relationships.⁶

In terms of independent variables, our principal theoretical variables are the survivors' self-reported personal network size 5 months after the disaster, identified in the regression tables as "personal networks," as well as measures of government and non-government private aid. "Government aid" measures the survivors' self-reported number of federal, military, state and local government agencies that provided assistance to the individual after the disaster. "Private aid" measures the

⁴ The particular "before" economic satisfaction questions are as follows: "How satisfied were you with your financial situation *before* Hurricane Katrina?"; "How satisfied were you with the general economy of the Gulf Coast area *before* Hurricane Katrina?" These economic satisfaction questions were repeated later in the survey instrument replacing "before" with satisfaction "now" and, later, satisfaction "one year from now." The marginal differences between responses were used to construct disturbance, relief, and recovery variables.

⁵ The particular "before" health satisfaction questions are as follows: "How satisfied were you with your physical health *before* Hurricane Katrina?"; "How satisfied were you with your psychological health *before* Hurricane Katrina?" These health satisfaction questions were repeated later in the survey instrument extracting "before" with satisfaction "now" and, later, satisfaction "one year from now." The marginal differences between responses were used to construct disturbance, relief, and recovery variables.

⁶ The particular "before" relationship satisfaction questions are as follows: "How satisfied were you with your professional and business relationships *before* Hurricane Katrina?" These social relationship satisfaction questions were repeated later in the survey instrument replacing "before" with satisfaction "now" and, later, satisfaction "one year from now." The marginal differences between responses were used to construct disturbance, relief, and recovery variables.

survivors' self-reported count of community, civic, or religious groups that provided assistance to the individual. We also control for other variables affecting perceived disturbance, relief, and recovery. "Damage" is the survivors' self-reported level of "damage to the place where you stayed or lived prior to Katrina." We expect a positive relationship between "damage" and the "disturbance" dependent variable, and we expect a negative relationship between "damage" and perceived relief and recovery. "Insurance" is the survivors' self-reported measure of whether they had federal flood insurance prior to Hurricane Katrina.

Our results indicate some support for the impact of personal networks on survivors' perceptions of disaster disturbance and disaster relief. Tables 2, 3, and 4 show regression results for each of the five dimensions of well-being (personal financial, general economy, physical health, psychological health, professional and business relationships) and three stages (disturbance, relief, recovery) respectively. The personal networks variable appears most significant at mitigating disaster disturbance—particularly, survivors' personal financial, physical, and professional well-being in the Hurricane aftermath. Networks also appear important in the relief stage for improving psychological and physical health. Overall, the "network" and "damage" variables are the most consistently significant variables across the regressions. The network variable is significant in eight of the eighteen regressions with the "damage" variable significant in nine. Interestingly, the "government aid" variable is significant in only one regression.

Finally, Fig. 4 shows a network-level in addition to individual-level effect of Hurricane Katrina. We find that the survivors' average network-size decreases over time by disaster stage (before, immediately following, and after the event). More exactly, our survey results indicate that disaster survivor's average number of self-reported, personal ties decreases from over six per respondent before the event to about five in the immediate (5 months) aftermath. Survivors' projections of personal ties "in one year" further decreases. That is, the average personal network-size projected for 18 months post-disaster declines to about four ties. Group networks, likewise, decay over time in the aftermath of the disaster. Family, friend, neighbor,

Table 2 Regression of perceptions of disturbance—dependent variables (std. error)

	Financial	Economic	Psychological	Physical	Professional relationships
Damage	.484*** (.115)	.176* (.104)	.208** (.099)	.323*** (.091)	.210** (.104)
Insurance	.129 (.108)	.129 (.097)	.088 (.091)	-.023 (.084)	-.036 (.097)
Government aid	.153 (.100)	.160* (.090)	-.010 (.085)	.039 (.079)	.020 (.089)
Private aid	-.065 (.076)	-.055 (.070)	-.068 (.065)	-.060 (.060)	.003 (.069)
Personal networks	-.053** (.021)	-.040** (.019)	-.030* (.018)	-.026 (.016)	-.045** (.019)
Constant	-1.90*** (.393)	-2.38*** (.352)	-1.43*** (.339)	-1.24*** (.307)	-.819** (.358)
R ²	.07	.03	.02	.05	.03
N	335	332	335	341	287

* $p < .10$, ** $p < .05$, *** $p < .01$

Table 3 Regression of perceptions of relief—dependent variables (std. error)

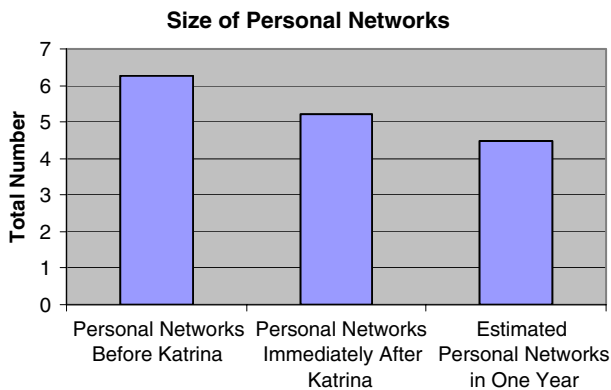
	Financial	Economic	Psychological	Physical	Professional relationships
Damage	−.298*** (.095)	−.135 (.088)	−.177** (.082)	−.182** (.084)	−.044 (.087)
Insurance	−.018 (.090)	−.141* (.081)	−.104 (.077)	.053 (.079)	−.038 (.080)
Government aid	−.014 (.082)	−.074 (.075)	.079 (.070)	−.001 (.072)	.088 (.073)
Private aid	.074 (.063)	.078 (.058)	.039 (.054)	.068 (.055)	.007 (.057)
Personal networks	.031* (.018)	.034** (.016)	.029* (.015)	.021 (.016)	.027 (.017)
Constant	1.02*** (.327)	1.15*** (.297)	.918*** (.286)	.661** (.290)	.315 (.303)
R^2	.05	.03	.04	.03	.01
N	306	307	308	308	265

* $p < .10$, ** $p < .05$, *** $p < .01$

Table 4 Regression of perceptions of recovery—dependent variables (std. error)

	Financial	Economic	Psychological	Physical	Professional relationships
Damage	.182* (.111)	.038 (.106)	.178** (.076)	.178** (.076)	.141* (.082)
Insurance	.158 (.104)	−.063 (.096)	.054 (.070)	.054 (.070)	−.022 (.075)
Government aid	.108 (.093)	.096 (.089)	.087 (.064)	.087 (.064)	.100 (.068)
Private aid	.017 (.072)	.034 (.069)	.008 (.049)	.008 (.049)	.017 (.052)
Personal networks	−.037 (.021)	−.016 (.020)	.003 (.014)	.003 (.014)	−.024 (.016)
Constant	−.807** (.382)	−1.08*** (.359)	−.821*** (.264)	−.821*** (.264)	−.505* (.286)
R^2	.03	.01	.02	.02	.03
N	304	307	308	308	270

* $p < .10$, ** $p < .05$, *** $p < .01$

**Fig. 4** Average size of survivors' personal networks across post-disaster stages

and church-based social networks all appear to decline in size in the aftermath of a disaster event. Despite their evident role in disaster relief, these social networks themselves are not fully resilient to the disaster aftermath.

Discussion

What lessens fears and strengthens hopes among survivors in a disaster aftermath? Our study of Hurricane Katrina survivors indicates that social networks—informal personal and group relationships—played an important role in the relief effort independent of government and non-government aid. More generally, these results point toward a more complete understanding of who is at-risk and who recovers from disasters. Vulnerable or at-risk populations are typically defined by personal or physical attributes. Personal attributes typically include an individual's socio-economic status, employment, disabilities, and age. Physical vulnerabilities may include the housing status and quality, or availability of personal transportation. The proposed study suggests new variables and measures for identifying vulnerable or at-risk populations: the size and composition of an individual's social network. Social or network vulnerability assesses the extent to which socially isolated disaster survivors are less likely to adapt and recover after a crisis.

Our research also underscores the dynamic nature of disaster events. The different stages and dimensions to disaster recovery affect the nature and degree of network effects. Our understanding of disaster response is enriched by examining disaster and network conditions and effects before, during and after the disaster. Disaster research making use of a social network approach should attend to these temporal elements. We find that social networks effects were significant particularly in the immediate and intermediate term after the disaster, particularly in lessening the perceived immediate disturbance and improving perceptions of relief.

Our findings also indicate patterns in social networks and how their effects change throughout a disaster. Pre-disaster networks—those relationships that existed prior to the occurrence of a disaster—are most developed among older, non-minority status, church-going, long-time residents within the affected population. During a disaster, ad-hoc social networks form, among both seekers and providers of post-disaster services, both in and out of the disaster area. These types of networks typically come together quickly and generally dissipate as the network members move through the disaster relief phase. “Temporary” shelters, for instance, may connect previously unconnected people but generally do not provide lasting connections. Emergent networks are those characterized by new social ties and a new function. Last, stationary social ties are those unaffected by the disaster. These stationary relationships persist and are unaffected by residency change, social infrastructure devastation, or inconsistent communication.

Our measures of social networks before, during, and after Hurricane Katrina indicate that stationary social ties were most frequently listed by survivors. The continuity and intensity of these stationary ties—friend and kinship relationships—result in their central role in disaster relief. Most earlier social support studies indicate that disaster victims activate their kinship ties when they are in need or in

crisis (Haines et al. 1996; Hurlbert et al. 2000; McPherson et al. 2006; Quarantelli and Dynes 1977; Shavit et al. 1994).

Finally, these results suggest some practical, policy-based recommendations. First, our findings suggest that community-based assessments of residents' network vulnerabilities may be a useful disaster mitigation strategy. Understanding the spatial or geographic correlates of socially isolated disaster survivors may allow governmental and non-governmental emergency management teams to better target relief efforts. In future work, we intend to investigate these spatial correlates. A second policy implication is for governmental emergency management to be sensitized to the importance of informal social networks in relief efforts. Despite media reports emphasizing anti-social behaviors—criminal activity, racial and economic conflict, public ambivalence—following Hurricane Katrina, our results show the significance of pro-social behaviors during the disaster aftermath. Government emergency management should work to leverage greater public–private synergies for disaster relief efforts. Our results indicate that further study of inter-organizational networks (both public and private) in a post-disaster setting may allow planners to improve the speed, coordination, and breadth of coverage of disaster relief.

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