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PERSONAL NETWORKS AND SOCIAL SUPPORT IN DISASTER CONTEXTS

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ABSTRACT

In this study we analyze the effects of post disaster personal networks in the provision of social support among victims of natural disasters. We developed a multiple regression analysis based on survey data collected from ninety-four flood victims in Colombia. Three forms of social support (emotional, instrumental, informative) were used as response variables, while the structure and composition of post-disaster personal networks, operated as predictor variables. Results revealed that density and betweenness affect the provision of emotional and informative support in disaster contexts.

INTRODUCTION

Society has always been required to cope with natural disasters. It is estimated that by 2030, 50% of the world's population will live at least 100 kilometers from a coast, been exposed to extreme meteorological conditions and, consequently, to natural disasters (Small & Nicholls, 2003). Between 2010 and 2011, Colombia faced one of the greatest natural disasters in national history, when floods affected 3.893.087 people and 33 regions. Particularly, in the region of Atlántico, 110.202 people became homeless (High Council for Region and Citizen Participation, 2012).

Flooding displaces entire populations and disrupts victim's personal networks. Therefore, in addition to the need for geographical relocation, flooding also creates the need for psychosocial readaptation (Benítez et al., 2004). In post-disaster situations, victims lose their connections and face the immediate need to rebuild their personal networks for their recovery and relief (Provan & Kenis, 2008).

We understand personal networks as the relations emerging from particular situations of everyday life. Such relations form a variety of ties with different types of alters (social contacts), who provide different social resources to ego (the network owner) (Granovetter, 1973). From this perspective, personal networks are often constrained by structural realities and the resources

that those structures make available. Therefore, Social Network Analysis (SNA) can be a fruitful tool for examining not only the personal network's structure and composition (Wasserman & Faust, 1994; Borgatti et al., 2009), but also for illustrating the role of personal networks in disaster recovery.

Although natural disasters remain the most devastating events that individuals face all over the world, there is insufficient empirical evidence investigating how post-disaster personal networks contribute to recovery (Sadri et al., 2018). There is also limited research that considers the role of social networks in facilitating or impeding the rebuilding of post-disaster societies. Some studies focus on transportation and distribution networks in the aftermath of a disaster (Ukkusuri & Yushimito, 2008; Ukkusuri et al., 2007, 2014; Hasan et al., 2011; Murray-Tuite & Mahmassani, 2004; Ye and Ukkusuri, 2015). Others engage the literature on the interpersonal and social dynamics of disasters (Norris et al, 2005; Kaniasty and Norris, 2008) and the impact of social networks on disaster relief (Forgette et al, 2009). However, the identification of specific support mechanisms facilitated by personal networks in the immediate aftermath of disasters, has yet to be extensively explored. Regarding the literature of social support, it has focused on describing the characteristics and functions of support providers, without examining their relationships to each other (Maya-Jariego, 2006). In this study, we use SNA to study the effects of post disaster personal networks, in the provision of social support among victims of natural disasters.

METHOD

Participants

This study is based on survey data collected from Manatí, a small town in Colombia that was hit by deadly floods in December 2010. Thirty three regions were affected by the floods that killed more than 400 people and left 2.400.000 homeless (Colombia Humanitaria, 2013). We contacted the families who were directly affected by the floods, most of them homeless and living in temporal community shelters. Once identified, we asked one member of the family to sign a consent letter by which they were informed about the research purposes, background, procedure, risks and benefits. Finally, we obtained completed surveys from ninety-four respondents.

Instruments

For the sociodemographic information, we asked the participants some questions about their age, marital status, education level, number of children, birthplace and time living in the town affected by the floods. For the information about post-disaster personal networks and social support, we used a semi-structured interview divided in three sections: the first generates the master list of social support ties; the second completes the list with social ties that did not necessarily provide any form of support, but were considered part of the network; the third rates the influence of such ties in the network.

To generate the master list, we used the Arizona Social Support Interview Schedule (ASSIS) (Barrera, 1980) as a name generator. The ASSIS facilitated the identification of support resources by collecting data about three forms of social support: emotional, informative and instrumental. Each participant generated a list of between 5 and 15 alters, who provided them with emotional, informative or instrumental support. Then, we asked each participant to

complete that list with names of social ties who they considered part of the network, even if those ties were not support providers. We requested the participants to complete the list until they named 30 unique alters, which is considered sufficient to capture the distinctive structural properties of each personal network (Maya-Jariego, 2018). They were free to name individuals living in the same community shelters or not. Finally, for the influence rating, participants indicated if the nodes or members of their network knew each other (on a scale of 0 to 1 where 0 was *do not know each other* and 1 was *do know each other*).

Data Analysis

We constructed 94 matrices of post disaster personal networks with a total of 2.820 unique pair of relations. With these matrices we developed a SNA based on four indicators that have been widely used to study the structure of social networks: density, centralization, degree and betweenness. Density measures the level of connectivity in the network, considering the percentage of ties out of all possible ties; centralization indicates how the relationships of the network cluster around a few well-positioned actors, who control the flow of information; degree identifies how well-connected is an actor to other actors in the network; and betweenness measure the extent to which an actor serves as bridge between other actors, playing the role of mediator (Freeman, 1979; Wellman, 1979; Fischer, 1982; Burt, 1984; Campbell & Lee, 1991; Kapucu et al., 2009; McCarty, 2002). To build the matrices and analyze these indicators we used the software UCINET (Borgatti et al., 2002). Then, we used the Pearson's correlation coefficient to illustrate the associations between the structure and composition of post-disaster personal networks and the provision of social support among the networks. Finally, we performed a multiple regression analysis using emotional, instrumental and informative support as response variables, and the structure and composition of the networks as predictor variables. For these analysis we used the software SPSS.

The findings are organized in two sections. In the first section, we describe the characteristics of post-disaster personal networks and the provision of social support. In the second, we explain how the structure and composition of post disaster personal networks influence the provision of social support.

RESULTS

The ninety-four respondents were women who represented their families and identified themselves as heads of households, regardless of whether they had a relationship (66%) or not (34%). For this reason, we decided to work with women as representatives of their families and articulators of the home. The mean age was 34.5 years with a standard deviation of 12.3. The ninety-four respondents were living in community shelters by the time of the survey. Most of them were born in the town affected by the floods (82%) or had more than ten years living in this area (90.4%). Table 1 presents the demographic profiles distribution.

Table 1. Demographic profiles distribution.

Demographic	Value	Frequency	%
Age	15 – 19 years old	7	7
	20 – 29 years old	31	33
	30 – 39 years old	27	29
	40 – 49 years old	18	19
	50 years old and older	11	12
Marital status	Married	17	18
	Free union	45	48
	Single	32	34
Education	None	13	14
	Some primary school	38	40
	Primary school graduate	19	20
	Some high school	13	14
	High school graduate	10	11
	Technical training	1	1
Number of children	None	3	3
	1 – 2 children	28	30
	3 – 4 children	37	39
	5 – 6 children	17	18
	7 children and more	9	10
Birthplace	Town affected by floods (Manatí)	77	82
	Other town	17	18
Time living in the town affected by the floods (Manatí)	Less than 5 years	6	6.4
	Between 5 and 10 years	3	3.2
	More than 10 years	85	90.4

Post-Disaster Personal Networks

The 88.7% of alters were living in community shelters with ego, which suggests a preference for local contacts and few ties with external contacts (see table 2). Networks were mainly composed by family members (42.8%), followed by neighbors (30.7%), friends (17.3%) and acquaintances (6.6%). They showed a higher proportion of female (70.4%) than male alters (29.6%), with females almost tripling the number of males.

Table 2. Composition of personal networks.

Indicators of composition	f	%	Average	SD	Min	Max
Relationship of alters						
Partner	62	2.20	0.7	0.48		
Number of family members	1209	42.87	13.0	5.96	0	29
Number of friends	488	17.30	5.2	5.66	0	28
Number of acquaintances	187	6.63	2.0	4.47	0	22
Number of neighbors	868	30.78	9.2	7.06	0	25
Number of other individuals	6	0.21	0.1	0.29	0	2
Place of residence of alters						
Number of alters living in community shelters	2504	88.79	26.6	4.54	6	30
Number of alters living out of community shelters	316	11.21	3.3	4.55	0	24
Gender of alters						
Number of men	835	29.6	8.9	3.65	0	17
Number of women	1985	70.4	21.1	3.65	13	30

Table 3 presents the structural properties of the networks. Here, each property is divided into three levels: low, medium, high. The levels were assigned according to the distribution of the data into quartiles, which are based on percentiles. Low levels indicate the punctuations in the first quartile (25th percentile), medium levels indicate the punctuation in the second quartile (50th percentile, also known as the median) and high levels indicate the punctuations in the third quartile (75th percentile).

Table 3. Structural indicators of personal networks.

Descriptive		Degree (<i>dg</i>)	Betweenness (<i>b</i>)	Density (<i>d</i>)	Centralization (<i>c</i>)
Average		85.81	0.50	0.86	14.37
SD		15.35	0.55	0.15	15.31
Percentage	25 (low)	76.82	0.00	0.80	0.50
	50 (medium)	90	0.35	0.90	10.35
	75 (high)	99.50	0.80	1.00	23.42

Networks demonstrated moderately high connectivity (*average density* = 0.86). The 58% had a medium density score of 0.9, while the 42% had a low density of less than 0.8. Direct contacts were less frequent, with 46% of networks with low levels of degree ($dg \leq 76.82$). Actors were moderately likely to act as intermediaries between other actors in the network (*average betweenness* = 0.5). Only 28.7% showed high levels of betweenness ($b \geq 0.8$), while 33% showed medium levels ($b = 0.35$) and 38.3% showed low levels ($b \leq 0$). A moderate trend was also identified in the levels of centralization. This result suggests that social control and participation were dispersed throughout the structure of the networks, and popular members who centralized the flow of relationships were less prominent. Most networks (34%) demonstrated low levels of centralization ($c \leq 0.5$), while medium ($c = 10.35$) and high levels ($c \geq 23.42$) were less frequent (33% in both cases).

Post-Disaster Social Support

Disaster victims experienced reduced levels of social support. Of the 2.820 alters in the 94 networks studied, only 35.2% provided support to the ego. The most frequent form of received support was emotional, which was experienced by 24.6% of participants. The most common support mechanisms reported here was social participation (13.2%), followed by being able to share private feelings (11.4%). It was followed by informative support, occurring among 19% of the sample. Most of those who received informative support, were offered advice (11.09%) or positive reinforcement (7.87%). Finally, instrumental support was the less frequent, mainly received in the form of material support (10.46%) and physical assistance (7.87%).

Post-Disaster Personal Networks and Social Support

The participation of family members in an individual's network was associated with higher levels of advice ($r=0.240$, $p<0.05$), positive feedback ($r=0.242$, $p<0.05$) and social participation ($r=0.368$, $p<0.01$). In contrast, inverse associations were observed between the number of alters living in the same community, and the opportunities they had to share private feelings ($r=-0.203$, $p<0.05$) and advice ($r=-0.261$, $p<0.05$), receive positive feedback ($r=-0.344$, $p<0.01$), physical help ($r=-0.298$, $p<0.01$), and engage in social participation ($r=-0.269$, $p<0.01$). In contrast, if a victim's network included a higher number of alters living outside of the community, victims experienced each of the described support mechanisms to a greater degree, obtaining identical but positive values.

The indicators of social support were crossed with the indicators of structure and composition of the networks. This information appears in table 4, which shows that density presents inverse associations with positive feedback ($p<0.05$), advice ($p<0.05$), social participation ($p<0.01$) and private feelings ($p<0.01$). Degree also presents inverse associations with advice ($p<0.01$), social participation ($p<0.01$) and private feelings ($p<0.01$). Conversely, betweenness and centralization were positively associated with positive feedback, advice and private feelings ($p<0.05$).

Table 4. Pearson's correlation coefficient of structural indicators and social support in the analyzed support networks.

Form of support	Mechanism	Betweenness	Density	Centralization	Degree
Emotional	Social Participation	0.158	-0.210*	0.156	-.257*
	Private Feelings	0.250*	-0.277*	0.259*	-.247*
Informative	Advice	0.230*	-0.252*	0.249*	-.233*
	Positive Feedback	0.208*	-0.245*	0.222*	-0.166
Instrumental	Physical Assistance	0.042	-0.055	-0.020	-0.049
	Material Help	0.151	-0.178	0.158	-0.154

Note: * $p=0.05$

Finally, to examine whether the variables that expressed significant correlations can predict the degree of emotional, informative and instrumental support received by the victims, we performed a multiple linear regression analysis (see table 5). The results reveal that emotional support is inversely predicted by density, while informative support is inversely predicted by

density and betweenness. The results didn't show significant predictors regarding instrumental support.

Table 5. Significant predictors of the regression results for social support .

Predictor variables	Summary of the models			ANOVA	Coefficients	
	R ² corrected	Change in R ²	Durbin-Watson	F*	β	t*
^a Density	,107	,116	1,701	12,089	-,341	-3,477
^b Density	,064	,074	1,403	7,378	-,272	-2,716
Betweenness	,095	,040	1,403	4,153	-1,128	-2,038

^a Regression model for emotional support; * $p < 0,05$.

^b Regression model for informative support; * $p < 0,05$.

CONCLUSION

Adversity affects the size of personal networks and the availability of social support resources in a community. In emergency situations, personal networks are placed under immense pressure. This strain weakens certain ties, affecting relationships that typically provide companionship, emotional support, cognitive guidance, social regulation, material help and access to new contacts (Oliver-Smith, 1996). This leads to a state of crisis that endangers individuals' psychosocial identity, and their ability to functionally adapt to the consequences of the natural disaster.

In this study, the post-disaster network structures performed moderately in the indicators for interaction and social relationships. The results for all of the structural indicators analyzed oscillated between low or moderate levels, suggesting that victims experienced less control over their relationships and were less able to expand their social ties and exert social influence. Previously, Varda and colleagues (2009) have shown that interactive networks typically become less socially permeable under disaster conditions. This result was confirmed by the structural reality of the personal networks identified in our study, which showed low levels of connectivity that belied the distance of the interactions. Additionally, there were few central nodes acting as preferential objects for social exchanges within the networks.

Notably, at the compositional level, close family members have higher values in the provision of social support, which reaffirms the importance of relatives in the constitution of personal networks (Ayuso, 2012; Cox, 2005; Molina, 2005). Previous studies have shown that despite the decreasing network diversity caused by natural disasters, family relationships remain stable (Varda et al., 2009). Social ties among relatives are fostered in an environment of trust, and the provision of support, which includes immediate support in times of need, becomes natural in a family context (Lin, 2001).

The characteristics of family relationships therefore become essential under circumstances in which material and psychosocial needs require effective, practical and timely responses. In summary, the post-disaster personal networks under study revealed a relationship pattern characterized by an intensified integration of family members. However, a disadvantage of networks with this preference is that network members experience difficulties accessing support resources beyond those offered by the family (Molina et al., 2005). This reality is

experienced in the networks analyzed in this study, as indicated by the low levels of social support identified. The overview of social support coincides with reports of Karlin and colleagues (2012), who also found a reduced flow of supportive behavior in the aftermath of a disaster. In this context, because of the scarcity of other types of support, emotional support appears to acquire the utmost importance to disaster victims.

Finally, this study shows two more findings. First, networks with social bridges and external relationships have more opportunities to receive positive feedback and advice, and to express emotions. Second, weak ties, far from creating alienation, seem to be vital for victims' recovery and relief in the immediate aftermath of a disaster. As Granovetter (1973) has pointed out, in this study we found that individuals with few weak ties are deprived of information from distant parts of the social system, and are confined to the local news and views of their close friends. This deprivation puts them in a disadvantaged position in society, and makes them unlikely to mobilize effectively for collective action within their communities (Gans, 1961).

The results highlight the importance Social Network Analysis (SNA) in researching disaster recovery and relief. The possibilities offered by contact with external actors can facilitate interactive mobility between individuals and foster relationships with support providers. These positive changes can subsequently increase the availability and effectiveness of diverse forms of humanitarian assistance.

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