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Socio-Psychological Recovery From Disasters Through the Neighborhood Storytelling Network: Empirical Research in Shinchimachi, Fukushima

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More than eight years have passed since the Great East Japan Earthquake, but recovery efforts in Fukushima are still under way. This study focuses on socio-psychological recovery from the triple disasters in 2011, which involved the earthquake, tsunami, and nuclear accident. Based on communication infrastructure theory, the study examines how people's connections to their neighborhood storytelling network and collective efficacy influence their socio-psychological recovery measured by life satisfaction and future outlook. Based on a survey conducted in Shinchimachi, Fukushima, the study found that residents who are more connected to their neighborhood storytelling network—consisting of community organizations, local media, and interpersonal storytelling—are likely to have higher life satisfaction and a more positive future outlook. In addition, collective efficacy was found to have positive effects on life satisfaction and future outlook. Implications of the study for disaster research and intervention are discussed.

Keywords: disaster recovery, Fukushima, storytelling network, communication infrastructure theory, collective efficacy, Great East Japan Earthquake

It has already been more than eight years since the Great East Japan Earthquake struck on March 11, 2011. The earthquake resulted in triple disasters involving the earthquake, tsunami, and nuclear accident. In particular, the Fukushima nuclear accident immediately made "Fukushima" infamous, not only in Japan but also globally, changing the lives of people in Fukushima.

Disaster recovery has been under way in Fukushima, and many places and facilities have been reconstructed. Train stations that were swept away by the tsunami were reconstructed and began operating. Buildings and houses were repaired or rebuilt. While government funding and aid were provided for physical recovery, less support was provided for people's recovery from socio-psychological trauma and damage (Matsumoto, Sakuma, Ueda, Nagao, & Takahashi, 2016). Individual-level counseling is the most common way to help people overcome psychological trauma, but several studies have emphasized the role of

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community-level social networks and support systems in overcoming trauma (Aldrich, 2012; Steinglass & Gerrity, 1990).

This study focuses on socio-psychological factors, such as life satisfaction and future outlook, as indicators of how people are overcoming trauma and recovering from the disaster. Based on communication infrastructure theory (Ball-Rokeach, Kim, & Matei, 2001), the author proposes that people's connectedness to their neighbors and community resources is related to their socio-psychological recovery after the Great East Japan Earthquake. The study is based on a survey of residents in Shinchimachi, a coastal village in Fukushima Prefecture.

Literature Review

Communication Infrastructure Theory

Even in the age when translocal connections via the Internet are prevalent, one of the critical situations in which people's physical environment and local social relationships become important is during and after disasters. One of the ways that people cope with disasters is to exchange information and share stories about their experience with their neighbors. In disaster situations, having access to communication networks and resources, such as neighbors, community-based organizations, and local media, is likely to help people understand and cope with the situation. Communication infrastructure theory (CIT) presents a theoretical and empirical framework for examining people's connections in their community and the outcomes (Ball-Rokeach et al., 2001; Kim & Ball-Rokeach, 2006a).

Communication infrastructure of a community is defined as the storytelling network set in its communication action context (Ball-Rokeach et al., 2001). A neighborhood storytelling network consists of three main players: residents, community organizations, and local media. A strong storytelling network has residents actively talking to one another about what is happening in their community; residents involved in community organizations; residents closely following local media to find out what is happening in their community; and community organizations and local media maintaining close connections and collaboration. Communication action context includes the physical, cultural, demographic, and technological context that can either facilitate or hinder the viability of the storytelling network.

Studies that applied CIT have found that the strength of the neighborhood storytelling network is associated with belongingness to one's neighborhood (Ball-Rokeach et al., 2001), collective efficacy (Kim & Ball-Rokeach, 2006b), civic participation (Cohen, Ball-Rokeach, Jung, & Kim, 2002; Jung, Toriumi, & Mizukoshi, 2013), and health outcomes (Matsaganis, Golden, & Scott, 2014; Wilkin, Moran, Ball-Rokeach, Gonzalez, & Kim, 2010). In particular, CIT has been applied to investigate the role of the storytelling network in disaster situations. After the September 11 terrorist attack in New York, researchers examined the ways in which people's connections to their neighborhood storytelling network influenced their likelihood of engaging in civic actions. Cohen et al. (2002) found that those who engaged in conversation with neighbors, belonged to neighborhood organizations, and read newspapers after September 11 were more likely to engage in civic actions. In a study after the Great East Japan Earthquake, Jung et al. (2013)

found that those who have a higher connectedness to the offline storytelling network and the Internet were more likely to engage in civic activities related to the disaster.

Social Connectedness and Disaster

People's social relationships have been associated with different outcomes such as health and longevity, life satisfaction, career development, and civic engagement (Gil de Zúñiga, Jung, & Valenzuela, 2012; Granovetter, 1983; Holt-Lunstad, Smith, & Layton, 2010; Vaillant, 2012). Holt-Lunstad and colleagues (2010) conducted a meta-analysis of 148 studies that examined the relationship between social relationships and longevity. The authors found that stronger social relationships were associated with a 50% increase in the likelihood of survival. Vaillant (2012), in a longitudinal study, found that warmth of social relationships has a positive impact on health and life satisfaction, as well as on financial success.

The concept of social capital has been widely applied to examine the impact of informal social relationships on various outcomes. Social capital, characterized by reciprocity, trust, and cooperation, has been associated with both individual- and community-level benefits (Putnam, 2000). At the individual level, social capital has been associated with economic and educational benefits, well-being, and quality of life (Coleman, 2000; Granovetter, 1983; Seibert, Kraimer, & Liden, 2001). At the community and societal level, social capital has been associated with civic and political participation (Gil de Zúñiga et al., 2012).

Social relationships have been found to have benefits during and after disasters (Harada, 2012; Weil, Lee, & Shihadeh, 2012). In particular, many studies have found that people's relationships with their neighbors play an important role in coping with disaster and disaster recovery. Weil et al. (2012) found that people who were more socially embedded faced a burden of helping others immediately after Hurricane Katrina in the United States, but they eventually coped better with the stress of recovering from the disaster than others. Harada (2012) noted that both bonding and bridging social capital played an important role in coping with the Great East Japan earthquake.

A few studies have examined community-level differences in disaster recovery. Elliott, Haney, and Sams-Abiodun (2010) compared two communities that were affected by Hurricane Katrina. The researchers found that residents in a community with higher social and financial capital were more likely to have received support from others, evacuated earlier, and resumed a normal community life faster than those of the other community with lower social and financial capital. Sanyal and Routray (2016) observed that community-level social capital played a crucial role in the survival of residents after disasters in Sundarbans, India. Aldrich (2012) studied several natural disasters in Japan and India and highlighted that community-level social capital played a crucial role in building resilience in coping with disasters.

Collective Efficacy

Collective efficacy is defined as individuals' perceptions of their neighbors' willingness to participate in solving neighborhood problems as well as their perceptions of social cohesion in the neighborhood (Kim & Ball-Rokeach, 2006b; Sampson, Raudenbush, & Earls, 1997). Whereas self-efficacy is about how much "I"

have control over my surroundings, collective efficacy is about how much "we" as a community have the capacity to control and manage our surroundings based on trust and cohesion (Kim & Ball-Rokeach, 2006b). Sampson and his colleagues (1997) proposed two subdimensions of collective efficacy: informal social control, and social cohesion and trust. Informal social control refers to the capacity and willingness of residents to control group-level problems (Sampson et al., 1997). Social cohesion and trust refers to individuals' perceived solidarity of the neighborhood and trust toward neighbors. The two subdimensions were merged into a single factor of collective efficacy, as explained by Sampson (2017): "As hypothesized, social cohesion and social control were strongly related across neighborhoods and, thus, combined into a summary measure of collective efficacy, yielding an aggregate-level reliability in the .80 to .85 range" (p. 154).

Collective efficacy of a neighborhood was associated with reduced violence (Sampson et al., 1997) and antisocial behaviors in children (Odgers et al., 2009), as well as with better physical health (Browning & Cagney, 2002). Studies applying CIT found that people who were more connected to their neighborhood storytelling network were more likely to have higher collective efficacy, which led to higher participation in civic activities (Kang, 2013; Kim & Ball-Rokeach, 2006b).

Socio-Psychological Disaster Recovery

Past studies have used different ways to define and assess disaster recovery. The majority of studies defined disaster recovery in terms of bringing the community back to predisaster conditions (Chang, 2010). Indicators of disaster recovery include physical reconstruction, such as that of housing, public buildings, businesses, local infrastructure, and population recovery (Aldrich, 2010). Cheng, Ganapati, and Ganapati (2015) proposed two ways of operationalizing local disaster recovery. One way is to assess how much the local area returned to predisaster conditions, and the other way is to compare the postdisaster development of an affected area with other unaffected areas with similar characteristics. In a study of local disaster recovery after the Kobe earthquake in 1995, Chang (2010) defined and measured the recovery in terms of population change, business recovery, and economic recovery measured by gross regional product.

Fewer studies measured disaster recovery by socio-psychological indicators. Regarding psychological recovery, studies have examined posttraumatic stress disorder (PTSD) as a psychological symptom that hinders disaster recovery (Cukor et al., 2011; Lai, Chang, Connor, Lee, & Davidson, 2004). For example, Bonanno, Galea, Bucciarelli, and Vlahov (2006) defined postdisaster resilience as an absence of PTSD. Aside from PTSD, however, not many studies have developed indicators to measure intangible recoveries.

The concept of socio-psychological disaster recovery proposed in this study is not only about overcoming PTSD, but also about more actively establishing a sustainable state of mind and social relations to cope with ongoing difficulties of the disaster (Doerfel, Chewning, & Lai, 2013; Tanisho, Smith, Sodeoka, & Murakami, 2015). Socio-psychological disaster recovery is all the more important in postnuclear disasters. The effect of a nuclear disaster lasts for many decades. The effect is also uncertain, especially in a case such as the Fukushima nuclear disaster. For example, there are significant variations

in expert opinions on the health effects of low-level radiation following the Fukushima nuclear disaster. When high uncertainty continues for an extended period, people may continue to experience social and psychological anxiety even after their lives have seemingly returned to normal routines. Although assessing the degree of people's socio-psychological status is more challenging than evaluating physical and economic recoveries, measuring it and identifying antecedent factors can contribute to developing intervention programs to help people overcome difficulties.

In acknowledging the lack of research in socio-psychological indicators of disaster recovery, the current study proposes perceived life satisfaction and future outlook as two indicators of socio-psychological disaster recovery. Life satisfaction is a subjective assessment of one's quality of life (Diener, Emmons, Larsen, & Griffin, 1985; OECD, 2015). Life satisfaction was used as an indicator of psychological recovery from disaster and environmental degradation in several studies (Berger, 2010; Huang & Wong, 2014; Rehdanz & Maddison, 2008). Huang and Wong (2014), in their study of the Wenchuan earthquake in China, found that sense of community and satisfaction with governmental aid for recovery were positively associated with life satisfaction. Berger (2010) compared a secondary survey result before and after the Chernobyl nuclear disaster among German residents and found that environmental worries increased after the disaster, but there was no change in life satisfaction. Rehdanz and Maddison (2008) found that higher local air pollution significantly diminished subjective life satisfaction. In the current study, how people's life satisfaction varies in postdisaster circumstances and the ways in which people's community connectedness influence their life satisfaction are examined.

The second indicator of socio-psychological disaster recovery is future outlook, defined as perceived safety, sustainability, and disaster preparedness of the residents and the local community (Kwesell, 2013). Whereas life satisfaction concerns a present assessment of one's life, future outlook concerns a longer term prospect of individuals in their community. The concept is derived from the concept of resilience, which has been used as an umbrella term to indicate individuals' and communities' ability to adapt to and cope with a sudden disruption in their lives (e.g., Aldrich, 2012; Wang, Shi, Zhang, & Zhang, 2010). Among the factors that constitute a psychological aspect of resilience, positive outlook based on optimism, hope, courage, and confidence has been found to be an important indicator for coping with a disaster or difficult personal circumstances (Abramson et al., 2015; Berkes & Ross, 2013; Walsh, 2003). Future outlook is derived from studies of psychological resilience, but goes beyond to incorporate people's perceived future outlook not only about individuals themselves, but also about their community.[2]

The concept of future outlook is appropriate as a measurement in the post–nuclear disaster context (Doerfel et al., 2013; Tanisho et al., 2015). Because of the accident at the Fukushima Dai-ichi

[2] To summarize the relationship among different terminologies, socio-psychological disaster recovery is operationalized as life satisfaction and future outlook. The concept of future outlook is derived from the literature of resilience, but is explicitly proposed to refer to individuals' perceptions about the safety, sustainability, and preparedness of themselves and their community. The definition is distinguished from a broader meaning attached to the term *resilience*, which includes physical, infrastructural, and systematic capabilities of individuals and communities to bounce back to the predisaster state and to overcome the disruption of disasters (for a detailed discussion, see Paton & Johnston, 2017).

Nuclear Power Plant, Fukushima has suddenly become globally infamous. Since the disaster, the prefecture and residents have been facing stigma attached to the name, such as being contaminated, unhealthy, dangerous, and deserted (Kwesell & Jung, 2019). Many residents left their hometown because of the stigma and danger of nuclear disaster. However, the majority of residents decided to stay in Fukushima after considering various options. For those who decided to continue their lives in Fukushima, having a more positive future outlook is likely to be one of the important indicators of their socio-psychological recovery from the disaster. While few studies have examined the relationship between community engagement and future outlook, literature on disaster resilience indicates that those who are connected to their local community and those who live in a community with a viable social network are more likely to cope with and recover from disasters faster than others (Aldrich, 2010; Chamlee-Wright & Storr, 2011).

Hypotheses and Research Questions

Based on communication infrastructure theory and past studies, two hypotheses and two research questions are proposed. Hypothesis 1 tests the relationship among the three neighborhood storytelling network variables. Studies have found that individuals who are connected to meso-level resources in the neighborhood, such as community organizations and local media, are more likely to talk with their neighbors about what is happening in their neighborhood (Ball-Rokeach et al., 2001; Matei & Ball-Rokeach, 2003). Being part of a community organization is likely to grant people social networks and exposure to community affairs. Closely following local media, such as local newspapers, cable channels, or newsletters, is likely to provide people with "story seeds" for talking with their neighbors about what is happening in their neighborhood.

H1: Residents who are more connected to community organizations and local media are more likely to engage in conversations with their neighbors about what is happening in their neighborhood.

Hypothesis 2 is based on past studies that found significant relationships between the connectedness to one's neighborhood storytelling network and collective efficacy (Kim & Ball-Rokeach, 2006b; Kim et al., 2019). People who are connected to the neighborhood storytelling network are more likely to have higher trust toward other residents and also have higher level of confidence that community members collectively will intervene and make a difference when a need arises.

H2: Residents who are more connected to their neighborhood storytelling network (community organizations, local media, and interpersonal storytelling) are more likely to have higher collective efficacy.

Research Questions 1 and 2 concern the influence of the neighborhood storytelling network and collective efficacy on two socio-psychological disaster recovery variables: life satisfaction and future outlook. While few studies have directly examined the relationship between the neighborhood storytelling network and the two dependent variables, several studies have examined the relationship between community engagement and life satisfaction (Berger, 2010; Huang & Wong, 2014), as well as community

social network and resilience (Aldrich, 2010; Chamlee-Wright & Storr, 2011; Elliott et al., 2010). Because of the insufficient number of past studies, two research questions, rather than hypotheses, are proposed.

RQ1: Are residents who are more connected to their neighborhood storytelling network (community organizations, local media, and interpersonal storytelling) and those who have higher collective efficacy more likely to have higher life satisfaction?

RQ2: Are residents who are more connected to their neighborhood storytelling network (community organizations, local media, and interpersonal storytelling) and those who have higher collective efficacy more likely to have a more positive future outlook?

Research Methods

Research Site

As part of an ongoing research project led by the author to investigate the role of community connectedness on disaster recovery in Fukushima Prefecture, this study is based on a survey administered in Shinchimachi, Fukushima. Shinchimachi is a small coastal village located in the northeast corner of Fukushima Prefecture with 8,272 residents and 2,836 households (Shinchi Town, 2018). In addition to the survey research included in this article, the in-depth community-based research in Shinchimachi included interviews and focus groups.

Shinchimachi was chosen as a research site because of its unique location and situation, as well as the feasibility of conducting research in the community. Shinchimachi was affected by the tsunami on March 11, 2011, and 118 people died. Many homes and buildings were swept away by the tsunami. A total of 497 households were completely destroyed by the tsunami, and 22 houses were destroyed by the earthquake; this resulted in 1,512 residents moving into one of nine temporary housing developments, where many of them lived for the next four to five years (Shinchi Town, 2014). However, because they were approximately 50 kilometers away from the Fukushima Dai-ichi Nuclear Power Plant, Shinchimachi residents did not have to evacuate after the nuclear accident. Although the effect of the nuclear accident was weaker than in other areas in Fukushima, the radiation level in the air, soil, and ocean increased after the accident, and it severely affected the farming and fishing industries in the town. The difficulty of farming and fishing was due not only to the actual radiation contamination, but to the fact that Shinchimachi was part of Fukushima Prefecture. Whatever was "produced or caught in Fukushima" was automatically devalued and avoided (Wakamatsu & Miyata, 2017). Being part of Fukushima—affected by the tsunami, but not having to evacuate from the neighborhood—made Shinchimachi a suitable community to conduct this research. In addition, the author and her colleagues have been conducting in-depth interview research in Shinchimachi since 2011 (Kwesell & Jung, 2019), and a larger scale survey was a logical next step to further examine the relationship between community connectedness and socio-psychological disaster recovery.

Research Procedure

A survey was administered from July 2017 to June 2018. A stratified neighborhood sampling method was used to collect data. Shinchimachi has 15 administrative districts, and each district has an official head person appointed by the mayor of Shinchimachi. The researcher contacted every district head person, asking for cooperation in distributing the survey. Of 15 district head persons contacted, eight agreed to cooperate, and seven declined.[3] In four districts, head persons distributed and collected surveys. In the other four districts, head persons distributed the surveys to each household with a return envelope enclosed. Respondents in these districts sent back their surveys directly to the researcher. Because of the two different ways of collecting data, the response rate differed. For the districts in which the head person collected surveys, the response rate was 66%. In the districts in which the surveys were sent back by mail, the response rate was 20%. In total, 405 surveys were collected. The survey instruction asked an adult (20 years old or older) in the household to answer the questions.

The survey was first drafted in English and was translated into Japanese by a professional translator. The translation was reviewed by two persons who were bilingual in English and Japanese. A pilot study was conducted with five residents of Shinchimachi, who edited and gave comments about the survey. The researcher finalized the survey based on the edits and comments.

Measures

Life satisfaction was measured with five items adopted from the World Health Organization Quality of Life Index (World Health Organization, 2004). The items are: "How satisfied are you with your ability to perform your daily life activities?" "How satisfied are you with your social relationships?" "How satisfied are you with the support you get from your friends?" "How satisfied are you with the conditions of your living place?" and "How satisfied are you with the ways in which you enjoy your life?" Answer categories were: *not satisfied at all* (1), *not satisfied* (2), *neutral* (3), *satisfied* (4), and *very satisfied* (5; $M = 3.48$, $SD = .65$, Cronbach's $\alpha = .85$).

Future outlook was measured with six items derived from past studies and interview research in Shinchimachi (Abramson et al., 2015; Doerfel et al., 2013; Kwesell, 2013). The items are: "I see a future for my children and grandchildren in Shinchimachi," "I feel safe in Shinchimachi," "I think the Shinchimachi community is stronger after March 11, 2011," "I think Shinchimachi will grow stronger in the

[3] Given the extremely challenging situations that Fukushima residents have experienced since the disaster, they generally do not welcome researchers coming into their community and doing "research" about them. In addition, doing survey research is generally more difficult in Japan than, for example, in the United States because people are highly concerned about protecting "private information" (*kojinjouhou*) and are hesitant to fill out surveys even though their identities remain anonymous. This survey and other research activities were only possible because of the initial rapport that research members established in the community since 2011. The lack of community studies in Fukushima proves the difficulty of conducting such types of research. That said, research purposes were kept strictly confidential from the residents to avoid influencing their responses.

next 10 years," "I feel the children are safe in Shinchimachi," and "I think Shinchimachi is well prepared for any future disasters." A 5-point Likert scale (1= *strongly disagree*; 2 = *disagree*; 3 = *neutral*; 4 = *agree*; and 5 = *strongly agree*) was used to measure the items (*M* = 3.11. *SD* = .66, Cronbach's α = .86).

Connectedness to the neighborhood storytelling network was measured by three subdimensions derived from past studies based on communication infrastructure theory (Ball-Rokeach et al., 2001; Kim & Ball-Rokeach, 2006a): interpersonal storytelling, participation in community organizations, and connectedness to local media. *Interpersonal storytelling* was measured by one item: "How often do you talk with your neighbors about things happening in Shinchimachi? Using a 10-point scale where 1 means *never* and 10 means *all the time*, where would you place yourself?" (*M* = 5.80, *SD* = 2.77). *Connectedness to community organizations* was measured in terms of five types of organizations. Respondents were asked if they are part of any sports or hobby organizations; school-related organizations or groups; neighborhood associations (*chounaikai*); community-building organizations (*machizukuri*); and other types of organizations. Answer categories were *yes* (1), *no* (0), and *don't know* (0). Respondents' answers to the five-organizations question were added (*M* = 1.59, *SD* = 1.39). *Connectedness to local media* was measured by asking how important six types of local media are to keeping up with what is going on in Shinchimachi: local newspapers (e.g., *Fukushima Minpo*, *Fukushima Minyu*); public relations newsletters published by the Shinchimachi local government twice a month (*Kouhou Shinchi*); Facebook or Twitter; talking to neighbors; newsletters published by community organizations or groups (e.g., *Miraito Newsletter*); and the circular notice board (*kairanban*). Answer categories were: *not important at all* (1), *not important* (2), *so-so* (3), *important* (4), and *very important* (5; *M* = 3.26, *SD* = .74, Cronbach's α = .80).

Collective efficacy was measured in terms of two subdimensions: informal social control, and social cohesion and trust (Sampson et al., 1997). Informal social control was measured by asking respondents how many of their neighbors could be counted on to do something in the following six situations: "A stranger was found in an empty house in the neighborhood," "A street or a park was damaged by heavy rain or typhoon," "A park in which neighborhood kids often play has become unsafe because of poor maintenance," "You ask them to help organize a neighborhood event," "A child in your neighborhood is showing clear evidence of being in trouble or getting into big trouble," and "The trees along the streets in your neighborhood were uprooting the sidewalks, making them unsafe." A 5-point scale was provided: *none* (1), *a few* (2), *many* (3), *most* (4), and *all* (5; *M* = 3.06, *SD* = .81). Social cohesion and trust was measured by asking how much respondents agreed or disagreed (5-point Likert scale) with six statements: "This is a close-knit neighborhood," "People in this neighborhood can be trusted," "I feel connected to my neighbors," "People in this neighborhood generally get along with each other," "People around here are willing to help their neighbors," and "People in this neighborhood share similar values" (*M* = 3.24, *SD* = .83). A collective efficacy variable was created by combining the two subscales (*M* = 3.15, *SD* = .70, Cronbach's α = .91).

Income, education, age, gender, residential tenure, and mainstream media for news were included in the analysis as control variables. Income was measured by last year's household income. Twelve answer categories ranged from *less than 1 million yen* (1) to *20 million yen or higher* (12; *M* = 4.40, *SD* = 2.31). *Don't know* and *Do not want to answer* categories were also provided and were counted

as missing. Education was measured by respondents' final educational levels: *elementary/middle school graduate* (1), *high school graduate* (2), *technical college graduate* (3), *university graduate*, (4) and *postcollege degree* (5; M = 2.27, SD = 2.31). Age was asked in an open-ended format (M = 61.25, SD = 14.29). Gender was asked by three answer categories: *male* (0), *female* (1), and *other* (male = 52.5%, female = 47.5%). Residential tenure was measured by asking how long the respondent had lived in Shinchimachi (M = 45.26, SD = 23.3). Mainstream media for news was measured by asking, "Which media do you use to get news and information?" Answer categories were television, paper-based national newspapers, Internet newspapers, radio, SNS, and others. A variable of mainstream media for news was created by counting positive answers to the six types of media (M = 2.62, SD = 1.09).

Results

Table 1 displays zero-order correlations of all the variables included in this study.

Table 1. Zero-Order Correlations of Variables.

	1	2	3	4	5	6	7	8	9	10	11
1. Life satisfaction											
2. Future outlook	.36**										
3. Interpersonal storytelling	.33**	.22**									
4. Community organization	.35**	.19**	.27**								
5. Local media	.35**	.39**	.37**	.22**							
6. Collective efficacy	.42**	.38**	.39**	.25*	.51**						
7. Income	.11*	.01	.02	.11*	−.07	.01					
8. Education	.11*	.03	−.10*	.18**	−.07	−.05	.23**				
9. Age	.14**	.10	.23*	.10	.21**	.23**	−.27**	−.26**			
10. Gender (female)	.04	−.05	−.03	−.01	.06	−.03	−.02**	.03	−.04		
11. Residential tenure	.10	.11*	.22**	.08	.26**	.27**	−.17**	−.26**	.65**	−.13**	
12. Mainstream media for news	.16**	.09	.12*	.26**	.13*	.17**	.10	.16**	−.01	−.10	.07

* $p < .05$. ** $p < .01$.

Multiple linear regression analyses were conducted to test hypotheses and research questions. Hypothesis 1 tested the effects of connectedness to community organizations and to local media on interpersonal storytelling (Table 2). Connectedness to both community organizations (b = .23, $p < .01$) and local media (b = .29, $p < .01$) had significant effects on interpersonal storytelling, controlling for

education, income, age, gender, residential tenure, and mainstream media for news. The R^2 change in Model 2 (ΔR^2 = .15) was significant. Hypothesis 1 was supported.

Table 2. The Effects of Connectedness to Community Organizations and to Local Media on Interpersonal Storytelling.

	Interpersonal Storytelling (Standardized coefficient)	
	Model 1	Model 2
Education	−.08	−.11*
Income	.11	.10
Age	.20**	.16*
Gender (female)	.02	−.02
Residential tenure	.05	−.02
Mainstream media for news	.13*	.03
Community organization		.23**
Local media		.29**
R^2 (ΔR^2)	.08	.23 (.15**)
F	4.75**	11.67**
N	330	330

* $p < .05$. ** $p < .01$.

Hypothesis 2 concerned the effect of three storytelling network variables on collective efficacy (Table 3). Interpersonal storytelling (b = .17, p <.01) and connectedness to local media (b = .41, p <.01) had significant effects on collective efficacy, whereas connectedness to community organizations did not. The R^2 change in Model 2 (ΔR^2 = .23) was significant. Hypothesis 2 was partially supported.

Table 3. The Effects of Connectedness to Neighborhood Storytelling Variables on Collective Efficacy.

	Collective Efficacy (Standardized coefficient)	
	Model 1	Model 2
Education	.00	.01
Income	.05	.04
Age	.11	.05
Gender (female)	−.01	−.07
Residential tenure	.18*	.08
Mainstream media for news	.15**	.04
Interpersonal storytelling		.17**
Community organization		.08
Local media		.41**
R^2 (ΔR^2)	.10	.33 (.23**)
F	5.56**	17.00**
N	322	322

* $p < .05$. ** $p < .01$.

Research Question 1 inquired about the effects of the neighborhood storytelling network and collective efficacy on life satisfaction. A hierarchical regression analysis was conducted. After accounting for control variables, all three storytelling variables had significant effects on life satisfaction (Model 2 in Table 4). When collective efficacy was entered in the final model, connectedness to community organizations (b = .20, p < .01) and collective efficacy (b = .27, p <.01) had significant effects on life satisfaction. R^2 changes in Model 2 (ΔR^2 = .16) and 3 (ΔR^2 = .05) were significant.

Table 4. The Effects of Connectedness to Neighborhood Storytelling Networks and Collective Efficacy on Life Satisfaction.

	Life Satisfaction (Standardized coefficient)		
	Model 1	Model 2	Model 3
Education	.11	.09	.09
Income	.14*	.11*	.10*
Age	.21**	.14*	.13
Gender (female)	.08	.04	.06
Residential tenure	.02	−.05	−.07
Mainstream media for news	.10	−.01	−.02
Community organization		.22**	.20**
Local media		.22**	.10
Interpersonal storytelling		.15**	.11
Collective efficacy			.27**
R^2 (ΔR^2)	.08	.24 (.16**)	.29 (.05**)
F	4.45**	10.95**	12.70**
n	317	317	317

* p < .05. ** p < .01.

Research Question 2 examined the effects of the neighborhood storytelling network and collective efficacy on future outlook (Table 5). In Model 2, in which three neighborhood storytelling network variables were entered, connectedness to community organizations (b = .11, p <. 05) and to local media (b = .44, p <. 01) showed significant effects on future outlook. In Model 3, in which collective efficacy was entered, local media (b = .34, p < 01) and collective efficacy (b = .26, p < .01) had significant effects on future outlook. R^2 changes in Model 2 (ΔR^2 = .21) and Model 3 (ΔR^2 = .04) were significant.

Table 5. The Effects of Connectedness to Neighborhood Storytelling Networks and Collective Efficacy on Future Outlook.

	Future Outlook (Standardized coefficient)		
	Model 1	Model 2	Model 3
Education	.10	.11	.11
Income	.00	.00	−.01
Age	.03	−.01	−.02
Gender (female)	−.01	−.07	−.06
Residential tenure	.06	−.04	−.06

Mainstream media for news	.03	−.08	−.09
Community organization		.11*	.09
Local media		.44**	.34**
Interpersonal storytelling		.03	−.01
Collective efficacy			.26**
R^2 (ΔR^2)	.02	.23 (.21**)	.27 (.04**)
F	.79	9.67**	11.00**
N	309	309	309

* $p < .05$. ** $p < .01$.

Discussion

The study examined the ways in which people's connectedness to their neighborhood resources, such as neighbors, community organizations, and local media, influenced their socio-psychological disaster recovery, measured by life satisfaction and future outlook. Residents' connectedness to community organizations had a direct effect on life satisfaction, while their connectedness to local media and interpersonal storytelling had indirect effects on life satisfaction via collective efficacy. On the other hand, connectedness to local media had a direct, positive effect on future outlook, while connectedness to community organizations and interpersonal storytelling had indirect effects on future outlook. Collective efficacy had direct and positive effects on both life satisfaction and future outlook.

Implications of the Study

One of the most important contributions of this study is the examination of the relationship between neighborhood variables and disaster recovery. In particular, this is one of the first studies to demonstrate that there are significant relationships between people's connections to their neighborhood storytelling network and their socio-psychological disaster recovery. While reconstruction of facilities, infrastructures, and businesses is an important measure of disaster recovery, people's social and psychological recovery is as important and difficult to achieve. Two measures of socio-psychological disaster recovery, life satisfaction and future outlook, demonstrated high reliabilities and served as valid dependent variables. More future research in developing and testing the "soft recovery" measures are desirable and will add much value to disaster recovery research.

The results about the relationships among the neighborhood storytelling network variables and their effects on collective efficacy support past studies based on communication infrastructure theory (Ball-Rokeach et al., 2001; Kim & Ball-Rokeach, 2006a). Meso-level storytelling networks—community organizations and local media—were found to significantly influence micro-level interpersonal neighborhood storytelling. The interpersonal storytelling in this study specifically refers to talking to neighbors about what is happening in the neighborhood rather than about general topics. Residents who are part of community organizations, such as hobby groups, child-related organizations, or residents' associations, are more likely to, first, know people in the neighborhood, and second, be exposed to issues and activities in the neighborhood. In addition, those who regularly follow local media are more likely to know what is happening in the neighborhood and thus are more likely to talk to their neighbors about local affairs. The study result

confirms that being connected to meso-level communication resources is likely to facilitate neighborhood storytelling among neighbors. To facilitate residents' conversation about neighborhood affairs, which was found to have significant effects on civic engagement, collective efficacy, and a sense of belonging to one's neighborhood (Ball-Rokeach et al., 2001; Kim & Ball-Rokeach, 2006b), policy makers and local leaders should facilitate community organizations and devote efforts to enhancing people's connections to local media.

Those who often talk with their neighbors about neighborhood affairs and those who closely follow local media were found to have higher collective efficacy than others. Types of local media that were highly used by Shinchimachi residents included local newspapers, magazines published by the local government, and *kairanban* (a folder with neighborhood news and information passed around among the residents of an administrative district). The more they are connected to these types of local media and talk with their neighbors about neighborhood affairs, the more they are likely to think that "we" as residents can control and manage the surroundings based on trust and cohesion. To develop collective efficacy in a neighborhood, both micro-level interpersonal storytelling and meso-level local media connectedness should be initiated.

Collective efficacy had direct effects on both life satisfaction and future outlook. Those who believe in the ability of their community to take action when certain needs for intervention arise are more likely to be satisfied with their lives and also have a more positive future outlook about their community. Adding to the past studies that have found collective efficacy to be effective in reducing violence in the neighborhood and enhancing physical health (Browning & Cagney, 2002; Sampson et al., 1997), the present study's result emphasizes the significance of collective efficacy for socio-psychological well-being in postdisaster situations. Paths from the neighborhood storytelling network to collective efficacy to two disaster recovery variables provide important ways in which policy makers and community leaders can approach, and take action in, helping people recover from disasters. Efforts have been made to help people in Fukushima overcome traumatic experiences, but most of the efforts have been targeted toward improving individuals' mental health by providing counseling services or a helpline. The result of the present study emphasizes that community-level interventions, such as facilitating people's participation in community organizations or activating local media, can be effective ways for people to cope with disaster, achieve higher life satisfaction, and hold a more positive future outlook.

One of the interesting findings of the study is that connectedness to community organizations has a direct positive effect on life satisfaction, while connectedness to local media has a direct positive effect on future outlook. Being part of community organizations and engaging in organizational activities are likely to enhance life satisfaction. In fact, after the Great East Japan Earthquake, many residents mentioned that community organizations played important roles in Shinchimachi, which was severely hit by the tsunami and affected by the nuclear accident (Kwesell & Jung, 2019). For example, a community organization created immediately after the disaster in Shinchimachi has played an important role in disaster recovery. People involved in the organization initially started cleaning up the neighborhood after the earthquake and tsunami; they continued on to develop many programs for residents, particularly for local children, to come together and engage in fun and reflective activities with fellow residents. Those who have been involved in organizing these activities may have turned the frustration and difficulties of

coping with the disaster into a sense of achievement and belongingness. Past studies have noted that taking certain actions, rather than remaining passive, helps overcome difficulties after going through personal tragedies or disasters (Zakour, 2012). One of the leaders of the organization mentioned that his life goal has expanded after the disaster, from earning money and supporting his family to doing something meaningful for the community (Kwesell & Jung, 2019). Through these processes, people may have been able to recover, to a certain extent, and enhance their life satisfaction despite experiencing devastating disaster.

Connectedness to local media having a direct effect on future outlook is also intriguing. Given that the future outlook variable concerns the community, such as the safety of children in Shinchimachi and the likelihood that Shinchimachi will grow as a community in the next 10 years, people who closely follow local media and consider local media to be important are likely to develop close attachment and a sense of belonging to their neighborhood (Ball-Rokeach et al., 2001). Knowing what is going on in the neighborhood, including actions and interventions by community organizations and the local government, may help people develop a more positive future outlook. For example, Rausch (2013) found that regional newspapers in Fukushima and adjacent areas extensively reported about the nuclear disaster and recovery prospects; these reports were more targeted to the local areas, which likely helped people be on top of important information in coping with disasters. More research should be conducted on the role of local media, in addition to mainstream media, in disaster situations and in the disaster recovery process. Furthermore, specifically examining the political and economic context of postdisaster Fukushima and how local media balance the roles of informing and assisting residents in rebuilding communities, on the one hand, and maintaining a critical stance in watching the government and nuclear power industry approach the nuclear disaster recovery, on the other, would enhance richer understanding of local media in postdisaster situations.

Limitations and Future Implications

The study has limitations. This study was conducted in one coastal village in northeastern Fukushima, about 50 kilometers north of the Fukushima Dai-ichi Nuclear Power Plant. Being a coastal village, Shinchimachi was severely affected by the tsunami. Many residents had to live in temporary housing for several years and eventually settled into a new neighborhood. However, residents of Shinchimachi did not have to evacuate following the nuclear accident. Different villages in Fukushima Prefecture had different types of destruction and different experiences. Therefore, caution should be employed in generalizing the study result to the wider area. That said, being a resident of Fukushima, regardless of the proximity to the nuclear power plant, has taken on many negative connotations related to radiation contamination and health. Residents of Shinchimachi mentioned that they felt stigmatized when interacting with people from outside Fukushima and sometimes avoided telling people that they were from Fukushima (Kwesell & Jung, 2019). In such ongoing circumstances, examining socio-psychological recovery is likely to be highly relevant and important for residents in any part of Fukushima. Future studies should examine relationships between neighborhood variables and socio-psychological recovery in other areas of Fukushima.

In applying communication infrastructure theory, this study did not actively incorporate communication action context variables. The particular context of Shinchimachi—its population

characteristics, social resources, and physical infrastructure—has influenced and shaped its neighborhood storytelling network. In future studies in which Shinchimachi is compared with other neighborhoods in Fukushima, the influence of different communication action contexts on storytelling networks and socio-cultural disaster recovery should be examined.

The study employed a stratified neighborhood sampling method based on administrative districts in Shinchimachi, but could only conduct a survey in eight of 15 districts because of the difficulty obtaining cooperation from district head persons despite multiple attempts. This may have affected the characteristics of the data. In addition, distributing the survey via district head persons may have affected the sample. Comparing the study data with census data (Shinchi Town, 2018), the gender breakdown is similar (study data: male: 52.5% vs. census data: male: 50.7%), while those aged 65 years and older were overrepresented in the study sample (study data: 45% vs. census data: 35%). The sampling limitations should be taken into consideration in generalizing the study results.

The survey respondents being older and from a rural area likely influenced their media use patterns. The respondents of the study were more likely to rely on traditional media, such as television, newspapers, and radio, than new media, such as the Internet and, particularly, social media (56% of the respondents do not use the Internet). This indicates the ongoing digital divide, even in a technologically advanced society such as Japan (Pick & Sarkar, 2015). Several studies have examined the role of digital media after the Great East Japan Earthquake (e.g., Hjorth & Kim, 2011; Kaigo, 2012; Peary, Shaw, & Takeuchi, 2012), and more studies should be conducted to monitor the use of digital media in coping with the disaster.

Despite limitations, the study highlights the importance of individual- and neighborhood-level connections in coping with difficult situations such as natural or human-made disasters. No community is safe from disasters, such as earthquakes, terror attacks, shootings, and other events. While this study is about the case of nuclear disaster in which certain postdisaster situations are unique, the study result nonetheless can be applied to other disaster situations. In any type of major disaster, knowing many neighbors and having a support group in the neighborhood to rely on and through which people help one another are likely to be crucial in coping with disasters. The study results are likely to inform individuals, researchers, policy makers, and local leaders about the importance of local-level communication infrastructure and social connections in being prepared for possible future disasters.

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