

Original Paper

Application of the Hope Theory to Understand Reconstruction
Beliefs and Life Satisfaction Level among Residents following
the Fukushima Disaster

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Abstract

The Great Eastern Japan Earthquake struck in 2011, which had an enormous impact on society and lives in the northern part of the Japan (Tohoku region). The disaster also led to hydrogen explosion at the Fukushima Daiichi Nuclear Plant (FDNP), resulting in leakage of radioactive substances that contaminated the surrounding area. The Fukushima population is highly stressed and lives under constant fear of radiation, in addition to losing neighbors to evacuations during the earthquakes and the tsunami. Yet, there is lack of research on the psychological state of Japanese earthquake survivors. The present study uses psychological variables to measure hope for understanding how these factors could explain beliefs toward reconstruction and life satisfaction level of the local residents in Miyakoji town of Fukushima Prefecture. The survey (n=223) showed that only a few residents (about 30%) believed in successful reconstruction. Regression analysis revealed that factors of hope such as pathway and agency thinking have an influence on respondents' beliefs regarding reconstruction and their level of life satisfaction. Future outreach and supporting activities should target raising residents' hope to increase their psychological well-being.

Keywords

disaster, Fukushima, Hope theory, life satisfaction, psychological well-being

1. Introduction

The Great Eastern Japan Earthquake of March 11, 2011, hugely impacted society and people living in the northern part of Japan (Tohoku region). A tsunami triggered by the earthquake destroyed the entire coastal area of Iwate, Miyagi, and Fukushima Prefectures. As many as 15,894 people were killed by the earthquake and tsunami, and, as of December 2017, nearly 2,546 are reported missing (National Policy Agency of Japan, Emergency Disaster Countermeasures Headquarters 2017). Worse still, a hydrogen explosion in the tsunami-hit Fukushima Daiichi Nuclear Plant (FDNP) affiliated with the Tokyo Electric Power Company resulted in the leak of radioactive substances, thus contaminating the surrounding area of Fukushima Prefecture. A 20-km area surrounding the FDNP was designated as a “Restricted Area” by the Japanese Nuclear Emergency Response Headquarters (NERHQ) and ordered evacuation of the area on April 22, 2011 (International Atomic Energy Agency, 2011). Moreover, the area where the annual dose rate of radioactive substances was more than 20 mSV (micro Sievert) was declared the “Deliberate Evaluation Area”, while the area between 20 and 30 km from the FDNP was designated as the “Evacuation-Prepared Area” (International Atomic Energy Agency, 2011). This resulted in about 99,000 local residents being forced to evacuate from those areas (Asaoka & Ishiyama, 2013). By December 2016, more than 45,000 people were still living in temporary housings (Reconstruction Agency, 2017).

Fukushima Prefecture declared three goals in the “Plan for Revitalization of Fukushima Prefecture”:

- 1) to establish a safe, secure, and sustainable society free from nuclear power,
- 2) to revitalize the region by bringing together everyone who loves and cares about Fukushima, and
- 3) to create a homeland that people can once again be proud of (Fukushima Prefectural Government, 2011).

Although efforts were concentrated on developing physical infrastructure to revive primary industries and promote renewable energy, Fukushima emphasized the social aspects such as improving the living conditions and social environment for evacuees, revitalizing communities, and building a resilient community through shared vision of the future (Fukushima Prefectural Government, 2011).

Literature on the post-disaster reconstruction of communities revealed that much of government’s efforts by was directed at restoration of physical infrastructure (e.g., buildings) rather than building social and physical aspects (e.g., alleviating residents’ stress) (Chandra & Acosta, 2010). This was true for Fukushima as well, where maximum efforts were made for reconstructing the infrastructure and radiation decontamination (Zhang et al., 2014). Budget allocated to support residents, alleviate stress, and support revitalization of the communities was less than 10% of that allocated to constructing houses, roads, and other infrastructure (Asahi, 2016). The residents of Fukushima are believed to have suffered greater stress than those of the other two prefectures (Miyagi and Iwate) owing to the fear of radiation as well as the loss of erstwhile neighbors due to evacuation in addition to damages by earthquake and tsunami (Zhang et al., 2014).

Communities cannot be revitalized without the active involvement of the local residents. Previous studies show that the top-down approach, that is, government-led community development, is ineffective and unsustainable in contrast to the bottom-up approach (Zanetell & Knuth, 2004; Hill, 2008). To encourage community revitalization through active involvement of local residents, social science studies are warranted to understand the factors influencing residents' feeling toward reconstruction of the community as well as their psychological well-being. The present study used psychological variables for measuring hope to understand how these factors could explain beliefs of Fukushima Prefecture's resident toward reconstruction and their life satisfaction level. Understanding their psychological status would give better insights to motivation factors toward reconstruction as well as their resilience (e.g., targeted community programs for specific psychological needs) to help recover from the trauma of disaster.

2. Theoretical Background

Hope theory was used to understand the psychological factors influencing local residents' feeling toward reconstruction of the community. The theory developed by Snyder (2000) consists of three assumptions: goals, pathway thinking, and agency thinking. Snyder assumes, first, that human actions are goal directed. Since achieving goals includes uncertainty, hope plays an important role in motivating people toward the goal. Second assumption is that people must feel capable of "generating workable routes to those goals", and it was named as pathway thinking. Previous studies revealed that high-hope individuals are good at finding alternative routes to achieving goals. The third assumption is that people should have the perceived capacity to move on and continue to progress along the pathway. This motivation component was named as agency.

Similarly, Herth (1992) constructed and tested factors that measured hope and developed three scales. The present study focuses on two of these scales: "temporality and future" and "positive readiness and expectancy", and along with two scales, "pathway thinking" and "agency thinking", by Snyder (2000). The study tested these four scales to explain beliefs toward reconstruction.

This study uses hope theory variables since reconstruction of communities struck by disaster is a major goal of all stakeholders such as governments and local residents, etc. Literature shows that communities show resilience in the face of disaster if motivated individuals form part of the community (Tidball & Krasny, 2009; Itonaga, 2012). Residents' motivation could be affected by factors like a clear vision toward reconstruction and belief that the community could be revitalized yet again (Yan & Roggema, 2017). Therefore, this study draws the hypothesis that the residents' beliefs toward reconstruction would be affected by two factors: whether they could: (1) derive various/alternative pathways to achieve reconstruction, and (2) feel capable of reaching their own goals. Hope theory is relatively a new concept, and there have been no studies to measure the level of hope of earthquake survivors in Fukushima region yet, as far as the authors know. Therefore, the present study is one of the first to utilize hope theory in actual sites in Japan and serves to bridge a gap in the

literature.

In the present study, people's life satisfaction level was studied using the scale developed by Diener et al. (1985). Although Fukushima people faced highly stressful situations post-disaster, very few studies have been conducted to measure their psychological well-being, such as life satisfaction level. Although increasing the happiness level in people following a disaster has been emphasized earlier (Yan & Roggema, 2017), it would be impossible to evaluate success of reconstruction in terms of people's well-being without actually measuring these psychological factors. Therefore, the present study utilized the Satisfaction with Life Scale developed by Diener et al. (1985) to assess people's general life satisfaction level. Life satisfaction is defined as "judgmental process in which individuals assess the quality of their lives based on their criteria" (Shin & Johnson, 1978). Subjective well-being (assessment of a person's quality of life) has been studied in depth especially since 1980s. Diener et al. (1985) aimed to devise a scale to assess an individual's global judgment of his or her life, not only one's satisfaction of a specific domain (Pavot & Diener, 1993). Diener (1985) used five scales to measure life satisfaction level. Since the fifth item refers to the past, whereas the other four items refer to the present (Pavot & Diener, 1993), we used the four items to measure people's evaluation of their current condition. Thus, another hypothesis of this study was that residents' life satisfaction level is influenced by two factors: (1) whether they could think of various/alternative pathways to achieve reconstruction, and (2) if they could feel capable of reaching their own goals. While previous studies discussed about the high level of stress in Fukushima post-disaster, many studies were personal accounts through interviews and did not use psychological theories (Yokemoto et al., 2012; Zhang et al., 2014; Sakurai & Yan, 2017; Yan & Roggema, 2017). The present study is novel because it quantitatively reveals conceptual characteristics of residents in line with social-psychological framework. Moreover, it provides an understanding that the residents' psychological well-being, including their level of hope, beliefs toward reconstruction of the community, and life satisfaction level, is important for evaluating the efforts toward community revival following a disaster.

3. Study Site and Method

The research was conducted at Miyakoji town of Tamura city in southeastern part of Fukushima Prefecture. Much of Miyakoji town is located within 20 km from the FDNP. When there was hydrogen explosion at the plant, the Japanese Nuclear Emergency Response ordered all the residents in close proximity to evacuate the town. As many as 2,279 residents (666 households) were cleared from the area as of June 2013 (Iwasaki, 2013). Japanese government was engaged in radiation decontamination mainly around the residential area, and upon decontamination, the evacuation order in Miyakoji town was lifted. As of June 2014, 998 residents had returned to their original homes in Miyakoji town (Council for Basic Plan of Life in Miyakoji Town, 2014).

As Miyakoji town was the among the first to announce the lifting of the evacuation order, understanding the general psychological well-being of residents at Miyakoji town could help to

improve the other areas that would be decontaminated in the future. Previous studies revealed that post-disaster psychological impacts and/or trauma among local residents were long-lasting (Adams et al., 2011).

A questionnaire survey was conducted among the residents of Miyakoji town. The questionnaire first explained the purpose of this research and that it was an anonymous and a voluntary survey. The residents were given approximately one month to complete the survey. The questionnaire consisted of items for measuring hope (12 items), residents' beliefs toward reconstruction of the community (2 items), residents' life satisfaction level (4 items), and sociodemographics (2 items) (Table 1). The questionnaire contained randomly mixed items, and the items were not labeled as hope theory or life satisfaction level. A pilot study among the staff members of Fukushima Cooperative Reconstruction Center who were aware of local situation were conducted to check and revise those items if necessary to confirm the validity and comprehensiveness of each question after translating the items for measuring hope and life satisfaction level. The questionnaires were distributed in March 2015 to all households (n=800) registered in the residents association of the town. The head of the family was requested to answer the questions and return it to the Fukushima Reconstruction Supporting Center using a prepaid envelope.

4. Analysis

Table 2 shows the descriptive results for each item. A multiple regression analysis was then conducted to understand which items of the hope theory (total of 12 items) and sociodemographics (sex and age) would affect residents' beliefs toward reconstruction and their life satisfaction level. A reliability test was conducted to understand if multiple variables had enough internal consistency to form dependent variables (two items to form beliefs toward reconstruction and four items to form life satisfaction level). Once multiple items were ascertained for sufficient consistency using Cronbach Alpha value, the average of two items was taken to form beliefs toward reconstruction value and the average of four items to form life satisfaction level. A stepwise method was used to identify the best-fit model having a 5% significance level in the F-value. Variance Inflation Factor (VIF) was measured to test for correlation among independent variables. SPSS 18 (IBM, Tokyo, Japan) was used for all analyses. A value of $p < 0.05$ was considered statistically significant.

5. Results

There were 223 respondents (27.9%); of which, 34% were female and 66% male. Majority were older than 50 years (50s=24.5%, 60s=38.5%, More than 70s=25.0%), while 3% were in their 30s and 9% in their 40s.

Many (36%) respondents either agreed or slightly agreed that "there are lots of ways to achieve reconstruction", about 26% agreed or slightly agreed that "there are lots of things they could do to contribute to reconstruction". About 30% of respondents agreed or slightly agreed to most of items

related to “agency thinking” and “temporality and future” factors related to the hope theory. However, respondents who believed that their outlook affects their lives were much higher (50%) than other items regarding the hope theory (Table 2).

Table 1. Questionnaire Items

Category	Items	Response scale
Hope theory	When I have a problem, I can come up with lots of ways to solve it	1=Disagree, 2=Slightly disagree, 3=Neither option, 4=Slightly agree, 5=Agree
	Pathway thinking There are lots of ways to achieve reconstruction from the disaster	
	There are lots of things I can do to contribute to reconstruction from the disaster	
	Right now, I am energetically involved in reconstruction from the disaster	
	Agency thinking I have been meeting the goals that I set for myself	
	I think my past experiences have prepared me well for my future	
	Temporality and future I am looking forward to the future I have plan for the future	
	I can see a light even in a tunnel	
	Positive readiness and expectancy I have inner positive energy I see the positive in most situation	
	I believe my outlook affects my life	
Beliefs toward reconstruction of the community	I believe that Miyakoji Town can achieve reconstruction from the disaster	
	I believe that we can achieve reconstruction from the disaster	
Life satisfaction level	In most ways my life is close to my ideal	
	The conditions of my life are excellent	
	I am satisfied with my life	
Sociodemographics	So far I have gotten the important things I want in life	
	Sex	1=Female, 2=Male
	Age	1=10s, 2=20s, 3=30s, 4=40s, 5=50s, 6=60s, 7=More than 70s

Table 2. Results of Descriptive Statistics

Category	Items	Ratio of respondents who either agreed or slightly agreed the statement	Mean score	Standard Deviation
Pathway thinking*	When I have a problem, I can come up with lots of ways to solve it (n=189)	32%	2.80	1.19
	There are lots of ways to achieve reconstruction from the disaster (n=189)	36%	3.10	1.20
	There are lots of things I can do to contribute to the reconstruction from the disaster (n=188)	26%	2.85	1.04
Agency thinking*	Right now, I am energetically involved for the reconstruction from the disaster (n=190)	31%	2.95	1.19
	I have been meeting the goals that I set for myself (n=188)	26%	2.83	1.12
Temporality and future*	I think my past experiences have prepared me well for my future (n=188)	29%	2.95	1.16
	I am looking forward to the future (n=189)	29%	2.93	1.16
	I have plan for the future (n=187)	33%	2.95	1.20
Positive readiness and expectancy*	I can see a light even in a tunnel (n=187)	34%	2.99	1.17
	I have inner positive energy (n=187)	29%	2.90	1.16
	I see the positive in most situation (n=188)	27%	2.89	1.12
Beliefs toward reconstruction of the community	I believe my outlook affects my life (n=189)	50%	3.45	1.22
	I believe that Miyakoji Town can achieve reconstruction from the disaster (n=190)	33%	3.10	1.20
Life satisfaction level	I believe that we can achieve reconstruction from the disaster (n=190)	34%	3.14	1.19
	In most ways my life is close to my ideal (n=181)	16%	2.41	1.09
	The conditions of my life are excellent (n=180)	15%	2.32	1.12
	I am satisfied with my life (n=181)	28%	2.67	1.29
	So far I have gotten the important things I want in life (n=179)	31%	2.85	1.22

*Items measuring factors of the hope theory

More than 30% of respondents believed that Miyakoji town (33%) and local residents (34%) could achieve reconstruction. Few respondents (<20%) agreed or slightly agreed that their lives were closer to their ideal or their lives conditions are excellent.

Reliability analysis revealed that both items regarding beliefs toward reconstruction (Cronbach Alpha=0.82) and life satisfaction level (Cronbach Alpha=0.91) had high internal correlations, and we judged that these items could form respective scales: “beliefs toward reconstruction” and “life satisfaction level”.

The best-fit model identified by the stepwise multiple regression analysis for explaining the respondents’ beliefs toward reconstruction included three variables that significantly affected the dependent variable (Table 3). “I am looking forward to the future” had the strongest effect ($B=0.46$, $p<0.01$) toward the dependent variable, while “there are lots of things I can do to contribute to reconstruction the disaster” ($B=0.25$, $p<0.01$) and “I have inner positive energy” ($B=0.16$, $p<0.05$) also had significant effects. VIFs for these three independent variables were less than 2.0, indicating that insignificant multicollinearity (Vaske, 2008). The model used adjusted $R^2=0.52$; in other words, majority (52%) of the target variable was explained by these three variables.

Table 3. Multiple Regression Analysis with Respondents’ Beliefs toward Reconstruction as a Dependent Variable and Items of the Hope Theory and Sociodemographics as Independent Variables. B =Standardized Coefficient. $n=176$

		B	p	VIF	R^2	Adjusted R^2
Temporality and future	I am looking forward to the future	0.46	<0.01	1.59		
Pathway thinking	There are lots of things I can do to contribute to reconstruction from the disaster	0.25	<0.01	1.47	0.53	0.52
Positive readiness and expectancy	I have inner positive energy	0.16	<0.05	1.83		

The best-fit model identified by the stepwise multiple regression analysis for explaining respondents’ life satisfaction level included three variables that significantly explained the target variable (Table 4). Three independent variables selected in the model were “I think my past experiences have prepared me well for my future” ($B=0.32$, $p<0.01$), “I see the positive in most situation” ($B=0.26$, $p<0.01$), and “I believe my outlook affects my life” ($B=0.21$, $p<0.01$). The level of multicollinearity was negligible ($VIF<0.2$). The model had a decent explanatory power for explaining the target variable (Adjusted $R^2=0.41$).

Table 4. Multiple Regression Analysis with Respondents' Life Satisfaction Level as a Dependent Variable and Items of the Hope Theory and Sociodemographics as Independent Variables. *B*=Standardized Coefficient. n=164

		<i>B</i>	<i>P</i>	VIF	<i>R</i> ²	Adjusted <i>R</i> ²
Agency thinking	I think my past experiences	0.32	<0.01	1.41	0.42	0.41
	have prepared me well for my future					
Positive readiness and expectancy	I see the positive in most situation	0.26	<0.01	1.97		
	I believe my outlook affects my life	0.21	<0.01	1.74		

6. Discussion

Although there were fewer respondents (27.9%), the response rate is reasonable because it was a mail survey without a reminder or prior notice (Dillman, 2007). Moreover, the majority of respondents in this study was elderly males (older than 60 years) as we asked the head of the family (who are usually male) to answer the survey. However, while our results represent perceptions of residents, especially heads of families, these do not necessary represent the whole population in Miyakoji town.

Descriptive statistics revealed that only a few respondents (about 30%) believed that reconstruction could be achieved, which implies the harsh reality; a majority of respondents either disagree or neither agree or disagree. Furthermore, because only a minority could recognize methods to achieve reconstruction (36%) and were involved in it (31%) revealed the difficulties faced by residents in visualizing the pathway toward reconstruction as well as to actively be involved in the activities. The life satisfaction level was especially low; less than 20% of respondents agreed that their life is close to their ideal or excellent, and less than 30% agreed that they were satisfied with their life.

Regression analysis revealed that residents' future expectation had the strongest influence to beliefs toward reconstruction, while respondents' beliefs felt there were many things they can contribute. Thus, the first hypothesis; residents' beliefs toward reconstruction would be affected by items of hope such as whether they could think various pathways and feel capable of reaching their own goals, was proven. In other words, outreach and/or supporting programs to increase residents' positive beliefs toward achievement of reconstruction could include information on future events that would boost residents' expectation as well as the activities that residents could engage in to contribute to or get involved in reconstruction.

The second regression analysis revealed that those respondents who thought that past experience prepared them for future had higher life satisfaction. Meanwhile, respondents with positive thinking had higher life satisfaction as well. Thus, our second hypothesis "residents' life satisfaction level would

be affected by items of hope” was correct. The results imply that, even under difficult conditions such as losing houses, jobs, and the community, positive thinking, and agency thinking support maintaining local residents’ life satisfaction level.

Our results revealed that factors of hope affect people’s beliefs toward reconstruction and their life satisfaction level. This corresponds with previous literature stating that high-hope people could more likely overcome barriers and pursue their original goals by using alternative routes (Rodriguez-Hanley & Snyder, 2000). Therefore, increasing degrees of hope in local residents will lead to not only feeling more satisfied with their lives but also believing that reconstruction of the community could be achieved. Previous studies examined how hope could be increased through therapy and communication. Lopez et al. (2000) emphasized the importance of helping people to conceptualize goals, produce various pathways to attainment, and summon the mental energy for pursuing goals.

In 2013, a few efforts made to enhance hope in residents of Minamisoma City of Fukushima Prefecture and Kesenuma City of Miyagi Prefecture, sites different from our study, were collaborated design and planning workshops; “vision charrette” (Roggema & Yan, 2017). A series of workshops for local residents including high school students and stakeholders were conducted, in which participants discussed the most important issues and problems of the past 30 years and forthcoming 30 years. These were followed by meetings in which same participants co-created their own spatial future using maps according to their demands and wishes. These exercises were beneficial as participants could envisage their future and set clear visions. Further, by collaborating with other participants to discuss and design their future, local residents were able to find various pathways to achieve these goals. Previous study found that people’s psychological well-being could be promoted through face-to-face interaction (Weiss et al., 2016), and these workshops could increase factors consisting hope.

“Reconstruction Supporters Project” established by Ministry of Internal Affairs and Communication (Ministry of Internal Affairs and Communication, 2014) is another effort contributing to raising residents’ hope. Through this project, a few select supporters settle in disaster regions and support local residents by providing opportunities in which residents can talk about their future and implement activities to revitalize the region. Seven supporters (as of 2014) were working in Miyakoji town to support the local residents. Their activities include making and distributing leaflets introducing events of the town to residents and inviting volunteers to collaborate with residents for reconstruction (Sakurai et al., 2016). These activities are also expected to increase residents’ level of hope by spreading awareness about the events among people to enhance their future expectation as well as activities to become involved.

This research has scientific significance because it showed how psychological theory such as items of the hope theory could be utilized to understand people’s psychological conditions and beliefs toward reconstruction. Also, the study revealed how psychological theory, that is, the hope theory, developed in the United States, could be used in a different cultural setting such as Japan. In addition, the research is one of the first to reveal relationships between items of the hope theory and life satisfaction scales

especially under circumstances of disaster reconstruction.

This study has practical significance in that it reveals specific factors affecting residents' beliefs toward reconstruction. The research implies that by increasing people's expectation toward future and showing things they can do, people's positive beliefs toward reconstruction could be increased. Meanwhile, to achieve people's perception of reconstruction and revitalization of communities, there must be measurable criteria success of the targets achieved. This research shows that factors of hope and life satisfaction scale could be two of such criteria to understand the current level of people's psychological well-being.

This study has limitation, in that the respondents' demographics were biased to male and the elderly, and the results, too, relied on self-reported surveys. Moreover, while our study revealed association between residents' level of hope and beliefs toward reconstruction as well as their life satisfaction level, it is unsure if increasing their hope would actually increase their more positive beliefs toward reconstruction or increasing their life satisfaction. Few previous studies suggested that hope enhancement strategies have only modest power to increase hopefulness or life satisfaction (Weis & Speridakos, 2011). Future research should identify not only the level of hope or life satisfaction but also monitor these cognitive factors over long term and test if hope and life satisfaction level could in fact be increased over time through workshops and other interventions.

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