

A Study on Factors Related to Earthquake Preparedness by Family of Non-institutionalized Individuals with Severe Motor and Intellectual Disabilities

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Abstract This study sought to discern the state of earthquake preparedness by family of non-institutionalized individuals with severe motor and intellectual disabilities (SMID) and to ascertain factors related to earthquake preparedness. Potential subjects were family members of non-institutionalized individuals with SMID who resided in the Tokyo area and who were seen by medical facilities in that area. An anonymous questionnaire was self-administered and returned by mail. Responses were received from 116 subjects. Results of analysis yielded the following findings. In terms of their state of earthquake preparedness, a majority of subjects had prepared materially, but fewer than 20% of subjects had made preparations that involved other parties, such as gathering or checking information, participating in disaster preparedness drills, or discussing the response in the event of a disaster. The age of individuals with SMID, the degree of dependence on medical care, the number of sources of disaster preparedness information, perceptions of risk, and perceptions of the effectiveness of preparations were significantly associated factors related to earthquake preparedness.

Key words : earthquake preparedness, Great East Japan Earthquake, non-institutionalized individuals with severe motor and intellectual disabilities, family

I. Introduction

This study sought to discern the state of earthquake preparedness by family of non-institutionalized individuals with severe motor and intellectual disabilities (denoted here as “individuals with SMID”). This study also sought to ascertain factors related to earthquake preparedness by these family members.

Individuals with a certificate for the physically disabled in 31 municipalities in 3 prefectures in the Tohoku region that were struck by the Great

East Japan Earthquake had a mortality rate twice as high as the overall mortality rate (NHK, 2012). Non-institutionalized individuals were reported to have a higher mortality rate than residents of facilities (Tatsuki, 2013). In addition, the effects of the earthquake were not limited to the Tohoku region; the earthquake also affected non-institutionalized individuals with disabilities residing in the Tokyo area (Yamamoto *et al.*, 2013).

Several issues with public and mutual assistance for individuals who need extra assistance during a disaster have been noted, including the delayed formulation of evacuation assistance plans, the provision of special needs shelters, the limited awareness of the existence of those shelters, and disaster-related deaths (Hori and

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Ohnishi, 2013; Yoshida, 2014). Efforts to resolve these issues are underway. However, issues related to self-reliant effort, *i.e.* the extent to what individuals who need extra assistance during a disaster actually prepare for an earthquake on an individual level, and what problems they are confronted with, have yet to be ascertained. Thus, this study focused on earthquake preparedness by individuals who need extra assistance during a disaster, and particularly non-institutionalized individuals with SMID. The reason for the focus on individuals with SMID is because these individuals increasingly use medical equipment that requires electricity, such as that for home mechanical ventilation and oxygen inhalation, to remain alive. Such individuals would be severely impacted by an earthquake.

“Preparedness may be defined as the knowledge, capabilities and actions of governments, organizations, community groups, and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions” (Levac *et al.*, 2012).

An association between disaster preparedness and demographic factors has been noted. That said, research into the effects of factors related to perceptions is proceeding since such approaches are considered effective in practice. Several theoretical frameworks for that purpose have been put forth. According to the protection motivation theory (Rogers, 1975, 1983), the motivation to cope with a threat consists of perceived intrinsic and extrinsic rewards of not engaging in appropriate behavior (*i.e.* engaging in risk behavior), the perceived severity of a threatened event and the probability of its occurrence, the perceived efficacy of the coping response to that event, the perceived level of one’s ability to actually undertake appropriate behavior, and the perceived cost of engaging in that behavior. Based on this theory, Mulilis and Lipka (1990) tested how earthquake preparedness changed as a result of a threat-inducing persuasive message. They found that heightened perceptions of the probability of an earthquake occurring, heightened perceptions

of the extent of damage from that earthquake, heightened perceptions of the effectiveness of disaster preparedness, and heightened perceptions of self-efficacy in disaster preparedness encouraged disaster preparedness. According to the person-relative-to-event (PrE) theory, a disaster can be treated as a stress event and disaster preparedness can be treated as problem-focused coping to cope with that event. According to the theory, whether one prepares for a disaster or not is determined by the relationship between the threat appraisal of an event and an appraisal of one’s coping resources (Mulilis and Duval, 1995, 1997). Based on this theory, Mulilis and Duval (1995) tested a threat appeal regarding an earthquake to assess its impact on disaster preparedness by college students. They found that disaster preparedness was encouraged when subjects had heightened perceptions of their coping resources and a low threat appraisal of the earthquake. The theory of reasoned action is a general model to predict behavior based on attitudes (Ajzen and Fishbein, 1980; Ajzen, 1991). One aspect of this theory is that subjective norms (*i.e.* the belief that significant others expect an individual to act) are determinants of behavioral intentions in addition to the perceived cost and benefit of taking a certain action. Based on this theory, Motoyoshi *et al.* (2004, 2008) demonstrated that subjective norms are determinants of behavior in social settings such as community disaster preparedness. According to the model of Paton *et al.* (2006), people are predicted to be more likely to prepare for a disaster the more they exchange information.

There are several previous studies of disaster preparedness by individuals with disabilities. Individuals with disabilities were more likely to be unprepared for a disaster than healthy individuals (Smith and Notaro, 2009; Uscher-Pines *et al.*, 2009), and individuals in poor health and individuals with a severe psychiatric disorder were more likely to be unprepared for a disaster than healthy individuals (Eisenman *et al.*, 2009). Individuals who had discussed disaster preparedness with their primary physician were more

likely to be prepared for a disaster than individuals who had not (Olympia *et al.*, 2010). In addition, psychoeducational interventions were found to encourage disaster preparedness (Baker *et al.*, 2012; Baker and Cormier, 2013). However, no studies have used the aforementioned theoretical frameworks to systematically examine factors related to disaster preparedness in relation to individuals with disabilities.

Common elements of many of the aforementioned theoretical frameworks are perceptions of risk and perceptions of the cost and benefit of action. The current study views these elements as factors related to disaster preparedness by family of non-institutionalized individuals with SMID. In addition, factors specific to individuals with disabilities include their degree of dependence on medical care and the number of services they use (an indicator of the extent to which they have a network of experts supporting them). A higher degree of dependence on medical care means that an individual needs medical equipment that uses electricity to remain alive, and this may foster a sense of urgency with regard to preparing for a disaster. In addition, having more of a network of experts providing support may lead to increased awareness of disaster prevention.

II. Methods

1. Subjects and methods

Subjects for the current study were family members who were the principal caregivers of non-institutionalized individuals with SMID residing in the Tokyo area. Family members of individuals who were presumed to have SMID were given a questionnaire near outpatient services at a medical facility in the Tokyo area over a period of 1 week in August 2013. The anonymous questionnaire was self-administered and returned by mail.

In total, 408 questionnaires were distributed and 228 were returned for a response rate of 55.9%. Among the returned questionnaires, responses from 110 individuals who did not meet the criteria for individuals with SMID and 2 indi-

viduals who were not living at home in Tokyo when the disaster occurred were excluded, resulting in 116 subjects.

2. Ethical considerations

A researcher unaffiliated with the medical facility where this study was conducted provided the following verbal and written explanation to family members. Potential subjects were informed that study participation was voluntary and that there would be no penalty for not participating, that responses would be used only for research purposes, and that individual responses would not be disclosed. Privacy considerations and return of the questionnaire were described, after which final consent was provided. This study was approved by the Research Ethics Committee of the university where the author works and by the Research Ethics Committee of the medical facility where the study was conducted.

3. Items studied

3.1. Earthquake preparedness

This item asked how respondents prepared for an earthquake. Eleven items covering typical earthquake preparations were devised based on a poll by the Public Relations Department of the Cabinet Office (2010) and a survey by the Tokyo Metropolitan Government (2011). Ten items covering earthquake preparations for individuals with SMID were devised based on a study by Tanaka *et al.* (2012) and a preliminary study by the current authors. An additional item, "Other," was added to these 21 items for a total of 22 items. There were 3 responses to the open-ended question about "Other," and these responses were post-coded. Specific items are shown in Table 2.

3.2. Study items used as factors related to earthquake preparedness

(1) Family characteristics

Family characteristics were represented by "Household income," the "Number of sources of disaster preparedness information," "Perceptions of risk," "Perceptions of the cost of preparations," and "Perceptions of the benefit of preparations."

“Household income (including tax)” that was “Under 2 million yen” was given a score of 1 point, income of “2 million to 4 million yen” was given a score of 2 points, income of “4 million to 6 million yen” was given a score of 3 points, income of “6 million to 8 million yen” was given a score of 4 points, income of “8 million to 10 million yen” was given a score of 5 points, income of “10 million to 12 million yen” was given a score of 6 points, and income “Over 12 million yen” was given a score of 7 points.

The item about the “Number of sources of disaster preparedness information” asked where respondents received their disaster preparedness information from. Responses were “TV,” “The Internet or blogs,” “Other parents of children with disabilities,” etc., and “Other.” Multiple responses were allowed. The total number served as the “Number of sources of disaster preparedness information.”

The item “Perceptions of risk” indicated how respondents perceived risk. Specifically, 2 items, “If an earthquake struck, my family and I would be greatly impacted” and “Even if an earthquake struck, my family and I would not be impacted much” (reverse item), were devised based on the study by Ohtomo and Hirose (2007). Responses to each item were on a 5-point scale from “I completely disagree” (1 point) to “I fully agree” (5 points). Cronbach’s α was .75. And scores for the 2 items were tallied to serve as the score for “Perceptions of risk.”

“Perceptions of the cost of preparations” refer to the perceived cost of disaster preparedness. Two items, “Preparing for an earthquake take a considerable amount of time” and “Preparing for an earthquake won’t take that much time” (reverse item), were devised based on a study by Motoyoshi *et al.* (2004). Responses to each item were on a 5-point scale from “I completely disagree” (1 point) to “I fully agree” (5 points). Cronbach’s α was .80. And scores for the 2 items were tallied to serve as the score for “Perceptions of the cost of preparations.”

“Perceptions of the benefit of preparations” refer to the perceived effectiveness of disaster

preparations (Motoyoshi, 2004). Two items, “If I prepare for an earthquake, I can minimize its impact on my child” and “No matter how much I prepare, if an earthquake struck, there’s nothing I could do” (reverse item), were devised. Responses to each item were on a 5-point scale from “I completely disagree” (1 point) to “I fully agree” (5 points). Cronbach’s α was calculated and was found to be low at $\alpha = .54$. The sentiment in the latter item is presumed to be an impression formed as a result of having directly or indirectly experienced the Great East Japan Earthquake. Thus, these 2 items were treated as separate variables. The former was designated “Perceptions of the effectiveness of preparations” while the latter was designated “Resignations about disaster preparedness.”

(2) Characteristics of individuals with SMID

Characteristics of individuals with SMID were represented by “Age,” the “Degree of dependence on medical care,” and the “Number of services currently used.”

“Age” was the actual age of individuals with SMID.

The “Degree of dependence on medical care” scored the extent to which care management was required based on “Criteria for Children/Individuals with Profound Disabilities and Children/Individuals with Somewhat Profound Disabilities Who Need Intensive Medical Care” (Medical Economics Division *et al.*, 2012). These criteria define the extent to which intensive medical management is required. Eighteen items represented the level of care that was provided for 6 months or longer. Multiple responses were allowed, and the total score for the items in question served as the score for the “Degree of dependence on medical care.” Specific items included “Home mechanical ventilation” (10 points), “Suction at least once an hour” (8 points), and “Tube feeding (including nasogastric and gastrostomy tube feeding)” (5 points).

The “Number of services currently used” referred to at-home services used by individuals with SMID. Such services were “Home helper (at-home care),” “Home-visit nursing,” etc., and

“Other.” Multiple responses were allowed. The total number of services served as the “Number of services currently used.”

4. Methods of analysis

4.1. Analysis of the state of earthquake preparedness

Twenty-two earthquake preparations were listed, and the ratio of the number of respondents who responded that they “made” each of those preparations was calculated with respect to all subjects.

4.2. Analysis of factors related to earthquake preparedness

The “Level of earthquake preparedness,” a dependent variable, was the proportion of 22 earthquake preparations that the respondent had made. The denominator was 22 and the numerator was the number of earthquake preparations that had been made. The independent variables used were family characteristics and characteristics of individuals with SMID, and these characteristics are explained in the section 3.2.

Pearson’s correlation coefficients were first calculated for variables used in the analysis. Multiple regression analysis was then performed with the variables mentioned above. SPSS for Windows ver.15.0 was used to perform the aforementioned analysis.

III. Results

1. Characteristics of subjects (family members) and individuals with SMID

Characteristics of subjects (family members) and individuals with SMID are shown in Table 1. The vast majority (96.6%) of subjects were the mother of an individual with SMID. Most respondents (37.1%) were in their 40s and most (72.2%) resided in the Tokyo area. Individuals with SMID had a mean age of 14.4 years (± 10.1). Of the individuals with SMID, 88.8% required routine medical care and 52.6% used medical equipment that required electricity.

2. The state of earthquake preparedness

As shown in Table 2, a majority of subjects prepared for an earthquake as a family by “[Preparing] emergency supplies (portable radio, flashlight, etc.)” (83.6%), “[Preparing] several days’ worth of typical foods and potable water for family members” (81.9%), “[Preparing] emergency childcare items (such as diapers)” (75.0%), “[Preparing] several days’ worth of food (including tube feeding formulas) and potable water for a child to consume” (65.5%), or “[Preparing] a supply of a child’s regular medication for use in an emergency” (65.5%). Fewer than 20% of respondents “[Had] checked methods of evacuation and evacuation routes” (15.5%), “[Had] gathered disaster-related information such as local hazards” (10.3%), “Participated in disaster preparedness drills” (7.8%), or “[Had] discussed the response in the event of a disaster with the medical facility overseeing a child’s care” (5.2%). In addition, 0.9% of respondents had made none of these preparations.

3. Factors related to earthquake preparedness

The minimum value of the “level of earthquake preparedness” was .00, the maximum value was .91, the mean was .39, and the standard deviation was .18. Correlation coefficients for variables used in analysis and the variable mean and standard deviation are shown in Table 3. Results of multiple regression analysis are shown in Table 4.

Results of correlation analysis revealed that the “level of earthquake preparedness” was significantly associated with the “Age of individuals with SMID” ($r = .30, p < .01$), the “Degree of dependence on medical care” ($r = .26, p < .01$), the “Number of sources of disaster preparedness information” ($r = .41, p < .01$), “Perception of risk” ($r = .20, p < .05$), and “Perceptions of the effectiveness of preparations” ($r = .23, p < .05$). In addition, a significant association between “Perceptions of the effectiveness of preparations” and “Resignations about disaster preparedness” was noted ($r = .37, p < .05$). A significant associ-

Table 1 Demographic Characteristics of Subjects

(N= 116)

Individuals with SMID		Family (primary caregiver)	
Sex (%)		Relationship (%)	
Male	53.0	Mother	96.6
Female	47.0	Father	3.4
Age	14.4 years (\pm 10.1)	Age group (%)	
Residence (%)		20s	0.9
Tokyo area	72.2	30s	24.1
Saitama Prefecture	21.7	40s	37.1
Kanagawa Prefecture	3.5	50s	25.0
Chiba Prefecture	2.6	60s	10.3
Stage of life (%)		70 and over	2.6
Pre-kindergarten	7.1	Household income (%)	
Kindergarten, nursery, or preschool daycare facility	15.9	under 2 million yen	7.3
Elementary school or elementary school department of a special needs school	23.9	2 million to 4 million yen	16.4
Middle school or middle school department of a special needs school	13.3	4 million to 6 million yen	27.3
High school or high school department of a special needs school	1.8	6 million to 8 million yen	19.1
Day care facility or local workshop	37.2	8 million to 10 million yen	10.9
Other	0.9	10 million to 12 million yen	9.1
Certificate for the Physically Disabled (%)		Over 12 million yen	10.0
Class 1	92.2		
Class 2	6.1		
Do not have a certificate	1.7		
Certificate of Intellectual Disability (%)			
Have a certificate	68.8		
Do not have a certificate	31.3		
Medical care (%)			
Required	88.8		
Not required	11.2		
Form of medical care (%) multiple responses allowed			
Home mechanical ventilation ¹⁾	10.3		
Tracheostomy care	15.5		
Nasopharyngeal airway tube	4.3		
Oxygen inhalation	12.1		
Suction	45.7		
Nebulization	13.8		
Tube feeding (nasogastric or gastrostomy tube feeding)	50.9		
Use of medical equipment requiring electricity (%)			
Used	53.0		
Not used	47.0		

¹⁾Includes a cough assist machine, NIPPV, and CPAP.

Table 2 Earthquake Preparedness

(N = 116)

Earthquake preparedness	Ratio (%) of the number of individuals who responded that they "made preparations" with respect to all subjects
Prepared emergency supplies (portable radio, flashlight, etc.)	83.6
Prepared several days' worth of typical foods and potable water for family members	81.9
Prepared emergency childcare items (such as diapers)	75.0
Prepared several days' worth of food (including tube feeding formulas) and potable water for a child to consume	65.5
Prepared a supply of a child's regular medication for use in an emergency	65.5
Prepared medical supplies for use by a child in an emergency (irrigator, syringe, suction catheter, etc.)	49.1 ¹⁾
Had items needed for an evacuation ready in a "go bag"	44.8
Took care to replenish gasoline	39.7
Have discussed the response in the event of a disaster with the school the child attends, the facility where the child resides, the service provider that serves the child (home helper, visiting nurse, etc.), etc.	37.1
Securing furniture, refrigerators, and other items so they do not fall over	37.1
Prepared items to transport a child (stroller, stretcher, back-mounted baby carrier, etc.) in an emergency	34.5
Have decided on an evacuation site as a family	31.9
Have created an emergency assistance card (a card listing points of contact, the child's condition, the child's medications, etc.) for a child	31.0
Have decided on ways to contact family members	26.7
Have taken firefighting precautions such as providing water for bathing and fire extinguishers	25.9
Have considered the earthquake resistance of the home or building where one lives, e.g. earthquake-proofing one's home, checking its earthquake resistance, and determining when it was built	25.0
Prepared for a power outage that potentially renders medical equipment unusable since it requires electricity	24.1 ²⁾
Have checked methods of evacuation and evacuation routes	15.5
Have gathered disaster-related information such as local hazards	10.3
Participate in disaster preparedness drills	7.8
Have discussed the response in the event of a disaster with the medical facility overseeing a child's care	5.2
Prepared an evacuation site in another prefecture	0.9 ³⁾

¹⁾When tube feeding or suction is not required, this item does not apply and has been excluded from analysis. Responses to this item were analyzed for 71 individuals.

²⁾When medical equipment that requires electricity is not routinely used, this item does not apply and has been excluded from analysis. Responses to this item were analyzed for 61 individuals.

³⁾New items created as a result of post-coding open-ended responses.

Table 3 Correlation Coefficients for Variables Used in Analysis¹⁾, Variable Mean and Standard Deviation ($N=116$)

	1	2	3	4	5	6	7	8	9	10
1. Level of earthquake preparedness	1.00									
2. Household income	.10	1.00								
3. Number of sources of disaster preparedness information	.41**	.12	1.00							
4. Perceptions of risk	.20*	-.05	.07	1.00						
5. Perceptions of the cost of preparations	-.17	.04	-.18	.06	1.00					
6. Perceptions of the effectiveness of preparations	.23*	-.14	-.10	-.04	-.16	1.00				
7. Resignations about disaster preparedness	-.06	-.16	.10	.12	.14	-.37**	1.00			
8. Age of individuals with SMID	.30**	-.08	.16	.10	-.02	-.01	.14	1.00		
9. Degree of dependence on medical care	.26**	-.01	.10	.05	-.04	-.01	.10	.15	1.00	
10. Number of services currently used	.14	.10	.10	.08	.01	-.03	.02	.12	.31**	1.00
Mean	.39	3.77	3.58	7.25	6.53	3.63	3.54	14.43	10.99	3.16
Standard Deviation	.18	1.71	1.62	1.91	2.04	1.05	1.12	10.11	10.03	1.55

* $p < .05$ ** $p < .01$ *** $p < .001$ ¹⁾Pearson correlation coefficientTable 4 Results of Multiple Regression Analysis Using the Level of Earthquake Preparedness as a Dependent Variable ($N=116$)

Independent variables	$\beta^{1)}$	$r^{2)}$
Age of children with SMID	.21*	.30**
Degree of dependence on medical care	.18*	.26**
Household income	.02	.01
Number of services currently used	.01	.14
Number of sources of disaster preparedness information	.37***	.41***
Perceptions of risk	.16 [†]	.20*
Perceptions of the cost of preparations	-.06	-.17
Perceptions of the effectiveness of preparations	.24**	.23*
Resignations about disaster preparedness	-.02	-.06
R	.59	
R^2	.34***	
Adjusted R^2	.28	

[†] $p < .10$ * $p < .05$ ** $p < .01$ *** $p < .001$ ¹⁾Standard partial regression coefficient²⁾Pearson correlation coefficient

ation between the “Degree of dependence on medical care” and the “Number of services currently used” ($r = .31, p < .05$) was also noted.

Results of multiple regression analysis also revealed that the model was significant ($R^2 = .34, p < .001$), and that the “level of earthquake preparedness” was significantly associated with “Age of children with SMID” ($\beta = .21, p < .05$), the “Degree of dependence on medical care” ($\beta = .18, p < .05$), the “Number of sources of disaster preparedness information” ($\beta = .37, p < .001$), “Perceptions of risk” ($\beta = .16, p < .10$), and “Perceptions of the effectiveness of preparations” ($\beta = .24, p < .05$). According to the results of multiple regression analysis, however, the level of significance for “Perceptions of risk” was $p < .10$.

IV. Discussion

In terms of their state of earthquake preparedness, a majority of subjects had prepared materially, but fewer than 20% of subjects had made preparations that involved other parties, such as gathering or checking information, participating in disaster preparedness drills, or discussing the response in the event of a disaster. Based on experiences during the Great East Japan Earthquake, Tanaka (2013) noted that the best way to save children with disabilities from a disaster was to raise them as members of the community. However, the special needs schools they attend are separate from the community, so these children exist separately from the community. They also have difficulty participating in disaster preparedness drills in the local community, and the support they need in the event of a disaster is not discussed. Individuals with disabilities tend to be isolated from the community, and a practical problem for the future is how to bring community support to families of those individuals.

A look at factors related to disaster preparedness based on analysis of the correlation between variables indicates that the age of individuals with SMID, the degree of dependence on medical care, the number of sources of disaster pre-

paredness information, perceptions of risk, and perceptions of the effectiveness of preparations were significantly associated with disaster preparedness. In addition, a significant association between the degree of dependence on medical care and the number of services currently used was noted, so individuals with a higher degree of dependence on medical care use more services. Multiple regression analysis yielded results similar to those from correlation analysis. However, the level of significance for perceptions of risk was $p < 0.10$. This means that perceptions of risk alone had little influence when controlling for other factors. Weinstein & Nicolich (1993) indicated that the association between perceptions of risk and coping responses diminishes over time. The current study was conducted a year and a half after the Great East Japan Earthquake, so the influence of perceptions of risk presumably waned.

Individuals with SMID were older and family members had cared for them for a longer period, so the family members had increased concerns about earthquake preparations. This is presumably why they had a higher level of preparedness.

In addition, the degree of dependence on medical care indicates the extent to which medical equipment that requires electricity is required for routine care. Earthquake preparedness is directly linked to life-sustaining care, so respondents were probably aware of a potential crisis and had planned accordingly. Thus, the factor “perceived vulnerability of individuals requiring care to a disaster” probably needs to be included when considering the theoretical framework for disaster preparedness by individuals who need extra assistance during a disaster. This study merely examined factors related to disaster preparedness, and was unable to develop a framework to explain disaster preparedness by individuals who need extra assistance during a disaster, though this is a topic to be taken up in the future.

As in previous studies, perceptions of the effectiveness of preparations were factors that encouraged earthquake preparedness. However,

resignations about disaster preparedness did not diminish earthquake preparedness.

There were no significant findings with regard to household income and perceptions of the cost of preparations. Financial factors and the sense of the time and effort to make preparations were not associated with earthquake preparedness.

The number of services currently used is an indicator of the extent to which one can draw upon a network of experts. Greater ability to draw on that network may increase awareness of disaster prevention, although there were no significant findings to that effect.

The number of sources of disaster preparedness information had the greatest influence in this study. People with extensive avenues of information, *i.e.* with numerous opportunities to receive information, prepared for an earthquake.

A previous study indicated that people who have not prepared themselves are most vulnerable to a disaster (Eisenman *et al.*, 2009). The current results have revealed the characteristics of people who have not prepared themselves. These people care for younger individuals with SMID, those individuals with SMID are less dependent on medical care, those caregivers have few sources of disaster preparedness information, they have a low perception of risk, and they perceive preparations as having limited effectiveness. What sort of impetus would encourage those people to prepare for an earthquake? How can disaster preparedness efforts incorporate people with few avenues of disaster preparedness information and little interest in disaster preparedness? The answers to these questions are topics for the future. One possible answer is an approach via the facilities that individuals with disabilities use most regularly or the schools they attend most regularly. However, studies of risk communication from the past few years have noted that one-way dissemination of information from experts does not foster understanding of risk among the general public. "Deliberative communication," whereby various bodies create opportunities to meet in the same location, assess risk, and understand related problems, is consid-

ered an effective means of disseminating information and fostering an understanding of risk. Research into ways to implement that approach is underway (Matsuda, 2007). A setting in which family members caring for individuals with disabilities can exchange information about disaster preparedness can be created, for example, as part of events for parents/guardians at schools or facilities for individuals with disabilities. If, however, such opportunities cannot be readily created, then the second-best approach may be to expose caregivers to information and heighten their awareness by intermixing one-way communication and deliberative communication. This approach needs to be examined in the future. In addition, the current study has indicated that those forms of communication will be more effective by including information about the risk of a disaster and the effectiveness of disaster preparations.

This study has revealed the current state of and issues with disaster preparedness by family of non-institutionalized individuals with SMID. This study revealed that most families have prepared materially, but they seldom exchange information with the community or relevant organizations. This study also revealed the characteristics of a certain segment of the population that is unprepared for a disaster. Approaches to reach these people are a topic for the future.

Addendum

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References

- Ajzen I (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes* 50: 179–211.
- Ajzen I, Fishbein M (1980). *Understanding Attitudes and Predicting Social Behavior*. Upper Saddle River, NJ,

Prentice-Hall.

- Baker MD, Baker LR, Flagg LA (2012). Preparing families of special health care needs for disasters: an education intervention. *Social Work in Health Care* 51(5): 417–429.
- Baker LR, Cormier LA (2013). Disaster preparedness and families of children with special needs: A geographic comparison. *Journal of Community Health* 38: 106–112.
- Eisenman DP, Zhou Q, Ong M, *et al.* (2009). Variations in disaster preparedness by mental health, perceived general health, and disability status. *Disaster Medicine and Public Health Preparedness* 3(1): 33–41.
- Hori K, Ohnishi K (2013). A study on individuals who need extra assistance during a disaster and special needs shelters: A survey of urban areas nationwide with a population of 100,000 or more. *Planning-related Papers of the Kinki Branch of the Architectural Institute of Japan* 53: 393–396. (in Japanese)
- Levac J, Toal-Sullivan D, O'Sullivan T (2012). Household emergency preparedness: A literature review. *Journal of Community Health* 37: 725–733.
- Matsuda Y (2007). A study of techniques for risk communication to promote preparedness for a catastrophic disaster. Doctoral thesis, Kyoto University. (in Japanese)
- Medical Economics Division, Health Insurance Bureau, Ministry of Health, Labor, and Welfare (2012). Facility Standards for Basic Treatment Fees and Procedures for [Submitting] Notifications in Relation to Those Standards, Annex 6, Annex 14 Criteria for Children/Individuals with Profound Disabilities and Children/Individuals with Somewhat Profound Disabilities Who Need Intensive Medical Care. (in Japanese)
- Motoyoshi T (2004). An overview of psychological research on disasters: Determinants of disaster preparedness. *Bulletin of the Graduate School of Education and Human Development, Nagoya University (Psychology and Human Development Sciences)* 51: 9–33. (in Japanese)
- Motoyoshi T, Takao K, Ikeda S (2004). Determinant factors of community-based disaster preparedness: A case study of flood prone area. *The Japanese Journal of Psychology* 75(1): 72–77. (in Japanese)
- Motoyoshi T, Takao K, Ikeda S (2008). Determinants of household- and community-based disaster preparedness. *Japanese Journal of Social Psychology* 23(2): 209–220. (in Japanese)
- Mulilis J-P, Duval TS (1995). Negative threat appeals and earthquake preparedness: A person-relative-to-event (PrE) model of coping with threat. *Journal of Applied Social Psychology* 25: 1319–1339.
- Mulilis J-P, Duval TS (1997). The PrE model of coping and tornado preparedness: Moderating effect of responsibility. *Journal of Applied Social Psychology* 27: 1750–1766.
- Mulilis J-P, Lippa R (1990). Behavioral change in earthquake preparedness due to negative threat appeals: A test of protection motivation theory. *Journal of Applied Social Psychology* 20: 619–638.
- NHK (2012). The Disabled Who Were Left Behind. NHK E, "Heartnet TV," broadcast Sept. 11, 2011. (in Japanese)
- Ohtomo S, Hirose Y (2007). The influence of situation-oriented and goal-oriented decision-making on risk-related behavior in a natural disaster. *Japanese Journal of Social Psychology* 23(2): 140–151. (in Japanese)
- Olympia RP, Rivera R, Heverley S, *et al.* (2010). Natural disasters and mass-casualty events affecting children and families: A description of emergency preparedness and the role of the primary care physician. *Clinical Pediatrics* 49(7): 686–698.
- Paton D, Kelly G, Burgelt PT, *et al.* (2006). Preparing for bushfires: Understanding intentions. *Disaster Prevention and Management* 15: 566–575.
- Public Relations Department, Cabinet Office (2010). Overview of a Special Opinion Poll on Disaster Prevention. Available at: <http://www8.cao.go.jp/survey/tokubetu/h21/h21-bosai.pdf> (as of 7/6/2014) (in Japanese)
- Rogers RW (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology* 91: 93–114.
- Rogers RW (1983). Cognitive and physiological process in fear appeals and attitudes change: A revised theory of protection motivation. In: Cacioppo JT & Petty RE, eds. *Social psychophysiology*, pp.153–176. New York, Guilford Press.
- Smith DL, Notaro SJ (2009). Personal emergency preparedness for people with disabilities from the 2006–2007 Behavioral Risk factor Surveillance System. *Disability and Health Journal* 2(2): 86–94.
- Tanaka S (2013). Issues in the support and disaster preparedness of severely disabled children in affected areas. *Brain & Development* 35: 209–213.
- Tanaka S, Sugai H, Takeyama Y (2012). *Disaster Preparedness Handbook for Individuals with Severe Disabilities: Children with severe disabilities who survived March 11th [the date of the Great East Japan Earthquake]*. Creates Kamogawa. (in Japanese)
- Tatsuki S (2013). The elderly, the disabled, and the Great East Japan Earthquake: The realities of and issues with evacuation of individuals who need extra assistance during a disaster. *Fire Science and Information* 111: 7–15. (in Japanese)
- Tokyo Metropolitan Government (2011). Results of 2011 4th Metropolitan Government Online Panel Survey, Earthquake Preparations, <http://www.metro.tokyo.jp/INET/CHOUSA/2011/11/60lbh109.htm> (as of 7/6/2014) (in Japanese)
- Uscher-Pines L, Hausman AJ, Powell S, *et al.* (2009). Disaster preparedness of households with special needs

- in southeastern Pennsylvania. *American Journal of Preventive Medicine* 37(3): 227–230.
- Weinstein ND, Nicolich M (1993). Correct and incorrect interpretations of correlations between risk perceptions and risk behaviors. *Health Psychology* 12: 235–245.
- Yamamoto M, Nakagawa K, Ishigami Y, *et al.* (2013). Difficulties and worries of the life to survive in a disaster: Characteristics of the experiences in the Great East Japan Earthquake of severe mental and physical disabled people who live in the capital region. *The Journal of Child Health* 72(2): 298–304.
- Yoshida N (2014). A discussion of individuals who need extra assistance during a disaster and special needs shelters. *Nihon Fukushi University Journal of Economic Studies* 47–48: 25–44. (in Japanese)