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Development of the "Personal Resilience Scale (PRS)" for Natural Disasters

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Abstract

Purpose: Natural disasters are on the rise worldwide, and resilience is the important ability that individuals demonstrate in the process of recovering from such difficulties. The purpose of this study is to develop a personal resilience scale (PRS) for natural disasters and to examine its reliability and validity.

Methods: A self-administered questionnaire survey was administered to residents who lived in evacuation shelters after the Great East Japan Earthquake, and 201 valid responses were analyzed. Factors were extracted by exploratory factor analysis. Cronbach's alpha coefficient was calculated for scale reliability. Correlations with other scales were examined for criterion-related validity. Confirmatory factor analysis was conducted based on the results of exploratory factor analysis to examine construct validity.

Results: The results of the factor analysis showed that the 16 items had a four-factor structure: [social support], [positive thinking], [stress coping], and [problem-solving abilities]. Regarding the reliability of the PRS, the Cronbach's alpha coefficient was 0.945s. For validity, significant correlations were observed with almost all external variables for all scales and subscales. Model fit was GFI=.912, AGFI=.878, CFI=.969, and RESEA=.056.

Conclusion: The PRS was statistically acceptable with respect to reliability and validity. A 16-item, 4-factor structure was developed as a personal resilience scale (PRS) for natural disasters, and reliability and validity were ensured.

Introduction

In recent years, natural disasters have become more frequent worldwide due to the effects of global warming. In earthquake-prone Japan, 30115 people are still living as evacuees more than 10 years after the magnitude 9.0 Great East Japan Earthquake in March 2011 [1]. The earthquake and tsunami disaster had a tremendous impact on the lives and health of many victims. Past disaster stress studies have shown that these post-disaster changes in living conditions have a significant impact on mental health [2-5]. In addition, low household income and lack of social networks were risk factors for mental health among survivors 6 to 11 months after the 2011 Great East Japan Earthquake and Tsunami [4]. It has been reported that low income after a disaster was associated with depression [6]. In addition to psychological factors, socioeconomic conditions also affect their mental health. It is also reported that disasters are mostly unpredictable, which leaves the victims in a state of shock. As Makwana points out, being almost always unpredictable, disasters put victims in a state of psychological shock [7]. The damage to household goods, death of loved ones, socioeconomic losses, and changes in living conditions caused by disasters make survivors anxious and psychologically vulnerable. The psychological effects of disasters can also come in the form of the most common mental disorders such as PTSD, depression, and alcoholism.

On the other hand, it has been stated that the exact resources that mitigate the adverse health effects of a disaster, or directly improve health after a disaster, are unclear [8]. However, the ability to recover mental health from the difficult phases of a disaster and to adapt to life after a disaster is necessary. Resilience is recognized as a positive factor that reduces risk during such disasters and influences recovery and recovery from disasters. Resilience is a phenomenon or process reflecting relatively positive adaptation despite significant adversity or trauma [9]. The Sendai Framework for Disaster Reduction 2015-2030, an international framework on disaster reduction, emphasized the importance of health care to enhance the resilience of people and communities in overall disaster prevention and the need for resilience

enhancing efforts and projects to be improved based on scientific evidence [10].

Resilience is positively correlated with mental health, including psychological adjustment and self-esteem [11-13], and has been shown to be a protective factor against negative mental health conditions such as stress, anxiety, and depression [14-16]. In recent years, resilience, as a protective or buffering factor against the inevitable effects of stresses such as disasters, has gained attention as a protective force against the potential negative impacts of disasters. A psychological support intervention (Skills for psychological recovery: SPR) using psychological recovery skills was conducted as an effort to enhance resilience in times of disaster, and a comparison of pre- and post-intervention results showed that mental health and resilience improved after the intervention [17]. There are scattered reports of post-disaster resilience enhanced by program interventions that promote interaction and increasing exchanges among residents in the community [18] , but the challenge is that post-disaster resilience intervention studies have rarely evaluated effectiveness [19].

In order to respond effectively to enhance the mental health and resilience of the local population in disaster areas, first and foremost, resilience must first be properly understood. The Connor-Davidson Resilience Scale (CD-RISC) [10] has been used internationally as a tool to assess the resilience of disaster victims. However, the CD-RISC was developed as a measure of resilience as an individual characteristic

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to assess the resilience of clients who have experienced traumatic experiences. It was developed to assess the resilience of subjects with PTSD and was not a tool developed specifically for the special situation of disasters. As Rutter observed, "as circumstances change, so does resilience [20]. We determined that there is a need to develop a resilience measurement tool specifically for subjects who have encountered special circumstances caused by disasters.

Therefore, the purpose of this study was to develop a scale to assess the personal resilience of affected community members, considering the special characteristics of natural disasters, and to examine the reliability and validity of this scale. Once this scale is developed, it will be possible to assess the outcomes of interventions for refugees against natural disasters. This will be useful for visualizing individual resilience to natural disasters and contribute to improving the quality of mental health care for disaster victims.

Methods

Development of the scale draft of PRS

In order to clarify the personal resilience of the disaster people, semi-structured interviews were conducted and analyzed qualitatively and inductively [21]. Based on the results of these preliminary surveys and findings from the literature [22], 64 scale items were developed by extracting the areas that respond to resilience to natural disaster. To examine the content validity of the scale items, seven experts who are familiar with providing support to disaster victims were asked to check whether the questionnaire items were appropriate in reflecting their personal resilience. In addition, opinions were gathered on the appropriateness of the wording of the questionnaire items and the modification of wording regarding unclear questionnaire items. From these results, a draft of the Personal Resilience Scale (PRS) for natural disasters (39 items) was developed.

Survey subjects and data collection methods

The study population consisted of residents who had their resident registration cards in the areas affected by the Great East Japan Earthquake. The disaster victims may show vulnerability to stress when asked about disaster-related content. Based on these trends, we explained the purpose of the survey and ethical considerations to the staff of the health centers in the affected areas before the survey, and they cooperated with us. As a first step, these staff members explained the study to the residents and called for their participation in the study after the health checkups were completed. These invitations were made with great care to prevent residents from feeling uncomfortable. Next, a request letter and a questionnaire describing the purpose of the study and ethical considerations were distributed to the 371 residents who expressed interest in the survey. As a rule, an anonymous self-report questionnaire was used, but respondents who did not wish to use this method due to advanced age were interviewed by the researcher instead. The time required to answer the questions was set at 10 minutes. The time period was August-September 2019.

Of the 212 respondents, 201 valid responses (54.2% valid response rate) were included in the analysis after excluding respondents who had several errors or missing information.

Survey items

Personal attributes

The respondents were asked about their gender, age, presence or absence of family members living with them, current place of residence, type of residence, and current community acceptance status.

Personal Resilience Scale (PRS)" for natural disasters (draft)

The 39-item Personal Resilience to Natural Disasters Scale (draft) was used. Responses were on a 5-point Likert scale of "strongly disagree," "somewhat disagree," "neither," "somewhat agree," and "strongly agree," with scores ranging from 0 to 4 in that order. Scores ranged from 0-156. Higher scores indicate higher resilience.

University of Tokyo Health Sociology version of the SOC3 scale (SOC3-UTHS)

The SOC3-UTHS is a scale that measures SOC (Sense of Coherence), a health-generating ability, reflecting the SOC sub-concepts of manageability, meaningfulness, and comprehensibility. The scale consists of three items on a 7-point Likert scale. The reliability and validity have been verified by Togari [23]. Higher scores indicate higher SOC. It was used in this study to examine criterion-related validity. Scale permission was obtained.

Adolescent Resilience Scale (ARS)

The ARS is a quantitative measure of mental resilience that facilitates recovery from mental depression [24]. It consists of three subscales: "novelty seeking," "emotional regulation," and "positive future orientation". It is a 21-item, 5-point Likert scale that has been tested for reliability and validity. It was used in this study to examine criterion-related validity (concurrent validity). Scale permission was obtained.

Statistical Analysis

In the item analysis, the mean and standard deviation were calculated for each item of the PRS (draft) to confirm the presence of ceiling and floor effects.

To confirm the factor structure, an exploratory factor analysis with maximum likelihood and promax rotation was conducted by using the statistical analysis software SPSS (version 27).

Cronbach's alpha coefficient was also calculated to examine the internal consistency of the created scale.

To examine validity, criterion-related validity and construct concept validity were examined. To examine criterion-related validity, a correlation analysis of the total PRS (draft) scores and each subscale and the ARS and SOC-UTHS was conducted to determine whether each variable showed significant positive correlations. To examine construct concept validity, a confirmatory factor analysis was conducted based on the results of the exploratory factor analysis. In the confirmatory factor analysis, the Goodness Fitness Index (GFI), Adjusted GFI (AGFI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMEA) were used. SPSS27.0 and AMOS27.0 statistical software was used for statistical analysis.

Ethical considerations

To protect the human rights of the participants, this study was conducted with the approval of the Kyoto University Medical Ethics Committee and the settlement of ethical regulations of the collaborating institutions. The purpose of the study, methods, respect for the free will of the respondents, protection of personal

information, data management methods and publication of the results were explained in writing, and consent was deemed to be obtained by answering the questionnaire.

Results

Subject characteristics

The characteristics of the target group are shown in Table 1. More than 60% of the respondents were between 60 and 79 years old, and more than 80% of them lived with their families. As for their current place of residence, more than 90% had moved to a municipality in the prefecture. They had moved to the area after the disaster. A total of 138 respondents (68.7%) had rebuilt their homes. 164 (82.4%) of the respondents felt that they were favorably accepted by their current community, while 35 (17.6%) felt that they were not favorably accepted.

Item analysis

Based on the item analysis, Q13 showing strong ceiling effects were excluded. No items demonstrated a floor effect.

In the I-T correlation, there were no items with low correlations with correlation coefficients <0.3.

As a result of correlation analysis between items, 4 items (Q11, Q14, Q19, and Q22) that showed high correlation coefficients of 0.7 or higher were excluded.

Table 1: Participant characteristics(N=201).

Variable	n	%
Age		
20-39	20	10.0
40-59	58	28.9
60-79	123	61.1
Gender		
Male	86	42.8
Female	115	57.2
Family living Together		
Yes	162	80.6
No	39	19.4
Current place of residence		
Original municipality	6	3.0
In the prefecture	189	94.0
Outside the prefecture	6	3.0
Housing form		
Owned house	138	68.7
Temporary housing	63	31.3
Accepted by local community		
Accepted	164	82.4
Not accepted	35	17.6

Exploratory factor analysis

The remaining 34 items were factor analyzed using the maximum likelihood method (promax rotation). When the number of factors was determined by examination of scree plots, it resulted in 4 factors.

As shown on Table 2, 18 items with loadings less than 0.4 were dropped and 4 factors were derived for the original 16-item PRS (PRS-16). The first factor was named "Social Support" because it consists of items such as those that indicate the presence of a person to whom one can confide one's thoughts and to whom one can turn to in times of need. Factor 2 was named "Positive Thinking" because it consisted of items that indicated positive thinking, trying to see the positive side of things even after unpleasant experiences. Factor 3 was named "Stress Coping" because it consists of items that indicate coping with stress so that one does not feel depressed even if one has troubles. Factor 4 was named "problem-solving abilities" because it consists of items related to the ability to solve problems without losing oneself even when encountering difficulties. Each factor consisted of four items.

Table 2: Exploratory factor analysis of the PRS.

Item(α=.924)	Factor loadings			
	F1	F2	F3	F4
Factor 1: Social support (α =.893)				
10. Someone listens to my selfishness and complaints.	.945	-.030	-.052	-.024
9. Someone can count on you when you need it.	.823	-.141	-.016	.031
16. Someone can share both pain and fun.	.775	.108	.087	-.041
15. I have someone whom I can express my true feelings and myself.	.735	.051	-.016	.079
Factor 2: Positive thinking (α = .836)				
1. Even if you don't like it, the experience will benefit your future.	-.014	.786	-.087	.001
2. Always try to see the good side of things.	-.025	.778	.011	.024
4. I think there is a role I can play in society.	-.055	.775	-.007	.010
3. I cherish my personality.	.018	.657	.053	.043
Factor 3: Stress coping (α = .882)				
37. I don't mind even if I have troubles.	-.088	-.179	.973	.088
38. I try to find fun, so I don't feel depressed.	.057	.079	.837	-.125
36. I can change my mood well.	-.009	-.034	.762	.091
39. I try to be conscious of my activities so as not to become inactive.	.059	.265	.601	-.069
Factor 4: Problem-solving abilities (α = .876)				
21. Even if you encounter a bad event, you can keep track of yourself without having an irresponsible and apathetic attitude.	.003	-.077	-.004	.971
20. I've had some difficulties before, so I think I can survive now.	.066	.074	.039	.745
23. I try to find the best solution on the spot.	.053	.237	.036	.595
24. When things go wrong, I try to look back to see if there is a cause to myself.	-.033	.252	-.024	.449
Correlations between factors				
Factor 1: Social support	-	.554	.469	.613
Factor 2: Positive thinking		-	.570	.702
Factor 3: Stress coping			-	.554
Factor 4: Problem-solving abilities				-

Note. PRS = Person Resilience Scale for Natural disasters. Loadings from the maximum likelihood method with promax rotation at baseline (n = 201). The loadings contributing to each factor are shown in bold typeface.

Reliability testing of the PRS

To consider the reliability of the PRS-16, we performed a Cronbach's alpha coefficients for the total scale and each factor. As a result, the PRS-16 showed excellent internal consistency for the total scale (α = 0.924) as well as its four factors α =0.893, 0.836, 0.882, and 0.876 for *Social support, Positive thinking, Stress coping, and Problem-solving abilities.*

Validity of the PRS

To examine the validity of the PRS (PRS-16), the Spearman's rank correlation coefficients with external variable was calculated for the total scale and subscale scores (Table 3). In the criterion-related validity, "the University of Tokyo Health Sociology version of the SOC3 scale (SOC3-UTHS)" and "the Adolescent Resilience Scale (ARS)" and PRS were used as an external variable. In the results of the criterion-related validity, the correlation coefficient was from 0.548 to 0.763 between each scale and subscale in the PRS (PRS-16) and SOC-UTHS and ARS, which indicated a significant correlation. To examine construct (structural) validity, confirmatory factor analysis was conducted on the 16-item, 4-subscale PRS extracted from the exploratory factor analysis. The goodness-of-fit indices of the model for the confirmatory factor analysis were GFI = 0.912, AGFI = 0.878, CFI = 0.969, and RESEA = 0.056.

Table 3: Correlations between each scale score between the PRS and ARSJSS and SRS.

	PRS-16				
	Total	F1	F2	F3	F4
SOC3-UTHS	0.703**	0.675**	0.596**	0.671**	0.548**
ARS	0.689**	0.658**	0.593**	0.763**	0.607**

Note. **P<.01
F1: Social support
F2: Positive thinking
F3: Stress coping
F4: Problem-solving abilities

Discussion

Survey subjects

More than 60% of the subjects of this study had left their place of residence and rebuilt their homes after the disaster. It was found that less than 20% of the disaster victims felt that they were not accepted by the people in the community where they currently live. Previous studies have shown that such post-disaster feelings of alienation and loneliness lead to lower mental health [2-5]. Therefore, we believe it is necessary to confirm the mental health of survivors having such feelings of alienation in detail in the future.

Reliability and validity of the PRS (PRS-16)

The aim of this study was to develop a PRS (PRS-16) for natural disasters and test the reliability and validity of the scale. The following is a discussion based on the results.

Resilience is an important area of assessment and evaluation in mental recovery during disasters. The PRS was developed as a brief, self-administered scale to capture an individual's degree of resilience in the process of overcoming and adapting to the difficulties of life after a disaster. The PRS developed in this study consisted of 16 items and 4 factors, named as Factor 1: Social support, Factor 2: Positive

abilities. The ARS, an existing resilience scale, includes "positive future orientation" and "emotional regulation" in its subscales [24]. Factor 2: Positive Thinking and Factor 3: Stress Coping of the PRS developed in this study are similar to its ARS subscales. According to the APA, the core elements of resilience include building and accepting connections with others, embracing healthy thoughts, managing stress, and asking yourself, "what can I do for the problems in my life" and acting on them [25]. The PRS developed in this study includes these elements, and we believe that it has important elements in the process of enhancing mental recovery and adaptation after disaster.

Our analyses demonstrated that the PRS-16 has excellent reliability and adequate validity. Regarding reliability of the PRS(PRS-16), tests of internal consistency for the total scale and subscales gave Cronbach's alpha coefficients of .836-.924 (Table 2). However, we did not conduct two rounds of analysis, including a retest method, and therefore, the reliability of the PRS-16 needs to be confirmed in the future. Criterion-related validity was demonstrated by significant positive correlations between the PRS-16 and existing measures of resilience and SOC. In the results of the confirmatory factor analysis, the model had an overall good fit with GFI=.912, AGFI=.878, CFI=.969, and RESEA=.056. This allowed us to conclude that there was construct validity.

Although many assessments in post-disaster resilience use scales that measure resilience in general, self-reports of disaster victims who are forced to accept changes of their life due to disasters, are also valuable.

Disaster survivors are a group that is prone to have alienation and isolation. Resilience is an important component in mental health from disasters and is an area that should be regularly assessed. PRS-16 may have a possibility of offering a tool for finding specific areas that may need intervention on resilience to improve mental recovery after a disaster.

Conclusion

The PRS-16 developed in this study consisted of 16 items and 4 factors, named as [social support], [positive thinking], [stress coping], and [problem-solving abilities]. The PRS-16 has been confirmed to have adequate reliability and validity. The results suggest that this scale is useful in measuring resilience in determining mental recovery after a disaster.

Competing Interests

The author declare that they have no competing interests.

Author Contributions

The author contributed to the conception of the study and the overall study process.

Refrences

1. Japanese Reconstruction Agency (2023) Number of evacuees nationwide [PDF File]. Retrieved from Accesses 2023 Sep 27.

2. Norris FH, Friedman MJ, Watson PJ (2002) 60,000 disaster victims speak: Part II. Summary and implications of the disaster mental health research. Psychiatry 65: 240-260.

3. Frankenberg E, Friedman J, Gillespie T, Ingwersen N, Pynoos R, et al (2008) Mental health in Sumatra after the tsunami. Am J Public Health 98: 1671-1677.

4. Yokoyama Y, Otsuka K, Kawakami N, Kobayashi S, Ogawa A, et al (2014) Mental Health and Related Factors after the Great East Japan Earthquake and Tsunami. PLoS One 9: e102497.

5. Kukihara H, Uchiyama K, Horikawa E (2015) Trauma, Depression, resilience of victims of the earthquake, tsunami, and nuclear accident in Japan. J of Neuropsychiatry 117: 957-964.

6. Ahern J, Galea S (2006) Social context and depression after a disaster: the role of income inequality. J Epidemiol Community Health 60: 766-770.

7. Makwana N (2019) Disaster and its impact on mental health: A narrative review. J Family Med Prim Care 8: 3090-3095.

8. Luthar SY, Crossman EJ, Small PJ (2015) Resilience and adversity., Handbook of child psychology and developmental science (p.7248) New York: Wiley.

9. Sasaki Y, Aida J, Tsuji T, Koyama S, Tsuboya T, et al (2019) Pre-disaster social support is protective for onset of post-disaster depression: Prospective study from the Great East Japan Earthquake & Tsunami. Sci Rep 9: e19427.

10. UNISDR (2015) Sendai Framefork for Disaster Risk Reduction2015-2030. Accesses 2023 Sep 27.

11. Connor KM, Davidson JT (2003) Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). Depress Anxiety 18: 76-82.

12. Hirano M (2012) An examination of the buffering effect of resilience on psychological sensitivity: Can we compensate for our original "weakness" from an acquired perspective? Japanese J Educ Psychol 60: 343-354.

13. Koshio S, Nakatani M, Kaneko K, Nagamine S (2002) Psychological characteristics that lead to recovery from negative events: Creation of a mental resilience scale. Counseling Research 35: 57-65.

14. Rutter M (1985) Resilience in the face of adversity: Protective factors and resistance to psychiatric disorder. Br J Psychiatry 147: 598-611.

15. Bonanno GA (2004) Loss, trauma and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? American Psychologist 59: 20-28.

16. Fletcher D, Sarkar M (2013) A Review of Psychological Resilience; a review and critique of definitions, concepts, and theory. European Psychologist 18: 12-23.

17. Shoji W, Takahashi Y, Ueda K, Nagao A, Usukura H et al. (2017) A Feasibility Study of the Psychological Recovery Skills for Disaster Recovery: A Before-and-After Comparative Study. Programs and Abstracts of the Annual Meeting of the Japanese Society for Traumatic Stress Research 16: 92.

18. Kessel G, MacDougall C, Gibbs L (2014) Resilience- Rhetoric to reality: A systematic review of intervention studies after disasters. Disaster Med Public Health Prep 8: 1-9.

19. Abramson D, Brooks K, Peek L (2013) The Science and Practice of Resilience Interventions for Children Exposed to Disasters, Proceedings of the 2013 workshop on Disaster Preparedness, Response and Recovery Considerations for Children and Families.

20. Rutter M (1981) Stress, coping and development: Some issues and some questions. J Child Psychol Psychiatry 22: 317.

21. Yasuda M, Nitta M (2021) A qualitative study on the driving force to recover from difficulties: focusing on post-disaster community residents. Proceedings of the 52nd conference on Japan Academy of Nursing Science: 489.

22. Koshio S, Nakatani M, Kaneko K, Nagamine N (2002) Psychological characteristics leading to recovery from negative events: Creation of a mental resilience scale. Counseling Research 35: 57-65.

23. Togari T (2008) Development of the University of Tokyo Health Sociology version of the SOC3 scale (SOC3-UTHS) for a large-scale multi-purpose general population survey. Discussion Paper Series 4, Institute of Social Science, Tokyo University Press, JAPAN.

24. American Psychological Association (APA) (2023). Building Your Resilience Retrieved from Accesses 2023 Oct 17.