

Exploring Children's Mental Health during Natural Disasters in Japan: A Scoping Review

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Abstract—Background and aim: Japan has experienced numerous earthquakes. However, there is a paucity of research on the impact of earthquakes on children's mental health. The objective of this study was to elucidate the impact of natural disasters, particularly earthquakes, on children's mental health, and to assess the optimal provision of psychological support to children in disaster-stricken areas. Methods: A literature study was conducted using the scoping review method for literature published from 2014 to 2024. Results: Natural disasters have been shown to have serious psychological effects on children, causing problems such as anxiety, depression, and aggression. Observations revealed differences in the effects based on age. Symptoms manifested earlier in life for younger children, while introverted problems tended to emerge over time for older children. Conclusions: The psychological effects of disasters on children often manifest over time; therefore, we believe that a long-term, continuous support and monitoring system is necessary, extending beyond the initial response phase after a disaster. Furthermore, given the pivotal role of a regular lifestyle in maintaining mental and physical well-being, it is imperative for adults to recognize its significance and promote regular routines. It was suggested that appropriate interventions by such supporters and the community may promote posttraumatic growth in children. Future initiatives will include the enhancement of pediatric-focused disaster mental health care and the continuation of long-term research.

Keywords—natural disaster, children, mental health, nursing, support

I. INTRODUCTION

Japan has experienced numerous disasters that have resulted in injuries and fatalities [1]. Japan has experienced significant natural disasters, including the Great Hanshin-Awaji earthquake and the Great East Japan earthquake. The aftermath of these disasters has led to the displacement of residents who have been compelled to seek refuge in evacuation shelters. This has significantly impacted their daily lives and living conditions. Children in the process of growing up are exposed to situations where they cannot exercise or study properly, depending on the level of the disaster. The psychological impact on children in the aftermath of the disaster is expected to differ from that on adults.

However, there is a paucity of research on the impact of disasters on children's mental health [2].

Therefore, the objective of this study was to elucidate the impact of natural disasters on children's mental health in Japan and to assess the optimal provision of psychological

support to children in the event of a disaster. Our hypothesis was that mental healthcare for children could mitigate the psychological impact of disasters on children and promote their healthy growth and development.

II. LITERATURE REVIEW

In recent years, natural disasters have occurred frequently all over the world. In Japan, there are residents who have continued their long-term evacuation life due to the effects of the 2011 Great East Japan Earthquake (GEJE) and accident at the Fukushima Daiichi Nuclear Power Plant (FDNPP). Even 10 years after the disaster, some residents are still having difficulty going back home because of the nuclear accident [3]. It is said that the difficulty of rebuilding the lives of people living in such highly separated or damaged areas will be the risk factor for mental health deterioration [4]. The losses experienced during and after the Great East Japan Earthquake, and life-changing conditions thereafter exerted a tremendous impact on the mental health of many people, especially in the disaster areas [5–7].

Amagai [6] reported that the frequency of mental health problems was high among residents forced to live in long-term shelters following a disaster. The mental health status was found to be related to matters such as employment status after the disaster, the presence of people who will listen to problems, formation of social norms and bonds among a local community that has been displaced, stress on human relationships and health, and thoughts of suicide in the past. Residents affected by the nuclear power plant accident, and had multiple problems, are at high risk of developing secondary mental health problems. Therefore, from the perspective of suicide prevention, it is essential to provide long-term mental health support according to residents' stress coping abilities. As a personal quality of stress coping, Antonovsky proposed the Sense of Coherence (SOC) [8], which is a concept of stress coping ability or health maintenance ability.

By studies on the SOC of residents affected by natural disasters, it has been reported that those with higher Post-Traumatic Stress Disorder (PTSD) three months after the disaster had lower SOC [9], and that earthquake-related stress affected pregnant women's SOC who experienced the earthquake and are living in the affected areas [10]. Yasuda [11] reported that the stress coping and health retention skills of long-term evacuees tended to decline. SOC

was found to be related to things such as age, mental health status, and social activities and socializing with outsiders as stress relievers. It was suggested that it is important to provide continuous social support to improve stress coping ability and health maintenance of adults who must live in long-term evacuation [11]. These reports on mental health during disasters focus on adults. Research on children's mental health during disasters remains scarce [2].

III. MATERIALS AND METHODS

A. Selection of Target Literature

1) Literature search method

The literature search was conducted using the Ichushi-Database (Japan Medical Abstracts Society), a widely used database of medical publications commonly used in Japan. The search period was from 2014 to 2024. A comprehensive search strategy was implemented, utilizing keywords such as “natural disaster”, “pediatric”, and “mental health”.

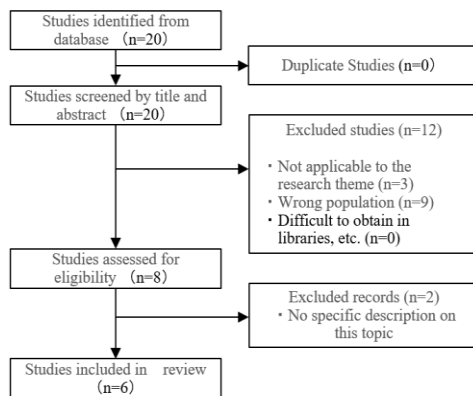


Fig. 1. Flowchart for selection of target literature.

After an initial identification through a literature search, selected papers were determined through a close examination as shown in Fig. 1. The selection criteria were as follows: the article had to report on mental health during natural disasters, which is the theme of this study; the study had to be limited to children; and the full text of the article had to be available online or via the library.

2) Data conversion and analysis methods

To process the selected literature into an analyzable form, an analysis form was created with column topics of “Title”, “Author”, “Research Problem”, “Year of Publication”, “Subject and Period”, “Name of Disaster”, “Research Method”, and “Main Results of Study” in reference to the scoping review method [12].

B. Ethical Considerations

Each reference was managed with strict adherence to copyright regulations, and meticulous efforts were made to ensure fidelity to the original articles and to cite them appropriately.

IV. RESULT

After organizing the references using the selection and exclusion criteria, six references remained in the final analysis. These metrics are outlined in the analysis form and are presented in Table 1.

A. Overview of Reviewed Literature

Two of the studies were published in 2016, and the others were published in 2014, 2015, 2021, and 2023. Regarding the study period, the majority of studies were conducted within 1 to 5 years following the earthquake, with only one out of six references conducted immediately after the event.

Table 1. Summary of reviewed literature

No.	Reference	Aim/Objective	Sample and Setting	Methods	Major findings
1	Yoshioka <i>et al.</i> [14]	Characteristics of children exposed to disasters that led to psychiatric consultation	Children aged 3–9 who experienced the Great East Japan Earthquake, tsunami, and collapsed houses	Descriptive survey	Children with fewer siblings and children who have experienced loss of family members or loved ones have higher rates of psychiatric consultation.
2	Inoue [18]	Long-term trends in the incidence of violent behavior and bullying among children in the affected areas	Children aged 7–18 from the three affected prefectures (Miyagi, Fukushima, and Iwate) that experienced the Great East Japan Earthquake	Comparison of affected prefectures and national average from national survey	The incidence of violence and bullying among children increased 3–4 years after the disaster. Children who were elementary school students at the time of the disaster were approaching the age of puberty, and their problematic behavior was increasing.
3	Kikuya and Miyashita [15]	Grasping the actual situation of children's health damage after the earthquake	Elementary and junior high school students in Miyagi Prefecture affected by the disasters	Descriptive survey	Living in a coastal area and experiencing a tsunami were associated with asthma and severe eczema symptoms, respectively. Wheezing and eczema symptoms were more frequent in younger children. As the children grew older, the frequency was relatively low in upper elementary and junior high school students
4	Yoshida <i>et al.</i> [17]	Understanding the impact of the Great East Japan Earthquake on children's mental health	Children who visited a child psychiatric hospital in Miyagi Prefecture with earthquake-related symptoms in the two years after the disaster	Descriptive survey of mental state and living conditions	School-age children, who were relatively younger, showed symptoms of PTSD in the first year after the disaster. Older children in junior high school tended to visit a psychiatric hospital after a long period of time, when their daily life functions were impaired by psychiatric symptoms.
5	Yoshida [16]	Understanding the mental and physical health of children after the disaster	Elementary and junior high school students living in the affected areas two and a half years after the earthquake	Descriptive survey	In relation to the Children's Stress and Lifestyle Survey, in all grades, children who did not eat breakfast every day and children who played video games for long periods of time tended to have higher levels of stress. The survey results showed that children who had a regular lifestyle were more mentally calm.

6	Kure <i>et al.</i> [2]	Understanding the challenges of pediatric health care to support the physical and mental health of children in the affected areas	Children aged 3–5 who were enrolled in preschool at the time of the Great East Japan Earthquake	Descriptive survey and interview with childcare provider	In terms of children affected by the disaster, 50.8% of the children had their homes damaged; 38.9% of the children experienced life away from their parents. Furthermore, 27.1% of the children were bereaved of family and friends. In the three affected prefectures, 28% of the children exhibited anxiety, depression, and withdrawal, and 21% were aggressive. In addition, 26% of the children had problems with social adjustment.
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1) Disaster name

All six references investigated the Great East Japan Earthquake. Miyagi Prefecture was the designated study area for all six references. Two of the six studies focused on the three affected prefectures (Miyagi, Iwate, and Fukushima).

2) Research methods

All six final articles selected for review were quantitative in nature. Five of the studies involved administering questionnaires, while one study entailed conducting a comparative analysis of existing data.

B. Major Findings

The study's primary findings were examined based on the Lazarus-Coping theory of stress reactions when confronted with the stress of the earthquake disaster [13]. In other words, the text describes "related factors" to the earthquake stress and "psychological effects" brought about by the earthquake stress. The literature does not address the use of coping mechanisms for stress related to earthquakes. Furthermore, the literature contains no information on support for mental health care beyond medical examinations for individuals experiencing stress due to the disaster.

1) Relevant factors that caused the psychological effects of the disaster

a) Influence of loss experience

According to Yoshioka *et al.* [14], the group that visited a psychiatric hospital had fewer siblings as a characteristic of their family structure. Furthermore, the group that visited a psychiatric hospital exhibited a higher percentage of loss experiences, including "death of a family member or relative" and "death of a loved one or pet".

b) Physical effects of the earthquake

Kikuya and Miyashita's report [15] indicates that children who experienced the tsunami resulting from the earthquake exhibited a higher prevalence of bronchial asthma and atopic dermatitis symptoms. Multivariate analysis revealed that factors significantly associated with eczema were youth, female gender, history of hospitalization, psychiatric disorders, and tsunami experience. In contrast, younger age, psychiatric illness, and tsunami experience were significantly associated with severe eczema symptoms. Even three years after the earthquake, the physical effects of the disaster were still observed in elementary and junior high school students.

c) Impact of the earthquake on lifestyle

According to Kikuya and Miyashita [15], wheezing and eczema symptoms were more prevalent in lower grades. It was reported that the frequency of wheezing and eczema symptoms decreased as the children grew older.

Yoshida *et al.* [16] reported that younger children were more likely to present with symptoms and visit the outpatient clinic immediately after the disaster. Conversely, symptoms

in older children manifested later after the disaster. Individuals with symptoms would typically visit outpatient clinics after their daily functioning was significantly impacted.

d) Variations in symptom manifestation by age group

According to Kikuya and Miyashita [15], wheezing and eczema symptoms were more prevalent in lower grades. It was reported that the frequency of wheezing and eczema symptoms decreased as the children grew older.

Yoshida *et al.* [17] reported that younger children were more likely to be present with symptoms and visit the outpatient clinic immediately after the disaster. Conversely, symptoms in older children manifested later after the disaster. Individuals with symptoms typically visit outpatient clinics after their daily functioning was significantly impacted.

2) Psychological effects brought about by the earthquake

a) Damage effect

According to Inoue [18], the incidence of problematic behaviors such as violence and bullying among children began to increase 3–4 years after the earthquake. The incidence of such behaviors among children in the lower grades of elementary school increased markedly as they approached puberty.

Additionally, Kakuya and Miyashita [15] found that symptoms of asthma and atopic dermatitis, stress-related diseases, continued to be observed in elementary and junior high school students three years after the earthquake.

Yoshida *et al.* [16] found that the number of children visiting a psychiatric clinic for earthquake-related stress symptoms for the first time decreased over time. However, some children had persistent symptoms, and some experienced symptoms sometime after the disaster. This indicates a decline in life functioning. There were no differences between men and women.

A survey of children in areas affected by the Great East Japan Earthquake revealed that 50.8% lost their homes, and 38.9% lived away from their parents. Furthermore, 27.1% of the children lost family members and friends. In the three affected prefectures, 28% of children were anxious, depressed, and withdrawn, while 21% were aggressive. Additionally, 26% of the children had social adjustment problems [2].

Two and a half years after the earthquake, Yoshida *et al.* [16] conducted a stress assessment of children. The mean score from first to third grade was 18.0 ± 12.9 , increasing with each grade. Scores were particularly high among female junior high school students, indicating that over 10% of children were anxious about the earthquake.

b) Growth effects

In a post-traumatic growth assessment conducted two and a half years after the earthquake to ascertain positive mental aspects of elementary and junior high school students, scores

tended to fall in the upper grades. Conversely, scores were significantly higher for children who led regular lives, ate breakfast daily, and kept up with news about the disaster. It has been reported that leading a regular life is important for improving mental health [18].

V. DISCUSSION

A. Traumatic Impact of Disasters on Children's Mental Health

The results of the literature review revealed that disasters have significantly impact on children psychologically. Specifically, the experience of loss and harsh displacement conditions are likely to cause psychological problems such as anxiety, depression, and aggressive behavior. Childhood is a critical period for establishing a foundation for growth. Psychological stability influences future healthy growth and development. Therefore, providing psychological support to children after a disaster is essential. In many cases, the impact of disasters persists for a long time, so support should be ongoing, not just short-term.

B. Psychological Impact on Individual Factors

The impact of disasters on mental health varies by age. Younger children often express anxiety and fear immediately after a disaster, while older children tend to internalize their problems and report symptoms after a longer period. There is also a risk that symptoms may be more easily overlooked as children grow older because they become less apparent. This suggests the need for age and developmentally appropriate care for children after disasters.

C. The Importance of Lifestyle in Children's Mental Health

Findings show that a regular lifestyle and diet can reduce children's stress after a disaster, demonstrating the importance of restoring routine. Disruption of routine due to evacuation and environmental changes was a major psychological burden for children. Therefore, it is important to support them in adjusting their lifestyle. We believe that the challenge lies with adults in understanding the importance of helping children regain their lives at home, and in promoting the return of regularity in children's lives.

D. Possible Growth Effects through Disaster Experiences

The literature review results did not describe any support specific to children's mental health care and its effects other than psychiatric consultation. Disaster experiences have serious psychological effects on children. However, it was also noted that, with appropriate support, these experiences could lead to Post-Traumatic Growth (PTG). Traumatic experiences do not necessarily have only negative effects. It is hoped that positive interventions from supporters and the community will empower children with the ability to overcome disasters.

E. Psychological Influences of Environmental Factors and Support Systems

The need for psychiatric consultation among children was caused by prolonged evacuation, separation of parents and children due to evacuation, and loss of friends due to school transfers. In addition, the fact that children lived in an environment with little support during the chaotic period

after the disaster contributed to their need to see a psychiatrist after a long period of time had passed. These changes increased the rate of children receiving medical examinations over the long term. Reestablishing a network to nurture children in schools and communities after disaster is essential for their psychological recovery. It is important for children to focus on human connections and create a safe and secure environment in the community. We also believe that ongoing psychological support and long-term research are necessary.

F. Future Issues of This Study

Although this study was limited to the mental health of children in Japan, it is necessary to expand its scope to include the global perspective. It is necessary to consider not only at natural disasters, but also at man-made disasters such as terrorism.

VI. CONCLUSION

This study revealed the serious psychological effects of natural disasters on children's mental health. Factors such as the experience of loss and evacuation were shown to cause anxiety, depression, and aggression in children. The post-disaster psychological effects varied by age and individual circumstances. Younger children were more likely to express anxiety and fear immediately, while older children tended to have more internalized problems over time. Psychological trauma in childhood is likely to affect future development and health. Long-term evacuation, separation of parents and children, and separation from friends due to school transfers were also identified as environmental factors contributing to further psychological distress.

These findings indicate the importance of supporting children after disasters. Long-term psychological support and community support are particularly essential for the healthy development of children. Additionally, restructuring daily routines was found to reduce children's stress. It is considered important for adults to promote support for children to regain their daily routines.

Finally, it has been pointed out that, if appropriate support is provided, disaster experiences may lead to Post-Traumatic Growth (PTG), which is expected to help children overcome difficulties and develop the ability to grow. Consequently, the development of a post-disaster mental health care system and long-term research is an important issue to address in the future.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Mahiro Moriya, Nana Saito, Ayana Shikakura, Chinatsu Fujii, and Momoka Yamada were responsible for search terms, critical review of manuscripts, and draft of the first manuscript, development of tables; Yumiko Aikawa was responsible for critical review of manuscripts and redrafting of the paper; Manami Yasuda was responsible for inclusion criteria, review of manuscripts, and redrafting of the paper; all authors had approved the final version.

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