

BMJ Open Long-term psychological recovery process and its associated factors among survivors of the Great Hanshin-Awaji Earthquake in Japan: a qualitative study

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ABSTRACT

Objectives The 1995 Great Hanshin-Awaji Earthquake had an enormous negative impact on survivors' health. Many survivors experienced psychological distress and their long-term psychological recovery process remains unclear. Our objective was thus to explore this long-term psychological recovery process.

Design Qualitative study.

Setting From January to December 2015, face-to-face interviews were conducted in Kobe, Japan.

Participants 20 affected survivors (55% female; ages ranged from 7 to 60 at the time of the disaster)—10 volunteer storytellers, six first responders (firefighters/public health nurses) and four post-traumatic stress disorder patients.

Outcome measures We asked participants about their experiences and psychological distress relating to the earthquake and what facilitated or hindered their psychological recovery. We analysed interview data using constructivist grounded theory.

Results Participants experienced diverse emotional reactions immediately after the disaster and often hyperfocused on what they should do now. This hyperfocused state led to both mental and physical health problems several months after the disaster. Months, and sometimes years, after the disaster, guilt and earthquake narratives (ie, expressing thoughts and feelings about the earthquake) played key roles in survivors' psychological recovery: guilt suppressed their earthquake narrative; conversely, the narrative alleviated feelings of distress about the earthquake. In time, participants reconsidered their earthquake experiences both alone and through social interaction. This alleviated their emotional reactions; however, participants still experienced attenuated emotional reactions, and some hid their feelings of distress even 20 years postdisaster. Interpersonal relationships modified this psychological process both positively and negatively.

Conclusions Future psychosocial support plans for disaster survivors may need to (1) include both mental and physical care in the transition from the acute phase to the recovery phase; (2) facilitate supportive interpersonal relationships for survivors during the mid-term recovery phase and (3) provide long-term psychological support to the most traumatised survivors, even if they appear to be functioning normally.

Strengths and limitations of this study

- This is the first study to explore a long-term psychological recovery model among survivors of the large-scale natural disaster by using in-depth interview data.
- Qualitative research methods allowed us to understand survivors' complex psychological experiences and develop a conceptual long-term psychological recovery model, which might not be detectable with quantitative research methods alone.
- One limitation of this study is that potential recall bias could affect the results since the interviews were conducted 20 years after the earthquake.

BACKGROUND

Natural disasters are occurring at an increasing rate,¹ especially in Asia. Among all continents, Asia ranked the highest in the indices of disaster occurrences, the number of people killed and economic damage in 2016.² Survivors often experience economic hardship, physical problems and mental health problems after natural disasters.³ Post-disaster mental health problems may persist long after the disaster.^{4 5} Therefore, disaster-related mental health is a serious public health concern.

Japan has experienced many large-scale natural disasters in its history; however, the mental health problems experienced by disaster survivors had not been widely recognised before the 1995 Great Hanshin-Awaji Earthquake.⁶ The earthquake struck Kobe city and its surrounding areas with a Richter-scale magnitude of 7.3, causing 6434 deaths and damaging 39 440 houses. Governmental and non-governmental organisations provided various types of aid, including mental health and psychosocial support for each recovery phase.⁷ However, the psychological and mental health needs of survivors change over time; thus, it is crucial to

understand survivors' psychological recovery process to implement an effective and timely psychosocial support system.

Many disaster survivors manifest various psychological reactions, like posttraumatic stress disorder (PTSD), immediately after the disaster, though these reactions are generally alleviated over time.⁸ However, the majority of previous studies on survivors' mental health have been conducted within 3 years of the disaster.^{8–10} Some studies have shown a substantial reduction in the prevalence of PTSD after 4–5 years,^{11 12} whereas others reported that PTSD remained relatively high 4–8 years postdisaster.^{13–15} A previous study of the Great Hanshin-Awaji Earthquake found no significant differences in psychological distress between disaster survivors and non-exposed individuals 11 years after the earthquake.¹⁶ However, half of the bereaved relatives still had psychological problems such as complicated grief, PTSD and depression even 15 years after the earthquake.¹⁷

To date, findings on the long-term psychological impact of the disaster remain contradictory and inconclusive. This inconsistency may be partly explained by differences in study samples' basic characteristics (eg, sex, marital status, education level and prior trauma), trauma characteristics (eg, experiences of fear, injury, bereavement and witnessing injury/death) and post-trauma characteristics (eg, social support, employment, loss of property and relocation).^{8 18} Since psychological recovery among disaster survivors is a complex process and is associated with multiple factors, qualitative research is useful to explore survivors' psychological experiences and to develop a conceptual long-term psychological recovery model without destroying complexity and context.¹⁹

In the present study, we conducted face-to-face interviews with survivors of the Great Hanshin-Awaji Earthquake and analysed data qualitatively to reveal changes in the psychological impact of the earthquake and the factors associated with their long-term psychological recovery.

METHODS

We conducted a qualitative study using in-depth interview (IDI) data with survivors 20 years after the earthquake. The study allowed us to flexibly explore diverse and complex psychological phenomena among survivors, although there may be recall bias in the data.

Qualitative methodology

We followed the principles of constructivist grounded theory (CGT).²⁰ CGT is rooted in pragmatism and relativist epistemology and assumes that data are coconstructed by researchers and participants. As with other types of grounded theory, the sample selection, data collection and analysis were conducted through an iterative, mutually informed process to be responsive to emergent themes and concepts. Findings were identified

inductively through data collection and analysis rather than guided by an existing theoretical model.

Field sites

This study was conducted in Kobe, Japan, the capital city of Hyogo prefecture. Kobe has a population of 1.53 million people.

Participant selection

Participants were eligible if they had lived or worked in the area severely affected by the earthquake during the disaster. More specifically, severely affected areas were defined as Kobe city (Higashinada, Nada, Chuoh, Hyogo, Nagata and Suma ward), Ashiya city, Nishinomiya city and Awaji island because all these areas had the seismic intensity of seven, which was the strongest during this earthquake, and 96% of all casualties occurred there.²¹

Purposive sampling was used to select interviewees; we aimed for maximum diversity in age, sex, occupation, earthquake exposure (eg, being buried, being injured, destruction of own house, loss of relatives or friends and witnessing the death or injury of another person), and disaster-related psychopathologies. We also tried to include severely affected survivors because previous studies have shown that greater levels of earthquake exposure were associated with greater psychological problems.^{22–24} These sampling strategies could contribute to data triangulation and enhance the validity of the emergent results. All invited individuals were aged >18 years and provided written, informed consent to participate.

Data collection

We conducted IDIs between January and December 2015, 20 years after the earthquake. First, we recruited participants working as volunteer storytellers of their own experiences at the Great Hanshin-Awaji Earthquake memorial museum (the storytellers group). Most had been severely affected by the earthquake; for example, being buried or injured or experiencing the destruction of their house. In addition, they had been sharing their earthquake experiences there for 10 years since the establishment of the museum. Therefore, we thought their recall bias could be minimised.

First, we randomly selected 10 men and 10 women from 41 volunteer storytellers for administrative reasons. Of the 20 potential participants, three men and two women declined participation. Reasons for non-participation were not explored because we were afraid that inquiring might impose psychological pressure for participation. IDIs were scheduled at the participants' convenience.

Among 15 volunteer storytellers who agreed to participate, we interviewed only 10 because informational redundancy was reached for this population (ie, no new themes emerged) after completing 10 IDIs. Then, a tentative psychological recovery model was developed. We also recruited six participants from the Fire and Ambulance Service Division of Kobe city and from public health nurses who had worked for public health centres

located in the affected area during the disaster (the first responders group). Both groups were the first responders in the aftermath of the disaster and therefore may have been affected by critical incident stress. Previous studies on the long-term effects of critical incident stress among firefighters and nurses who had experienced the earthquake revealed a high risk of PTSD (11.6%–14.8%) among this population, even 10–12 years after the earthquake.^{25 26}

Finally, we recruited participants from our clinic who were receiving treatment for psychological trauma and PTSD (the patients group). Four patients who acquired PTSD after the earthquake were making regular clinic visits when this study was planned. After trauma-focused psychotherapy, such as prolonged exposure and psychopharmacotherapy, we confirmed their recovery from PTSD and other psychopathologies, such as depression. We then asked these individuals if they were willing to participate (all agreed). Our participants received 2000 Japanese Yen (approximately 20 US\$) after each interview to acknowledge their contribution to the study (four participants did not receive this payment). After completing 10 additional interviews, no new themes emerged; therefore, our psychological recovery model was theoretically saturated.

The first author, ET, who was a psychiatrist at the time of the study, conducted all face-to-face semistructured interviews in a private conference room or separate waiting area. ET had engaged in mental health and psychosocial support activities for earthquake survivors before this study was planned. The other authors (SK and HK) were also well-experienced psychiatrists in the field of disaster mental health at the time of the study.

Members of the research team developed the interview guide, which contained four domains: demographic information, experiences of the earthquake, psychological distress after the earthquake and what had facilitated or hindered recovery from psychological distress. All participants could speak Japanese fluently. IDIs lasted between 16 and 76 min, averaging 44 min. IDIs were digitally audiorecorded, transcribed verbatim and anonymised. All transcripts and memo-writing data were entered into NVivo V.11 qualitative data software for analysis.

Data analysis

ET led the analysis using an approach based on CGT.²⁰ He listened to the recordings and read the transcripts twice to become familiarised with the data. He coded sections of text from the transcribed interviews by assigning descriptive labels and using memo writing, then grouped the codes based on their shared properties to create categories and themes, using the constant comparative method.²⁰ To maximise rigour and reliability, transcripts were independently reviewed and coded by another author (HT). In the event of coding discrepancies between ET and HT, the research team members discussed the data until an agreement was reached.

The expertise of ET, SK and HK may have biased the data analysis, as we have been involved in mental health and psychosocial support activities for survivors of the Great Hanshin-Awaji Earthquake and other disasters for a long time. To mitigate this bias and obtain diverse perspectives, HT (who is a clinical psychologist, but does not have experience in disaster mental health) was involved in the data coding process as an independent coder.

After developing the long-term psychological recovery model for participants, we obtained other interview scripts from all 41 potential candidates about their earthquake experiences not exclusive to their psychological condition, through the web home page of the museum.²⁷ Then, we used these interview data for data triangulation to improve the validity of the final long-term psychological recovery model. After data triangulation, the final model remained identical.

Patient and public involvement

Patients with postearthquake PTSD were involved in this study. The authors sent the brief analysis report to each participant so that the participants could member-check the analysis and comment if warranted.

RESULTS

Participants' characteristics were shown in [table 1](#).

Survivors' experiences of the earthquake and their psychological trajectories

Our initial inquiry focused on participants' experiences of the earthquake and how their psychological reactions to the earthquake had changed over time. We categorised their psychological reactions into four phases: immediate aftermath (within 1 month), initial recovery (within 1 year), mid-term recovery (1–5 years) and long-term recovery (over 5 years). We identified 11 themes across the four phases ([figure 1](#)).

Immediate aftermath (within 1 month): perception of death, diverse emotional reactions and hyperfocus

Individuals severely affected by the earthquake experienced this as a chaotic phase. Some participants were nearly killed or had witnessed another's death. Most participants experienced extreme stress that was greater than anything they had experienced before. Five participants described perceiving a mortal risk to themselves at the moment the earthquake occurred. Other participants reported a variety of stressors, such as environmental change and interpersonal disputes following the earthquake. In response to this chaotic condition, participants developed diverse emotional reactions: fear, anger, numbness, emptiness, guilt and a sense of self-loss. Participants reported feeling so stunned that they could not think properly and could not accept the earthquake as real.

'I didn't have any room for feeling anything. I just went blank. I was staggered. I hadn't ever thought about the possibility of an earthquake. I didn't prepare anything. I

Table 1 Participants' characteristics (n=20)

	At the time of the earthquake		Current	
	n	%	n	%
Sex				
Male	9	45	NC	
Female	11	55	NC	
Age group (range)				
	(7–60 years)		(27–80 years)	
0–19	2	10	0	0
20–39	6	30	2	10
40–59	11	55	6	30
≥60	1	5	12	60
Marital status				
Single	4	20	2	10
Married	16	80	18	90
Occupation				
Company employee	4	20	0	0
Self-employed	1	5	0	0
Public service employee	10	50	5	25
Full-time housewife	3	15	5	25
Student	2	10	0	0
Retirement	0	0	10	50
Impact of the earthquake				
Complete destruction of own house	9	45	NC	
Partial destruction of own house	6	30	NC	
Buried during the earthquake	3	15	NC	
Death of close relative	2	10	NC	
Disaster-related psychopathology	3	15	NC	

NC, not changed.

just went to the park and stayed at a temporary shelter'. (Company employee in her 50s, from the storytellers group)

Some participants reported that people were irritated and got offended easily. Other participants reported that people did not panic much but behaved responsibly. Despite such diverse emotional reactions, most participants concentrated intensely on what they should do now (a state we labelled 'hyperfocus') to survive this difficult time. Once in a hyperfocused state, they worked hard without much rest, felt energetic, experienced no unpleasant physical sensations and felt rather well.

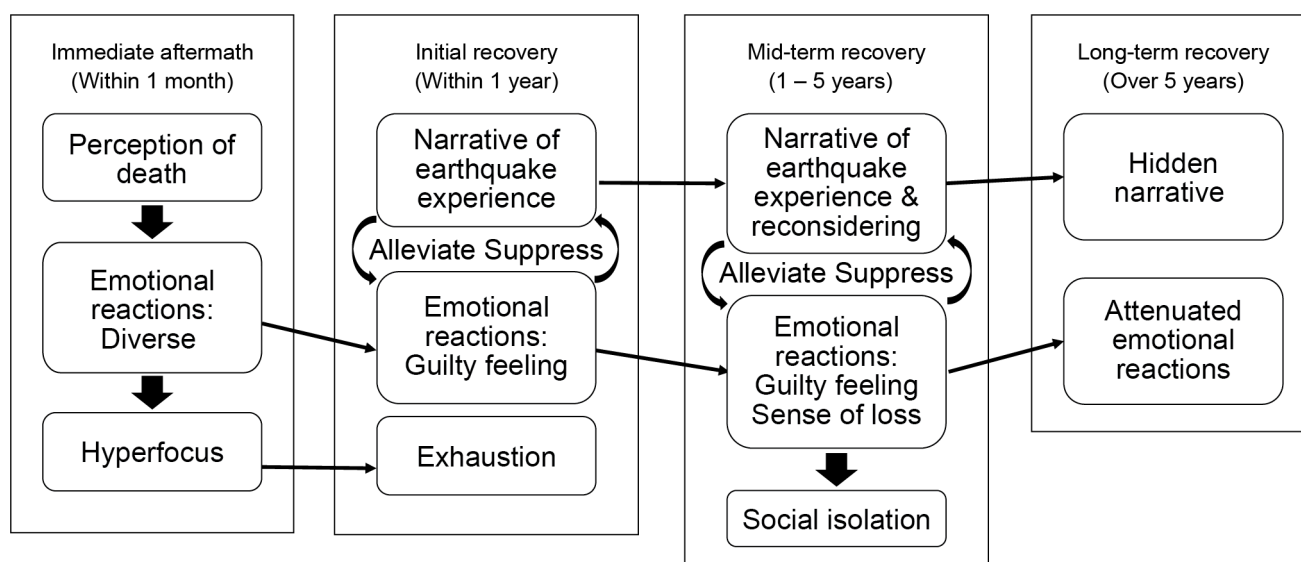
'There were pieces of glass in my shoes. I was wearing the shoes for a week before I noticed it. I didn't recognize that I was injured at all. A week later, I felt itching on the bottom of my feet and took off my shoes. I found pieces of glass and dried blood. I had not felt any pain'. (Housewife in her 40s, from the storytellers group)

Initial recovery phase (within 1 year): exhaustion after hyperfocus, guilt feelings and narratives of the earthquake experiences

After their hyperfocused state, participants experienced exhaustion and felt burned-out. They got tired easily and had physical symptoms such as pain, high fever and insomnia. Their mental state also became unstable and depressed.

'I realized how precious a house was because it could protect us from rain and wind. We could have a meal together there. Then, I felt calm and restful. Afterward, however, I developed physical and mental disorders one after another. I suffered from back pain, insomnia, and depression'. (Housewife in her 40s, from the storytellers group)

Although participants' emotional reactions to the earthquake began to gradually settle during this phase, their feelings of guilt persisted. These guilt feelings involved feeling ashamed and self-accusatory. The latter feeling

**Figure 1** Model of psychological recovery process.

derived from participants thinking that they had done something wrong, caused problems for others, could not help others or had received benefits that others had not received.

'My sister was trapped during the earthquake. That was the beginning of my guilt feelings. Why not me? (Two months after the earthquake) During afternoon exercises at school, I asked my best friend whether all her family members were all right, without knowing that her father had passed away during the earthquake. She didn't answer me. I learned of her father's death later; but, I didn't have a chance to say sorry to her. That memory lingered in my mind, and I couldn't get along with others anymore'. (Elementary school student in her teens, from the patients group)

Participants' narratives of earthquake experiences in this phase were complicated. Some suppressed their memories of the earthquake, whereas others wanted to discuss the earthquake with others. Among those wishing to share their earthquake experiences, some successfully talked about what they had experienced at the time of the disaster and obtained relief.

'One of my senior colleagues took care of us a lot. He was trustworthy, witty, and popular with us. Once, I told him that I was not able to save some people's lives during my rescue activity; he said that it couldn't be helped. Only later, I realized that it was because of him that I hadn't collapsed. I had heard that I should speak up (about what I experienced). I think he encouraged me to do so'. (Public service employee in his 20s, from first responders group)

However, not all participants could share their experiences with others. Some said they simply did not know who they could have talked to about their feelings of distress related to the earthquake.

Mid-term recovery phase (1–5 years): guilt feelings, sense of loss, social isolation, narratives of the earthquake experience and reconsidering

Some participants experienced guilt for a long time after the disaster. This period was also characterised by a sense of loss (ie, bereavement and property damage). Ultimately, these feelings of distress led to social isolation, which deprived individuals of the opportunity to interact with others and share narratives of the earthquake.

'Although I had very superficial interactions with classmates, I thought it was better for me not to make friends at school because I didn't want to distress others anymore. So, I didn't tell anyone my story of the earthquake'. (Elementary school student in her teens, from the patients group)

'Since my mother passed away during the earthquake, I have not been able to do the chores and have stayed at home for almost 3 years. After my daughter leaves for school in the morning, I just lie on the bed. I feel that I have lost my foundation because of my mother's death'. (Housewife in her 30s, from the patients group)

Some participants gradually started to talk about their experiences and feelings regarding the earthquake. Through this process, some successfully reconsidered their experiences and changed their views of the earthquake.

'I communicated with others in my daily life. Then, I worked through various kinds of (feelings and thoughts) by talking and discussing them with others at my own pace. As I said, I had feelings of guilt at the beginning. I had caused many problems for others, and my house had been completely destroyed. I might have even caused a fire in a neighborhood owing to leaking gasoline from my motorbike. One of my neighbors harshly accused me of it and I felt it was all my fault at the time. But, as time went on, I got to think that it was not us that did all these terrible things, but the natural disaster'. (Self-employed in her 50s, from the storytellers group)

Long-term recovery phase (more than 5 years): attenuated emotional reactions and hidden narratives

Even 20 years after the earthquake, some participants were still experiencing emotions such as sadness, fear and regret in response to the memory of the earthquake, although these feelings were attenuated and not clinically significant.

'Even now, sometimes I am petrified by news of an earthquake. Suddenly, I am petrified, and I cannot do anything for a while. It may be that my nature is to be easily scared'. (Housewife in her 30s, from the patients group)

'Although it has been 20 years since the earthquake, I cry when I remember it'. (Public service employee in her 40s, from the first responders group)

We defined hidden narratives as personal stories about the earthquake that survivors think about but are not able to verbalise even 20 years after the earthquake. Half of the participants mentioned or implied that they had a hidden narrative. Some participants confessed that they still thought about their experiences and could not share them with others. Some had family members who experienced difficult times during the earthquake but did not speak about the event. Some participants felt that the more severe the damage they experienced, the harder it was to talk about it.

Factors associated with psychological recovery after the earthquake

Interpersonal relationships

Of the 20 participants, 14 mentioned interpersonal relationships as a factor that influenced their recovery, both positively and negatively. Interpersonal relationships encompassed family, relatives, neighbours, colleagues and other individuals. For instance, relatives who did not live in the affected areas helped by providing supplies. In addition, family members provided emotional support.

'I must support my family. That's my belief. Ultimately, it's my anchor'. (Company employee in his 60s, from the storytellers group)

Some participants emphasised the importance of mutual aid among the neighbourhood.

'If I had known my neighbors better, we could have organized the management of the shelter more quickly together. So, I advise you to at least get to know your neighbors' faces. This would make it easier for you to cooperate with them in case of a disaster'. (Housewife in her 40s, from the storytellers group)

Public officers, firefighters and public health nurses mentioned that they were encouraged by their colleagues and temporary support workers. In these cases, interpersonal relationships reduced their psychological distress. However, interpersonal relationships could have negative influences on survivors' recovery. For example, individuals unaffected by the disaster may not adequately understand the experiences and distress of those affected. In many cases, interim external supporters were helpful for those working in the affected areas, though one participant said that she felt stressed by their presence. She understood that they were there to help the recovery efforts; however, she felt as if they had been monitoring her.

Other associated factors

Participants reported other factors associated with their recovery: environmental change, work, religion, hobbies, time and previous adverse life events. The latter five factors had protective effects on psychological recovery. Regarding previous adverse life events, older participants felt they were more resilient to the earthquake because they had experienced previous disasters, such as World War II and other natural disasters. Environmental change was both a protective and a risk factor for survivors. Some participants reported that environmental change, such as relocation, was very stressful. Others reported that they felt better seeing the destroyed landscape recovering over time.

DISCUSSION

The present study revealed the detailed long-term psychological recovery process of survivors of the Great Hanshin-Awaji Earthquake. In short, the survivors experienced diverse emotional reactions immediately after the disaster. They often concentrated on what they should do at that moment, a state that we labelled 'hyperfocus'. Afterward, they might feel exhausted mentally and physically. Some shared their experiences of the earthquake with others; however, others did not or could not. Gradually, survivors reconsidered their experiences of the earthquake through interaction with others or by themselves. Thus, their emotional reactions reduced over time. However, some still experienced attenuated emotional reactions, and some hid their distressing experiences even 20 years later. Interpersonal relationships helped modify survivors' psychological recovery, both positively and negatively.

Previous quantitative studies found no substantial negative impact on survivors' mental health more than

10 years postdisaster.^{16 28} Our results suggest that affected people may experience long-term attenuated psychological distress, which cannot be detected using quantitative questionnaire measures. This is because survivors who experience distress owing to the earthquake, particularly those who have had severe traumatic experiences, may try to hide their feelings and be reluctant to talk about their experiences of the earthquake even with family members. Thus, it is vital to note that long-term psychological support may be needed for severely affected people who superficially appear to be functioning well.

In addition, Raphael²⁹ identified five phases of response to a disaster: warning (predisaster), impact (in hours), honeymoon (in weeks), disillusionment (in months) and enhanced community/individual adaptation (in years). According to her model, fear is dominant during the impact phase. Survivors are hypervigilant and often engage in acts of heroism in this phase. Afterward, in the honeymoon period, survivors largely adapt to the disastrous situation and respond with altruistic actions and mutual aid. Her model of the acute phase (from hours to weeks) resembles our findings; participants reported diverse emotional reactions and hyperfocus immediately after the earthquake. Raphael also noted that, following the honeymoon phase, survivors must confront their disillusioned reality (disillusionment phase). We believe that her disillusionment phase is comparable with our finding that exhaustion often followed hyperfocus; however, we found that exhaustion encompassed not only mental problems, but also physical problems such as fatigue, pain and fever. Our results are also consistent with those of recent quantitative studies, which reported an association between PTSD and somatic symptoms among earthquake survivors 3 months postdisaster.^{30 31} Of the diverse psychological reactions reported by our participants, feelings of guilt were prominent. Previous studies reported that guilt feelings are associated with PTSD, other psychopathologies and maladaptive coping.^{32–35} Guilt can keep survivors from interacting with others and telling their story of the earthquake, which might make them feel more guilty. Narrative storytelling about the traumatic experience is a key part of some psychotherapies, such as prolonged exposure therapy and trauma-focused cognitive behavioural therapy for PTSD.^{36 37} That is, talking about their experiences of the earthquake could enhance survivors' psychological recovery. In fact, one of our participants described how speaking of their earthquake experiences helped their psychological recovery. However, some participants stated that they had not known who to share their story with. Other participants said that they did not want to tell their story. Psychological debriefing, which is aimed at encouraging survivors to express their traumatic experiences immediately after the disaster, is now not recommended owing to its possible negative effects.^{38 39} However, survivors with long-lasting psychological distress may need to express their story about their traumatic experiences during the long-term recovery phase.

Consistent with previous studies,^{40–42} we found that interpersonal relationships were a crucial factor associated with psychological recovery from the disaster. This may be because emotional support from others gives survivors the opportunity to reappraise their thoughts and feelings about the earthquake. However, it should be noted that survivors might be very sensitive to social interaction and may feel pressured, particularly in the acute phase. A unique finding of this study is the role of previous adverse experience as a protective factor for psychological recovery. Previous studies reported that pre-existing trauma is a risk factor for developing psychopathology after a disaster.^{18 43} In contrast, some participants felt that they could overcome difficulties because of their previous adverse experiences. A previous study of the Great East Japan Earthquake supports our finding because it reported that the elderly who had experienced adverse childhood events were less likely to have PTSD symptoms than those without adverse childhood events.⁴⁴

This study had some limitations. First, the purposive sampling might not be sufficient, which threatened the generalisability of our findings. We recruited specific participants: storytellers at a museum and first responders; therefore, caution must be applied when generalising the findings to other populations. However, the final model was saturated theoretically, and additional data triangulation of museum storytellers did not change the results. We also compared emergent themes among three groups: volunteer storytellers, first responders and patients. There were no great differences among the groups; although, first responders emphasised the importance of interpersonal relationships and patients emphasised guilt. Thus, we believe our analysis had some validity. Second, we might not have sampled the most severely affected survivors. Some participants had family members who had endured traumatic experiences during the earthquake but did not wish to tell their story, even to their family, 20 years after the earthquake. However, the recruitment of participants from our clinic may have minimised this limitation, as our clients said that they had not fully spoken about their earthquake experiences before coming to our clinic. Third, potential recall bias could affect the results since the interviews were conducted 20 years after the earthquake. In particular, there were fewer narratives in mid-term to long-term recovery phases than those in the acute recovery phase. A prospective qualitative interview study is needed to minimise this recall bias. Fourth, the volunteer storytellers regularly spoke about experiences related to the disaster. This may have attenuated their mental health concerns, especially in the long-term recovery phase; although, we did not ask them about the effect of being a volunteer storyteller on their mental health.

In summary, the following points could be important for the long-term psychological recovery of disaster survivors. First, there should be a focus on survivors' mental health problems and physical problems, as survivors and responders may experience mental and physical

exhaustion following periods of hyperfocus. This may be especially true in the transition period from the acute phase to the recovery phase. Second, supportive interpersonal relationships could help survivors reduce their guilt and facilitate the expression of their earthquake experiences during mid-term recovery. Finally, severely affected survivors might have attenuated emotional reactions during the long-term recovery phase, even if they appear to be functioning normally. Survivors must receive long-term support to address this.

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Data availability statement As per approved ethics protocol, the data will not be shared outside of the research institution. Any sharing of the data beyond the institution will require reasonable request and will be subject to review by the Ethics Review Committee of Hyogo Institute for Traumatic Stress. Any queries on how to access the data set should be directed to the corresponding author.

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