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Short-term Mental Health Changes Seen in Mothers and Play-age Children after the 2023 Türkiye-Syria Earthquakes

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Abstract

Objective: To evaluate the mental health of play-age children affected by the 2023 Türkiye–Syria earthquakes and their mothers, using single-item scales.
Methods: Four hundred earthquake survivor mother–child dyads were included. The mental health of mothers and children was assessed using single-item screening tools, the Self-Reported Mother Mental Health (SRMH) and the Mother-Reported Child Mental Health (MRCMH).
Results: The prevalence of negative mental health increased from 10% to 52% in play-age children and from 13% to 70% in their mothers after the earthquakes. For post-earthquake negative SRMH, associated factors included limited access to safe water (AOR = 2.52, 95% CI: 1.10–5.75, $P = 0.029$), good perception of security services (AOR = 0.30, 95% CI: 0.12–0.73, $P = 0.008$), and post-earthquake negative MRCMH (AOR = 8.65, 95% CI: 4.70–15.91, $P < 0.001$). For post-earthquake negative MRCMH, associated factors were out-of-house sheltering (AOR = 3.13, 95% CI: 1.72–5.69, $P < 0.001$), good perception of nutritional services (AOR = 0.46, 95% CI: 0.22–0.96, $P = 0.039$), pre-earthquake negative MRCMH (AOR = 4.68, 95% CI: 1.87–11.73, $P = 0.001$), and post-earthquake negative SRMH (AOR = 11.35, 95% CI: 5.92–21.76, $P < 0.001$).
Conclusion: Post-earthquake mental health outcomes were most consistently predicted by limited basic resources (water and nutrition services), not good service quality, and pre-existing or co-occurring negative mental health.

Introduction

Mental health has become a global health priority, as mental disorders constitute a significant burden of disease worldwide. Natural disasters exacerbate this existing burden by disrupting individuals, families, and communities both psychosocially and economically, thereby increasing vulnerability to mental health problems.[1] Children are particularly more vulnerable because their emotional, cognitive, behavioral, and sensory development is incomplete, and they lack effective coping mechanisms to manage traumatic experiences. They may also fear the recurrence of disasters and the loss of loved ones.[1–3] Studies estimate that 5–43% of disaster-affected children develop posttraumatic stress disorder (PTSD), while many others experience depression, anxiety, or other mental disorders.[4]

On February 6, 2023, 2 consecutive earthquakes with magnitudes of 7.7 and 7.6 struck Kahramanmaraş province 9 hours apart in Türkiye. These twin earthquakes caused tens of thousands of deaths, massive destruction, and the displacement of approximately 2.7 million people. These earthquakes constitute a collective trauma with nationwide repercussions.[5] In low- and middle-income countries such as Türkiye, women and young children are disproportionately affected by natural disasters, making mother–child dyads a particularly vulnerable group in terms of post-disaster mental health.[6,7]

The acute mental health problems experienced by children affected by disasters depend on factors such as age, family support, personality, and the type and duration of the disaster.[8] Disasters may negatively affect the autonomy and environmental exploration skills of children aged 1–3 years, increasing separation anxiety; in children aged 4–5 years, they may lead to psychosocial and behavioral problems such as re-enactment of the catastrophe, nightmares, aggression, and generalized anxiety.[1] Experiencing one or more natural disasters before the age of 5 increases the risk of any mental health and substance use disorders in adulthood by 15.7%.[9] Therefore, the early childhood period requires careful attention. Although recent studies have

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explored the psychological impact of the 2023 Türkiye–Syria earthquakes on school-aged children and adolescents,[10,11] no research has specifically focused on the mental health status of play-age children following the earthquakes.

Children's outcomes after earthquakes are influenced not only by direct exposure but also by parental mental health and family dynamics. Maternal psychological well-being and the quality of the mother–child relationship play a central role in shaping children's recovery and resilience.[12] Early diagnosis and intervention of mental symptoms in children are critical to supporting recovery and promoting long-term well-being. The existing literature emphasizes the need for holistic and family-centered mental health approaches in post-earthquake settings.[13]

The disaster literature has rarely examined reciprocal effects of maternal and child mental symptoms. This literature reports that after controlling for predisaster symptoms, longitudinal actor-partner interdependence models indicate that mother's and children's mental symptoms are linked, and change in tandem and influence each other after a disaster.[14,15] Previous findings demonstrate bidirectional cross-generational influences of mother and child on each other's mental problems in contexts of mass trauma and pinpoint early childhood as a sensitive period for such mutual influences.[16] Since the mental problems of parents and their related behaviors can be a secondary source of mental problems for children, integrated family-centered interventions and parent and family support services can improve the mental recovery of children after disasters. Especially mother-focused interventions may facilitate proper identification and adequate regulation of mother's own as well as the child's mental problems both in the short and long term after a disaster.[15,16]

Assessing children's post-disaster mental health poses challenges for health care professionals, as many tools are available but vary in scope, complexity, and applicability.[17] The growing number and diversity of these tools may cause confusion in selecting a reliable and valid instrument for practical use. Single-item mental health scales, which have gained attention for their efficiency, may help health care providers rapidly screen mother–child dyads in disaster settings.[18] Since forcing children to talk about their traumas in the early months after an earthquake may not be appropriate,[19] we preferred using single-item questions about general mental health status. Scalable single-item screening tools SRMH (the Self-Reported Mother Mental Health) and MRCMH (the Mother-Reported Child Mental Health) are relatively easy to understand for mothers, place minimal response burden, and capture a mother's global evaluation of their own and their children's mental state, and hence both ill-health and positive aspects.[20] These are important advantages especially in post-disaster settings. On the other hand, single-item tools provide limited contextual information on the nature and severity of symptoms or the type of mental health condition.[21]

Against this background, the present study aims to (i) evaluate the mental health of play-age children and their mothers affected by the 2023 Türkiye–Syria earthquakes using single-item scales, (ii) compare negative mental states before and after the disaster, and (iii) identify factors associated with these negative outcomes. Considering the profound developmental implications of early childhood trauma, this study seeks to address a critical gap in the literature on earthquakes and mental health in play-age populations.

Methods

This analytical cross-sectional study was conducted in tertiary hospitals located in cities declared as earthquake-affected regions. Between the 8th and 12th weeks following the earthquake, mother–child dyads who were earthquake survivors and presented to well-child or general pediatric outpatient clinics were included in the study. The inclusion criteria for children were as follows: being 24–60 months old, and having no chronic disease or mental disorder. The inclusion criteria for mothers were as follows: proficiency in the Turkish language, and absence of mental disorders or substance dependence. Migrant mother–child dyads were excluded from the study. The mothers' written consents were obtained to participate. This study was approved by Mersin University Clinical Research Ethics Committee (MEU 2023-04-12/241).

Data were collected between April 15 and May 15, 2023, through face-to-face interviews using a structured questionnaire form. Sociodemographic and earthquake-related characteristics of the participants were recorded, including the city in which they experienced the earthquake, housing damage, initial shelter after the earthquake, current shelter, current access to healthy food and clean water, and post-earthquake health problems of the child. Mothers were asked about their perceptions regarding the shelter, health, safety, hygiene, nutrition, education, and psychosocial support services provided to them after the earthquake, and were requested to rate these services on a scale from 0 to 10: 0–3 points as "poor," 4–6 points as "moderate," and 7–10 points as "good."

The mental health of mothers and children was assessed using a single-item screening tool. The Self-Reported Mother Mental Health (SRMH) and the Mother-Reported Child Mental Health (MRCMH) instruments, validated by Yalçın et al.,[20] are single-item mental health screening tools that can measure depression, anxiety, stress, and psychological distress in mothers, as well as psychosocial and behavioral strengths and difficulties in children aged 2–5 years.[20] Mothers were asked 4 questions to assess their mental health status on the day before the earthquake and on the day of data collection (current status): (i) "How would you rate your overall sense of well-being and mental health? At the present time, would you say your mental health is.?", (ii) "How would you rate your overall sense of well-being and mental health? The day before the earthquake, would you say your mental health is.?", (iii) "How would you describe your child's mental health? At the present time, would you say your child's mental health is.?", (iv) "How would you describe your child's mental health? The day before the earthquake, would you say your child's mental health is.?". Mothers were asked to rate their own mental health status (SRMH) and that of their child (MRCMH) as follows: 1 = excellent, 2 = very good, 3 = good, 4 = fair, 5 = poor. Responses of "excellent, very good, good" on the 5-point Likert-type scale were defined as a positive mental state, while responses of "fair, poor" were defined as a negative mental state.[20] Scores referring to the day before the earthquake were considered as pre-earthquake, and current scores were considered as post-earthquake.

Statistical Analyses

The statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 21.0. Normality was assessed with the Shapiro-Wilk test and histograms. For continuous variables median (IQR 25th–75th percentiles) values, for categorical variables numbers (n) and percentages (%) were given as descriptive statistics. Comparison of 2 dependent groups was examined with Wilcoxon Signed Ranks Test and McNemar test, while 2 independent groups were compared using the Mann–Whitney U test and Chi-square test. Univariate logistic regression analyses were first performed to explore potential predictors of negative post-earthquake

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SRMH and MRCMH. Variables with a P value < 0.25 in univariate analyses (Mann–Whitney U test for continuous variables and Chi-square test for categorical variables) were entered into the multivariable logistic regression model. Collinearity diagnostics were conducted, and no multicollinearity was detected (Variance Inflation Factor [VIF] and tolerance values were within acceptable ranges). The enter method was used for model construction. Adjusted odds ratios (AORs) and 95% confidence intervals (CIs) were calculated for each predictor. A P value < 0.05 was considered statistically significant.

Results

Sociodemographic Characteristics

Sociodemographic characteristics are presented in Table 1. The median (IQR) age of the children was 40.5 (30.5–49.0) months; 48% were male, and 35.3% were firstborn. Before the earthquake, 85.7% of the children were cared for by their mothers, and this rate increased to 90.8% after the earthquake. The median (IQR) ages of mothers and fathers were 31 (27.5–35) years and 34 (30–38) years, respectively. A total of 57.3% of mothers and 66% of fathers had a high school or university education level. Regarding maternal employment status, 77.5% were not working either before or after the earthquake, 16.7% were employed both before and after the earthquake, and 5.8% had left or lost their jobs due to the earthquake. Among the families, 21.8% had only one child, and 89.5% were nuclear families.

Earthquake-related Characteristics

Earthquake-related characteristics are presented in Table 1. While 24.5% of participants' homes were undamaged, 23.5% had homes that were severely damaged or destroyed. A total of 27.3% had family members who were injured or died during the earthquake. The 3 most common initial shelter types after the earthquake were motor vehicles (32.3%), tents (32%), and temporarily rented or shared houses (29%). At the time of data collection (8–12 weeks after the earthquake), the three most common current shelters were temporarily rented or shared houses (65%), containers (14.5%), and dormitories (10.8%). Regarding food access, 50.5% of participants had unlimited access to healthy food, 34.5% had access to healthy food only during 3 main meals, and 15% had limited access to food with no regular meals. A total of 26.7% had limited access to clean/safe water. Following the earthquake, 72.5% of children experienced febrile, diarrheal, or rash-related illnesses, 33.8% had sleep problems, and 13.5% experienced accidents or injuries.

Mothers' Perceptions of the Services Offered to Them

While 51.2% of mothers rated shelter services, 54% rated health services, 59.5% rated security services, 56.5% rated hygiene services, and 53.5% rated nutrition services as "good" (score 7–10), 59.8% rated education services and 74.5% rated psychosocial support services as "moderate–poor" (score 0–6) (Table 2).

Single-item Characteristics

Single-item mental health characteristics are presented in Table 3. Before the earthquake, 90% of children and 87% of mothers had positive mental health, whereas after the earthquake, these rates decreased to 48.5% for children and 30.8% for mothers. With the earthquake, the prevalence of fair mental health increased from 8% to 37% in children and from 9% to 38% in mothers; the prevalence of poor mental health increased from 2% to 15% in children and from 4% to 32% in mothers (Figure 1).

The median MRCMH score was 3 before the earthquake and 4 after the earthquake, and the difference between these scores was significant (P < 0.001). The increase in the prevalence of negative mental health status in children from 10% to 51.5% after the earthquake was statistically significant (P < 0.001). The median SRMH score was 3 before the earthquake and 4 after the earthquake, and the difference between these scores was significant (P < 0.001). The increase in the prevalence of negative mental health status in mothers from 13% to 69.3% after the earthquake was statistically significant (P < 0.001) (Table 4).

Associated Factors for Post-earthquake Negative Mental Health

Compared to the positive SRMH group, the negative SRMH group, and compared to the positive MRCMH group, the negative MRCMH group, had significantly higher frequencies of the following variables (P < 0.05): being cared for by the mother, unemployed mother, severely damaged or destroyed home, presence of febrile, diarrheal, or rash-related illness in the child after the earthquake, initial and current shelter being outside of a house, limited access to healthy food and clean/safe water, and perceiving the services provided as less than "good" (Table 5). The frequency of having a family member injured or deceased in the earthquake was higher in the negative SRMH group than in the positive SRMH group (31% vs. 18.7%, P = 0.010). The median number of people sharing the same shelter was 5 (4–10) in the negative MRCMH group compared to 5 (4–6) in the positive MRCMH group (P = 0.003).

Multivariable logistic regression analyses were conducted to identify predictors of post-earthquake negative SRMH and MRCMH. For post-earthquake negative SRMH, significant predictors included limited access to safe water (AOR = 2.52, 95% CI: 1.10–5.75, P = 0.029) and good perception of security services (AOR = 0.30, 95% CI: 0.12–0.73, P = 0.008). Post-earthquake negative MRCMH was strongly associated with post-earthquake negative SRMH (AOR = 8.65, 95% CI: 4.70–15.91, P < 0.001). For post-earthquake negative MRCMH, significant predictors were out-of-house sheltering (AOR = 3.13, 95% CI: 1.72–5.69, P < 0.001), good perception of nutritional services (AOR = 0.46, 95% CI: 0.22–0.96, P = 0.039), and pre-earthquake negative MRCMH (AOR = 4.68, 95% CI: 1.87–11.73, P = 0.001). Additionally, post-earthquake negative SRMH was a strong predictor for post-earthquake negative MRCMH (AOR = 11.35, 95% CI: 5.92–21.76, P < 0.001) (Table 6).

Discussion

In order to meet the mental health needs of play-age children in earthquake-affected regions, it is essential first to identify the incidence and predictors of mental health problems. In this study, during the second–third months following the earthquake, the prevalence of negative mental health was 52% among play-age children and 70% among their mothers. Overall, post-earthquake mental health outcomes were most consistently predicted by limited basic resources (water and nutrition services), not good service quality, and pre-existing or co-occurring negative mental health status.

It is known that the frequency of psychosocial difficulties increases in children after earthquakes.[8] According to our findings,

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Table 1. Sociodemographic and earthquake-related characteristics, n = 400

Child-related factors		Mother-related factors	
Age, months	40.5 [18.5]	Age, years	31 [7.5]
Gender		<25 years	37 (9.3)
Male	192 (48.0)	25–35 years	284 (71.0)
Female	208 (52.0)	>35 years	79 (19.2)
Gestational age, weeks	38 [1]	Educational level	
<37 weeks	37 (9.3)	Primary school	171 (42.7)
≥37 weeks	363 (90.7)	High school	138 (34.5)
Birth order	2 [2]	College	91 (22.8)
1st	141 (35.3)	Employment status	
2nd	139 (34.7)	Employed	67 (16.7)
≥3rd	120 (30.0)	Not employed	310 (77.5)
Nutrition during the first 6 months		Quit her job due to the earthquake	23 (5.8)
Exclusive breastfeeding	242 (60.5)	**Family-related factors**	
Mixed feeding	142 (35.5)	Paternal age, years	34 [8]
Formula feeding	16 (4.0)	Paternal educational level	
Primary caretaker before the earthquake		Primary school	136 (34.0)
Mother	343 (85.7)	High school	134 (33.5)
Grandmother	21 (5.3)	College	130 (32.5)
Childminder	19 (4.7)	Number of child(ren) in the family	2 [1]
Kindergarten	17 (4.3)	1	87 (21.8)
Primary caretaker after the earthquake		2	155 (38.7)
Mother	363 (90.8)	≥3	158 (39.5)
Grandmother	16 (4.0)	Family structure	
Childminder	8 (2.0)	Nuclear	358 (89.5)
Kindergarten	13 (3.2)	Extended	42 (10.5)
Living province during earthquake and health status		**Living condition after the earthquake**	
Earthquake-affected city		The first sheltering	
Adıyaman	159 (39.8)	Motor vehicle	129 (32.3)
Şanlıurfa	102 (25.5)	Tent	128 (32.0)
Adana	75 (18.8)	Temporary house	116 (29.0)
Hatay	32 (8.0)	Closed fairground	11 (2.8)
Gaziantep	10 (2.5)	Container	7 (1.8)
Kahramanmaraş	9 (2.3)	Hotel	5 (1.3)
Osmaniye	6 (1.5)	Dormitory	4 (1.0)
Malatya	5 (1.3)	Current sheltering	
Elazığ	1 (0.3)	Motor vehicle	4 (1.0)
Damage status of the house		Tent	29 (7.3)
Undamaged	98 (24.5)	Temporary house	260 (65.0)
Light damaged	134 (33.5)	Closed fairground	1 (0.3)
Moderate damaged	74 (18.5)	Container	58 (14.5)
Heavy damaged	68 (17.0)	Hotel	5 (1.3)
Collapsed	26 (6.5)	Dormitory	43 (10.8)

(*Continued*)

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Table 1. (*Continued*)

Child-related factors		Mother-related factors	
After the earthquake, child's		Access to sufficient and balanced food	
Illness; fever, diarrhea, or rash	290 (72.5)	Unlimited	202 (50.5)
Sleep problems	135 (33.8)	Only in 3 main meals	138 (34.5)
Injuries and accidents	54 (13.5)	Limited, no regular meals	60 (15.0)
		Access to safe water	
		Unlimited	293 (73.3)
		Limited	107 (26.7)
Family member injured or who died in the earthquake	109 (27.3)	Number of people living in the current sheltering	3 [5]

Data are median (interquartile range, IQR), and number (percentage).

Table 2. Mothers' perceptions of the services offered to them, n = 400

Essential living and support services	Mothers' perceptions		
	Good (score 7 to 10)	Moderate (score 4 to 6)	Poor (score 0 to 3)
Sheltering	205 (51.2)	150 (37.5)	45 (11.3)
Health care	216 (54.0)	139 (34.7)	45 (11.3)
Security	238 (59.5)	119 (29.7)	43 (10.8)
Hygiene	226 (56.5)	116 (29.0)	58 (14.5)
Nutrition	214 (53.5)	140 (35.0)	46 (11.5)
Education	161 (40.2)	143 (35.8)	96 (24.0)
Psychosocial support	102 (25.5)	131 (32.7)	167 (41.8)

Table 3. Single-item characteristics of mother-child pairs, n = 400

	Pre-earthquake, n (%)	Post-earthquake, n (%)
MRCMH score		
Excellent	53 (13.3)	23 (5.8)
Very good	133 (33.3)	38 (9.5)
Good	174 (43.5)	133 (33.3)
Fair	31 (7.8)	147 (36.8)
Poor	9 (2.3)	59 (14.8)
MRCMH		
Positive*	360 (90.0)	194 (48.5)
Negative**	40 (10.0)	206 (51.5)
SRMH score		
Excellent	48 (12.0)	8 (2.0)
Very good	118 (29.5)	16 (4.0)
Good	182 (45.5)	99 (24.8)
Fair	37 (9.3)	151 (37.8)
Poor	15 (3.8)	126 (31.5)
SRMH		
Positive*	348 (87.0)	123 (30.8)
Negative**	52 (13.0)	277 (69.2)

MRCMH: mother-reported mental health of child, SRMH: self-reported mental health of mother.
*Excellent-Very good-Good = positive; **Fair-Poor = negative.

the prevalence of negative mental health among play-age children increased from 10% before the 2023 earthquakes to 52% after the earthquakes. Within the first 5 months following the 2023 earthquakes, psychiatric problems were identified in 100% of earthquake-affected children and adolescents presenting to child and adolescent psychiatry outpatient clinics, whereas prior to the earthquake only 21% of these cases had a psychiatric diagnosis.[10] After the Great East Japan, 2016 Kumamoto, 2018 Lombok, and Sichuan earthquakes, the proportion of children with mental health problems reached epidemic proportions (23% to 54.5% prevalence) in affected regions.[22–25] The variability in the prevalence of post-earthquake mental health problems can be attributed to factors such as the country in which the earthquake occurred, the severity and duration of exposure, the timing of the assessment, and the methods used for evaluation.

Several risk and protective factors for psychological disorders in children and adolescents after disasters have been identified. (i) Demographic risk factors include older age, female gender, being an only child, low parental education level, and rural residence.[12,26] In our study, among play-age children with negative mental health after the earthquake, we found higher frequencies of being cared for by the mother and having a working mother; however, no socio-demographic factor was identified as an associated factor of negative MRCMH. (ii) Pre-earthquake risk factors include physical illness, low self-esteem, adverse life events, prior traumas, and parents with mental problems.[12,26,27] In our study, we did not investigate adverse life experiences or previous traumas, and we found that the pre-earthquake SRMH scores of mothers were similar between the negative and positive MRCMH groups. However, we demonstrated that pre-earthquake negative MRCMH and post-earthquake negative SRMH increased the risk of post-earthquake negative MRCMH. (iii) Earthquake-related objective risk factors include the loss of a family member and bereavement, injury of family members or acquaintances (friends, relatives, etc.), witnessing an injury/death, separation from family, personal injury, hospitalization/surgery/amputation, being trapped under debris, damage to the home, and loss of property, whereas protective earthquake-related objective factors are being with family, living under good standards, and being sheltered at home.[12,28] In our study, among play-age children with negative mental health after

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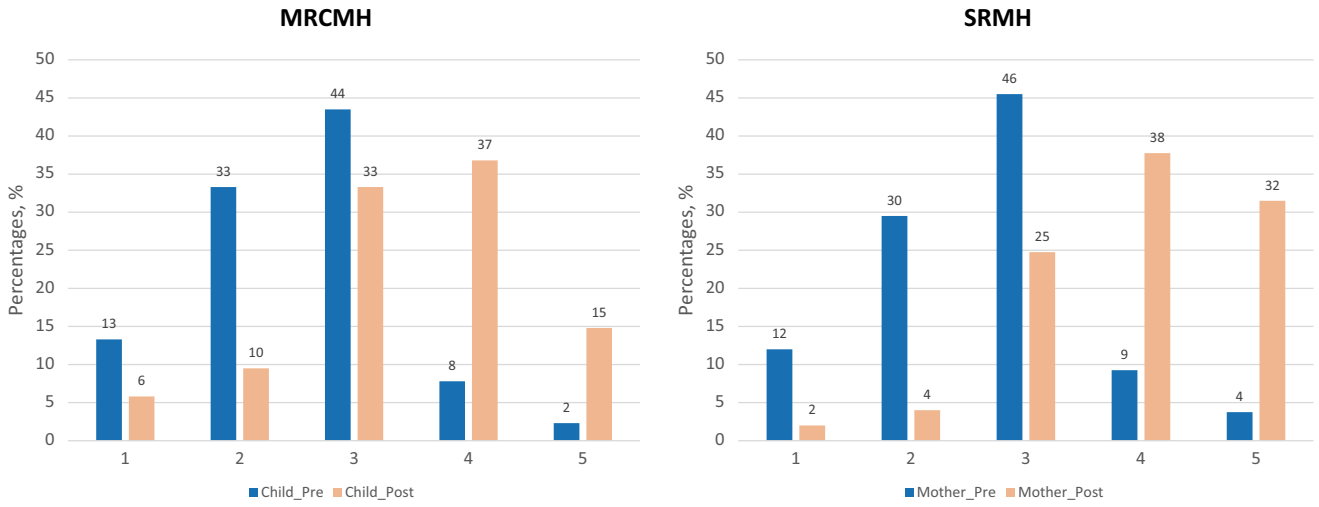


Figure 1. Frequencies of pre- and post-earthquake single-item scale points.
MRCMH; mother-reported mental health of child, SRMH; self-reported mental health of mother. Five-point scales: 1; excellent, 2; very good, 3; good, 4; fair, 5; poor.

Table 4. Comparison of pre- and post-earthquake mental status of mother-child pairs, n = 400

		Pre-earthquake	Post-earthquake	*P*
MRCMH	Median [IQR]	3 [1]	4 [1]	Z = −12.5, *P* < 0.001*
	Mean ± SD	2.5 ± 0.9	3.5 ± 1.0	
	Negative, %	10.0	51.5	Chi-sq. = 137.5, *P* < 0.001**
SRMH	Median [IQR]	3 [1]	4 [2]	Z = −14.2, *P* < 0.001*
	Mean ± SD	2.6 ± 0.9	3.9 ± 0.9	
	Negative, %	13.0	69.3	Chi-sq. = 193.7, *P* < 0.001**

MRCMH: mother-reported mental health of child; SRMH: self-reported mental health of mother.
*Wilcoxon Signed Ranks Test;**McNemar test.

the earthquake, we found higher frequencies of having a severely damaged or destroyed home, being sheltered outside the home environment, and experiencing febrile, diarrheal, or rash-related illnesses after the earthquake; however, no earthquake-related objective factor was identified as a predictor of negative MRCMH. (iv) Post-earthquake environmental risk factors include displacement, inadequate social support, delays in seeking care and support, domestic violence, and unmet basic needs, whereas protective post-earthquake environmental factors are early return to routine life, provision of mental health services, adequate social support, a positive family and school environment, and fulfillment of basic needs.[12,29] In our study, among play-age children with negative mental health after the earthquake, we found higher frequencies of limited access to healthy food, limited access to clean water, living with a greater number of people in the same environment indicating overcrowding, and inadequate shelter, health, safety, hygiene, nutrition, education, and psychosocial support; inadequate nutrition services were identified as a predictor of negative MRCMH. We interpreted this finding to mean that in the aftermath of a disaster, adequate nutrition is a top priority for mothers in terms of their children's mental well-being.

During the acute period after the February 2023 earthquakes, the unmet needs for drinking water, toilets, shelter, heating, clothing, and health care, as well as during the subacute period, the inadequately met needs for clothing, education, and social activities, were found to be factors increasing the risk of mental disorders in children and adolescents.[30] We found that during the subacute period, lack of shelter in the home environment increased the risk of negative MRCMH by 3.1 times, whereas perceiving nutrition services as "good" reduced the risk of negative MRCMH by 0.46 times in play-age children. In provinces affected by the February 2023 earthquakes, among breastfeeding mothers with children aged 0–2 years, those who were unemployed, living in tents, living in containers, or living in temporary houses and those without access to complementary food exhibited higher post-traumatic stress.[31] Similarly, in our study, the frequencies of unemployed mothers, non-home shelter, and limited access to healthy food were higher among mother–child dyads with negative mental health.

The assessment of children's mental health cannot be considered separately from family members and family dynamics. Changes and disruptions in family–peer–child systems, along with environmental conditions, are determinants of the impact on child mental health after disasters.[13,32] Following an earthquake, paternal stress and maternal depression increase the risk of psychopathology in children, while child psychopathology increases the risk of internalizing problems in parents.[12,33] Therefore, it is important to assess the mental health of earthquake-affected parents and to review the associated risk factors. These risk factors include the

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Table 5. Differences in child–mother–family-living conditions between positive and negative post-earthquake SRMH and MRCMH

	Post-earthquake SRMH			Post-earthquake MRCMH		
	Positive (n = 123)	Negative (n = 277)	*P*	Positive (n = 194)	Negative (n = 206)	*P*
Child-related factors						
Age, months	40.2 [21.4]	40.8 [17.6]	0.592	39.6 [20.1]	41.8 [16.3]	0.263
Gender, male	60 (48.8)	132 (47.7)	0.835	94 (48.5)	98 (47.6)	0.860
Birth order, 1st child	44 (35.8)	97 (35.0)	0.884	68 (35.1)	73 (35.4)	0.936
Nutrition during the first 6 months, exclusive breastfeeding	70 (56.9)	172 (62.1)	0.328	120 (61.9)	122 (59.2)	0.590
Primary caretaker before the earthquake, mother	98 (79.7)	244 (88.1)	**0.027**	153 (78.9)	189 (91.7)	**<0.001**
Primary caretaker after the earthquake, mother	103 (83.7)	260 (93.9)	**0.001**	167 (86.1)	196 (95.1)	**0.002**
Mother-related factors						
Age, years	31 [6]	31 [8]	0.910	31 [6.3]	31 [8]	0.433
Educational level, high school or college	75 (61.0)	154 (55.6)	0.316	111 (57.2)	118 (57.3)	0.990
Employment status			**0.022**			**0.043**
Employed	27 (22.0)	40 (14.4)		41 (21.1)	26 (12.6)	
Not employed	85 (69.1)	225 (81.2)		140 (72.2)	170 (82.5)	
Quit her job due to the earthquake	11 (8.9)	12 (4.3)		13 (6.7)	10 (4.9)	
Family-related factors						
Paternal age, years	34 [9]	34 [8]	0.493	34 [9]	34 [8]	0.748
Paternal educational level, high school or college	82 (66.7)	182 (65.7)	0.851	128 (66.0)	136 (66.0)	0.993
Number of child(ren) in the family	2 [1]	2 [1]	0.702	2 [2]	2 [1]	0.065
Family structure, nuclear	109 (88.6)	249 (89.9)	0.701	175 (90.2)	183 (88.8)	0.655
Earthquake-related factors						
Housing damage			**0.001**			**0.003**
Undamaged or light damaged	88 (71.5)	144 (52.0)		129 (66.5)	103 (50.0)	
Moderate damaged	15 (12.2)	59 (21.3)		31 (16.0)	43 (20.9)	
Heavy damaged or collapsed	20 (16.3)	74 (26.7)		34 (17.5)	60 (29.1)	
Child health after the earthquake						
Illness with fever, diarrhea, or rash	81 (65.9)	209 (75.5)	**0.047**	131 (67.5)	159 (77.2)	**0.031**
Sleep problems	36 (29.3)	99 (35.7)	0.207	63 (32.5)	72 (35.0)	0.601
Injuries and accidents	12 (9.8)	42 (15.2)	0.144	25 (12.9)	29 (14.1)	0.728
Family member injured or who died in the earthquake	23 (18.7)	86 (31.0)	**0.010**	47 (24.2)	62 (30.1)	0.188
Sheltering and living conditions						
The first sheltering after the earthquake			**<0.001**			**0.001**
Temporary housing	51 (41.5)	65 (23.5)		72 (37.1)	44 (21.4)	
Others*	72 (58.5)	212 (76.5)		122 (62.9)	162 (78.6)	
Current sheltering			**0.006**			**<0.001**
Temporary housing	92 (74.8)	168 (60.6)		147 (75.8)	113 (54.9)	
Others*	31 (25.2)	109 (39.4)		47 (24.2)	93 (45.1)	
Access to sufficient and balanced food			**0.001**			**0.003**
Unlimited	78 (63.4)	124 (44.8)		111 (57.2)	91 (44.2)	
Only in 3 main meals	36 (29.3)	102 (36.8)		65 (33.5)	73 (35.4)	
Limited, no regular meals	9 (7.3)	51 (18.4)		18 (9.3)	42 (20.4)	
Access to safe water			**<0.001**			**<0.001**
Unlimited	110 (89.4)	183 (66.1)		160 (82.5)	133 (64.6)	

(*Continued*)

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Table 5. (*Continued*)

	Post-earthquake SRMH			Post-earthquake MRCMH		
	Positive (n = 123)	Negative (n = 277)	*P*	Positive (n = 194)	Negative (n = 206)	*P*
Limited	13 (10.6)	94 (33.9)		34 (17.5)	73 (35.4)	
Number of people living in the current sheltering	5 [2]	5 [4]	0.089	5 [2]	5 [6]	**0.003**
Perceived service quality for mothers						
Sheltering services good	83 (67.5)	122 (44.0)	**<0.001**	121 (62.4)	84 (40.8)	**<0.001**
Healthcare services good	85 (69.1)	131 (47.3)	**<0.001**	127 (65.5)	89 (43.2)	**<0.001**
Security services good	84 (68.3)	154 (55.6)	**0.017**	134 (69.1)	104 (50.5)	**<0.001**
Hygiene services good	90 (73.2)	136 (49.1)	**<0.001**	134 (69.1)	92 (44.7)	**<0.001**
Nutrition services good	89 (72.4)	125 (45.1)	**<0.001**	123 (63.4)	91 (44.2)	**<0.001**
Education services good	74 (60.2)	87 (31.4)	**<0.001**	103 (53.1)	58 (28.2)	**<0.001**
Psychosocial support services good	53 (43.1)	49 (17.7)	**<0.001**	71 (36.6)	31 (15.0)	**<0.001**
Pre-earthquake MRCMH, negative	20 (16.3)	20 (7.2)	**0.005**	16 (8.2)	24 (11.7)	0.257
Post-earthquake MRCMH, negative	20 (16.3)	186 (67.1)	**<0.001**	–	–	–
Pre-earthquake SRMH, negative	17 (13.8)	35 (12.6)	0.745	25 (12.9)	27 (13.1)	0.948
Post-earthquake SRMH, negative	–	–	**–**	91 (46.9)	186 (90.3)	**<0.001**

MRCMH: mother-reported mental health of child; SRMH: self-reported mental health of mother.
*Others included motor vehicle, tent, closed fairground, container, hotel, dormitory.
Data are median (interquartile range, IQR), and number (percentage).

severity of earthquake exposure, loss of family members, exposure to multiple stressors, previous exposure to stressful events, and adverse living conditions. Low educational level and low socioeconomic status are also among the risk factors.[7,34] In mothers with negative mental health after the earthquake, we found higher frequencies of being the primary caregiver of the child, being unemployed or leaving work due to the earthquake, having a severely damaged or destroyed home, having a family member injured or deceased in the earthquake, being sheltered outside the home environment, limited access to healthy food, limited access to clean water, and perceiving the services provided for basic needs as inadequate. Limited access to clean water and inadequate security services were identified as predictors of negative SRMH. In addition, we demonstrated that post-earthquake negative MRCMH increased the risk of negative SRMH.

In our study, the prevalence of negative mental health among mothers was 70%, and a considerable proportion of mothers did not rate the basic needs services provided as "good." During the post-earthquake recovery process, parental dissatisfaction and perceptions of inequality have been shown to predict lower parental happiness and higher levels of child depression.[35] The 2023 earthquakes have been reported to cause significant distress, anxiety, and PTSD among Turkish parents, with 90% expressing concerns about their children's safety.[36] In our study, 59.5% of mothers rated post-earthquake security services as "good," and perceiving security services as "good" reduced the risk of negative maternal mental health by 0.3 times. We interpreted this finding to mean that in the aftermath of a disaster, security is a top priority for mothers in terms of their own mental well-being. Since we demonstrated that negative maternal mental health increased the risk of negative mental health in children, improving security services will support both maternal and child mental health.

The February 2023 earthquakes struck not only southeastern Türkiye but also Syria, significantly affecting the well-being and psychological health of millions of people in both countries. As mental health resources are limited in both settings, the psychosocial needs of affected children have not been adequately met.[37] In our study, only one-quarter of mothers rated post-earthquake psychosocial support services as "good." This finding highlights the high prevalence of inadequately met psychosocial needs, supporting previous findings.[38]

Post-earthquake mental assessment should aim to identify individuals at high risk of developing mental health problems, be conducted with locally adapted tools, encompass the parent–child dyad, and focus on improving family well-being.[39] Although children and parents may respond differently to earthquakes, the most appropriate approach is to evaluate them as a dyad. Previous studies provide new evidence showing a unidirectional pathway from parental earthquake-related symptomatology to the overall mental health of children. In situations where both parents and children are exposed to disasters, their post-traumatic mental responses are reciprocal. Parental psychopathology is among the predictors of emotional and behavioral difficulties in children.[13] Parental positive mental health is the most effective facilitator of children's recovery and resilience. Dyadic approaches are encouraged in understanding post-traumatic mental health among earthquake-affected families because the psychosocial difficulties of school-age children and adolescents after an earthquake are significantly correlated with their mothers' psychopathologies such as chronic stress and distress.[1,40–43] According to our findings, there is a positive association between maternal post-earthquake negative mental health and child post-earthquake negative mental health in the 2–5 year age group. In this context, our study has contributed data to the existing literature specifically concerning play-age children.

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Table 6. Predictors for post-earthquake negative SRMH and MRCMH

	Post-earthquake SRMH, negative			Post-earthquake MRCMH, negative		
	AOR	95% CI	p	AOR	95% CI	p
Primary caretaker after the earthquake; mother vs. others	1.47	0.53–4.06	0.455	1.61	0.52–5.02	0.412
Mother's employment			0.329			0.705
Quitting her job vs. not employed	0.44	0.14–1.47	0.183	1.45	0.47–4.45	0.514
Employed vs. not employed	1.21	0.52–2.84	0.658	1.3	0.57–2.94	0.535
Number of child(ren) in the family			–			0.131
2 vs. 1	–	–	–	1.11	0.57–2.16	0.751
≥3 vs. 1	–	–	–	1.83	0.92–3.61	0.083
Child health after the earthquake						
Illness with fever, diarrhea, or rash; presence vs. absence	0.97	0.53–1.77	0.914	1.41	0.8–2.49	0.236
Sleep problems; presence vs. absence	1.30	0.72–2.34	0.385	–	–	–
Injuries and accidents; presence vs. absence	1.62	0.69–3.82	0.267	–	–	–
Family member injured or who died in the earthquake; presence vs. absence	1.64	0.81–3.32	0.168	0.57	0.31–1.04	0.066
Current sheltering; others* vs. temporary housing	0.67	0.34–1.34	0.261	**3.13**	**1.72–5.69**	**<0.001**
Access to sufficient and balanced food		–	0.677		–	0.290
only in 3 main meals vs. unlimited	1.25	0.68–2.3	0.472	0.80	0.46–1.42	0.447
limited, no regular meals vs. unlimited	0.82	0.28–2.4	0.716	1.63	0.7–3.79	0.257
Access to safe water; limited vs. unlimited	**2.52**	**1.1–5.75**	**0.029**	1.49	0.8–2.78	0.208
Perceived service quality for mothers						
Sheltering services; good vs. moderate or poor	1.00	0.44–2.29	0.997	0.98	0.49–1.93	0.942
Healthcare services; good vs. moderate or poor	1.11	0.47–2.64	0.817	1.17	0.58–2.34	0.662
Security services; good vs. moderate or poor	**0.30**	**0.12–0.73**	**0.008**	1.55	0.74–3.25	0.248
Hygiene services; good vs. moderate or poor	1.83	0.72–4.63	0.205	1.5	0.69–3.23	0.305
Nutrition services; good vs. moderate or poor	2.10	0.88–5.03	0.097	**0.46**	**0.22–0.96**	**0.039**
Education services; good vs. moderate or poor	1.23	0.54–2.79	0.627	1.56	0.74–3.29	0.247
Psychosocial support; good vs. moderate or poor	1.29	0.61–2.73	0.513	1.32	0.63–2.79	0.467
Pre-earthquake SRMH; negative vs. positive	0.72	0.33–1.59	0.419	–	–	–
Post-earthquake MRCMH; negative vs. positive	**8.65**	**4.7–15.91**	**<0.001**	–	–	–
Pre-earthquake MRCMH; negative vs. positive	–	–	–	**4.68**	**1.87–11.73**	**0.001**
Post-earthquake SRMH negative vs. positive	–	–	–	**11.35**	**5.92–21.76**	**<0.001**
Constant	0.41	–	0.194	0.026	–	<0.001

MRCMH: mother-reported mental health of child; SRMH: self-reported mental health of mother; AOR: adjusted odds ratio; CI: confidence interval.
*Others included motor vehicle, tent, closed fairground, container, hotel, dormitory.

Mental health problems, inadequate sanitation, lack of access to clean water and safe food, and malnutrition constitute major health issues for children affected by earthquakes.[44] Environmental health risks of the 2023 Türkiye–Syria earthquake in affected areas include structural damage, ground shaking, water and air contamination, displacement and crowding, disease outbreaks, and mental health issues. The risk of malnutrition also became evident.[45–47] Consequently, inadequate access to unlimited healthy food, injuries and accidents, limited access to safe water, diarrheal diseases and febrile respiratory illnesses, rash diseases mostly cutaneous infectious illnesses and scabies, and unfavorable health care, educational, economic, and psychosocial facilities were the noticeable health issues for our participants. Also, negative mental health status increased from 10% to 52% in play-age children and from 13% to 70% in their mothers. Poor perceptions of the services, sheltering, health care, security, hygiene, nutrition, education, and psychosocial support were more common in mothers with negative mental health. Ensuring and maintaining family-friendly shelter, healthy nutrition, unlimited access to clean water, safety, and positive maternal mental health will be protective against mental health problems in play-age children.

The needs of individuals and communities change over time following disaster events.[48] During the acute (1–7 days after the earthquake) and subacute (8–30 days after the earthquake) phases, most people's priority is basic safety and survival. Once that need is secured, and the recovery phase begins, other psychosocial needs

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emerge that had been previously frustrated and unfulfilled. In early recovery phase, although the affected population is in a more stable period of transition, ongoing adversities are common and complicate recovery. Psychosocial needs, distress, concern, and dissatisfaction may also be intense in the recovery phase.[48] The timing of data collection in our study fell on the early recovery phase after the earthquakes. We propose that this timing enabled mothers to state their own and their children's mental status reliably.

Globally, the impact of disasters on children's mental health and the search for practical tools to measure these effects are becoming increasingly important issues. In earthquake situations, medical care services primarily focus on physical health. However, the mental health problems of earthquake-affected children and families should be addressed with equal priority.[17] As there is often a shortage of mental health specialists in earthquake-affected regions, the recognition of mental problems in children and families frequently falls to other health care or social service workers.[49] Single-item scales, SRMH and MRCMH, may provide practicality in screening, assessing, and monitoring negative mental health in mother–child dyads affected by earthquakes, thereby facilitating early and rapid interventions in emergency shelters, mobile clinics, community outreach, and early childhood programs.

This study has several strengths. First, it specifically focused on play-age children and evaluated mother–child dyads together. Second, a valid, reliable, rapid, and easily applicable screening tool was used to identify mother–child dyads who developed negative mental health after the earthquakes. Third, the selected screening tools have the capacity to identify multiple mental health problems; for example, negative SRMH may indicate depression, anxiety, stress, and psychological distress in mothers, while negative MRCMH may point to abnormal difficulties (covering internalizing and externalizing problems) and abnormal prosocial behaviors in children. Fourth, the large sample size provided sufficient statistical power to examine numerous confounding variables.

Study Limitations

In contrast to its strengths, our study has several limitations. These include the cross-sectional study design without making causal inferences and longitudinal follow-up, the fact that the mental health status of family members other than the mother–child dyad was not assessed, and the evaluation of services for basic needs based solely on the mother's subjective perception. A mother in a negative mental state may be more likely to perceive services negatively. Hence subjectivity of service ratings rather than objective measures of aid delivery has potentially created a circular correlation. A potential recall bias when rating pre-earthquake mental health states has been possible. Child and maternal mental health were assessed via mother-report only, and as such the data are subject to willingness to report completely and truthfully. Lastly, the exclusion of the migrant/refugee dyads may have limited generalizability. Further longitudinal follow-up studies considering also paternal mental health and broader family dynamics are needed to distinguish between acute stress reactions and the development of chronic conditions like PTSD.

Conclusions

Our findings may raise awareness about mental health issues and coping strategies in play-age children and mother dyads. To mitigate the impact of earthquakes on mental health, play-age children should be sheltered in a home environment, have access to healthy food and clean water, and be provided with safety. The mental health of young children and their parents in earthquake-affected regions should be addressed and supported together.

Author contribution. Study conception and design: ÖT, SSY, BG, HA, AB, MEN, EÖ. Acquisition of data: ÖT, BG, HA, AB, MEN, EÖ. Analysis and interpretation of data: ÖT, SSY. Drafting of manuscript: ÖT. Critical revision: SSY. All authors approved the final version of the manuscript and agree to be accountable for authenticity and integrity of the work.

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Ethical standards. This study was performed in line with the principles of the Declaration of Helsinki and the study protocol was approved by Mersin University Clinical Research Ethics Committee (MEU 2023/241).

Informed consent was obtained for all participants.

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