Progress in Disaster Science 24 (2024) 100371

Contents lists available at ScienceDirect

Progress in Disaster Science

journal homepage: www.elsevier.com/locate/pdisas

Qualiy of life in displaced earthquake survivors

Lucia Savadori [a,*], Daniela Di Bucci [b], Mauro Dolce [c], Alessandro Galvagni [d], Alessia Patacca [a], Elena Pezzi [a], Giuseppe Scurci [a], Fabio Del Missier [e]

[a] Department of Economics and Management, University of Trento, Italy
[b] National Civil Protection Department, Italy
[c] Department of Structures for Engineering and Architecture, University of Naples "Federico II", Italy
[d] Protezione Civile della Provincia Autonoma di Trento, Italy
[e] Department of Life Sciences, University of Trieste, Italy

ARTICLE INFO

Original content: QoLOSF (Original data)

Keywords:
Earthquake
Quality of life
Displacement
Temporary housing
Disaster
Well-being

ABSTRACT

Introduction: We investigated Quality of Life (QOL) in a sample of individuals (n = 341) who experienced different consequences in terms of displacement from their house after earthquake.
Methods: Three groups were studied: those who had been displaced but are no longer so, those still displaced, and those who were never displaced. QOL for four time points was assessed: pre-earthquake, during displacement, at the time of the survey, and in ten years.
Results: Different trajectories of QOL were observed in the three groups: not displaced individuals showed no significant variation, those who were displaced had a significant decline in QOL after the earthquake but a significant recovery after the displacement experience, and those who were still displaced at the time of the survey reported lowest QOL both after the earthquake and in the future, with no recovery. Predictors of perceived QOL decline were quality and type of temporary accommodation, place attachment, and perceived health impairment. Subsequent QOL perceived improvement was predicted by quality and type of temporary accommodation, risk awareness, and emotional well-being.
Discussion: Our findings highlight the importance of minimizing the duration of temporary displacement and providing high-quality temporary accommodations, considering individual needs in the local contexts and communities.

1. Introduction

Being involved in a disaster such as a strong earthquake is a traumatic experience that can have serious negative consequences on the quality of life (henceforth QOL) (e.g., [1–3]). Beyond the negative emotional and economic consequences, a specific and important aspect associated with a decreased QOL in disaster survivors is displacement from their damaged or destroyed homes. Indeed, the temporary housing experience implies detachment from a place felt as your own, living, in many cases, in a less comfortable arrangement, and often the partial or total disruption of ordinary life activities and social relations, and this experience is associated with lower satisfaction with different aspects of life [4,5]. It is important to note that the investigation of QOL in relation to displacement can provide insights beyond the earthquake-specific situation, given that displacement can occur after various kinds of disasters and extreme events (e.g., tornadoes, floods), some of which are expected to occur more frequently in the future (e.g., [6]).

In our study, we aimed to investigate the QOL and its predictors in a sample of individuals who experienced different consequences of earthquakes in terms of displacement from their houses. The main aim of the study was to examine the association between the displacement status and the perceived trajectories of individuals' QOL over time. Indeed, unlike most previous studies, we did not focus only on individuals' QOL after the earthquake, but we extended the analysis to individuals' retrospective evaluations (QOL before the disaster) and prospective evaluations (future QOL). In fact, behavioral science studies have shown that individuals' past, current, and future evaluations of life experiences are interrelated, with current evaluations being predicted by retrospective evaluations of the past, and future evaluations and intentions being predicted by current evaluations [7–10]. Such an autobiographical and diachronic approach could make it possible to identify stronger predictors of perceived QOL changes in disaster victims than a

* Corresponding author at: Department of Economics and Management, Via Inama 5, Trento, Italy.
E-mail address: lucia.savadori@unitn.it (L. Savadori).

https://doi.org/10.1016/j.pdisas.2024.100371
Received 8 May 2024; Received in revised form 17 July 2024; Accepted 6 September 2024
Available online 7 September 2024

standard approach, thanks to predictive models more grounded in behavioral and memory research. From the applied viewpoint, this approach can help identify the more promising factors on which to intervene to improve current and expected QOL in victims of disasters.

In our investigation, we examined the QOL of earthquake survivors in reference to three time points: the time before the earthquake (*Past*), the current time (i.e., the time of the study: *Present*), and ten years in the future (*Future*). This analysis was carried out on three groups of individuals: *Formerly Displaced*, *Still Displaced*, and *Non-Displaced*.

The *Formerly Displaced* survivors were those who were displaced due to the earthquake but were no longer living in the provisional homes when the survey took place. They might have moved to permanent housing, either returning to repaired homes, moving to new homes, or finding alternative long-term housing solutions. The *Still Displaced* survivors were those earthquake survivors who were displaced due to the earthquake and were currently living in provisional homes provided as temporary housing at the time of the study. These individuals were still in a transitory phase and had not yet moved back to permanent housing. Finally, the *Non-Displaced* survivors were individuals who, despite experiencing the earthquake, could remain in their original homes. These survivors did not require relocation to provisional or alternative housing. Their homes may have sustained minimal damage or were sufficiently strong to withstand the earthquake without necessitating evacuation or relocation.

To further characterize the trajectories of QOL and understand the potential consequences of returning to a stable housing condition after displacement, we carried out additional analyses on displaced participants only (i.e., *Formerly Displaced* and *Still Displaced* groups), also considering their retrospective evaluation of QOL while they were living in the temporary housing solution (*During*).

We also investigated the predictors of perceived QOL changes in displaced participants. To this aim, we identified via hierarchical multiple regression the predictors of two aspects of change in QOL of displaced individuals: (a) the difference in QOL from the time before the earthquake to the time of displacement (*Past – During*), and (b) the difference in QOL from the time of displacement to the time of the study (*During – Present*). For this analysis, we considered a wide array of potential predictors employed in previous studies on QOL and well-being in disaster survivors (cf. [4]), including socio-demographic variables, individual preparedness and risk perception, place attachment, type and quality of temporary accommodation, variables measuring social support, and variables measuring emotional and health status.

2. Method

2.1. Data

The data for this study was collected as part of a project on the resilience of the most vulnerable, funded by the European Union under Horizon 2020 (BuildERS, https://buildersproject.eu/). Data and additional online materials are openly available on the project's Open Science Framework page (https://osf.io/46jpu/).

We included survivors from the geographical areas impacted by the last three major Italian earthquakes (2009 Abruzzo, 2012 Emilia, 2016 Central Italy). Survivor outreach was facilitated through collaboration with local institutions (such as municipalities) and community organizations. Data collection was conducted from February to May 2021. The Ethical Committee of the University of Trento approved the research protocol (number 2020–039). Informed consent was obtained from all individual participants included in the study. Data were gathered via diverse methods accommodating respondents' preferences: face-to-face, telephonic interviews, and self-administered questionnaires (paper-and-pencil or online). To ensure the most comprehensive and accurate data collection possible, we compiled a list of municipalities affected by the earthquakes. For each municipality, we gathered information on the proportion of evacuees relative to the population and we collected a roughly equal proportion of questionnaires from each of these municipalities. Our final sample included 341 individuals who completed the study (see Table 1 for study sample characteristics).

2.2. Measures

All the variables included in the study are presented and briefly described in Table 2 (second column), together with the associated measures. The questionnaire items are detailed in the Supplementary Information section (SI; https://xxxx/).

Quality of life, the primary criterion measure, was assessed by the Cantril Self-Anchoring Ladder [11,12] This 11-point scale is widely used in research and world polls [28–31].

Among the predictors, we assessed earthquake risk awareness referred to the time before the disaster [13,14], place attachment [15], and earthquake preparedness [16]. We also measured individual differences in resilience capability [17], psychological vulnerability [18], and self-reported health status before the earthquake using the American Life Panel question [19].

Several variables assessed the survivor's condition after the event. Participants reported their temporary housing type, size, number of inhabitants, and stay duration. Eleven housing types (see SI and Table 2) were initially provided and later recoded into three categories for analysis: 1 = tent/camper/gym (combining types 1, 3, and 4 in Table 2), 2 = container/modules (combining types 8 and 9), 3 = house/apartment/hotel (combining types 2, 5, 6, and 7). Types 10 (1 participant) and 11 in Table 2 (Other or missing) were excluded from the new classification due to their distinct living conditions. Participants also rated their temporary housing quality across eighteen aspects, such as privacy, noise, space, natural light, placement, and overall comfort [20]. Post-earthquake support from various sources (adapted from [21]) and perceived social support during temporary housing [22] were also measured.

Psychological consequences were assessed via the Post-Traumatic Stress Disorder symptoms scale [23], health impairment due to the disaster [24], direct experiences with death [25], and emotional well-being over the past 30 days [26]. Demographic data on age, sex, education, and income of respondents were also collected.

3. Results

3.1. Descriptive statistics and preliminary analyses

Descriptive statistics for all the measured variables for the three groups we investigated (*Formerly Displaced*, *Still Displaced*, and *Non-Displaced*) are presented in Table 1. A series of analyses was conducted to compare the three groups on demographic variables. The distribution of sex across the different groups of earthquake survivors was relatively uniform and did not differ significantly based on the displacement status, $\chi^2(2, N = 310) = 0.28$, $p = .872$. Per capita income showed no significant differences, $F(2, 171) = 1.17$, $p = .312$. A significant difference was found in age, $F(2, 174) = 14.13$, $p < .001$, with the *Still Displaced* group being older on average than the *Formerly Displaced* ($p = .02$) and *Non-Displaced* groups ($p < .001$) and the Formerly Displaced being older than the Non-Displaced ($p < .001$). Significant differences were also found in education, Kruskal-Wallis $H(2) = 22.7$, $p < .001$, with the *Still Displaced* survivors reporting lower education than *Formerly Displaced* and *Non-Displaced* in temporary houses (both $ps < 0.001$). There was also a significant difference in work status, Kruskal-Wallis $H(8) = 41.8$, $p < .001$. Further analyses showed that students were more numerous among *Non-Displaced* and retired persons among *Still Displaced*. Age and education were used as covariates in subsequent ANOVA analyses.

Table 1
Demographic, socioeconomic, and psychological characteristics of earthquake survivor groups (Formerly Displaced, Still Displaced, and Non-Displaced).

	Earthquake Survivor Groups					
	Formerly Displaced		Still Displaced		Non-Displaced	
	n = 163	Rate (%)	n = 98	Rate (%)	n = 80	Rate (%)
Educational level						
Primary	2	1 %	5	5 %	0	0 %
Middle school	19	12 %	21	21 %	1	1 %
High school	68	42 %	52	53 %	51	64 %
University	73	45 %	20	20 %	28	35 %
Sex						
Males	65	40 %	43	44 %	34	43 %
Females	98	60 %	55	56 %	45	57 %
Employment status						
Student	10	6 %	6	6 %	25	31 %
Employee	95	59 %	47	49 %	34	43 %
Self-employed	24	15 %	18	19 %	8	10 %
Unemployed	8	5 %	4	4 %	5	6 %
Retired	25	15 %	22	23 %	8	10 %
Income						
€0	3	2 %	3	3 %	0	0 %
< €10,000	15	9 %	8	8 %	2	3 %
€10,001-15,000	12	7 %	10	10 %	7	9 %
€15,001-20,000	25	15 %	26	27 %	16	20 %
€20,001-30,000	34	21 %	28	29 %	21	26 %
€30,001-50,000	49	30 %	18	18 %	20	25 %
> €50,000	11	7 %	0	0 %	9	11 %
Missing	14	9 %	5	5 %	5	6 %
Earthquake experienced						
2009 Abruzzo	31	19 %	27	28 %	6	8 %
2012 Emilia	103	63 %	23	24 %	48	48 %
2016 Central Italy	29	18 %	48	49 %	26	33 %
Temporary House Type						
Tent/camper/gym	44	27 %	4	4 %	/	/
Container/modules	23	14 %	68	70 %	/	/
House/apartment/hotel	88	54 %	25	26 %	/	/
Missing	8	5 %	1	1 %	/	/
Continuous variables (min-max)	Mean	SD	Mean	SD	Mean	SD
Age (years)	48.1	14.5	53.5	17.5	39.7	17.2
Income (per capita) Pre-Event (€)	9777	6343	8743	6214	10,182	6979
Seismic Risk Awareness Pre-Event (1–7)	2.40	1.62	2.84	1.74	2.74	1.56
Place Attachment Pre-Event (1–7)	5.31	1.10	5.74	1.04	5.26	0.99
Preparedness Index (0–42)	13.80	6.32	13.30	6.96	17.90	6.77
Individual Resilience Capability (1–7)	4.45	1.18	4.08	1.14	4.58	1.05
Individual Psychological Vulnerability (1–7)	3.50	1.18	3.50	1.07	3.68	1.11
General Health Status Pre-Event (1–5)	3.71	0.82	3.70	0.83	3.99	0.80
Temporary Housing Duration (months)	27.70	35.80	71.20	41.80	/	/
Temporary House Quality (1–7)	4.59	1.06	4.44	0.82	/	/
Post-Earthquake Support Network (1–5)	3.43	0.83	3.23	0.70	3.28	0.72
Perceived Social Support During TH (1–7)	5.28	1.24	4.98	1.22	/	/
Post-Traumatic Stress Disorder (1–25)	10.43	4.85	11.95	5.26	7.44	4.49
Health Impairment Post-Event (1–7)	3.67	1.81	4.27	1.98	2.86	1.87
Experience with Death and Suffering (2–6)	4.09	1.32	3.86	1.41	4.83	1.17
Emotional Well-being at Present (1–5)	3.16	0.66	2.98	0.63	3.24	0.61
General Health Status at Present (1–5)	2.89	0.84	2.80	0.96	3.30	0.95
Quality of Life Pre-event (Past) (0−10)	7.69	1.35	7.84	1.56	7.59	1.14
Quality of Life During Displacement (0–10)	5.82	2.19	6.04	1.96	/	/
Quality of Life at Present (0–10)	7.06	1.85	6.34	1.69	7.28	1.37
Quality of Life in the Future (0–10)	7.33	1.78	6.69	2.00	7.60	1.47
Quality of Life (Decline)	1.88	2.56	1.83	2.51	/	/
Quality of Life (Improvement)	1.23	2.64	0.31	1.59	/	/

3.2. Quality of life in displaced and non-displaced participants

A mixed ANOVA was employed to explore changes in QOL along three time points — *Past*, *Present*, *Future* — for the three groups with different displacement experiences. The analysis revealed a significant interaction between Time and Group, $F(4, 652) = 6.04$, $p < .001$, $\eta^2 = 0.04$, indicating different trajectories of QOL over time in different groups (Fig. 1). A significant main effect of Time on QOL was also detected, $F(2, 652) = 30.37$, $p < .001$, $\eta^2 = 0.09$, together with a main effect of Group, $F(2, 326) = 4.75$, $p = .009$, $\eta^2 = 0.03$. The same analysis was performed with age and education as covariates, confirming the interaction between Time and Group, $F(4, 648) = 3.83$, $p = .004$, $\eta^2 = 0.02$.

Post-hoc tests with Scheffé correction were conducted to further investigate the significant interaction between Time and Group. In the *Non-Displaced* group, QOL did not differ between pairs of time points: *Past* vs. *Present* ($M_{Difference} = 0.36$, $p = .958$), *Past* vs. *Future* ($M_{Difference} = -0.03$, $p = 1.00$), *Present* vs. *Future* ($M_{Difference} = -0.39$, $p = .809$). On the contrary, the *Formerly Displaced* group showed a significant decline in QOL from *Past* to *Present* ($M_{Difference} = 0.66$, $p = .032$). However, there was no significant difference between *Present* to *Future* QOL ($M_{Difference} = -0.31$, $p = .683$) nor between *Past* and *Future* QOL ($M_{Difference} = 0.35$, $p = .79$). Participants in the *Still Displaced* group showed a statistically significant difference in *Past* vs. *Present* retrospective evaluations of QOL ($M_{Difference} = 1.51$, $p < .001$). A significant difference in the perception of QOL was also observed in the *Past* vs. *Future* comparison ($M_{Difference} = 1.14$, $p < .001$) but not in the *Present* vs. *Future* comparison ($M_{Difference} = -0.38$, $p = .736$).

Summarizing, the results revealed distinct trajectories of QOL across three groups. *Non-displaced* individuals who experienced the earthquake but had no displacement reported stable QOL levels over time. *Formerly Displaced* individuals reported having suffered a small but significant decline but showed signs of recovery in their future projections. In contrast, *Still Displaced* individuals reported the worst decline in QOL and no significant expected recovery.

3.3. Analysis of quality of life in displaced participants

To better understand the effect of displacement on the QOL of survivors, a Mixed ANOVA was carried out on the QOL of displaced survivors only. In this case, in addition to the three time points previously

Table 2
Measures used in the study.

Name	Description	Reference	n. of items (Cronbach's alpha)	Question number (as in SI)
Quality of Life	Self-reported subjective evaluation of quality of life at four time points: before the event, during temporary housing, currently, and in the future	Cantril Self-Anchoring Scale [11,12]	1	5, 55, 64, 65
Earthquake Risk Awareness	Individuals' perceptions of earthquake risk in the years preceding the event	Adapted from prior research ([13]; [14])	3 (0.90)	10–12
Place Attachment	Attachment to the place and community at the time of the event	Place Attachment Scale [15]	11 (0.92)	4a-4 k
Preparedness Index	Individuals' preparedness, awareness, and actions related to earthquake readiness, including knowledge of earthquake risk, engagement in preparedness activities, awareness of safety measures, and availability of emergency supplies and information at the time of the earthquake	A modified Mulilis-Lippa Earthquake Preparedness Scale [16]	42 (yes, no)	13a-41
Individual Resilience Capability	Ability to recover from stressful conditions	Brief Resilience Scale [17]	6 (0.84)	68a-68f
Individual Psychological Vulnerability	Measure of a set of detrimental cognitive beliefs that promote harmful reactions to stress	Psychological Vulnerability Scale [18]	6 (0.76)	69a-69f
General Health Status	Self-reported health status before the earthquake and at the time of the survey	American Life Panel question (https://alpdata.rand.org/) from the Survey on Well Being (No. 20) (Well Being and Health - Module - Rate General Health, Question - ms20_RH001 GENERAL HEALTH RATING) also used in the WHO's generalized health assessment [19]	1	6, 67
Temporary House Type	Type of temporary housing solution used	[1] Private car/camper/tent [2] House of friends [3] Gym/train wagon provided by the competent authority [4] Tent/camper provided by the competent authority [5] Hotel provided by the competent authority [6] Rented apartment or house [7] Apartment or house owned by respondent (e.g., second home) [8] Container module or PMAR (Prefabricated Modular Removable Housing Units) [9] MAP, SAE, MAPRE, PMRR (Temporary Housing Modules, Emergency Housing Solutions, Rural Prefabricated Emergency Housing Modules - Prefabricated Removable Rural Modular) [10] CASE (Ecocompatible Sustainable Anti-seismic Complexes - three-story buildings, with underground parking, in a green environment) [11] Other or Missing		43
Temporary Housing Duration	Duration of the temporary housing stay	Months		43
Temporary House Quality	Individuals' perceptions of housing quality, including evaluation of personal space, privacy, noise insulation, space adequacy, natural light, thermal comfort, overall building quality, comfort, surrounding environment, and proximity to essential facilities and loved ones	Adapted version of the Housing Characteristics Scale [20]	18 (0.82)	53a-53r
Post-Earthquake Support Network	The level of assistance received from various sources following the earthquake	Sources of support were adapted from previous literature [21]	7 (0.80)	57a-57 h
Perceived Social Support During Temporary Housing	Social support and interpersonal connections during temporary housing, including individuals' perceptions of understanding and security from others, availability of close and helpful relationships, ease of borrowing necessities, and access to social activities and emotional support during their stay in temporary housing	Short Perceived Social Support Scale F-SOzU K-6 [22]	6 (0.86)	56a-56f
Post-Traumatic Stress Disorder (PTSD)	Frequency multiplied by intensity of PTSD symptoms experienced in the 2–3 months following the earthquake	A shortened SPAN Scale (items 17, 14, 11, and 5 from the original scale; [23])	4 (0.77)	58a-58d
Health Impairment	Subjective evaluation of earthquake impact on individual health	Health Impairment Scale [24],	1	59
Experience with Death and Suffering Index	Direct experience with anyone who died or suffered serious physical or psychological injury due to the disaster	Two direct experience questions index [25]	2	60,61
Emotional Well-being*	Frequency of specific emotions over the past 30 days	MOS 36-Item Short-Form Health Survey (SF-36; [26])	7 (0.81)	66a-66 g
Per Capita Income	Self-reported pre-disaster family income, divided by household size	Per capita economic index [27]		8,9

* Higher values indicate higher well-being.

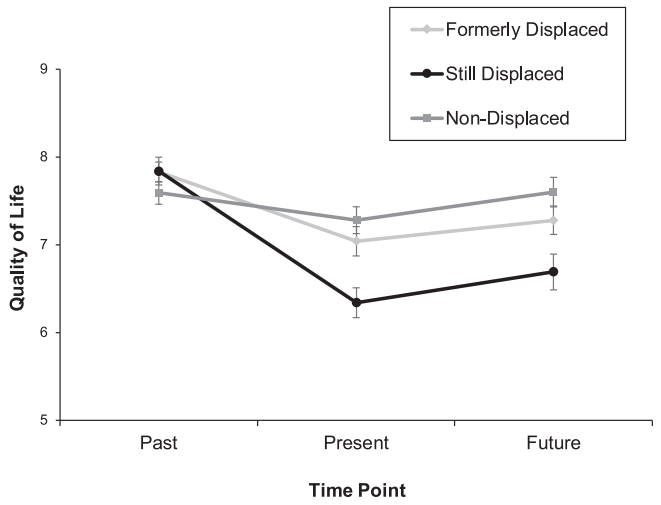

Fig. 1. Quality of life trajectories for Formerly Displaced, Still Displaced, and Non-Displaced earthquake survivors.
Note. Error bars are standard errors of the mean.

considered, we also included a fourth measurement of QOL available only for displaced participants: a global retrospective judgment of QOL referred to the time frame of the temporary housing solution in which participant spent most of their time while displaced (*During* the displacement period). This analysis showed a significant interaction between Time and Group, $F(3, 735) = 5.90$, $p < .001$, $\eta^2 = 0.02$, suggesting that trajectories of QOL differed between the *Formerly Displaced* and *Still Displaced* groups (Fig. 2). A significant main effect of Time on QOL was also detected, $F(3, 735) = 56.68$, $p < .001$, $\eta^2 = 0.19$, indicating significant changes in QOL with time, while the effect of Group on QOL did not reach significance, $F(1, 245) = 2.32$, $p = .129$, $\eta^2 = 0.009$. The same analysis was performed including age and education as covariates to control for their effect, but the interaction between Time and Group type was confirmed, $F(3, 729) = 5.09$, $p = .002$, $\eta^2 = 0.021$.

Post Hoc Comparisons showed that the *Formerly Displaced* group experienced a significant decline in QOL from *Past* to *During* the displacement ($M_{Difference} = 1.88$, $p < .001$), possibly related to the impact of the displacement. However, the perception of QOL was significantly higher at *Present* vs. *During* the displacement ($M_{Difference} = -1.23$ p < .001), suggesting an improvement in QOL from the displacement period. Finally, the difference in QOL between *Past* and *Future* was not statistically significant ($M_{Difference} = 0.38$, $p = .705$), indicating an almost complete expected recovery of QOL in ten years.

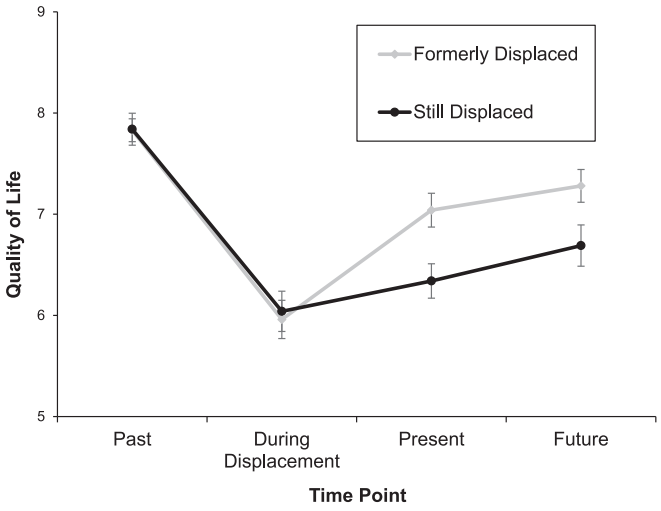

Fig. 2. Quality of life trajectories for displaced (Formerly Displaced and Still Displaced) earthquake survivors.
Note. Error bars are standard error of the mean.

In the *Still Displaced* group, the decline in QOL between *Past* and *During* displacement was also significant ($M_{Difference} = 1.82$, $p < .001$), like the one in the *Formerly Displaced* group. However, the *Still Displaced* group did not show a significant difference in QOL between *During* and *Present* ($M_{Difference} = -0.30$, $p = .98$), thus not highlighting a significant improvement. Furthermore, the difference in QOL between *Past* assessment and *Future* projection was significant ($M_{Difference} = 1.15$, $p < .001$), suggesting that *Still Displaced* individuals did not expect to regain the QOL they reported to have had before the disaster within the next ten years.

Following previous behavioral studies [9,10], we also specified a path model to qualify better the relationships between the evaluations of QOL in displaced participants (Fig. 3; $n = 262$). In this model, evaluations referring to previous times were linked to those referring to subsequent times, and this allowed appraising the relationships between retrospective evaluations of past QOL (Past, During), current QOL (Present), and expected QOL (Future). The model also included a variable for participants' current displacement status. The model was estimated with the maximum likelihood method, and its fit was excellent ($\chi^2 = 0.643$, df = 1, $p = .432$, $\chi^2/df = 0.643$, CFI = 1, RMSEA = 0.000).

As can be seen in Fig. 3, the retrospective evaluation of QOL before the earthquake (*Past*) was positively related to the current perceived QOL (*Present*) and the expected QOL (*Future*) but not to the QOL during the displacement (*During*). This suggests that the displacement experience was perceived as generally disruptive and not attenuated by the remembered QOL before the earthquake. The retrospective evaluation of QOL during the displacement (*During*), which was markedly lower than the *Past* one (see Fig. 2), was unrelated to the current displacement condition. Participants' evaluation of their *Present* QOL was instead positively associated with their evaluations referring to the displacement time and to the time before the earthquake and negatively associated with being still currently displaced. Participants perceived to have a better QOL if their retrospective evaluation of the past (including the displacement experience) was better and if they were no more displaced ($R^2 = 0.16$). Thus, the memory of the past mattered in predicting current QOL. Finally, future expectations of QOL were positively associated with past and current evaluations, showing that future projections can be predicted by evaluations of past and current QOL ($R^2 = 0.37$). Overall, these findings support the view that displacement after an earthquake is perceived as a subjectively disruptive experience, whose effects on QOL extend on the present and the future.

3.4. Predictors of changes in the quality of life of displaced earthquake survivors

We carried out two hierarchical linear regressions to identify the predictors of changes in the QOL of displaced earthquake survivors. Two difference-score variables were computed to be used as criterion variables. The first variable (decline) measured the difference in QOL from the evaluation relative to the pre-earthquake period to the evaluation relative to the displacement period. It was calculated by subtracting the *During* quality-of-life score from the *Past* score, with a higher value in this variable indicating a greater decline in QOL. The second variable (improvement) assessed the QOL change from the displacement period to the current moment. It was computed by subtracting the *During* quality-of-life score from the *Present* score. A higher value in this variable indicates a greater improvement in QOL.

3.4.1. Predictors of decline in quality of life

The results of the hierarchical linear regression examining the decline in QOL are summarized in Table 3. Model 1, which included age, education, sex, and income (per capita), did not significantly predict the variation in QOL ($R^2 = 0.02$, $p = .500$). Model 2 added risk awareness,

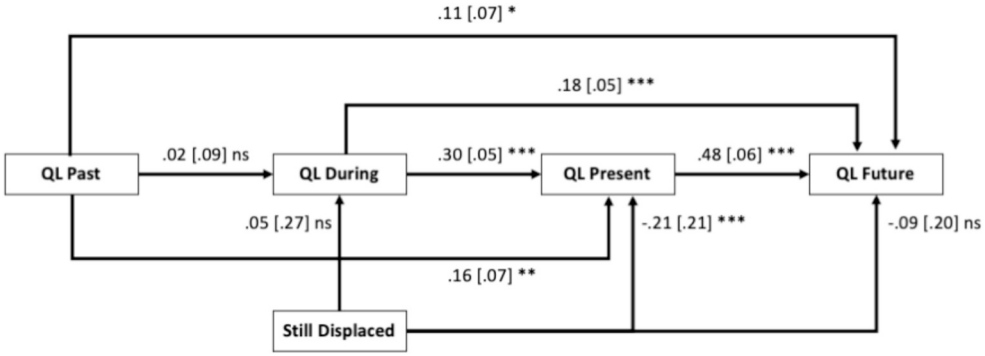

Fig. 3. Path model of quality of life in displaced participants.
Note. Numbers on the arrows indicate standardized coefficients followed by standard errors in brackets. Significance levels are as follows: ns $p \geq .05$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3
Results of the hierarchical linear regression analysis of predictors of decline in quality of life during displacement.

	Model									
	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	β	b	β	b	β	b	β	b	β
Age	0.01	0.08	0.01	0.06	0.01	0.06	0.02	0.11	0.01	0.06
Education	−0.08	−0.03	−0.05	−0.01	−0.06	−0.02	0.14	0.04	0.03	0.01
Sex										
Female – Male	0.38	0.15	0.14	0.05	0.12	0.05	0.58	0.23	0.48	0.19
Income (per capita)	0.00	−0.07	0.00	−0.06	0.00	−0.07	0.00	−0.03	0.00	−0.02
Earthquake Risk Awareness Pre-Event			−0.01	−0.01	0.00	0.00	−0.15	−0.10	−0.16	−0.11
Place Attachment Pre-Event			0.36*	0.17	0.37*	0.17	0.36*	0.16	0.30*	0.14
Earthquake Preparedness Index			−0.08**	−0.22	−0.08**	−0.22	−0.04	−0.10	−0.04	−0.10
Individual Resilience Capability			−0.05	−0.02	−0.06	−0.03	0.05	0.02	0.12	0.06
Individual Psychological Vulnerability			0.24	0.10	0.23	0.10	0.11	0.05	0.12	0.05
General Health Status Pre-Event			−0.04	−0.01	−0.03	−0.01	0.19	0.06	0.25	0.08
Group Type										
Still – Formerly Displaced					−0.17	−0.07	0.12	0.05	0.11	0.04
Temporary Housing Duration							0.00	0.03	0.00	0.03
Temporary House Quality							−1.14***	−0.44	−1.10***	−0.42
Post-Earthquake Support Network							−0.26	−0.08	−0.31	−0.10
Perceived Social Support During TH							−0.20	−0.10	−0.15	−0.07
Temporary House Type										
2–1							−1.33*	−0.53	−1.44*	−0.58
3–1							−1.12*	−0.45	−1.28*	−0.51
Post-Traumatic Stress Disorder									0.00	−0.01
Health Impairment Post-Event									0.23*	0.17
Experience with Death and Suffering									−0.10	−0.05
Emotional Well-being at Present									0.39	0.10
General Health Status at Present									−0.24	−0.08
Intercept	1.50		0.35		0.43		5.88**		5.22*	
R^2	0.02		0.10		0.11		0.37		0.40	
Adj. R^2	0.00		0.06		0.05		0.31		0.33	
ΔR^2			0.09		0.00		0.26		0.04	
F			3.22*		0.21		13.11***		2.18	

place attachment, preparedness, resilience, vulnerability, and pre-event health status, with a significant improvement in predictive power ($\Delta R^2 = 0.09$, $p = .020$). This model indicated that greater place attachment and lower earthquake preparedness were significant predictors of decline in QOL due to displacement. The inclusion of the group type (Still Displaced vs. Formerly Displaced) in Model 3 did not result in a significant improvement in model fit. Model 4, which added the duration of the temporary housing experience, the type and perceived quality of the temporary house, the strength of the support network after the event, and the perceived support during the displacement, showed a significant and sizable improvement in predictive power ($\Delta R^2 = 0.26$, $p < .001$). Most of the decline in QOL was significantly predicted by the perceived (lower) quality of the house, as well as by the type of house (tent/camper/gym were predictors of greater decline as compared to better types of accommodations). Model 5, the most comprehensive model, included additional predictors related to the experience after the event, like Post-Traumatic Stress Disorder (PTSD), health impairment, experience with death and suffering, emotional well-being, and perceived health status at present. This model had the highest explanatory power ($R^2 = 0.40$, $p < .001$), with significant predictors of greater decline in QOL being higher place attachment before the event, lower perceived quality of temporary housing, worse accommodation type, and greater perceived health impairment due to the disaster.

3.4.2. *Predictors of improvement in quality of life*

A second hierarchical linear regression analysis was computed to assess the improvement in the QOL from the displacement period to the time of the survey (Table 4). While initial models (1–2) showed no significant changes in predicted variance, further models (3–5) revealed significant contributions from specific variables. Model 3 significantly

Table 4
Results of the hierarchical linear regression analysis of predictors of improvement in quality of life after displacement.

	Model									
	Model 1		Model 2		Model 3		Model 4		Model 5	
Predictor	b	β	b	β	b	β	b	β	b	β
Age	−0.01	−0.06	−0.01	−0.09	−0.01	−0.07	0.00	−0.01	0.00	0.00
Education	−0.05	−0.02	−0.17	−0.06	−0.25	−0.08	−0.04	−0.01	0.01	0.00
Sex										
Female – Male	0.11	0.05	0.08	0.03	0.02	0.01	0.31	0.07	0.31	0.13
Income (per capita)	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01
Earthquake Risk Awareness Pre-event			−0.21	−0.15	−0.17	−0.13	−0.32**	−0.22	−0.32**	−0.23
Place Attachment Pre-Event			0.02	0.01	0.06	0.03	0.00	0.03	−0.08	−0.04
Earthquake Preparedness Index			−0.03	−0.10	−0.04	−0.12	−0.01	−0.03	−0.02	−0.05
Individual Resilience Capability			0.34*	0.18	0.30	0.15	0.31*	0.16	0.15	0.07
Individual Psychological Vulnerability			0.29	0.13	0.27	0.12	0.18	0.10	0.29	0.13
General Health Status Pre-Event			−0.24	−0.09	−0.19	−0.07	−0.07	−0.05	−0.08	−0.03
Group Type										
Still – Formerly Displaced					−0.76*	−0.33	−0.56	−0.20	−0.51	−0.22
Temporary Housing Duration							0.00	0.04	0.00	0.02
Temporary House Quality							−0.89***	−0.34	−0.97***	−0.40
Post-Earthquake Support Network							0.04	−0.03	−0.02	−0.01
Perceived Social Support During TH							−0.02	0.01	0.04	0.02
Temporary House Type										
2–1							−1.32*	−0.67	−1.33*	−0.57
3–1							−1.71***	−0.77	−1.70***	−0.73
Post-Traumatic Stress Disorder									0.01	0.02
Health Impairment Post-Event									0.13	0.10
Experience with Death and Suffering									0.12	0.07
Emotional Well-being at Present									0.90*	0.25
General Health Status at Present									0.15	0.06
Intercept	1.30		1.23		1.62		5.56*		2.12	
R^2	0.00		0.06		0.08		0.29		0.34	
Adj. R^2	−0.02		0.01		0.03		0.23		0.27	
ΔR^2			0.06		0.02		0.21		0.05	
F			2.04		4.84*		9.39***		2.77*	

increased the variance explained ($\Delta R^2 = 0.02$, $p = .029$), revealing a significant contribution of the group type in explaining the improvement. In line with previous analyses, survivors who were still in their temporary house when surveyed showed less improvement in QOL than those who had been formerly displaced but had returned to their homes or to a permanent solution at the time of the survey. Model 4 highlighted a substantial increase in variance explained ($\Delta R^2 = 0.21, p < .001$), with earthquake risk awareness, temporary housing quality, and type being significantly related to improvement in QOL. Having more earthquake risk awareness before displacement was associated with lower improvement in QOL after the displacement. Lower perceived quality and type of temporary accommodation during the displacement were associated with a higher improvement in QOL over time. The final model (5) confirmed these findings, achieving a good predictive power ($R^2 = 0.34$), with significant predictors still being risk awareness and housing quality and type variables, together with emotional well-being at present, with participants who reported a better current emotional well-being also reporting a higher improvement in QOL.

3.4.3. *Exploratory intersectional analysis*

The results of hierarchical linear regression analyses did not highlight significant effects of socio-demographic variables (age, education, sex, and income) on perceived changes in QOL. However, from an intersectional perspective (e.g., [32,33]), a combination of socioeconomic status features may characterize groups suffering from different consequences after an earthquake (see also section 3.1 for differences in age and education between our three groups of participants). First, some groups of individuals may be more likely to be displaced than others, due to poorer housing conditions before the disaster. Second, some groups of individuals may have more difficulty to leave the displacement condition due to limited economic, social, or knowledge resources. Third, some groups of individuals may not have enough economic, social, or knowledge resources to lessen the negative consequences of the present or past displacement, and thus have a lower present QOL or lower QOL expectations for the future.

Following this reasoning, we conducted some exploratory analyses to compare the two subgroups of participants with the greatest potential difference in vulnerability according to previous literature on QOL after disasters [1,34–36]. We used a combination of age and education to define the subgroups, given that preliminary analysis showed that participants who experienced different displacement-related consequences appear to differ on these two variables in our sample, but not on income or sex (see section 3.1). We also wanted to avoid creating subgroups that were too small. The first subgroup (vulnerable $n = 77$) comprises older people (60 or more years) with a non-university level education. The second subgroup (non-vulnerable $n = 104$) comprises young/middle-aged people (25–59 years) with a university level education.

We first compared the frequencies of displaced vs. non-displaced participants in the two subgroups (see Table 5 for descriptive statistics). The Fisher test showed that participants in the vulnerable subgroup were significantly more likely to be displaced than those in the non-vulnerable group ($p = .046$; 89.7 % vs. 77.9 %).

Then, we compared the frequencies of still displaced vs. formerly displaced participants in the two subgroups. The Fisher test showed that participants in the vulnerable subgroup were much more likely to be still displaced at the time of our study than those in the non-vulnerable subgroup ($p < .001$; 51.4 % vs. 18.5 %).

Finally, we compared the QOL at the time of the survey and the future QOL in the two subgroups considering all the participants who were displaced after the earthquake. Mann-Whitney tests highlighted a significant difference between the two subgroups in the future QOL only, with vulnerable participants showing a lower prospective QOL than non-vulnerable ones ($U = 1786$; $p < .001$).

These results suggest that older people with lower levels of education may be more likely to be displaced, may have greater difficulty leaving the temporary housing situation, and that their expected QOL may be

Table 5
Frequencies, present quality of life, and future quality of life in the two subgroups used for the intersectional analysis.

	Earthquake Survivor Groups								
	Formerly Displaced			Still Displaced			Non-Displaced		
	Frequency	Present QOL M (SD)	Future QOL M (SD)	Frequency	Present QOL M (SD)	Future QOL M (SD)	Frequency	Present QOL M (SD)	Future QOL M (SD)
Vulnerable	33	7.27 (2.11)	7.00 (2.09)	36	6.08 (1.92)	6.31 (1.92)	8	7.50 (1.60)	7.50 (1.60)
Non-vulnerable	66	7.14 (1.56)	7.78 (1.29)	15	6.53 (1.30)	7.20 (1.82)	23	7.57 (0.89)	8.09 (0.68)

Note. Vulnerable Group: older, non-university education. Non-Vulnerable Group: young/middle age, university education.

lower compared to young/middle-aged people with university level education. We emphasize that these results should be considered with caution and need to be replicated, as our convenience sample may not be fully representative of the populations affected by the earthquakes.

4. Discussion

In our study, we investigated QOL and its predictors in individuals who experienced different consequences of an earthquake in terms of displacement from their homes. We adopted a diachronic and autobiographic perspective grounded in behavioral research [7–10], analyzing QOL as referred to different time points in participants' life.

Overall, the findings showed that the experience of displacement was associated with negative changes in QOL in participants' retrospective evaluations. The quality and type of temporary accommodation after the disaster were significantly related to this decline in QOL, together with the attachment of the individuals to the places and community in which they were living and to their perceived health impairment attributed to the earthquake experience. The predictive role of temporary accommodation on survivors' QOL is consistent with other investigations focusing on this issue (cf. [4]), but in our study, we specifically showed that individuals who lived in lower-quality temporary houses during the displacement reported to have experienced a more pronounced fall in their QOL. A stronger attachment to the place and community in which displaced individuals were living before the earthquake contributed to the prediction of this fall, thus highlighting that the disruption of the links with familiar places (including the house) and with the community represents an important negative aspect of the displacement experience [37,38], which can have negative effects on coping in disaster contexts (e.g., [39]). Finally, the predictive role of reported health impairment on QOL can be related to the negative consequences of earthquakes and displacement on physical and psychological health (e.g., [1,3]).

Participants' retrospective evaluations showed a significant increase in QOL for individuals who had left the temporary housing condition but not for those who were still living in a temporary house, suggesting that adaptation to a temporary housing solution requires time and is a slow process. Individuals who had lived in a less satisfactory temporary house showed a stronger perceived improvement over time, confirming that lower quality temporary housing can have a depressing role on QOL, creating more room for future improvement. The improvement in QOL was also positively associated with higher current emotional well-being, which can be explained by referring to the positive association between general QOL and emotional state [40] and/or by rosier assessments in participants in a better current emotional status (e.g., [41]). Finally, displaced participants who reported being more aware of earthquakes showed a lower improvement in QOL, possibly due to higher continued worry about potential disasters. This is in line with the negative relation observed between earthquake risk perception and QOL [42].

Concerning future expectations, non-displaced individuals expected to maintain their current (and past) QOL in ten years, while individuals who were still displaced at the time of our study had lower expectations about their future QOL, suggesting a negative projection of the displacement experience even on their future perspectives. Lower expectations should be considered with attention, as they can have negative effects on current motivation and emotional well-being (e.g., [43,44]). Finally, individuals who reached a stable housing condition at the time of our study after a period of displacement had future expectations of QOL reaching the same levels as the ones they reported for their QOL at the time before the earthquake, confirming the positive consequences of having left the temporary housing situation.

Finally, we also carried out some exploratory analyses from an intersectional perspective (e.g., [32,33]) finding that older individuals with lower education may be more likely to be displaced and have more difficulty to leave the displacement condition. Prospective QOL in all displaced persons was also lower in older individuals with lower education. This signals the need to pay special attention to potentially weaker groups, which may need more support from the institutions to overcome the negative consequences of a disaster (see also [1,34–36]).

Our investigation has some limitations. The natural groups and correlational design preclude causal inferences, but we are not aware of other ecologically valid ways to study QOL in disaster survivors. Most of our measures are self-reported, but we were mainly interested in QOL, which needs to be self-assessed as well as other relevant constructs. Alternative operationalizations of investigated constructs, such as QOL or well-being, could be implemented in future studies to evaluate the robustness of our results, together with study replications in other countries and/or with other types of disasters.

5. Conclusion

Our study has highlighted the disruptive nature of the temporary displacement experience for QOL from a diachronic and autobiographical perspective. A practical implication of our findings is that institutions are encouraged to make every effort to limit temporary displacement to the strictly necessary duration. This seems particularly important for more vulnerable groups (e.g., older people with less education), whose members may find it more difficult to leave displacement conditions and may perceive their future more negatively. Furthermore, the findings on the predictors of perceived changes in QOL emphasize the need to provide high-quality temporary houses (e.g., [4]). This means that temporary houses must have features such as sufficient space, natural light, good thermal and acoustic insulation, privacy, good quality materials, and nice surroundings. It also means that the temporary house should be reasonably close to all facilities important to the displaced person [45], which may vary across individuals, and be close to the person's loved ones and community. This can support the resumption of life activities in the shortest possible time, with positive consequences for QOL.

Author note

Lucia Savadori https://orcid.org/0000-0003-3957-3132

Data and additional online materials are openly available on the project's Open Science Framework page (https://osf.io/46jpu/).

The contents of this paper represent the authors' ideas and do not necessarily correspond to the official opinion and policies of the Italian Civil Protection Department nor of the Civil Protection of the Autonomous Province of Trento.

Ethics approval

The Ethical Committee of the University of Trento approved the research protocol (number 2020–039).

Funding

This work has benefited from funding provided by the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No. 833496 (BuildERS).

CRediT authorship contribution statement

Lucia Savadori: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Daniela Di Bucci:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Mauro Dolce:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Alessandro Galvagni:** Writing – review & editing, Writing – original draft, Methodology, Conceptualization. **Alessia Patacca:** Writing – review & editing, Writing – original draft, Methodology, Data curation, Conceptualization. **Elena Pezzi:** Writing – review & editing, Writing – original draft, Methodology, Data curation, Conceptualization. **Giuseppe Scurci:** Writing – review & editing, Writing – original draft, Methodology, Data curation, Conceptualization. **Fabio Del Missier:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

Lucia Savadori reports financial support was provided by European Union. Daniela Di Bucci reports a relationship with Italian Civil Protection Department that includes: employment. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

link to data: https://osf.io/46jpu/
QoLOSF (Original data)(OSF)

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pdisas.2024.100371.

References

[1] Kim E-M, Kim GS, Kim H, Park CG, Lee O, Pfefferbaum B. Health-related quality of life among older adults who experienced the Pohang earthquake in South Korea: a cross-sectional survey. Health Qual Life Outcomes 2022;20(1):37. https://doi.org/10.1186/s12955-022-01944-8.
[2] Norris FH, Friedman MJ, Watson PJ, Byrne CM, Diaz E, Kaniasty K. 60,000 disaster victims speak: part I. An empirical review of the empirical literature, 1981—2001. Psychiatry 2002;65(3):207–39. https://doi.org/10.1521/psyc.65.3.207.20173.
[3] Ozdemir O, Boysan M, Ozdemir PG, Yilmaz E. Relationships between posttraumatic stress disorder (PTSD), dissociation, quality of life, hopelessness, and suicidal ideation among earthquake survivors. Psychiatry Res 2015;228(3):598–605. https://doi.org/10.1016/j.psychres.2015.05.045.
[4] Di Bucci D, Del Missier F, Dolce M, Galvagni A, Giordano F, Patacca A, et al. Life satisfaction during temporary housing after an earthquake: comparing three cases in Italy. Int J Disaster Risk Reduct 2023;91:103697. https://doi.org/10.1016/j.ijdrr.2023.103697.
[5] Shiba K, Hikichi H, Okuzono SS, VanderWeele TJ, Arcaya M, Daoud A, et al. Long-term associations between disaster-related home loss and health and well-being of older survivors: nine years after the 2011 great East Japan earthquake and tsunami. Environ Health Perspect 2022;130(7):077001. https://doi.org/10.1289/EHP10903.
[6] Goodess CM. How is the frequency, location and severity of extreme events likely to change up to 2060? Environ Sci Policy 2013;27:S4–14. https://doi.org/10.1016/j.envsci.2012.04.001.
[7] Kahneman D, Fredrickson BL, Schreiber CA, Redelmeier DA. When more pain is preferred to less: adding a better end. Psychol Sci 1993;4(6):401–5. https://doi.org/10.1111/j.1467-9280.1993.tb005.
[8] Pedersen T, Friman M, Kristensson P. The role of predicted, on-line experienced and remembered satisfaction in current choice to use public transport services. J Retailing Consumer Serv 2011;18(5):471–5. https://doi.org/10.1016/j.jretconser.2011.06.013.
[9] Stragà M, Del Missier F, Marcatto F, Ferrante D. Memory underpinnings of future intentions: would you like to see the sequel? PloS One 2017;12(4):e0176624. https://doi.org/10.1371/journal.pone.0176624.
[10] Wirtz D, Kruger J, Scollon CN, Diener E. What to do on spring break? The role of predicted, on-line, and remembered experience in future choice. Psychol Sci 2003;14(5):520–4. https://doi.org/10.1111/1467-9280.03455.
[11] Cantril H. A study of aspirations. Sci Am 1963;208(2):41–5. http://www.jstor.org/stable/24936463.
[12] Cantril H. The pattern of human concerns. Rutgers University Press; 1965. https://cir.nii.ac.jp/crid/1130282270933054080.bib?lang=en [Accessed: 5 January 2024].
[13] Ferrer RA, Klein WMP, Persoskie A, Avishai-Yitshak A, Sheeran P. The tripartite model of risk perception (TRIRISK): distinguishing deliberative, affective, and experiential components of perceived risk. Ann Behav Med 2016;50(5):653–63. https://doi.org/10.1007/s12160-016-9790-z.
[14] Kaufman AR, Twesten JE, Suls J, McCaul KD, Ostroff JS, Ferrer RA, et al. Measuring cigarette smoking risk perceptions. Nicotine Tob Res 2020;22(11):1937–45. https://doi.org/10.1093/ntr/ntz213.
[15] Scannell L, Gifford R. The relations between natural and civic place attachment and pro-environmental behavior. J Environ Psychol 2010;30(3):289–97. https://doi.org/10.1016/j.jenvp.2010.01.010.
[16] Mulilis J-P, Duval TS, Lippa R. The effects of a large destructive local earthquake on earthquake preparedness as assessed by an earthquake preparedness scale. Nat Hazards 1990;3(4):357–71. https://doi.org/10.1007/BF00124393doi.
[17] Smith BW, Dalen J, Wiggins K, Tooley E, Christopher P, Bernard J. The brief resilience scale: assessing the ability to bounce back. Int J Behav Med 2008;15(3):194–200. https://doi.org/10.1080/10705500802222972.
[18] Sinclair VG, Wallston KA. The development and validation of the psychological vulnerability scale. Cognitive Ther Res 1999;23(2):119–29. https://doi.org/10.1023/A:1018770926615.
[19] Bombak AE. Self-rated health and public health: a critical perspective. Front Public Health 2013;1:15. https://doi.org/10.3389/fpubh.2013.00015.
[20] Caia G, Ventimiglia F, Maass A. Container vs. dacha: the psychological effects of temporary housing characteristics on earthquake survivors. J Environ Psychol 2010;30(1):60–6. https://doi.org/10.1016/j.jenvp.2009.09.005.
[21] Bruine de Bruin W, Parker AM, Strough JN. Age differences in reported social networks and well-being. Psychol Aging 2020;35(2):159–68. https://doi.org/10.1037/pag0000415.
[22] Lin M, Hirschfeld G, Margraf J. Brief form of the perceived social support questionnaire (F-SozU K-6): validation, norms, and cross-cultural measurement invariance in the USA, Germany, Russia, and China. Psychol Assess 2019;31(5):609–21. https://doi.org/10.1037/pas0000686.
[23] Davidson JRT, Book SW, Colket JT, Tupler LA, Roth S, David D, et al. Assessment of a new self-rating scale for post-traumatic stress disorder. Psychol Med 1997;27(1):153–60. https://doi.org/10.1017/S0033291796004229.
[24] Schuster C, Honold J, Lauf S, Lakes T. Urban heat stress: novel survey suggests health and fitness as future avenue for research and adaptation strategies. Environ Res Lett 2017;12(4):44021. https://doi.org/10.1088/1748-9326/aa5f35.
[25] Lichtenstein S, Slovic P, Fischhoff B, Layman M, Combs B. Judged frequency of lethal events. J Exp Psychol Human Learn Memory 1978;4(6):551–78. https://doi.org/10.1037/0278-7393.4.6.551.
[26] Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. Med Care 1992;30(6):473–83. Available at: http://www.jstor.org/stable/3765916.
[27] He T, Derfler-Rozin R, Pitesa M. Financial vulnerability and the reproduction of disadvantage in economic exchanges. J Appl Psychol 2020;105:80–96. https://doi.org/10.1037/apl0000427.
[28] Akokuwebe ME, Likoko S, Osuafor GN, Idemudia ES. Determinants of life satisfaction among migrants in South Africa: an analysis of the GCRO's quality of life survey (2009–2021). BMC Public Health 2023;23(1):2030. https://doi.org/10.1186/s12889-023-16868-1.
[29] Deaton A. Income, health, and well-being around the world: evidence from the Gallup world poll. J Econ Perspect 2008;22(2):53–72. https://doi.org/10.1257/jep.22.2.53.
[30] Haspels HN, de Vries M, van den Akker-van Marle ME. The assessment of psychometric properties for the subjective wellbeing-5 dimensions (SWB-5D) questionnaire in the general Dutch population. Qual Life Res 2023;32(1):237–45. https://doi.org/10.1007/s11136-022-03234-8.
[31] Kahneman D, Deaton A. High income improves evaluation of life but not emotional well-being. Proc Natl Acad Sci 2010;107(38):16489–93. https://doi.org/10.1073/pnas.1011492107.
[32] Crenshaw K. Demarginalizing the intersection of race and sex: A black feminist critique of antidiscrimination doctrine, feminist theory and antiracist politics. In: Maschke K, editor. Feminist legal theories. Routledge; 2013. p. 23–51.

[33] Lorthe E, Richard V, Dumont R, Loizeau A, Perez-Saez J, Baysson H, et al. Socioeconomic conditions and children's mental health and quality of life during the COVID-19 pandemic: an intersectional analysis. SSM Population Health 2023; 23:101472. https://doi.org/10.1016/j.ssmph.2023.101472.
[34] Ardalan A, Mazaheri M, Vanrooyen M, Mowafi H, Nedjat S, Naieni KH, et al. Post-disaster quality of life among older survivors five years after the Bam earthquake: implications for recovery policy. Ageing Soc 2011;31(2):179–96. https://doi.org/10.1017/S0144686X10000772.
[35] Cao X, Chen L, Tian L, Jiang X. Psychological distress and health-related quality of life in relocated and nonrelocated older survivors after the 2008 Sichuan earthquake. Asian Nurs Res 2015;9(4):271–7. https://doi.org/10.1016/j.anr.2015.04.008.
[36] Wen J, Shi Y-k, Li Y-p, Yuan P, Wang F. Quality of life, physical diseases, and psychological impairment among survivors 3 years after Wenchuan earthquake: a population based survey. PloS One 2012;7(8):e43081. https://doi.org/10.1371/journal.pone.0043081.
[37] Brown BB, Perkins DD. Disruptions in place attachment. In: Place attachment. Boston, MA: Springer US; 1992. p. 279–304.
[38] Brown BB, Perkins DD. Disruptions in place attachment. In: Place attachment. Boston, MA: Springer US; 1992. p. 279–304.
[39] Bonaiuto M, Alves S, De Dominicis S, Petruccelli I. Place attachment and natural hazard risk: research review and agenda. J Environ Psychol 2016;48:33–53. https://doi.org/10.1016/j.jenvp.2016.07.007.
[40] Heinonen H, Aro AR, Aalto AM, Uutela A. Is the evaluation of the global quality of life determined by emotional status? Qual Life Res 2004;13:1347–56. https://doi.org/10.1023/B:QURE.0000040788.12947.b9.
[41] Lewis PA, Critchley HD. Mood-dependent memory. Trends Cogn Sci 2003;7(10):431–3. https://doi.org/10.1016/j.tics.2003.08.005.
[42] Cui K, Han Z. Association between disaster experience and quality of life: the mediating role of disaster risk perception. Qual Life Res 2019;28:509–13. https://doi.org/10.1007/s11136-018-2011-4.
[43] Vilhauer JS, Cortes J, Moali N, Chung S, Mirocha J, Ishak WW. Improving quality of life for patients with major depressive disorder by increasing hope and positive expectations with future directed therapy (FDT). Innov Clin Neurosci 2013;10(3):12–22.
[44] Zetsche U, Bürkner P-C, Renneberg B. Future expectations in clinical depression: biased or realistic? J Abnorm Psychol 2019;128(7):678–88. https://doi.org/10.1037/abn0000452.
[45] Félix D, Branco JM, Feio A. Temporary housing after disasters: a state of the art survey. Habitat Int 2013;40:136–41. https://doi.org/10.1016/j.habitatint.2013.03.006.