BUILDERS D4.2 VULNERABILITY IN POST-DISASTER TEMPORARY HOUSING

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Project title: Building European Communities' Resilience and Social Capital
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Executive Summary

Deliverable 4.2 reports the results of task 4.2 (Italian case study). Task 4.2 examined vulnerability in crisis-affected populations (i.e., individuals displaced in temporary housing after an earthquake). In line with BuildERS aims, the vulnerability in this context was examined to provide an understanding of how especially the most vulnerable individuals within the crisis-affected populations understand risks, prepare for them and behave individually and collectively (BuildERS Objective 1). By analyzing who is more vulnerable among the displaced people, task 4.2 seeks to understand why certain evacuees are more vulnerable than others by testing the predictive role of a very diverse set of antecedents of vulnerability, including risk awareness and social capital. This was done by exploring the living conditions of the crisis-affected populations. The results of task 4.2 can be used to create recommendations (WP5) that can be adopted as innovative solutions in emergency management. The evidence collected showed that the survivors who have been displaced display a significant deterioration on all the quality of life indicators measured. They display a significantly lower quality of life, more symptoms of post-traumatic stress disorder, higher health impairment, lower well-being, higher economic vulnerability, higher physical vulnerability, and, on the other hand, higher risk awareness than those individuals who just suffered the disaster. These negative outcomes collectively form a coherent cluster of symptoms of low quality of life that go beyond those experienced by individuals who suffered the disaster but were not displaced. The low quality of life found in survivors of this case study was predicted by three groups of variables: (a) variables existing before the disaster (i.e., lower individual preparedness, lower economic wealth, and lower physical health), (b) structural aspects (i.e., having experienced the 2016 Central Italy Earthquake, being sheltered in a tent or camper, experiencing a more lengthy displacement, being less satisfied with the displacement, and having perceived lower overall quality of the temporary housing), and (c) individual characteristics (i.e., being more psychologically vulnerable, possessing fewer trait resilience capabilities, and being older). Variables pertaining to the social environment (i.e., social support and protection net) were not directly predictive of vulnerability. However, social aspects were relevant because both individual resilience and individual place attachment are built over time through social relationships. Indeed, a model tested with path analysis revealed that evacuees that possessed a lower individual resilience capability were also more likely to be under-prepared before the disaster, and this, in turn, led to lower satisfaction with the temporary housing and a lower quality of life during the displacement, which in turn is reflected in a lower quality of life today. Also, those evacuees who had a lower place attachment before the disaster were less protected from the disaster when this occurred because they showed a lower satisfaction with the temporary housing characteristics and, in turn, lower satisfaction with the temporary housing experience and a lower quality of life today. In summarizing, the evidence collected in the 4.2 study highlighted the primary role of individual trait resilience capability in predicting vulnerability and a secondary role of risk awareness (individual preparedness) and place attachment, but no direct influence of social capital in the form of social network and protection net. However, social factors are important in building resilient individuals because place attachment and personal resilience are both built through social interactions with significant others throughout the lifespan. Indeed, individual resilience was correlated with social capital. A series of recommendations are proposed. The first is to improve the structural resistance of building to disasters to avoid displacement of individuals out of their homes for long periods of time since this was found to be a main predictor of distress. The second is to improve individual resilience capability, as this was the most predictive factor of dissatisfaction. The third is to plan more carefully the location and the environment where the displacement will take place, possibly by re-establishing a community environment. The fourth is to strengthen place attachment before the disaster.

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List of Acronyms

TH	Temporary Housing
BuildERS	Building European Communities Resilience and Social Capital project
D	Deliverable
DoA	Description of Action
M	Sample Mean (arithmetic mean)
SD	Sample Standard Deviation
SE	Standard Error
F	Fischer's F ratio
η^2	Eta-square
p	Probability
r	Estimate of Pearson product-moment correlation coefficient
R^2	Multiple correlations squared
ANOVA	Analysis of variance
WP	Work Package

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1. Introduction

Deliverable 4.2 reports the results of Task 4.2 (Italian case study), part of WP4 ("Case Studies: Practicalities and innovations reducing vulnerability"). Task 4.2 is linked to BuildERS Objective 1, which aims to understand and analyze how especially the most vulnerable exposed to disasters and threats understand risks, prepare for them, and behave individually and collectively in disasters. The type of crisis investigated in Task 4.2 is the earthquake and the innovation produced is a new understanding of survivor's needs. The group studied is disaster survivors who have been displaced in temporary housing because their home was made inhabitable by the disaster (i.e., crisis-affected populations). By analyzing who is more vulnerable among the crisis-affected population, Task 4.2 seeks to understand why certain evacuees are more vulnerable than others by testing the predictive role of a very diverse set of predictors of vulnerability, including risk awareness and social capital. This is done by exploring the crisis-affected population's living conditions to determine the presence of vulnerabilities. The results of Task 4.2 can be used to create recommendations (WP5) that can be adopted as innovative solutions in emergency management. Task 4.2 is in close relation to other works by BuildERS. As in WP3, we focus on the individuals' perspectives. As in D4.4 and D4.5, we look at the individual as well as structural factors of vulnerability. The study issue is related to the functioning of disaster management systems addressed in WP2 – the types of measures and solutions offered and their sensitivity to particular needs.

Within disaster management, the displacement problem addressed in Task 4.2 is related to the post-crisis phase. Indeed, when a disaster strikes, it often affects the buildings where people live. An earthquake, a landslide, a tsunami, a volcanic eruption, or a flood can result in residents being displaced from their homes, which are no longer considered safe. When the disaster has passed, some evacuated people can no longer return to their previous home because these homes are no longer habitable, and they are housed in temporary housing while their home is restored or rebuilt. Housing in temporary solutions can last months or years, and for those who are particularly elderly, it can last forever.

By considering a comprehensive variety of quality of life indicators (i.e., quality of life, health impairment, well-being, post-traumatic stress disorder, physical vulnerability, economic vulnerability, risk awareness), the Task 4.2 case study aimed at understanding who is more vulnerable in a post-disaster temporary housing context and why. To do this, we measured through a survey several predictors of quality of life indicators, both structural and objective and psychological and subjective, including risk awareness, preparedness, social capital, and many others. The aim was to statistically test their comparative predictive power in determining vulnerability in the specific case analyzed in the study.

Post-disaster temporary housing is an ideal context in which to study vulnerability. The primary reason is that temporary housing has been indicated by previous literature as a source of trauma, psychological distress, impaired recovery, and low well-being (e.g., Kukihara et al., 2014). Moreover, temporary housing is a frequent condition in many types of disasters (earthquakes, volcanic eruptions, hurricanes, landslides). The second reason is that although it is a transitory (momentary) condition, it can also last for a long time, even years (Chang, 2010). This allows

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scholars to examine its psychological dynamics, such as the relationships between vulnerability and other variables.

Temporary housing is distinct from simple emergency sheltering or temporary sheltering, which occurs just immediately after the disaster (Quarantelli, 1995). During temporary housing, the evacuees intentionally make an attempt to re-establish broken household routines. Despite knowing that the accommodation is not permanent, evacuees in temporary housing make an effort to restore broken normality by rebuilding household habits (Quarantelli, 1995). The temporary accommodation solutions are of different types. They go from mobile homes for temporary housing to trailers camps or rental assistance (the government pays for a rented apartment). There are usually many hotels in tourist areas, and these are sometimes used to house evacuees, but seldom is such usage preplanned.

Temporary housing is almost always a source of complaint from displaced people, often quite intense. According to some scholars, public expressions of discontent with the housing provided are an almost universal feature of significant disasters (Quarantelli, 1995). However, since virtually everyone who needs accommodation eventually gets it, then the degree of satisfaction with housing among the disaster survivors depends on specific aspects of the displacement. According to some research, temporary housing plans show recurrent problems, such as cultural or climatic inadequacy, bad location, social problems within the camps, delays related to the purchase of housing units, site finding, and lack of organizational skills, such as inconsistencies in the application of standards and requirements and sudden and unannounced changes in displacement policies (Johnson, 2007; Quarantelli, 1995).

Having experienced a displacement in a temporary solution is often accompanied by negative psychological consequences (Cofini et al., 2015; DeSalvo et al., 2007; Fussell & Lowe, 2014; Jere et al., 2014; Kukihara et al., 2014). Whereas psychological distress is often more present in older and less educated disaster-affected populations, in other cases, the factors contributing to a higher presence of post-disaster stress are of economic type (economic difficulties and unemployment) (Cofini et al., 2015; Gigantesco et al., 2013). The psychological consequences of temporary housing can be quite severe as it happened in the aftermath of Hurricane Katrina (August 29, 2005), when about one million inhabitants of the metropolitan area of New Orleans were displaced, and all residents of New Orleans (about 455,000 people) were forced to evacuate for 33 days from their homes. Some took refuge with their friends, others rented a house, and others used temporary caravans provided by the government. A strong positive correlation emerged between the symptoms of post-traumatic syndrome (PTSD) and the fact that the respondent was using the temporary trailer at the time of the survey instead of other housing solutions (DeSalvo et al., 2007). Obviously, these types of correlational studies lend themselves to many alternative explanations, but the results still raise some questions because they might be the evidence of a psychological discomfort linked to the type of temporary solution adopted or to the displacement experience itself.

It has been emphasized that temporary housing should not only provide shelter but also offer everything to return to normal life, such as being in a place with easy access to services and the workplace or providing affordable transportation, proximity to the former home, and maintaining neighborhood ties and support networks (Johnson, 2007).

The elderly are consistently found to be especially vulnerable to disasters (Chou et al., 2004; Cloyd & Dyer, 2010; Dyer et al., 2008). Relocation from one's familiar residence may result in an even slower recovery by the elderly population. Relocation is often coupled with less visiting frequency

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with friends and/or neighbors and disrupting one's social network. Moreover, as stated, temporary housing is, by its nature, a significant risk factor for psychological distress. One study addressed this issue by comparing psychological distress and health-related quality of life of relocated and non-displaced people aged 60 years and older after the 2008 earthquake in northwest Sichuan province of China (Cao et al., 2015). The study found evidence that psychological distress among relocated elderly survivors (20.5%) was significantly more prevalent than non-relocated elderly survivors (4.8%). Seemingly, health-related quality of life among relocated older survivors was significantly lower than those of non-relocated older survivors. Relocation from the pre-earthquake residence was the most significant predictor of psychological distress and quality of life in the total sample. Other predictors were more advanced age, lower educational level, the loss of family members during the earthquake, and the presence of chronic illnesses as well as the death of a spouse after the earthquake (Cao et al., 2015). Other studies have shown similar results. For example, cognitive functions were impaired in the elderly who were relocated to very small -room space of 5 m2 /person - temporary housing after the 2011 Japan earthquake (Ishiki et al., 2016). In the same vein, the elderly evacuated from their home after the 2009 Aquila earthquake showed a greater pre-post reduction (before and after the earthquake) in levels of happiness and well-being than elderly living in rented or owned accommodations (Giuliani et al., 2014).

To summarize, the studies focusing on survivors living in temporary housing after a disaster consistently show a decline in well-being. However, most of them miss unveiling the root antecedents of this decline. On the other hand, the convergent results clearly point to the need for relocation planning in post-disaster recovery programs that would take into account the needs of more vulnerable survivors (Cao et al., 2015). Often, existing social networks are dismantled during relocation, thus eliminating a crucial source of social buffer, which might potentially mitigate evacuees' discomfort (Di Gregorio & Soares, 2017). This is probably especially problematic as the elderly often have a smaller radius in which they move to go to places or meet with people. It has indeed been noted that relocating the elderly is especially a problem due to their need for social spaces and organized activities that enable them to meet others (Johnson, 2007).

New to the existing literature, as part of the BuildERS project, we will evaluate the role of multiple predictors of mental stress and low quality of life during displacement by considering a wide range of antecedents ranging from individual, structural, and environmental characteristics to better understand the role of resilience, risk awareness, and social capital in promoting survivors' quality of life. The use of a multitude of predictors, instead of just a few predictors, offers the possibility of extracting a clearer and more comprehensive picture of the effect of these variables, which would otherwise be obscured by other confounding variables that were not measured and thus not controlled.

Vulnerability

In BuildERS Deliverable 1.2, the concept of "social vulnerability" has been defined as "dynamic characteristic of entities (individuals, groups, society) of being susceptible to harm or loss, which manifests as situational inability (or weakness) to access adequate resources and means of protection to anticipate, cope with, recover and learn from the impact of natural or man-made risks".

Task 4.2 analyses who is vulnerable after a disaster. We focus on what constitutes vulnerability and how can it be measured in post-disaster temporary housing, and what factors lead to individuals becoming vulnerable. But we also address the factors that hinder individuals from coping with

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crises. This knowledge will be used to give recommendations in order to build resilience. For these reasons, vulnerability is central in this case study.

Within the present case study, we adapted the previous definition (D1.2) to the specific post-disaster temporary housing context. In this context, vulnerability is deemed as a dynamic concept, that is, anything about the condition of the individual evacuees that determines whether he/she is unable to access adequate psychological, economic, and physical resources and protection after the disaster.

To have a broad view of the impact of the vulnerability, we measured multiple indicators of vulnerability (Table 1). These indicators are both quantitative (e.g., age, economic condition, length and quality of displacement, experience with death and suffering, the severity of the damage, etc.) and qualitative (e.g., psychological vulnerability, quality of life, etc.). Moreover, some indicators of vulnerability are used as outcome variables to test the predictive power of the other factors, while others are included as pre-existing conditions (pre-crisis phase) (see Table 1, Figure 1, and Figure 2).

Social capital

In BuildERS Deliverable 1.2, the concept of "social capital" refers to "networks, norms, values, and trust that entities (individuals, groups, society) have available and which may offer resources for mutual advantage and support and for facilitating coordination and cooperation in case of crisis and disasters." In the context of our case study, we operationalize social capital as the resources that an individual can draw on through her or his social network and the extent of the protection net (see Table 1). Preexisting stocks of social capital, i.e., the presence of network linkages within communities, can partly explain the differential rates of community recovery, as was the case for the major earthquakes in Kobe, Japan (1995), and Gujarat, India (2001). In the aftermath of a disaster, social capital can serve as a buffer against negative outcomes, and this could be even more true for the more vulnerable individuals during temporary displacement (Kawachi & Subramanian, 2006).

In some previous studies, however, no significant association was found between structural social capital (i.e., group membership, support from community groups and individuals, and involvement in citizenship activities) and mental wellbeing after a disaster (Ehsan & De Silva, 2015; Flores et al., 2014). Whereas, cognitive social capital measures, such as trust, sense of belonging and interpersonal relationships in the community, were found to be negatively associated with mental health disorders (Ehsan & De Silva, 2015; Flores et al., 2014). To understand the reasons for this different behavior, in this study, we will examine a wide variety of variables to control for the effect of possible confounding variables that may modulate the role of some key variables.

Risk awareness

In BuildERS Deliverable 1.2, the concept of "risk awareness" is defined as the "collective (groups and communities) acknowledgment about a risk and potential risk preventing and mitigating actions, fostered by risk communication." In the context of our case study, we operationalize risk awareness by asking survivors to self-report the level of disaster preparedness before the event and risk awareness before and after the event. Survivors were asked to self-report the level of *disaster preparedness* before the event (e.g., "Before the earthquake, had you ever had your home checked for seismic safety?", "Before the event, have you ever seen an information campaign on seismic risk?", "When the earthquake happened, did you know what to do?"). R*isk awareness* was also

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measured before the event (e.g., “Before the event, did you know if your home was vulnerable to earthquakes or not?”, “Before the event, did you know that your area was subject to earthquake hazard?”). Furthermore, *perception of risk* was also measured before the event (e.g., “How worried were you about experiencing an earthquake before the event occurred?”, “How fearful were you about experiencing an earthquake before the event occurred?”, “Before the event occurred, how likely did you think it was that you would experience an earthquake in your lifetime ?”).

Most of these concepts are also measured for the post-crisis phase. Personal responsibility is measured after the event (e.g., “Indicate to what extent you feel responsible for preparing for the occurrence of a major earthquake,”, “Indicate to what extent you feel that the city, state, or federal government is responsible for making sure that you are prepared for the occurrence of a major earthquake.”). As well as post-disaster risk perception (e.g., “How worried are you about experiencing an earthquake in the future?”, “How fearful are you about experiencing an earthquake in the future?”, “How likely it is that you might experience another earthquake in your lifetime?”).

Resilience

In BuildERS Deliverable 1.2, the concept of “resilience” is defined as the “processes of proactive and/or reactive patterned adjustment and adaptation and change enacted in everyday life, in particular, in the face of risks, crises, and disasters.”

In the case study on temporary housing, we measured individual resilience as an individual trait, that is, as the individual capability of adapting to change (Smith et al., 2008). We expected to observe that individual resilience capability would significantly improve well-being during displacement and after. Individual resilience has been found to be a crucial protective factor against disaster impact and against post-traumatic stress disorders (PTSD), depression, or other mental health problems among disaster survivors (Fu et al., 2013; Kukihara et al., 2014; Rajkumar et al., 2008).

Conceptual Model

The variables listed in Table 1 are supposed to relate to each other, as shown by the conceptual model in Figure 2. As shown in Figure 2, we have postulated that a set of pre-existing conditions would have an impact on the long-term consequences, being moderated by structural aspects of the disaster and by a series of short-term consequences. Some factors have been assumed to play the role of protective elements that reduce the negative impact of pre-existing conditions on the long-term consequences of the disaster. To describe this dynamic, we measured quality of life before, during, and after the disaster, assuming that each group of variables (pre-existing conditions, moderating factors, long-term consequences) was summarized into an overall measure of perceived well-being.

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Table 1. Variables measured in the case study

Predictors			Outcomes
Pre-crisis (before)	Acute-crisis (during)		Post-crisis (after)
Vulnerability	*Structural variables*		*Vulnerability Outcomes*
Place Attachment (before)	Type of seismic event		Quality of Life during
Economic Vulnerability (before)	Type of Temporary Housing	→	Temporary Housing
Physical Vulnerability (before)	Density		Post-Traumatic Stress Disorder
Quality of Life (before)	Length of Displacement (months)		Health Impairment caused by the disaster
	Damage		Well-being (today)
	Experience with death		Quality of Life (today)
	Still in Temporary House		Economic Vulnerability (today)
	Temporary Housing Satisfaction		Physical Vulnerability (today)
	Temporary Housing Quality		Risk Awareness (today)
Risk awareness	*Social Capital*		
Risk Awareness (before)	Perceived Social Support (during)	→	
Individual Preparedness (before)	Protection Net (during)		
Individual characteristics			
Resilience Capability		→	
Psychological Vulnerability			
Personal Responsibility			
Age			
Gender			
Education			

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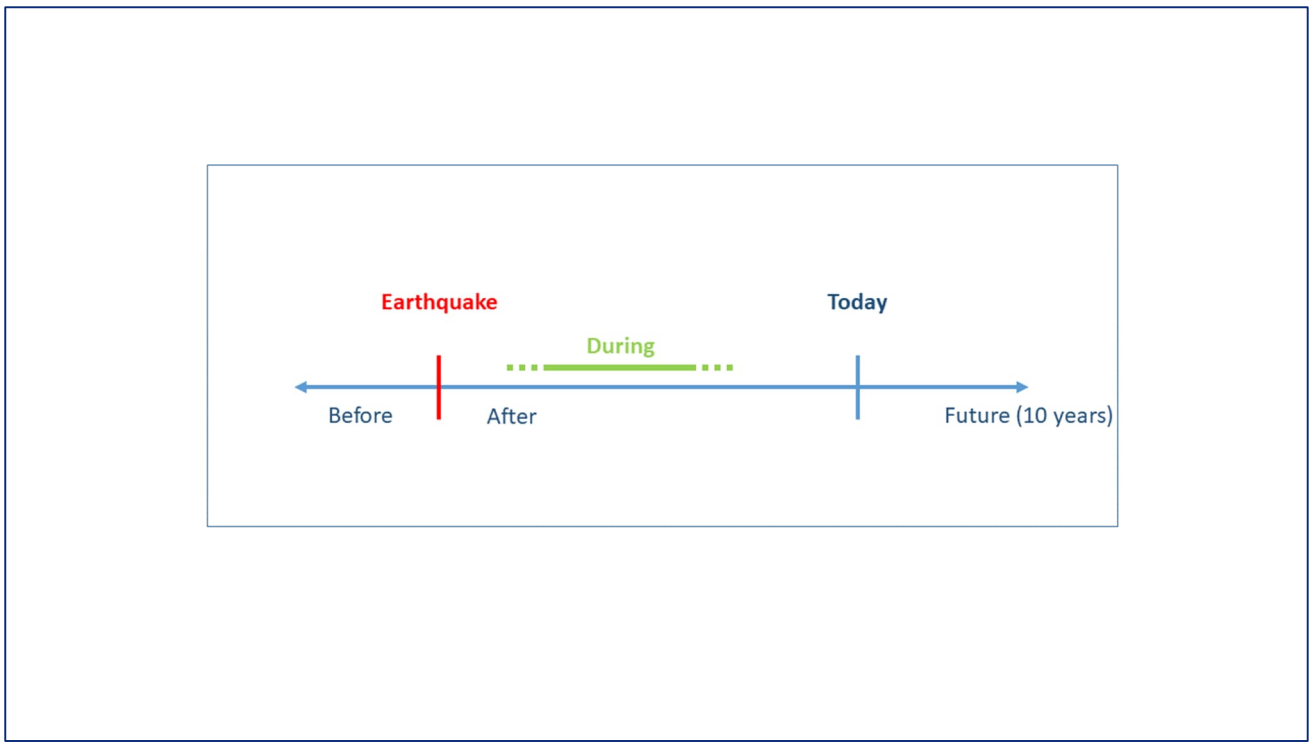

Figure 1. Time line of the variables studied

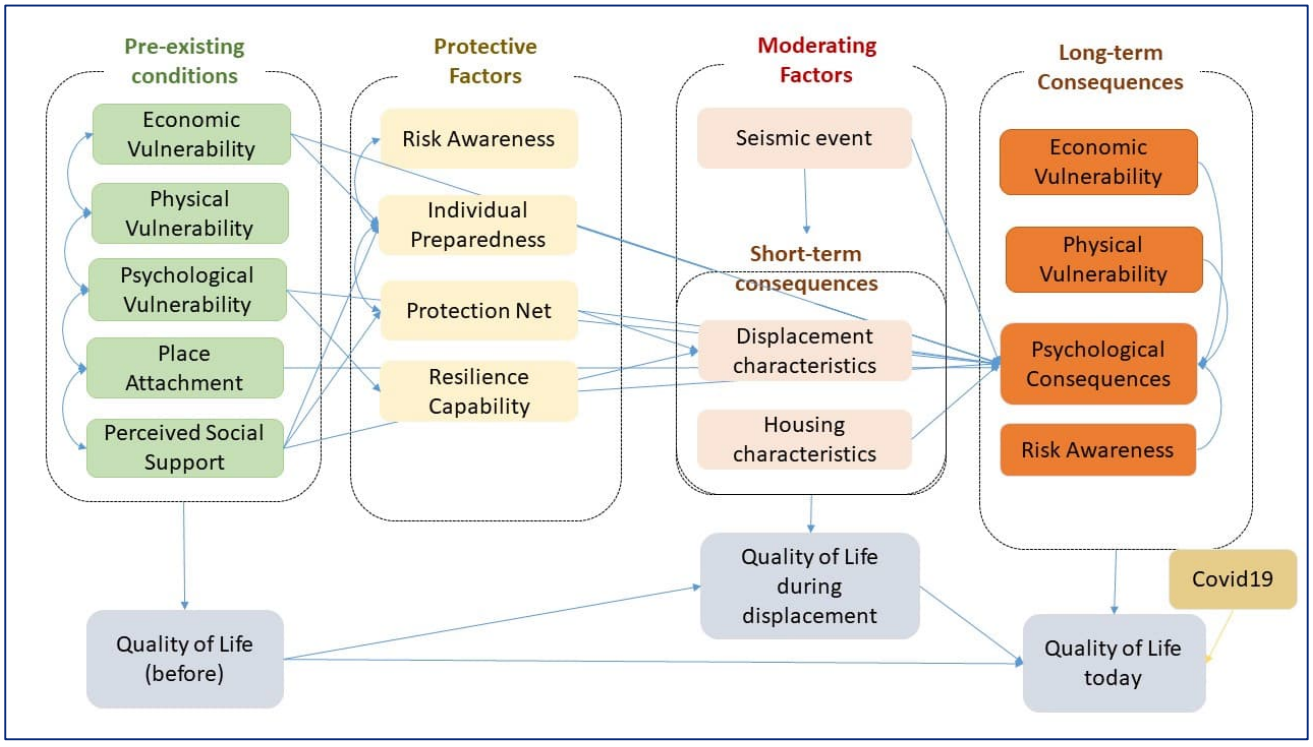

Figure 2. Conceptual model of the relationships between the variables examined in the study

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2. Target of study

The 2009, 2012, and 2016 Italian earthquakes

To conduct the case study, we selected three particularly disastrous events that occurred in Italy in the last 15 years where the temporary housing solutions were adopted, specifically, 2009, 2012, and 2016 seismic disasters (Figure 4). The characteristics of the events taken into consideration in our case study are summarized in Table 2. It has to be noted that in all the three disastrous events considered in the case study, a relatively high number of evacuees is present. This feature makes the selected events particularly suited to study vulnerability in temporary housing after a disaster.

Another feature that makes the selected cases particularly suited for our aim is that different post-disaster temporary housing solutions were adopted. In particular, evacuees could be displaced in rented apartments or in Temporary Housing Modules. Among the latter, there was the C.A.S.E. (Anti-seismic Complex Sustainable and Environmental friendly) which are sustainable earthquake complexes three-storey buildings, with underground parking, in a green environment; the P.M.A.R. (Removable Modular Prefabricated Housing Units), which are basically trailers; and the M.A.P. (Temporary Housing Modules), which are prefabricated houses, or in any case of rapid realization, often in wood, with one or two floors at most, single-family, semi-detached or terraced. See Table 1 for a more comprehensive list.

Table 2. Characteristics of the case studied

	Earthquakes		
	2009 in Abruzzo region (city of L'Aquila)	2012 in Emilia region	2016-17 in central Italy
Date of the first mainshock	6 April 2009 at 03:32:39 (CEST)	20 May 2012 at 04:03:52 (CEST)	24 August 2016 at 03:36:32 (CEST)
Magnitude (Mw)	6.3	6.1	6.0
Evacuees	67,000	45,000	49,844
Type of territory affected	Urban	Industrial	Rural

3. Methodology

3.1 Sample

Two hundred fifty-seven (257) individuals who experienced one of the last three major Italian earthquakes (2009 L'Aquila Earthquake, 2012 Emilia Earthquake, 2016 Central Italy Earthquake) participated in the study (see Table 3). The mean age of respondents was 47 years old (min = 18 max = 88), females were 57% of the sample (n = 145), and most of the sample (51%) had a high-school level of education, few had an elementary level (1%), some had only middle school (11%) and few had a university degree (37%). The most likely working status was being an employee (48%), followed by being self-employed (17%) and retired (16%). Few were students (14%) or unemployed (5%). The average level of income was around 20.000 - 50.000€.

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Table 3. Frequency of participants in the study who experienced each type of seismic event

Earthquake experienced	Counts	% of Total	Cumulative %
2009 L'Aquila Earthquake	64	24.9 %	24.9 %
2012 Emilia Earthquake	145	56.4 %	81.3 %
2016 Central Italy Earthquake	48	18.7 %	100.0 %

At the time of the disaster, the sociodemographic characteristics of respondents were not very different from those at the time of the survey. Most participants were employed (46%) or self-employed (19%). Some were retired (9%), a few were unemployed (2%), and some were students (24%). The family's total annual net income was on average in the range of 20.000-50.000€ (Table 4). Families included 3.4 members on average (min = 1 max = 7), and 19% of these were minors (under 18 years of age). The majority of the sample (93%) lived in a home owned by themselves or their family. The sample was distributed in different locations across the territory (see Table 5)

Table 4 Frequencies of income (before)

Levels	Counts	% of Total	Cumulative %
0€	5	2.1 %	2.1 %
0-10.000€	15	6.3 %	8.4 %
10-15.000€	18	7.5 %	15.9 %
15-20.000€	45	18.8 %	34.7 %
20-30.000€	60	25.1 %	59.8 %
30-50.000€	77	32.2 %	92.1 %
more than 50.000€	19	7.9 %	100.0 %

Note. Missings = 18

Table 5. Distribution of the participants among the different locations affected by the seismic events

Location	Type of Seismic event	Population at the time of the event	Number of evacuated (tentative number)	Number of participants in the study
Visso	2016 Central Italy Earthquake	1.107	1.107	3
Camerino	2016 Central Italy Earthquake	7.013	7.500	1
Ussita	2016 Central Italy Earthquake	444	444	9

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Amatrice	2016 Central Italy Earthquake	2.657	2.657	12
Accumoli	2016 Central Italy Earthquake	616	580	12
Montereale	2016 Central Italy Earthquake	2.581	not available	8
Carpi	2012 Emilia Earthquake	67.355	3.571	18
Cavezzo	2012 Emilia Earthquake	7.359	2.029	24
Concordia sulla Secchia	2012 Emilia Earthquake	9.092	1.878	17
Finale Emilia	2012 Emilia Earthquake	16.111	2.770	21
Mirandola	2012 Emilia Earthquake	24.769	6.665	34
Novi di Modena	2012 Emilia Earthquake	11.504	5.008	5
San Felice sul Panaro	2012 Emilia Earthquake	11.238	3.145	15
Crevalcore	2012 Emilia Earthquake	13.719	1.829	14
Reggiolo	2012 Emilia Earthquake	9.272	893	1
L'Aquila	2009 L'Aquila Earthquake	68.247	10.959	32
Poggio Picenze	2009 L'Aquila Earthquake	1.070	1.070	1
Lucoli	2009 L'Aquila Earthquake	1.700	1.700	13
Fossa	2009 L'Aquila Earthquake	700	700	17

At the time of the disaster, both risk awareness and subsequent seismic preparedness were very low. When the earthquake occurred, 1 in 2 citizens (50%) did not know that they lived in an earthquake-prone area. They judged it not at all likely (40%) that an earthquake could happen, did not think about the possibility of an earthquake at all (46%), and were not at all worried about it (41%). Consequently, very few (15%) had a seismic inspection completed to find out if their house was earthquake-proof. As a result, most of the survivors lived in buildings that were neither earthquake-proof (44%) nor insured against earthquakes (92%).

In the earthquake aftermath, 75% of the surveyed participants stayed in a temporary housing solution. The type of prevalent temporary solution (i.e., where they spent most of their time) was very diverse (see Figure 3 and Table 6). Most of the participants stayed in either a rented apartment or a Prefabricated Housing Module. On average, they stayed in the temporary solution for 48 months (4 years), but the range varied from 1 month (minimum) to 12 years (maximum). Many (41%) had to relocate to a different municipality than the one they lived in before the event. On average, the municipality where the temporary housing was located was 33 km from the municipality where the principal home was located, and the range varied from 0 km to 504 km. Although the latest earthquake occurred five years ago (2016) from when this report was written, many participants of our sample (40%) were still living in the temporary housing solution at the time when this study was conducted.

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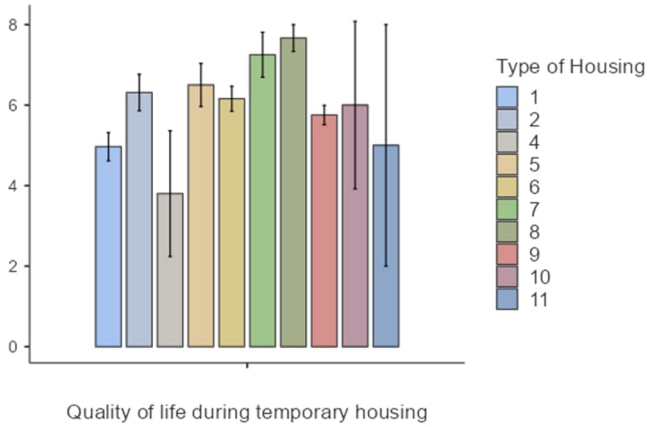

Figure 3. Frequencies of Temporary Housing Type

Type of Temporary Housing: [1] private car/camper/private tent [2] free friend's house [3] gymnasium/train car made available by competent authority [4] tent/camper/ made available by competent authority [5] hotel (made available by competent authority) [6] rented apartment or house [7] apartment or house I own (e.g., second house) [8] container module or P.M.A.R. (Prefabricated Modular Removable Housing Units) [9] M.A.P., S.A.E., M.A.P.R.E, P.M.R.R. (Provisional Housing Modules, Emergency Housing Solutions, Rural Emergency Prefabricated Housing Modules - Prefabricated or otherwise rapidly constructed houses, often made of wood, with up to one or two floors, single-family, two-family or arranged in rows - Rural Removable Modular Prefabricated Housing Modules) [10] C. A.S.E. (Anti-seismic Sustainable Eco-friendly Complexes - three-story buildings, with underground parking, in a green environment) [11] Other (Specify: _____)

Table 6. Frequencies of Temporary Housing Type in the sample of participants

Levels	Counts	% of Total	Cumulative %
Private car/camper/private tent	34	18.0 %	18.0 %
Free friend's house	16	8.5 %	26.5 %
Tent/camper/ made available by competent authority	5	2.6 %	29.1 %
Hotel (made available by competent authority)	8	4.2 %	33.3 %
Rented apartment or house	45	23.8 %	57.1 %
Apartment or house I own (e.g., second house)	8	4.2 %	61.4 %
Container module or P.M.A.R. (Prefabricated Modular Removable Housing)	3	1.6 %	63.0 %
M.A.P., S.A.E., M.A.P.R, P.M.R.R. (Provisional Housing Modules, Emergency Housing Solutions, Rural Emergency Prefabricated Housing Modules - Prefabricated or otherwise rapidly constructed houses, often made of wood, with up to one or two floors, single-family, two-family or arranged in rows - Rural Removable Modular Prefabricated Housing Modules)	65	34.4 %	97.4 %
C. A.S.E. (Anti-seismic Sustainable Eco-friendly Complexes - three-story buildings, with underground parking, in a green environment)	3	1.6 %	98.9 %
Other	2	1.1 %	100.0 %

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Figure 4. Buildings destroyed by the earthquakes in Central Italy and Emilia and temporary housing solutions

3.2. Procedure

We contacted survivors living in the geographic areas where the last three major Italian earthquakes occurred (2009 L'Aquila, 2012 Emilia, 2016 Central Italy) (see Figure 4 and Figure 5). Participants were invited to voluntarily contribute to participate in a survey on their experience with the earthquake. Survivors were contacted with the help of local institutions (municipalities), local organizations, or by directly approaching them in public places. The data collection took place between February and May 2021. The Ethical Committee of the University of Trento approved the study (protocol 2020-039). Data collection was completed through face-to-face interviews, phone interviews, autonomous paper-and-

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pencil, or online, depending on the needs of the participants. The questionnaire was anonymous. As seen in Table 5, we tried to represent as much as possible different realities of the phenomenon by surveying evacuees from different locations.

Figure 5. Geographic areas where the last three major Italian earthquakes occurred (2009 L'Aquila, 2012 Emilia, 2016 Central Italy) and the population data collection took place

3.3. Measures

Quality of Life (before, during, today, future)

Quality of life before, during, and after was measured using the Cantril Self-anchoring Scale (Zubaida & Cantril, 1967), which asks to rate one's life on an 11-points scale anchored from 0 (worst possible life) to 10 (Best possible life). This measure had been successfully used in previous studies on life satisfaction and well-being at different points in time (Gomez et al., 2013; Kahneman & Deaton, 2010; Krueger & Heckhausen, 1993). In the present study, the participants were asked: "Think about your life before the earthquake. How would you rate your life on a scale where 0 represents the worst possible life, and 10 represents the best possible life?". Participants were asked the quality of life question three or four times, depending on whether or not the participant had stayed in a temporary solution. The question was repeated to measure the quality of life before the disaster (before), during the temporary housing (during), today, and in 10 years from now (future) (see Appendix for exact wording of questions).

Place Attachment (before)

Place attachment was measured by the Place Attachment Scale (Scannell & Gifford, 2010), which asks participants to think about the place where they lived at the moment of the disaster and to report how much they agree or disagree with each of a series of statements using a 7-points Likert-type response scale (1 = completely disagree, 7 = completely agree). Sample statements were: "The community reflected who I was", "People like me lived there", " The green areas there were special", and "that city was special to me". Scale reliability was very good (alpha Cronbach = .915). Therefore, a composite score for each individual was computed, averaging individual responses on the eleven statements (M = 5.46, SD = 1.00), representing the extent to which the participant was attached to the place and to the community they lived in before (see Appendix for exact wording of questions).

Economic vulnerability (before, today)

Economic condition, before and after the disaster, was measured by asking the respondent to indicate in which income class was the total annual net income of the family, among the followings: 0 €;

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Up to € 10,000; 10,001 € - 15,000 €; 15.001 € - 20.000 €; 20.001 € - 30.000 €; 30.001 € - 50.000 €; Over 50,000; and to report the number of household members. A per capita household income was computed (He et al., 2020) by dividing the total household income by the number of household members (see Appendix for exact wording of questions).

Physical vulnerability (before, today)

Physical vulnerability, before and after the disaster, was measured using the American Life Panel question (https://alpdata.rand.org/) from the Survey on Well Being (n. 20) (Well Being and Health - Module - Rate General Health, Question - ms20_RH001 GENERAL HEALTH RATING) also used in the WHO generalized health assessment (Bombak, 2013). The question asked, "In general, would you say your health [before the earthquake was /now is] ..." Responses ranged from 1 (Excellent) to 5 (Poor) (see Appendix for exact wording of questions).

Risk Awareness (before, today)

Individual risk awareness was measured using a *short risk-awareness scale* created for the study. The *short risk awareness scale* comprised three items measuring the extent to which individuals were aware of the risk. One item measured the extent to which participants thought about the possibility of an earthquake occurring when they lived their lives before the event occurred (before) and now that the event had occurred (after). Two items were derived from previous literature on risk perception (Ferrer et al., 2016; Kaufman et al., 2020). One item assessed the affective component of risk perception (how concerned were you about the earthquake?), and the other item assessed the analytical/deliberate component (how likely did you think an earthquake was to occur) relative to both the years prior to the disaster and the present. Responses ranged from 1 (not at all) and 7 (very much). The same scale was used to measure risk awareness both before and after the disaster. Scale reliability was very good for both the periods before the disaster (Cronbach's alpha = .900) and after the disaster (Cronbach's alpha = .821). Therefore, a composite score for each individual was computed, averaging individual responses on the three statements measuring risk awareness before (M = 2.43, SD = 1.57) and after (M = 4.11, SD = 1.49) (see Appendix for exact wording of questions).

Individual Preparedness (before)

The *preparedness index* was derived from the Mulilis-Lippa Earthquake Preparedness Scale (MLEPS) (Mulilis et al., 1990) and adapted to the study's purpose and the specific emergency management system of the country (see Appendix for the full list of questions). The preparedness index assessed individual levels of awareness and preparedness before the disaster. Several questions asked whether participants had several items (e.g., an operating flashlight) handy at their residence for use immediately after an earthquake. Other questions measured the level of knowledge, asking, "Before the event, did you know you lived in an earthquake-prone area?", "Prior to the earthquake, to your knowledge, did you or anyone in the household had a seismic inspection done on your property (to find out if your house was earthquake resistant)?", "To your knowledge, was your home earthquake-proof at the time of the earthquake?", and " At the time of the event, was your home insured against earthquakes?". Some questions were also aimed at measuring whether the participant, prior to the event, had ever heard of any seismic risk information campaigns in their area or knew about any materials on earthquake preparedness, or participated in earthquake training activities, or knew whether or not the municipality had a Civil Protection Plan. For all items, "yes" was coded with 2, and "no" was coded 1. The forty-two items were averaged into a composite measure (Cronbach's alpha = .78), representing the degree to which the individual was prepared before the event (M = 1.43, SD = 0.16).

Structural Characteristics of Temporary Housing (during)

Type of Temporary Housing Solution. The participants were sked to report in what type of temporary housing solution they had been living in immediately after the disaster, in the medium term, in

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the mid-term, in the long term, and now. For each of these, we also asked for how long the participant lived in that temporary housing solution. The aim was to establish what was the prevalent temporary solution (i.e., the solution where the participant lived for most of the displacement). This was necessary because the information relative to the temporary housing was refereed to the most prevalent solution. Participants reported the type of temporary solution by selecting one from a list of possibilities: [1] private car/camper/private tent [2] free friend's house [3] gymnasium/train car made available by competent authority [4] tent/camper/ made available by competent authority [5] hotel (made available by competent authority) [6] rented apartment or house [7] apartment or house I own (e.g., second house) [8] container module or P.M.A.R. (Prefabricated Modular Removable Housing) [9] M.A.P., S.A.E., M.A.P.R, P.M.R.R. (Provisional Housing Modules, Emergency Housing Solutions, Rural Emergency Prefabricated Housing Modules - Prefabricated or otherwise rapidly constructed houses, often made of wood, with up to one or two floors, single-family, two-family or arranged in rows - Rural Removable Modular Prefabricated Housing Modules) [10] C. A.S.E. (Anti-seismic Sustainable Eco-friendly Complexes - three-story buildings, with underground parking, in a green environment) [11] Other (Specify: _____). Participants were also asked whether they had applied for Self-Settlement Contribution (CAS). The Self-Settlement Contribution is paid by the City Authority to households members ordered to evacuate their first dwelling unit declared unfit for occupancy as a result of the earthquake.

Density. Population density in the temporary house was measured by asking how many people lived in the same household (including the respondent) and dividing by the area of the dwelling (m^2).

Temporary Housing Quality. A series of questions investigated the perceived quality of the temporary housing on a series of characteristics (i.e., privacy, noise, space, light, temperature, quality, comfort, surroundings, placement). The housing characteristics were measured readapting a previous Housing Characteristics Scale (Caia et al., 2010), which asked participants to think about the housing solution and rate each of a series of statements that related to the housing characteristics. The items were averaged into a composite measure (α = .80) representing the degree to which the temporary housing was appreciated (*M* = 4.50, *SD* = 0.92) (see Appendix for the full list of questions).

Temporary Housing Satisfaction. Judgments about satisfaction with specific aspects of life during the temporary housing were measured as in previous studies (Schkade & Kahneman, 1998). The aspects of life considered were: job prospects, educational opportunities, financial situation, personal safety, social life, outdoor activities, natural beauty, overall climate, and cultural opportunities. The items were averaged into a composite measure (Cronbach's alpha = .86), representing the degree to which the individual was satisfied with specific aspects of life during the temporary housing displacement (M = 3.34, SD = 0.72) (see Appendix for the full list of questions).

Length of displacement. Length of prevalent temporary housing stay was measured as the number of months that the participant stayed in the temporary housing solution.

Still in Temporary House. Participants were also asked whether they were still living in the temporary house or not.

Structural Characteristics of the Disaster

Type of Seismic Event. The type of seismic event experienced by the participant was measured by asking which earthquake event they had experienced from a list of three: [1] the 2009 earthquake in Abruzzo (L'Aquila) [2] the 2012 earthquake in Emilia [3] the 2016-17 earthquake in Central Italy. If the participant had experienced two events, we instructed the participant to refer only to the most recent one.

Damage Severity. The intensity of structural damage to the house was measured by asking to report how the home was rated according to habitability (scale from A to F) after the event. According to the AeDES form, the habitability of buildings is classified into six categories: (1) A - Habitable building, (2) B - Building temporarily uninhabitable (in whole or in part) but accessible with emergency measures, (3) C - Building temporarily uninhabitable to be reviewed in-depth, (4) D - Building partially uninhabitable, (5) E - Building uninhabitable, (6) F - Building uninhabitable due to external risk. The higher the value, the higher the degree of damage to the house.

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Perceived Social Support (during)

A short version of the perceived social support scale F-SOzU K-6 (Lin et al., 2019) asked participants to think about their life during their stay at the temporary housing solution and to say how much they agree or disagree with a series of six statements (e.g., I experienced a lot of understanding and security from others). The items were averaged into a composite measure (Cronbach's alpha = .86), representing the degree to which the individual experienced social support during the temporary housing displacement (*M* = 5.17, *SD* = 1.19) (see Appendix for the full list of questions).

Protection Net (during)

Participants were asked to report how much help they received from a series of people after the event (Bruine de Bruin et al., 2020). The sources of support considered were: (a) relatives, (b) friends, (c) neighbors, (d) colleagues/employers, (f) other persons. We also included: (g) national institutions (Civil Protection Department, Government, Commissioner for Reconstruction) and (h) local institutions (Regional Civil Protection, Mayor, health workers, volunteers, etc.), which were analyzed separately. The five items were averaged into a composite measure (Cronbach's alpha = .79), representing the degree to which the individual felt supported by his or her protection net after the disaster (*M* = 3.36, *SD* = 0.81) (see Appendix for the full list of questions).

Experience with Death and Suffering (during)

Participants' experience with death and suffering as a consequence of the event was measured using the direct experience index (Lichtenstein et al., 1978). The index asked to report whether someone they knew died as a result of the disaster and if anyone they knew suffered (suffered serious physical or psychological consequences but did not die) as a result of the disaster (see Appendix for the full list of questions). For the analysis, the sum of the responses (ranging from 2 to 9) was used, representing the extent to which the participant had reported direct experience with suffering and death as a consequence of the disaster.

COVID-19 (during)

The extent to which the COVID-19 epidemic affected the displaced people was measured by asking them to report how much they thought that being in the temporary housing worsened the impact of the COVID-19 epidemic compared to if they were in their principal home. This question was directed only to individuals that were still in the temporary house. Answers were given on an ordinal scale: (1) being here or in my home would not have made a difference (2) being in my home would have made it a little easier to cope with the emergency (3) being in my home would have made the emergency much easier to deal with (see Appendix for the full list of questions). Higher values represented a higher impact of the COVID-19 epidemic on the survivors.

Post-Traumatic Stress (after)

The shortened SPAN Scale (Startle, Physiological arousal, Anger, Numbness), including items 17, 14, 11, 5 from the original scale (Davidson et al., 1997), measured post-traumatic stress disorder (Meltzer-Brody et al., 1999). Participants were asked to report how often they experienced a series of moods and how intensely during the 2-3 months following the event. The moods were: (a) Have you been physically upset by reminders of the event? (b) Have you had difficulty concentrating? (c) Have you found it hard to imagine having a long life span fulfilling your goals? (d) Have you been avoiding any thoughts or feelings about the event? The eight items were averaged into a composite measure (Cronbach's alpha = .88), representing the frequency with which the individual experienced the symptoms and the intensity of these symptoms after the disaster (*M* = 2.94, *SD* = 0.86) (see Appendix for the full list of questions).

Health Impairment (after)

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The consequences of the event on health were measured by the one-item health impairment scale (Schuster et al., 2017), which asked to what extent participants thought the event had compromised their health, using a scale from 1 (not at all) to 7 (very much) (see Appendix for the full list of questions).

Well-being (today)

To measure present well-being, we used the MOS 36-Item Short-Form Health Survey (SF-36) (Ware & Sherbourne, 1992), which asks to report how often (from 1 = all the time to 5 = none of the time) the participant experienced a specified emotional state during the last 30 days. The emotional states were: (1) nervous, (2) feeling calm and peaceful, (3) having a lot of energy, (4) feeling downhearted and blue, (5) feeling worn out, (6) feeling happy, (7) feeling tired (see Appendix for the full list of questions). The responses to the seven items were averaged into a composite measure (Cronbach's alpha = .82), representing the degree to which the individual experienced positive well-being at the present time (*M* = 3.17, *SD* = 0.62).

Individual Characteristics

Resilience Capability. The Brief Resilience Scale was used to measure individual ability to recover from stressful conditions, known as individual resilience capability (Smith et al., 2008). The scale asks to indicate the degree to which the participant agrees with each of a series of statements (e.g., I tend to bounce back quickly after hard times, It does not take me long to recover from a stressful event) (see Appendix for the full list of questions). The responses to the six items were averaged into a composite measure (Cronbach's alpha = .86), representing the degree to which the individual had a strong individual resilience capability (*M* = 4.43, *SD* = 1.15).

Psychological Vulnerability. The Psychological Vulnerability Scale (Sinclair & Wallston, 1999) asked to indicate the degree to which a series of statements best described the participant. Sample statements are: "If I do not achieve my goals, I feel like a failure as a person", "I am frequently aware of feeling inferior to other people", "I need approval from others to feel good about myself" (see Appendix for the full list of questions). The scale measures the degree to which the participant holds detrimental cognitive beliefs that render him or her more vulnerable. In particular, the scale measures a pattern of cognitive beliefs reflecting a dependence on external sources (i.e., concrete achievements or other people) for self-affirmation, as opposed to a belief in the worth of one's inner qualities and character. According to the theory (Sinclair & Wallston, 1999), such a dependence renders the person's sense of self-worth vulnerable to the capricious treatment of others or the vicissitude of life. Consequently, such dependence can markedly interfere with one's ability to achieve goals. The responses to the six items were averaged into a composite measure (Cronbach's alpha = .77), representing the degree to which the individual is psychologically vulnerable (*M* = 3.43, *SD* = 1.10).

Personal Responsibility for Disaster Preparedness. We asked to indicate to what extent, today, the participant felt personally responsible for their preparedness with respect to the occurrence of a major earthquake and to what extent, today, the participant felt that the City and State should be responsible for making sure he or she was prepared for the occurrence of a major earthquake (Mulilis & Duval, 1995, 1997). Responses were given on a 1 (not at all responsible) to 7 (total responsibility) response scale (see Appendix for the full list of questions). The level of personal responsibility was calculated by subtracting each person's level of responsibility attributed to external agents (e.g., the government) from his or her level of indicated personal responsibility. These computations yielded scores for each person ranging from a + 6 indicating a response indicating total responsibility (7) on the personal responsibility item and not at all responsible (1) on the external agents' item, to a -6 that represented total attribution of responsibility to external agents (7) versus no personal responsibility regarding self.

Sociodemographic characteristics. Information on each participant's age, gender, education, and employment status were also collected. Moreover, we asked participants where they lived when the

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earthquake happened, for how long they had lived in that location before the event (years), and if they lived in an owned or rented house at the time of the earthquake.

3.4. Statistical Analyses

We analyzed the data using R (Version 4.0) unless differently stated. Descriptive statistics (means and standard deviation) were used to explore the data. T-tests for independent samples and between subjects and repeated ANOVAs were used to test differences among groups and among variables within the same group. Tukey post-hoc tests were used to make comparisons between levels of the factor. Linear regression was used to test the predictive power of the predictors on the outcome. Pearson correlation was used to assess relationships between variables. P was set to .05.

4. Results

4.1. Outcome measures

Quality of life

Life ratings changed significantly across the various points in time (before the disaster, during the temporary housing, today, and ten years from now), $F(3,558) = 54.6$, $p < .001$, $\eta^2 = .138$. As shown in Figure 6, the life ratings were the lowest during temporary housing ($M = 5.86$, $SE = .150$), and the highest before the disaster ($M = 7.77$, $SE = .101$), with today being in between ($M = 6.94$, $SE = .128$) and not significantly different from the ratings expected in 10 years from now ($M = 7.21$, $SE = .127$). Respondents had clearly negative memories of the life they lived while in temporary housing, especially when compared to their previous and subsequent lives. Such a low quality of life is empirical evidence reflecting a condition of distress during temporary housing.

As shown in Figure 7, being in a temporary house (i.e., having lost the habitability of one's home) seems to exacerbate the condition of lower quality of life already induced by the disastrous event itself (i.e., the earthquake). A comparison of life ratings of those participants who had to move into a temporary house with those who did not show that being in a temporary house significantly worsened the survivors' conditions, $F(2,494) = 3.43$, $p = .033$, $\eta^2 = .006$. All participants who have suffered the disaster rated their present life as worse ($M = 7.07$, $SE = 0.123$) than the life they had before the event ($M = 7.67$, $SE = 0.098$). However, those survivors whose house was declared inhabitable after the disaster and who had to move into a temporary house rated their present life as even worse than those who were not forced to leave their home.

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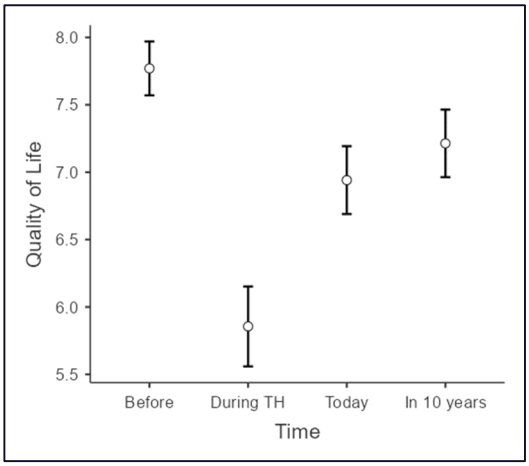

Figure 6. Quality of life during the different time periods (TH = temporary housing).

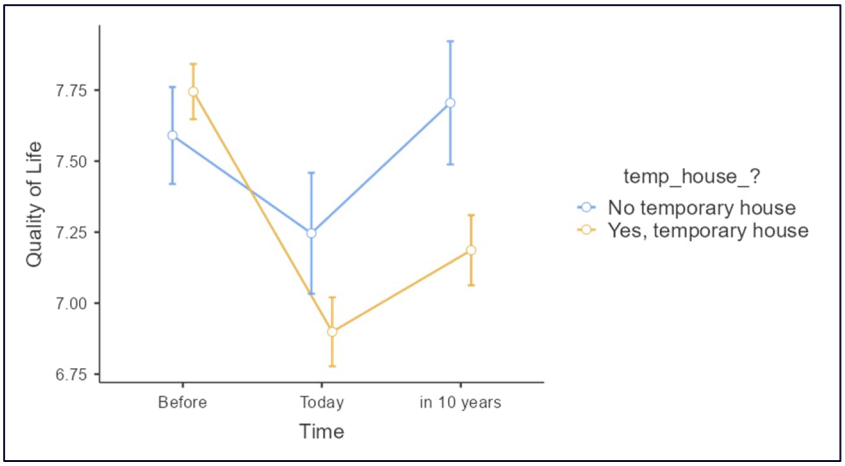

Figure 7. Quality of life for the different time periods by type of group (temporary housing)

Post-Traumatic Stress Disorder (after)

Post-Traumatic Stress Disorder (PTSD) relative to 2-3 months after the event was significantly higher (M = 42.1, SD = 20.0) in those survivors who were displaced into a temporary housing solution than those who were not (M = 27.1, SD = 17.9), $t(249) = -5.34$; $p < .001$, as shown in Figure 8.

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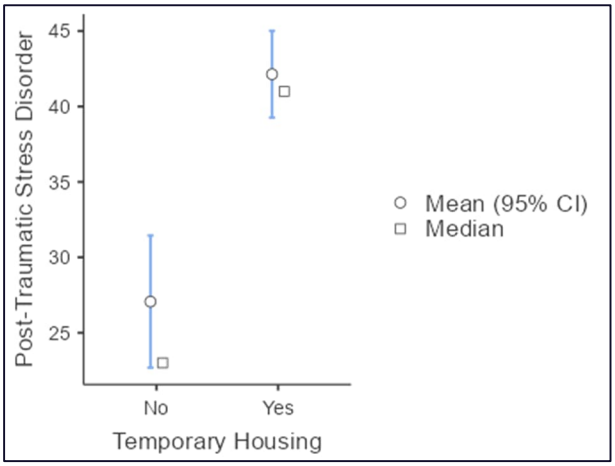

Figure 8. The difference in Post-traumatic Stress Disorder between groups (Yes = had been displaced, No = were not displaced)

Health Impairment (today)

Health Impairment was significantly higher (M = 3.76, SD = 1.84) among those survivors who were displaced into a temporary solution, than among those who were not (M = 2.77, SD = 1.85), t (253) = -3.75; p < .001, as shown in Figure 9.

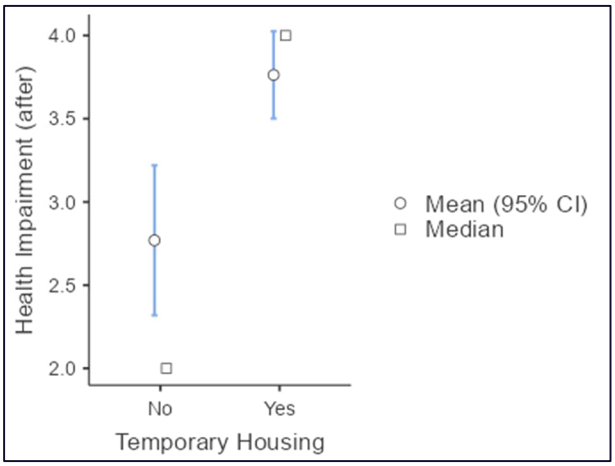

Figure 9. The difference in Health Impairment between groups (Yes = had been displaced, No = were not displaced)

Well-being (today)

Well-being was rated lower (M = 2.73, SD = 0.57) among survivors who were displaced in temporary housing than among those who were not (M = 2.80, SD = 0.52), but the difference did not reach significance t(255) = 0.897, p = .371, as shown in Figure 10.

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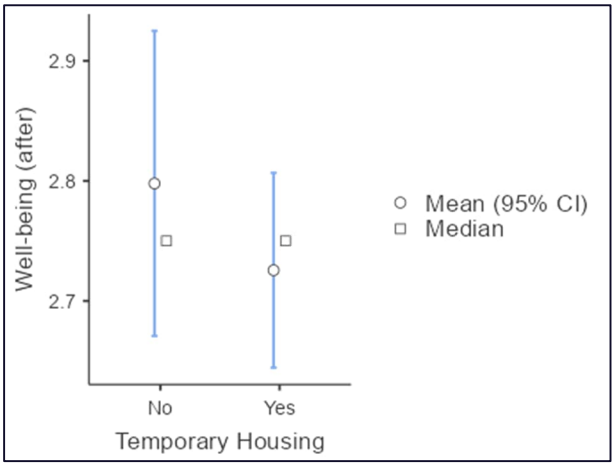

Figure 10. The difference in well-being between groups (Yes = had been displaced, No = were not displaced)

Economic Vulnerability (today)

Per-capita income was lower (*M* = 11.819, *SD* = 7.170) for those survivors who were displaced in temporary housing than for those who were not (*M* = 13.088, *SD* = 7.874), but the difference did not reach significance *t*(237) = 1.157, *p* = .248, as shown in Figure 11.

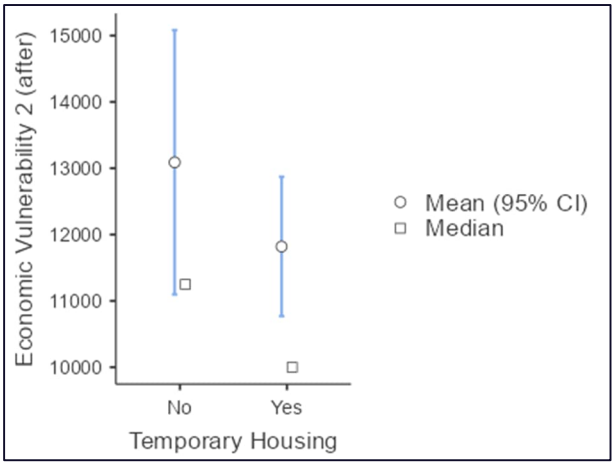

Figure 11. The difference in per-capita income between groups (Yes = had been displaced, No = were not displaced)

Physical Vulnerability (today)

Health was rated significantly lower (*M* = 2.91, *SD* = 0.92) by those survivors who were displaced in temporary housing than by those who were not (*M* = 3.28, *SD* = 1.00), *t* (253) = 2.71, *p* <.001, as shown in Figure 12.

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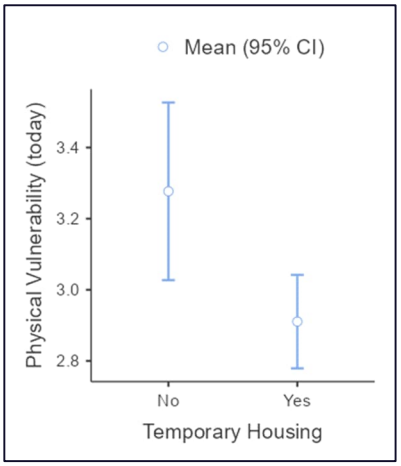

Figure 12. The difference in perceived health between groups (Yes = had been displaced, No = were not displaced)

Risk Awareness (today)

Risk awareness was significantly higher (*M* = 4.28, *SD* = 1.47) for those survivors who were displaced in a temporary solution, than for those who were not (*M* = 3.61, *SD* = 1.41), *t* (255) = -3.18; *p* = .002, as shown in Figure 13.

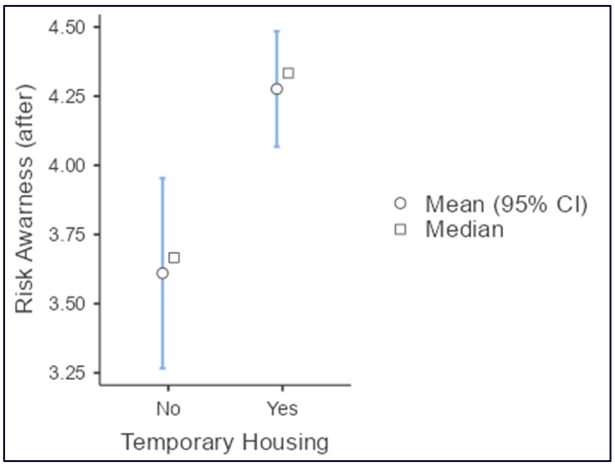

Figure 13. The difference in Risk Awareness between groups (Yes = had been displaced, No = were not displaced)

4.2. Predictors of vulnerability

Predictors of quality of life during displacement

We next examined the main causes of low quality of life during temporary housing to examine who and why is more vulnerable. The linear regression model (Table 7) explained a significant proportion of variance in the quality of life ratings during temporary housing, R^2 = .66, *F*(31, 113) = 7.02, p < .001. Significant predictors of quality of life during displacement were the type of temporary housing, the temporary housing quality, the temporary housing satisfaction, and the level of psychological vulnerability. Lower quality of life during displacement was significantly predicted by having lived in a camper or tent, by having perceived a lower satisfaction of life during displacement (*r* = .591; *p* < .001; Figure 14), by having perceived lower overall quality of the displaced solution (*r* = .541; *p* <. 001; Figure 15), and by being more psychologically vulnerable (*r* = -.221; *p* = .003; Figure 16).

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Table 7. Regression Analysis Summary for Model Variables Predicting Quality of Life during Temporary Housing

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept [a]	0.571	1.917	0.298	0.766	
Quality of Life (before)	0.018	0.107	0.168	0.867	0.012
Place Attachment (before)	-0.030	0.138	-0.217	0.829	-0.015
Economic Vulnerability (before)	0.000	0.000	0.575	0.566	0.038
Physical Vulnerability (before)	0.040	0.167	0.237	0.813	0.017
Risk Awareness (before)	0.089	0.092	0.967	0.335	0.074
Individual Preparedness (before)	-0.004	0.023	-0.161	0.873	-0.011
Type of Temporary Housing:					
2 – 1	1.246	0.590	2.114	0.037	0.612
4 – 1	-4.079	0.915	-4.457	< .001	-2.003
5 – 1	0.962	0.710	1.355	0.178	0.473
6 – 1	0.375	0.513	0.730	0.467	0.184
7 – 1	0.385	0.757	0.509	0.612	0.189
8 – 1	2.255	0.952	2.368	0.020	1.108
9 – 1	-0.476	0.618	-0.770	0.443	-0.234
10 – 1	-0.393	0.886	-0.444	0.658	-0.193
Density (per capita space)	-0.004	0.006	-0.704	0.483	-0.047
Temporary Housing Quality	0.800	0.160	4.990	< .001	0.375
Temporary Housing Satisfaction	1.366	0.212	6.450	< .001	0.485
Length of Displacement (months)	0.003	0.005	0.527	0.599	0.059
Still in Temporary Housing:					
Yes – No	0.500	0.383	1.306	0.194	0.245
Type of Seismic Event:					
2012 Emilia Earthquake – 2009 L'Aquila Earthquake	-0.939	0.386	-2.432	0.017	-0.461
2016 Central Italy Earthquake – 2009 L'Aquila Earthquake	-0.163	0.478	-0.341	0.734	-0.080
Damage Severity	-0.105	0.097	-1.079	0.283	-0.090
Social Support (during)	-0.036	0.133	-0.274	0.785	-0.021
Protection Net (during)	-0.218	0.188	-1.161	0.248	-0.087
Experience with Death and Suffering	0.030	0.108	0.277	0.782	0.020
Resilience Capability	-0.052	0.127	-0.409	0.684	-0.031
Psychological Vulnerability	-0.369	0.145	-2.539	0.012	-0.197
Responsibility	0.003	0.061	0.051	0.959	0.003
Age	-0.021	0.011	-1.938	0.055	-0.157
Gender:					
Female – Male	0.015	0.290	0.052	0.959	0.007

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Predictor	Estimate	SE	t	p	Stand. Estimate
Education	0.206	0.203	1.012	0.314	0.075

[a] Type of Temporary Housing: [1] private car/camper/private tent [2] free friend's house [3] gymnasium/train car made available by competent authority [4] tent/camper/ made available by competent authority [5] hotel (made available by competent authority) [6] rented apartment or house [7] apartment or house I own (e.g., second house) [8] container module or P.M.A.R. (Prefabricated Modular Removable Housing Units) [9] M.A.P., S.A.E., M.A.P.R.E, P.M.R.R. (Provisional Housing Modules, Emergency Housing Solutions, Rural Emergency Prefabricated Housing Modules - Prefabricated or otherwise rapidly constructed houses, often made of wood, with up to one or two floors, single-family, two-family or arranged in rows - Rural Removable Modular Prefabricated Housing Modules) [10] C.A.S.E. (Anti-seismic Sustainable Eco-friendly Complexes - three-story buildings, with underground parking, in a green environment

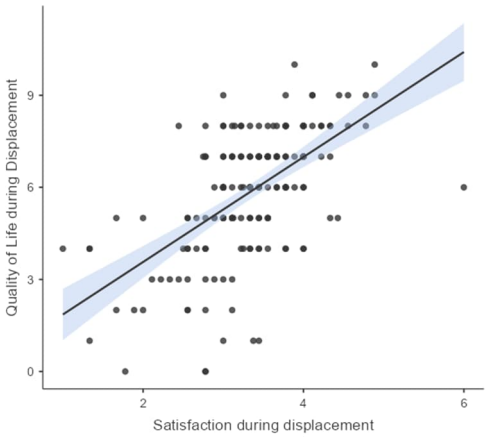

Figure 14. Correlation between Quality of Life during Displacement and Satisfaction with specific aspects of life during displacement.

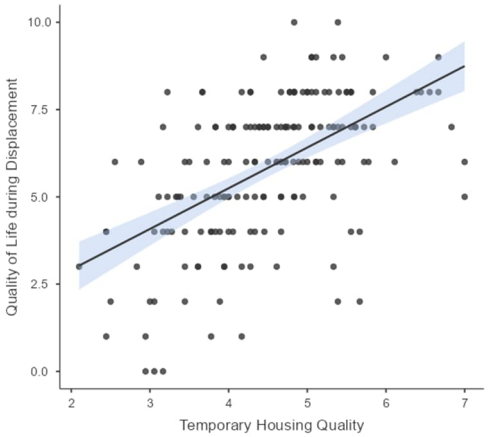

Figure 15. Correlation between Quality of Life during displacement and Quality of the Temporary Housing Solution.

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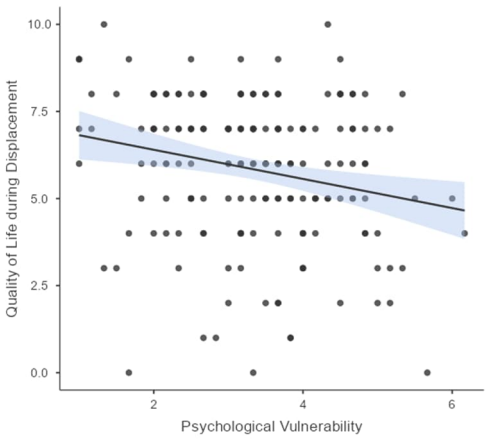

Figure 16. *Correlation between Quality of Life during displacement and Psychological Vulnerability.*

Specific housing characteristics

Respondents were asked to think about the housing solution they had used the longest and rate each of a series of statements that relate to the temporary housing characteristics indicating how much they agreed or disagreed with each one (1 = strongly disagree, 2 = disagree, 3 = nor agree nor disagree, 4 = agree, 5 = strongly agree). Answers were then regressed on the Quality of Life during Temporary Housing variable. The linear regression model (Table 8) explained a significant proportion of variance in the quality of life during temporary housing, R^2 = .45, F(16, 154) = 7.74, p < .001. Results indicate that among the different housing characteristics, those that had the most impact in determining a lower quality of life during the displacement were: the environment surrounding the house, which was deemed depressing (p = .006), the place where the house was located, which was judged to be not very nice (p = .0001), and the lack of an own personal space in the house (p = .004). The other housing characteristics (e.g., space, light, noise, insulation, quality, etc.) did not significantly impact the quality of life. Other variables measured in the study (e.g., type of housing, type of seismic event, age etc.) did not have any significant effect in explaining this result.

Table 8. Regression Analysis Summary for Specific Housing Characteristics Predicting Quality of Life during Temporary Housing

Predictor	Estimate	SE	t	p
Intercept	0.582	0.705	0.826	0.410
Privacy				
1. I have my own personal space in the house	0.207	0.083	2.484	0.014
2. Who is outside can see what happens inside (R)	0.049	0.078	0.627	0.531
Noise				
3. The house is well insulated from external noise	0.042	0.082	0.508	0.612
4. External noise is heard when you are at home (R)	-0.071	0.080	-0.886	0.377
Space/density				
5. There is little space inside the house (R)	-0.061	0.087	-0.708	0.480
6. The space available is adequate for my needs	0.107	0.090	1.184	0.238
Natural Light				
7. The natural light entering through the windows or doors is not satisfactory (R)	-0.071	0.067	-1.048	0.296

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Predictor	Estimate	SE	t	p
8. The windows allow the right amount of natural light to pass through	0.110	0.087	1.260	0.210
Hot/Cold				
9. The thermal insulation of this house is poor (R)	0.123	0.083	1.487	0.139
10. It is rarely too hot or too cold	0.079	0.070	1.129	0.261
Quality				
11. This house is a low-quality building (R)	0.046	0.098	0.472	0.637
12. In this house, I experienced no ruptures or breaks	0.015	0.069	0.217	0.828
View - Surrounding Environment				
13. The environment surrounding the house is depressing (R)	0.228	0.082	2.786	0.006
14. The place where the house is located is very nice	0.395	0.091	4.360	< .001
Placement				
15. The house is near all facilities relevant for me (e.g., work, schools, hospital, public services, pharmacy, shops, theatre, and cinema)	-0.066	0.080	-0.002	0.998
16. The house is far from my relatives and dears (R)	-0.101	0.072	-1.411	0.160

Note. The two items measuring overall comfort (i.e., "Overall I am comfortable in this house" and "This house is bad accommodation (R)" were eliminated from the predictors because they were measuring overall satisfaction and not single characteristics.

Specific aspects of life during displacement

Then we turned to investigate how specific aspects of life were deemed important in determining quality of life during displacement. How satisfied participants were during the displacement with each one of a list of specific aspects of their life was used to predict quality of life during displacement. The linear regression model (Table 9) explained a significant proportion of variance in the quality of life during temporary housing, $R^2 = .45$, $F(9, 160) = 14.3$, $p < .001$. Results showed that only two specific aspects of life significantly predicted the quality of life during temporary housing. These were the satisfaction with natural beauty and the overall climate. Reporting a lower quality of life during displacement was significantly predicted by dissatisfaction with the natural beauty and the overall climate. These were two aspects related to the surrounding environment and not personal life or social relationships. Dissatisfaction with the natural beauty was significantly higher in the Emilia Earthquake compared to the other two earthquakes, F(2,101) = 6.88, p = .001 and especially for the apartment solutions compared to the Provisional Housing Modules (e.g., M.A.P.), F (3,47) = 7.57, p = .0001. The same relationship was not found for the dissatisfaction with the climate.

Table 9. Regression Analysis Summary for Specific Aspects of Life during displacements Predicting Quality of Life during Temporary Housing

Predictor	Estimate	SE	t	p
Intercept	-0.132	0.626	-0.210	0.834
Job prospects	-0.203	0.155	-1.308	0.193

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Predictor	Estimate	SE	t	p
Educational opportunities	0.388	0.200	1.939	0.054
Financial situation	0.232	0.152	1.528	0.128
Personal safety	0.257	0.143	1.803	0.073
Social life	0.271	0.152	1.780	0.077
Outdoor activities	-0.175	0.170	-1.031	0.304
Natural beauty	0.334	0.160	2.089	0.038
Overall climate	0.439	0.188	2.341	0.020
Cultural opportunities	0.258	0.142	1.817	0.071

The quality of the temporary solutions adopted in the three earthquakes was not experienced very differently, with some exceptions. The earthquake in Central Italy 2016 suffered especially for the privacy ("Those who are/were outside can/could see what's going on/were inside"), for the poor thermal insulation, for the temperature inside the house ("is/was too hot or too cold"), and the fact that the housing solution is/was not close to relevant facilities (e.g., work, schools, hospital, utilities, pharmacy, shopping, theatre and movie theatre), compared to the other earthquakes.

Seemingly, satisfaction with life during temporary housing in survivors of the earthquake in Central Italy 2016 was lowest for the job opportunities, the educational opportunities, the social life, and the natural beauty.

Regarding the specific type of housing, the numbers were too low to draw significant conclusions, but it seemed that the Provisional Housing Modules (e.g., M.A.P.) was more appreciated than the other solutions for their natural beauties. While the space available in the rented apartment or house was more adequate to the needs than that in the tent or camper and also compared to the Provisional Housing Modules (e.g., M.A.P.). The problem of small indoor space, and the not insulation from external noise were more evident in the camper or tent than in other solutions, especially the rented apartment or house. The Provisional Housing Modules (e.g., M.A.P.), on the other hand, were rated less protective of one's privacy (those who were outside could see what was going inside) than the rented apartment.

Predictors of Post-Traumatic Stress Disorder (after)

We next examined the main causes of post-traumatic stress disorder after temporary housing to answer who and why is more vulnerable. The linear regression model (Table 10) explained a significant proportion of variance in the post-traumatic stress disorder scores of those survivors who were displaced in a temporary housing solution, $R^2 = .43$, $F(31, 111) = 2.71$, $p < .001$.
Significant predictors of post-traumatic stress disorder were individual preparedness, length of displacement, the type of seismic event, and the level of resilience capability.
A higher post-traumatic stress disorder was significantly correlated with being less prepared before the disaster ($r = -.221$; $p = .002$; Figure 17), having experienced the 2016 earthquake (Figure 18), having been displaced for less time in the temporary solution, and possessing fewer resilience capabilities ($r = -.328$; $p < .001$; Figure 19).

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Table 10. Regression Analysis Summary for Model Variables Predicting Post-traumatic Stress Disorder after Temporrary Housing

Model Coefficients - Post-Traumatic Stress Disorder

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept [a]	46.660	23.878	1.954	0.053	
Quality of Life (before)	2.237	1.325	1.688	0.094	0.156
Place Attachment (before)	3.219	1.736	1.854	0.066	0.171
Economic Vulnerability (before)	0.000	0.000	0.246	0.806	0.021
Physical Vulnerability (before)	-1.676	2.077	-0.807	0.421	-0.076
Risk Awareness (before)	1.298	1.144	1.135	0.259	0.113
Individual Preparedness (before)	-0.573	0.288	-1.990	0.049	-0.180
Type of Temporary Housing:					
2 – 1	-2.467	7.314	-0.337	0.737	-0.126
4 – 1	3.021	11.353	0.266	0.791	0.155
5 – 1	2.472	8.828	0.280	0.780	0.127
6 – 1	12.590	6.445	1.953	0.053	0.645
7 – 1	30.492	9.640	3.163	0.002	1.561
8 – 1	8.291	11.838	0.700	0.485	0.425
9 – 1	11.762	7.761	1.516	0.132	0.602
10 – 1	-6.656	10.983	-0.606	0.546	-0.341
Density (per capita space)	0.018	0.076	0.238	0.812	0.021
Temporary Housing Quality	2.309	1.992	1.159	0.249	0.113
Temporary Housing Satisfaction	-3.470	2.631	-1.319	0.190	-0.129
Length of Displacement (months)	-0.193	0.059	-3.264	0.001	-0.472
Still in Temporary Housing:					
Yes – No	8.546	4.820	1.773	0.079	0.438
Type of Seismic Event:					
2012 Emilia Earthquake – 2009 L'Aquila Earthquake	-13.879	4.807	-2.887	0.005	-0.711
2016 Central Italy Earthquake – 2009 L'Aquila Earthquake	-12.833	5.963	-2.152	0.034	-0.657
Damage Severity	-1.859	1.210	-1.537	0.127	-0.168
Social Support (during)	2.054	1.677	1.224	0.223	0.125
Protection Net (during)	-0.404	2.344	-0.172	0.864	-0.017
Experience with Death and Suffering	0.535	1.345	0.397	0.692	0.037
Resilience Capability	-3.819	1.585	-2.410	0.018	-0.240
Psychological Vulnerability	2.240	1.824	1.228	0.222	0.125
Responsibility	-0.234	0.758	-0.309	0.758	-0.026
Age	-0.119	0.134	-0.891	0.375	-0.094
Gender:					
Female – Male	1.461	3.607	0.405	0.686	0.075
Education	-3.668	2.526	-1.452	0.149	-0.141

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Model Coefficients - Post-Traumatic Stress Disorder

Predictor	Estimate	SE	t	p	Stand. Estimate

[a] Represents reference level

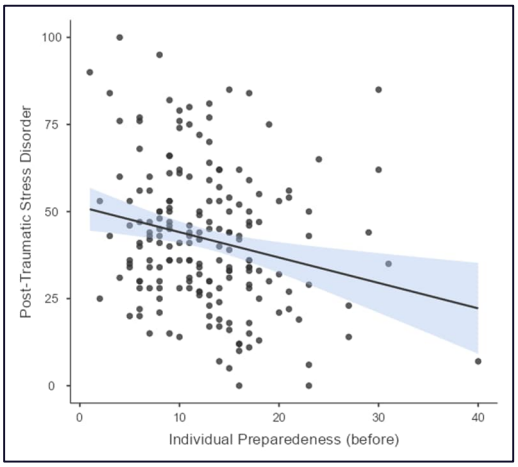

Figure 17. Correlation between Post-traumatic Stress Disorder and Preparedness before the Disaster.

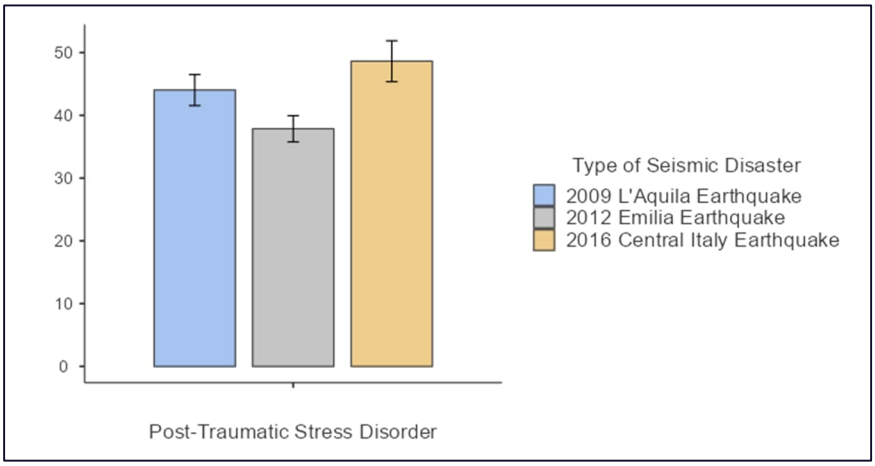

Figure 18. Post-traumatic Stress Disorder as a function of the type of disaster.

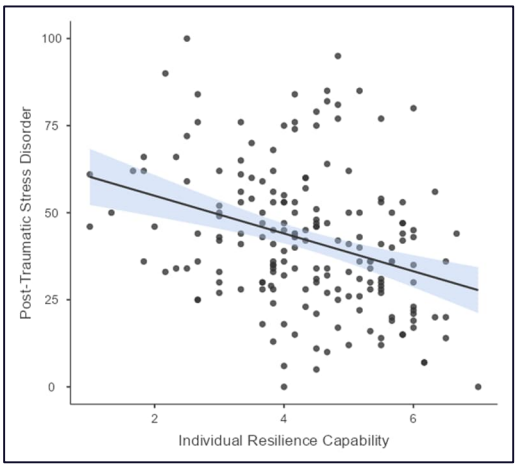

Figure 19. Post-traumatic Stress Disorder as a function of the Individual Resilience Capability.

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Predictors of Health Impairment (after)

Health impairment, achieved as a consequence of the disaster, is another cue of vulnerability and can be exacerbated by temporary housing. We, therefore, examined the main predictors of health impairment as a consequence of having experienced a disaster and being displaced in a temporary housing solution.
The linear regression model (Table 11) explained a significant proportion of variance in health impairment, R^2 = .42, F(31, 113) = 2.59, p < .001.
Significant predictors of health impairment were the level of resilience capability and the level of psychological vulnerability.
A higher level of health impairment was significantly correlated with (r = -.380; p < .001; Figure 20) possessing fewer resilience capabilities (r = -.380; p < .001; Figure 21) and being more psychologically vulnerable (r = .272; p < .001; Figure 22).

Table 11. Regression Analysis Summary for Variables Predicting Post-disaster Health Impairment in Survivors Displaced in Temporary Housing

Model Coefficients - Health Impairment

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept [a]	1.603	2.280	0.703	0.483	
Quality of Life (before)	0.322	0.127	2.540	0.012	0.236
Place Attachment (before)	0.072	0.164	0.436	0.664	0.040
Economic Vulnerability (before)	-1.01e−6	0.000	-0.042	0.967	-0.004
Physical Vulnerability (before)	-0.438	0.199	-2.201	0.030	-0.210
Risk Awareness (before)	0.068	0.109	0.622	0.535	0.063
Individual Preparedness (before)	0.011	0.027	0.413	0.680	0.038
Type of Temporary Housing:					
2 – 1	-1.015	0.701	-1.447	0.151	-0.548
4 – 1	0.382	1.088	0.351	0.726	0.206
5 – 1	1.015	0.845	1.202	0.232	0.549
6 – 1	0.861	0.610	1.411	0.161	0.465
7 – 1	1.911	0.900	2.123	0.036	1.033
8 – 1	1.087	1.132	0.960	0.339	0.587
9 – 1	0.538	0.735	0.731	0.466	0.291
10 – 1	-0.413	1.053	-0.393	0.695	-0.223
Density (per capita space)	-0.012	0.007	-1.610	0.110	-0.141
Temporary Housing Quality	0.267	0.191	1.402	0.164	0.138
Temporary Housing Satisfaction	-0.281	0.252	-1.117	0.266	-0.110
Length of Displacement (months)	-0.010	0.006	-1.770	0.079	-0.257
Still in Temporary Housing:					
Yes – No	0.632	0.455	1.388	0.168	0.341
Type of Seismic Event:					
2012 Emilia Earthquake – 2009 L'Aquila Earthquake	-0.020	0.459	-0.043	0.966	-0.011
2016 Central Italy Earthquake – 2009 L'Aquila Earthquake	-0.582	0.569	-1.024	0.308	-0.315

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Model Coefficients - Health Impairment

Predictor	Estimate	SE	t	p	Stand. Estimate
Damage Severity	-0.062	0.116	-0.540	0.590	-0.059
Social Support (during)	0.097	0.158	0.614	0.541	0.063
Protection Net (during)	0.232	0.224	1.037	0.302	0.102
Experience with Death and Suffering	-0.099	0.129	-0.772	0.442	-0.072
Resilience Capability	-0.499	0.151	-3.308	0.001	-0.331
Psychological Vulnerability	0.486	0.173	2.809	0.006	0.286
Responsibility	-0.064	0.073	-0.878	0.382	-0.074
Age	0.005	0.013	0.430	0.668	0.046
Gender:					
Female – Male	0.066	0.345	0.191	0.849	0.036
Education	0.049	0.242	0.201	0.841	0.020

[a] Represents reference level

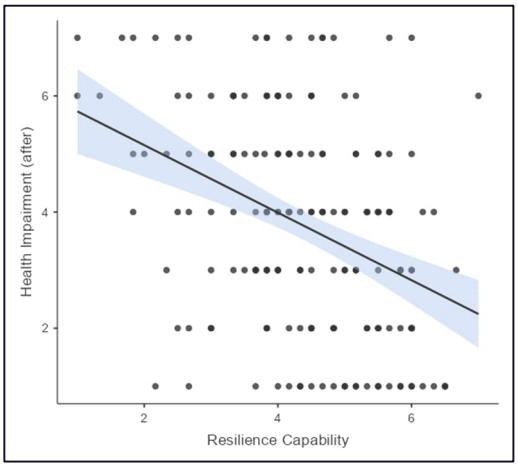

Figure 20. Health impairment as a function of the individual Resilience Capability.

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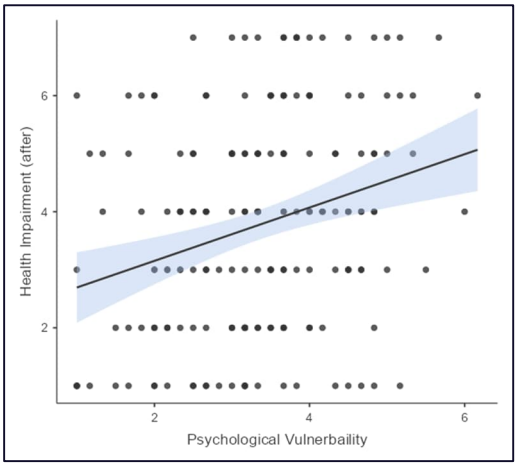

Figure 21. Health impairment as a function of the individual Psychological Vulnerability.

Predictors of Well-being (today)

Well-being during the last 30 days is another cue of distress and can be exacerbated by post-disaster temporary housing. We examined the main predictors of well-being as a consequence of having experienced a disaster and being displaced in a temporary housing solution. The linear regression model (Table 12) explained a significant proportion of variance in well-being, R^2 = .54, $F(31, 113) = 4.30$, p < .001.

Significant predictors of well-being were resilience capability and the level of psychological vulnerability. A lower level of well-being was significantly correlated with possessing fewer resilience capabilities (r = .496; p < .001; Figure 22) and being more psychologically vulnerable (r = -.493; p < .001; Figure 23).

Table 12. Regression Analysis Summary for Variables Predicting Present Well-being (today) in Survivors Displaced in Temporary Housing

Model Coefficients - Well-being (today)

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept [a]	1.554	0.611	2.546	0.012	
Quality of Life (before)	0.018	0.034	0.520	0.604	0.043
Place Attachment (before)	0.022	0.044	0.499	0.619	0.041
Economic Vulnerability (before)	0.000	0.000	0.279	0.781	0.021
Physical Vulnerability (before)	0.031	0.053	0.573	0.568	0.048
Risk Awareness (before)	0.051	0.029	1.724	0.087	0.153
Individual Preparedness (before)	0.007	0.007	0.926	0.356	0.075
Type of Temporary Housing:					
2 – 1	0.096	0.188	0.509	0.612	0.171
4 – 1	0.365	0.291	1.253	0.213	0.653
5 – 1	0.080	0.226	0.354	0.724	0.143
6 – 1	0.322	0.163	1.971	0.051	0.575
7 – 1	0.138	0.241	0.573	0.568	0.247
8 – 1	0.348	0.303	1.147	0.254	0.622
9 – 1	0.464	0.197	2.355	0.020	0.829
10 – 1	-0.141	0.282	-0.500	0.618	-0.252
Density (per capita space)	0.000	0.002	0.017	0.987	0.001

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Model Coefficients - Well-being (today)

Predictor	Estimate	SE	t	p	Stand. Estimate
Temporary Housing Quality	0.014	0.051	0.266	0.791	0.023
Temporary Housing Satisfaction	0.115	0.067	1.701	0.092	0.148
Length of Displacement (months)	0.000	0.002	0.061	0.951	0.008
Still in Temporary Housing:					
Yes – No	-0.235	0.122	-1.927	0.056	-0.420
Type of Seismic Event:					
2012 Emilia Earthquake – 2009 L'Aquila Earthquake	0.257	0.123	2.095	0.038	0.460
2016 Central Italy Earthquake – 2009 L'Aquila Earthquake	0.021	0.152	0.140	0.889	0.038
Damage Severity	-0.038	0.031	-1.215	0.227	-0.118
Social Support (during)	-0.020	0.042	-0.479	0.633	-0.043
Protection Net (during)	-0.030	0.060	-0.506	0.614	-0.044
Experience with Death and Suffering	-0.002	0.034	-0.059	0.953	-0.005
Resilience Capability	0.121	0.040	2.996	0.003	0.265
Psychological Vulnerability	-0.168	0.046	-3.626	< .001	-0.327
Responsibility	0.016	0.019	0.834	0.406	0.062
Age	0.000	0.003	0.035	0.972	0.003
Gender:					
Female – Male	-0.147	0.092	-1.592	0.114	-0.263
Education	0.104	0.065	1.601	0.112	0.138

[a] Represents reference level

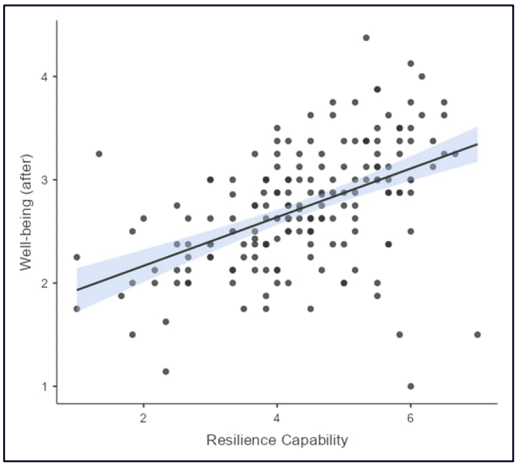

Figure 22. Well-being as a function of individual Resilience Capability

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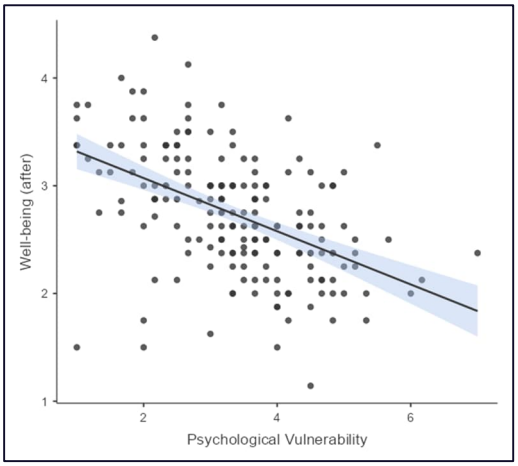

Figure 23. *Well-being as a function of individual Psychological Vulnerability*

Predictors of Quality of Life (today)

Quality of life at the moment of the study can be another indicator of a negative outcome and can be exacerbated by post-disaster temporary housing. We examined the main predictors of present quality of life in survivors who have been displaced in a temporary housing solution as a consequence of having experienced a disaster. The linear regression model (Table 13) explained a significant proportion of variance in present quality of life, R^2 = .45, $F(31, 113) = 3.00$, $p < .001$.

Significant predictors of quality of life at the time of the survey were the type of seismic event and the resilience capability.

Lower ratings of quality of life at the time of the survey significantly correlated with having experienced the 2016 Central Italy Earthquake, F(2, 189) = 15.0, p <.001, Figure 24) compared to the other two events and possessing fewer resilience capabilities (r = .270; p < .001; Figure 25).

Table 13. Regression Analysis Summary for Variables Predicting Present Quality of Life in Survivors Displaced in Temporary Housing

Model Coefficients - Quality of Life (today)

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept [a]	1.216	2.122	0.573	0.568	
Quality of Life (before)	0.182	0.115	1.583	0.116	0.142
Place Attachment (before)	-0.060	0.149	-0.404	0.687	-0.036
Economic Vulnerability (before)	-2.00e−5	0.000	-0.917	0.361	-0.076
Physical Vulnerability (before)	-0.005	0.180	-0.030	0.976	-0.003
Risk Awareness (before)	0.024	0.099	0.241	0.810	0.023
Individual Preparedness (before)	-0.001	0.025	-0.042	0.967	-0.004
Type of Temporary Housing:					
2 – 1	-0.012	0.635	-0.019	0.985	-0.007
4 – 1	1.350	0.986	1.370	0.173	0.780
5 – 1	-1.129	0.765	-1.475	0.143	-0.652
6 – 1	-0.051	0.553	-0.092	0.927	-0.029
7 – 1	0.086	0.816	0.106	0.916	0.050
8 – 1	0.366	1.026	0.357	0.722	0.211

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Model Coefficients - Quality of Life (today)

Predictor	Estimate	SE	t	p	Stand. Estimate
9 – 1	0.653	0.666	0.981	0.329	0.377
10 – 1	-0.983	0.954	-1.031	0.305	-0.568
Density (per capita space)	0.001	0.007	0.076	0.939	0.006
Temporary Housing Quality	0.200	0.173	1.158	0.249	0.110
Temporary Housing Satisfaction	0.159	0.228	0.696	0.488	0.066
Length of Displacement (months)	-0.009	0.005	-1.764	0.080	-0.248
Still in Temporary Housing:					
Yes – No	-0.233	0.412	-0.564	0.574	-0.134
Type of Seismic Event:					
2009 L'Aquila Earthquake – 2016 Central Italy Earthquake	1.000	0.515	1.941	0.055	0.578
2012 Emilia Earthquake – 2016 Central Italy Earthquake	1.747	0.561	3.113	0.002	1.009
Damage Severity	0.085	0.105	0.816	0.416	0.086
Social Support (during)	0.243	0.143	1.697	0.092	0.168
Protection Net (during)	0.050	0.203	0.249	0.804	0.024
Experience with Death and Suffering	0.153	0.117	1.313	0.192	0.119
Resilience Capability	0.293	0.137	2.148	0.034	0.208
Psychological Vulnerability	-0.031	0.157	-0.198	0.843	-0.020
Responsibility	0.073	0.066	1.108	0.270	0.090
Age	-0.016	0.012	-1.420	0.158	-0.146
Gender:					
Female – Male	-0.099	0.312	-0.318	0.751	-0.057
Education	-0.002	0.219	-0.007	0.994	-6.52e−4

[a] Represents reference level

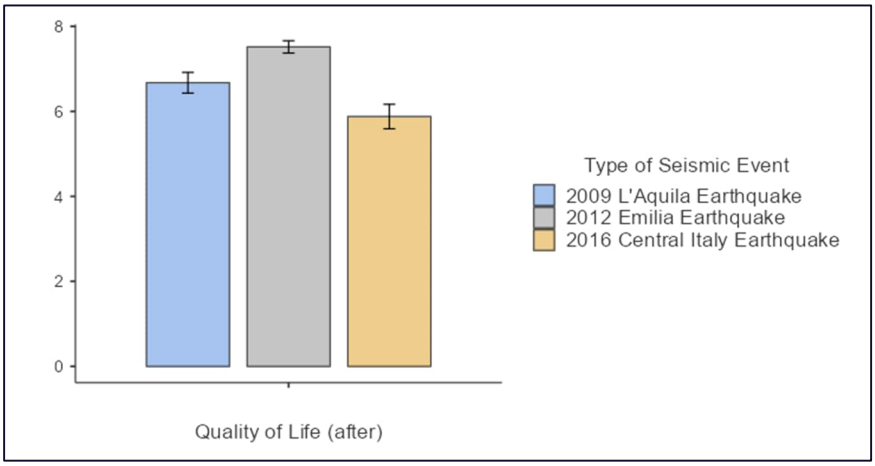

Figure 24. *Quality of Life (after) as a function of Type of Seismic Event*

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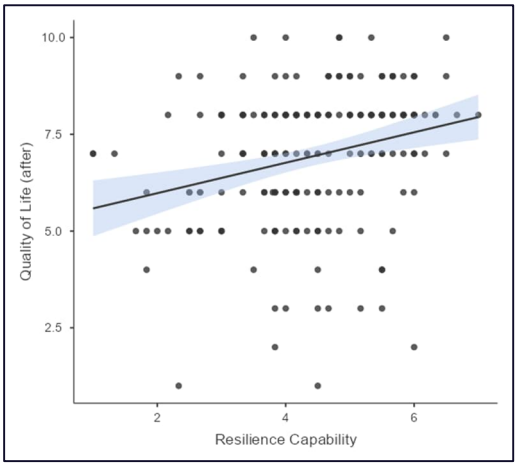

Figure 25. Quality of Life (after) as a function of individual Resilience Capability

Predictors of Economic Vulnerability (today)

Economic vulnerability at the moment of the study can be another negative outcome and can be exacerbated by post-disaster temporary housing. We examined the main predictors of present economic vulnerability in survivors who have been displaced in a temporary housing solution due to having experienced a disaster. The linear regression model (Table 14) explained a significant proportion of variance in economic vulnerability, R^2 = .68, F(31, 111) = 7.47, p < .001.

The economic vulnerability was significantly predicted by previous economic vulnerability and satisfaction with the temporary housing.

Lower ratings of per-capita income at the time of the survey significantly correlated with per-capita income at the time of the disaster (r = .681; p < .001), having been less satisfied with the temporary housing solution (r = .160; p = .036; Figure 27).

Table 14. Regression Analysis Summary for Model Variables Predicting Economic Vulnerability after Temporary Housing

Model Coefficients - Economic Vulnerability (per capita income) (today)

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept [a]	3873.564	6830.189	0.567	0.572	
Quality of Life (before)	-359.053	385.803	-0.931	0.354	-0.066
Place Attachment (before)	-852.552	492.589	-1.731	0.086	-0.120
Economic Vulnerability (before)	0.796	0.072	11.076	< .001	0.709
Physical Vulnerability (before)	508.031	593.755	0.856	0.394	0.061
Risk Awareness (before)	384.183	331.199	1.160	0.249	0.089
Individual Preparedness (before)	105.543	82.593	1.278	0.204	0.088
Type of Temporary Housing:					
2 – 1	712.970	2087.150	0.342	0.733	0.097
4 – 1	-351.499	3245.065	-0.108	0.914	-0.048
5 – 1	1178.791	2519.899	0.468	0.641	0.160
6 – 1	288.051	1823.229	0.158	0.875	0.039
7 – 1	-2510.890	2689.348	-0.934	0.353	-0.340
8 – 1	-2772.160	3375.633	-0.821	0.413	-0.375

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Model Coefficients - Economic Vulnerability (per capita income) (today)

Predictor	Estimate	SE	t	p	Stand. Estimate
9 – 1	-2387.554	2209.176	-1.081	0.282	-0.323
10 – 1	833.192	3139.157	0.265	0.791	0.113
Density (per capita space)	33.331	21.795	1.529	0.129	0.101
Temporary Housing Quality	-753.678	580.781	-1.298	0.197	-0.098
Temporary Housing Satisfaction	1971.608	753.350	2.617	0.010	0.194
Length of Displacement (months)	30.780	16.988	1.812	0.073	0.198
Still in Temporary Housing:					
Yes – No	-834.056	1377.569	-0.606	0.546	-0.113
Type of Seismic Event:					
2012 Emilia Earthquake – 2009 L'Aquila Earthquake	-1987.750	1378.822	-1.442	0.152	-0.269
2016 Central Italy Earthquake – 2009 L'Aquila Earthquake	-2681.702	1774.599	-1.511	0.134	-0.363
Damage Severity	46.497	347.828	0.134	0.894	0.011
Social Support (during)	443.291	473.390	0.936	0.351	0.071
Protection Net (during)	-599.353	668.326	-0.897	0.372	-0.066
Experience with Death and Suffering	-821.390	384.610	-2.136	0.035	-0.151
Resilience Capability	-210.326	451.264	-0.466	0.642	-0.035
Psychological Vulnerability	478.654	520.801	0.919	0.360	0.070
Responsibility	25.711	217.229	0.118	0.906	0.008
Age	41.421	37.997	1.090	0.278	0.087
Gender:					
Female – Male	871.643	1041.822	0.837	0.405	0.118
Education	-40.208	726.661	-0.055	0.956	-0.004

[a] Represents reference level

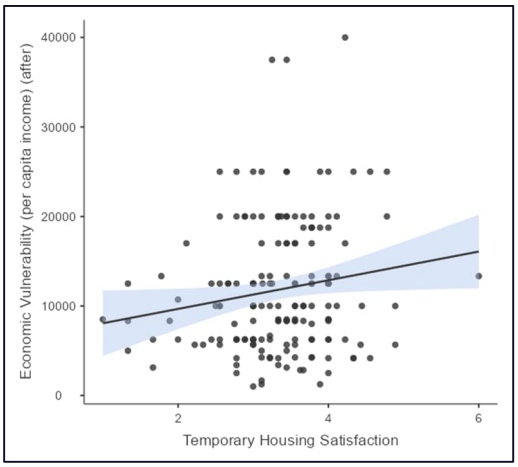

Figure 26. Economic Vulnerability after the event as a function of the satisfaction with the temporary housing

Predictors of Physical Vulnerability (today)

Physical vulnerability can be another indicator of vulnerability and can be exacerbated by post-disaster temporary housing. We examined the main predictors of present physical vulnerability in survivors who have been displaced in a temporary housing solution as a consequence of having experienced a

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disaster. The linear regression model (Table 15) explained a significant proportion of variance in physical vulnerability, R^2 = .54, F(31, 113) = 4.22, p < .001.
Physical vulnerability was significantly predicted by previous physical vulnerability, satisfaction with the temporary housing, individual resilience capability, and age.
Lower ratings of health at the time of the survey significantly correlated with lower health at the time of the disaster, (r = .435; p < .001), with having been less satisfied with the temporary housing solution (r = .343; p < .001; Figure 27), with possessing fewer resilience capabilities g (r = .431; p <.001; Figure 28), and with being older (r = -.216; p < .001; Figure 29).

Table 15. Regression Analysis Summary for Model Variables Predicting Physical Vulnerability after Temporary Housing

Model Coefficients - Physical Vulnerability (today)

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept [a]	1.079	1.028	1.049	0.296	
Quality of Life (before)	-0.002	0.057	-0.043	0.966	-0.004
Place Attachment (before)	0.022	0.074	0.292	0.771	0.024
Economic Vulnerability (before)	0.000	0.000	1.303	0.195	0.099
Physical Vulnerability (before)	0.279	0.090	3.112	0.002	0.264
Risk Awareness (before)	0.011	0.049	0.217	0.829	0.019
Individual Preparedness (before)	-0.002	0.012	-0.170	0.865	-0.014
Type of Temporary Housing:					
2 – 1	-0.035	0.316	-0.110	0.913	-0.037
4 – 1	0.361	0.491	0.736	0.463	0.385
5 – 1	-0.181	0.381	-0.475	0.636	-0.193
6 – 1	-0.265	0.275	-0.964	0.337	-0.283
7 – 1	-0.622	0.406	-1.531	0.129	-0.663
8 – 1	-0.351	0.511	-0.687	0.494	-0.374
9 – 1	0.090	0.332	0.270	0.788	0.096
10 – 1	-0.493	0.475	-1.037	0.302	-0.525
Density (per capita space)	0.004	0.003	1.305	0.195	0.102
Temporary Housing Quality	0.013	0.086	0.147	0.884	0.013
Temporary Housing Satisfaction	0.426	0.114	3.756	< .001	0.329
Length of Displacement (months)	0.001	0.003	0.386	0.700	0.050
Still in Temporary Housing:					
Yes – No	-0.090	0.205	-0.437	0.663	-0.096
Type of Seismic Event:					
2012 Emilia Earthquake – 2009 L'Aquila Earthquake	0.066	0.207	0.319	0.751	0.070
2016 Central Italy Earthquake – 2009 L'Aquila Earthquake	0.228	0.257	0.889	0.376	0.243
Damage Severity	-0.063	0.052	-1.204	0.231	-0.117
Social Support (during)	-0.013	0.071	-0.182	0.856	-0.017
Protection Net (during)	-0.119	0.101	-1.178	0.241	-0.103
Experience with Death and Suffering	0.002	0.058	0.040	0.968	0.003
Resilience Capability	0.237	0.068	3.480	< .001	0.310

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Model Coefficients - Physical Vulnerability (today)

Predictor	Estimate	SE	t	p	Stand. Estimate
Psychological Vulnerability	-0.120	0.078	-1.535	0.128	-0.139
Responsibility	-0.026	0.033	-0.806	0.422	-0.060
Age	-0.018	0.006	-3.225	0.002	-0.305
Gender:					
Female – Male	-0.133	0.156	-0.855	0.394	-0.142
Education	-0.002	0.109	-0.018	0.986	-0.002

[a] Represents reference level

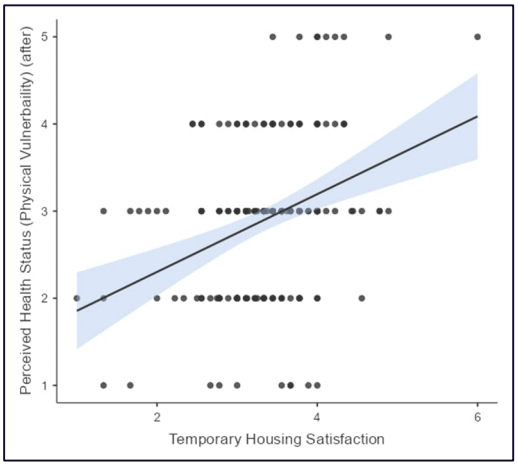

Figure 27. Physical Vulnerability after the event as a function of the satisfaction with the temporary housing

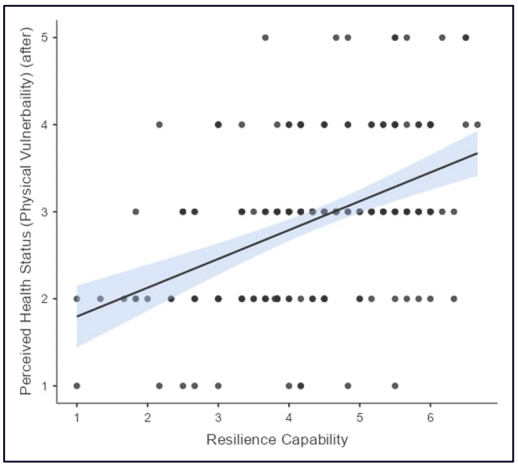

Figure 28. Physical Vulnerability after the event as a function of individual resilience capability

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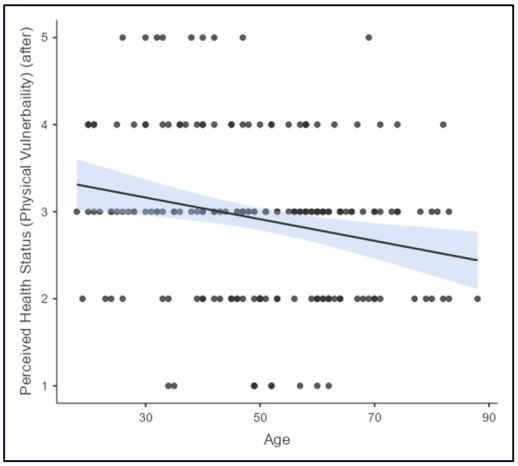

Figure 29. Physical Vulnerability after the event as a function of Age

Predictors of Risk Awareness (today)

Lack of risk awareness can be a negative condition if one is living in an earthquake-prone area. We examined the main predictors of low risk awareness in survivors who have been displaced in a temporary housing solution after a disaster. The linear regression model (Table 16) explained a significant proportion of variance in risk awareness, R^2 = .40, F(31, 113) = 2.44, p < .001.

Risk awareness was significantly predicted by temporary housing satisfaction and being still in temporary housing.

Lower ratings of risk awareness at the time of the survey significantly correlated with having experienced more satisfaction with the temporary housing (r = -.225; p < .001; Figure 30) and not being in temporary housing at the time of the survey F(1,190) = 9.65; p = .002, (Figure 31).

Table 16. Regression Analysis Summary for Model Variables Predicting Risk Awareness after Temporary Housing

Model Coefficients - Risk Awareness (today)

Predictor	Estimate	SE	t	p	Stand. Estimate
Intercept [a]	7.361	1.815	4.056	< .001	
Quality of Life (before)	0.043	0.101	0.428	0.670	0.040
Place Attachment (before)	-0.001	0.131	-0.009	0.993	-8.25e−4
Economic Vulnerability (before)	0.000	0.000	0.679	0.499	0.059
Physical Vulnerability (before)	-0.005	0.158	-0.031	0.975	-0.003
Risk Awareness (before)	0.076	0.087	0.876	0.383	0.089
Individual Preparedness (before)	-0.023	0.022	-1.072	0.286	-0.099
Type of Temporary Housing:					
2 – 1	-0.339	0.558	-0.608	0.545	-0.233
4 – 1	0.812	0.866	0.938	0.350	0.558
5 – 1	0.371	0.672	0.552	0.582	0.255
6 – 1	0.100	0.486	0.206	0.837	0.069
7 – 1	-0.017	0.717	-0.023	0.982	-0.011
8 – 1	1.096	0.901	1.216	0.227	0.753
9 – 1	0.144	0.585	0.245	0.807	0.099

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Model Coefficients - Risk Awareness (today)

Predictor	Estimate	SE	t	p	Stand. Estimate
10 – 1	1.410	0.838	1.683	0.095	0.969
Density (per capita space)	0.004	0.006	0.659	0.511	0.058
Temporary Housing Quality	-0.074	0.152	-0.485	0.629	-0.048
Temporary Housing Satisfaction	-0.515	0.200	-2.568	0.012	-0.256
Length of Displacement (months)	-0.003	0.004	-0.600	0.550	-0.088
Still in Temporary Housing:					
Yes – No	0.787	0.362	2.173	0.032	0.541
Type of Seismic Event:					
2012 Emilia Earthquake – 2009 L'Aquila Earthquake	-0.379	0.365	-1.038	0.301	-0.261
2016 Central Italy Earthquake – 2009 L'Aquila Earthquake	-0.169	0.453	-0.373	0.710	-0.116
Damage Severity	-0.093	0.092	-1.014	0.313	-0.112
Social Support (during)	-0.103	0.126	-0.823	0.412	-0.085
Protection Net (during)	0.300	0.178	1.687	0.094	0.167
Experience with Death and Suffering	-0.049	0.102	-0.479	0.633	-0.045
Resilience Capability	-0.137	0.120	-1.138	0.258	-0.115
Psychological Vulnerability	0.176	0.138	1.282	0.203	0.132
Responsibility	0.035	0.058	0.605	0.547	0.052
Age	-0.009	0.010	-0.893	0.374	-0.096
Gender:					
Female – Male	0.404	0.274	1.473	0.144	0.278
Education	-0.381	0.193	-1.982	0.050	-0.195

[a] Represents reference level

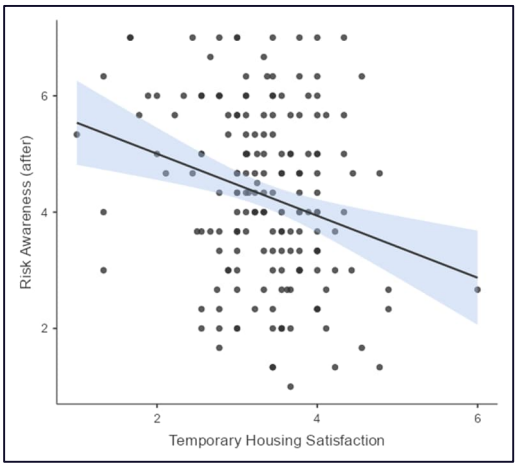

Figure 30. Risk awareness after the event as a function of temporary housing satisfaction

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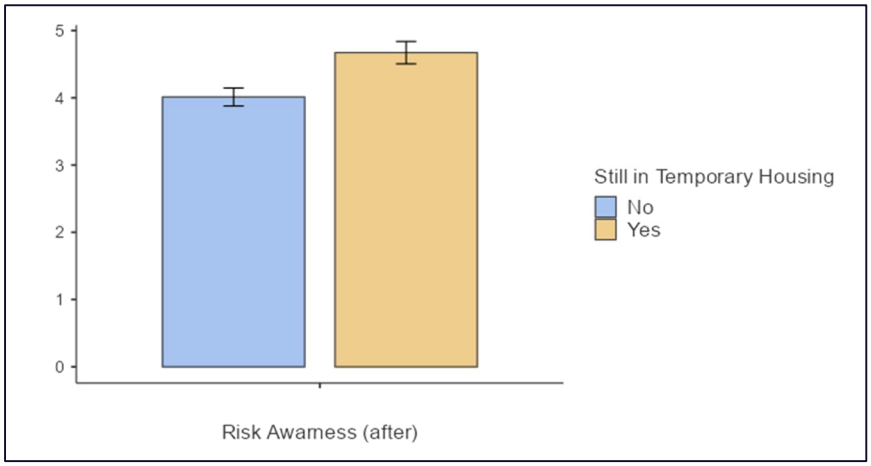

Figure 31. Risk awareness after the event as a function of being still in a temporary house at the moment of the survey

COVID-19

Those participants who were still in a temporary house during the COVID-19 emergency, who replied that being in their home would have made it much easier to deal with the emergency, reported lower ratings of quality of life today, $F(2, 73) = 9.08$, $p > .001$ and lower levels of quality of life during displacement, $F(2,72) = 11.04$, $p < .001$. This is a cue that the COVID-19 emergency significantly afflicted displaced participants (see Figure 32 and Figure 33).

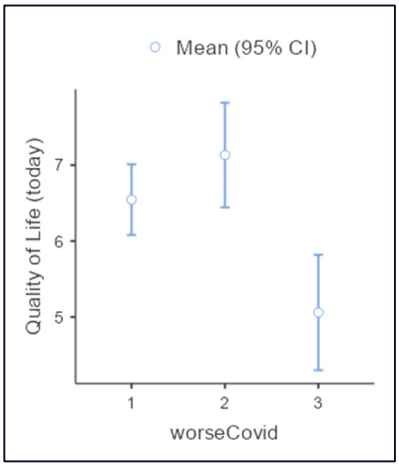

Figure 32. Quality of life today as a function of believing that being in ones' home would have made it easier to deal with the emergency. ([1] = being here or in my home would have made no difference [2] = being in my home would have made it a little easier to deal with the emergency [3] = being in my home would have made it much easier to deal with the emergency

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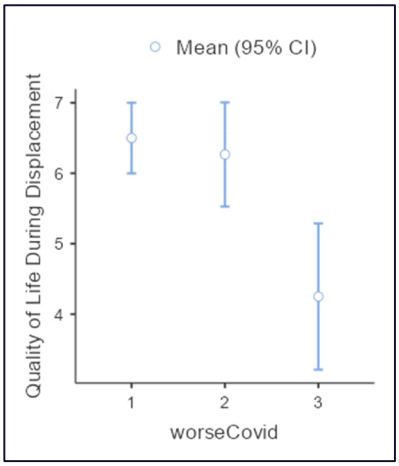

Figure 33. Quality of life during displacement as a function of believing that being in ones' home would have made it easier to deal with the emergency. ([1] = being here or in my home would have made no difference [2] = being in my home would have made it a little easier to deal with the emergency [3] = being in my home would have made it much easier to deal with the emergency

Restricted model

To isolate the effect of the core BUILDERS variables, we computed a series of regression models using a selected group of variables (i.e., resilience capability, place attachment, social support, protection net) as predictors. This analysis tells us whether these variables are predictive, keeping the other constant. In other words, it can tell us whether one variable (e.g., resilience) is more or less predictive than another included in the model (e.g., social support). It must be noted here that we are not controlling for all the other variables that we have measured (e.g., age, gender, type of house, type of earthquake, etc.) as we did in the previous analyses; therefore, the results can be different from those we obtained earlier when we controlled for (kept constant) all the other variables. Still, these analyses are informative because they directly address the BUILDER's core issue.

Table 17. Pearson correlation coefficients between core BUILDERS variables.

	Quality of Life During Displacement	Post-Traumatic Stress Disorder	Health Impairment	Well-being (today)	Quality of Life (today)	Economic Vulnerability (today)	Physical Vulnerability (today)	Risk Awareness (today)
Resilience Capability	0.231**	-0.328***	-0.38***	0.496***	0.27***	0.029	0.431***	-0.26***
Place Attachment (before)	0.079	0.222**	0.114	0.129	-0.02	-0.057	0.113	0.16*
Social Support (during)	0.175*	-0.055	-0.096	0.055	0.297***	0.175*	0.175*	-0.066
Protection Net (during)	0.237**	-0.16*	-0.115	0.171*	0.323***	0.024	0.201**	-0.02

***p<.001, **p<.01, *p<.05

Results of the correlation analyses (Table 17) show that resilience capability is highly associated with most of the outcome measures, but pace attachment, social support, and protection net are also moderately associated when analyzed without controlling for all the other variables that we have measured for (e.g., age, gender, type of house, type of earthquake, etc.).

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Table 18. Results (non-standardized estimates and standard errors) of regression analysis models restricted to specific predictor variables.

	Regression model							
	1	2	3	4	5	6	7	8
Predictor	Quality of Life (during)	Post-traumatic stress	Health Impairment	Well-being	Quality of Life (today)	Economic Vulnerability	Physical Vulnerability	Risk awareness
Resilience Capability	0.3023*	-5.045***	-0.5909***	0.2500	0.2897**	139	0.3105***	-0.3441***
	(0.127)	(1.17)	(0.106)	(0.0303)	(0.101)	(464)	(0.0527)	(0.0883)
Place Attachment	0.0973	4.136**	0.1992	0.0642	-0.0883	-443	0.0869	0.2253*
	(0.142)	(1.31)	(0.120)	(0.0341)	(0.114)	(521)	(0.0594)	(0.0994)
Social Support	0.1169	0.683	-0.0772	-0.0487	0.2476*	1231*	0.0549	-0.1024
	(0.148)	(1.38)	(0.125)	(0.0356)	(0.119)	(543)	(0.0618)	(0.1037)
Protection Net	0.1169	-2.610	-0.0676	0.0789	0.4641**	-704	0.0637	0.0778
	(0.148)	(2.03)	(0.186)	(0.0530)	(0.177)	(809)	(0.0920)	(0.1544)
Constant	2.0128	47.365***	5.9131***	1.2738	3.2441***	9646*	0.5661	4.8198***
	(1.098)	(10.03)	(0.926)	(0.2620)	(0.874)	(4059)	(0.4587)	(0.7632)
R-squared	0.304	0.397	0.422	0.560	0.424	0.184	0.457	0.334
Adjusted R-squared	0.0925	0.158	0.178	0.313	0.180	0.0340	0.209	0.111

Standard Error in parenthesis
***p<.001, **p<.01, *p<.05

Results of the regression analyses carried out on the outcome variables (see Table 18) show that resilience capability predicts significantly five variables out of eight: quality of life during, post-traumatic stress disorder, health impairment, quality of life today, physical vulnerability, and risk awareness. More precisely, holding greater psychological resilience capability increases the quality of life of the affected populations, both during the displacement and after, and it also reduces stress, health impairment, and physical vulnerability while reducing risk awareness. Place attachment also showed significant effects in reducing stress and increasing risk awareness. Grater social support during the displacement was also significantly associated with improved quality of life (today) and increased economic vulnerability. Individuals who received more help and social support during the displacement were probably more economically vulnerable at the beginning, and this did not change after the disaster. Holding a larger protection net during the displacement also improved the quality of life today. However, this could be because these persons still have a good protection net today, which positively impacts their present quality of life. Overall, the effects of social support and protection net have limited effect in predicting the quality of life of the affected populations during the displacement, especially in comparison with other more crucial variables, such as individual resilience capability. This result should not be read as a definite null effect of social variables because individual resilience capability and individual place attachment are built through interpersonal relationships.

Path analysis

We conducted a path analysis in IBM SPSS Amos 21 for Windows (IBM Corp., Armonk, NY) to test hypotheses concerning the relationships depicted in Figure 34. The model was estimated using a maximum likelihood algorithm. Model fit was judged using the following goodness of fit indexes: model $\chi 2$, Bentler's Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Squared Error of Approximation (RMSEA). According to Hu and Bentler (Hu & Bentler, 1999), CFI and TLI greater than 0.95, and RMSEA< 0.06 indicate a good fit of the model.

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Analysis of fit indices indicated the model fit the data well: $\chi^2(22, N = 190) = 13.720$, $p = .911$, CFI = 1.000, TLI = 1.064, RMSEA = .0001. Figure 35 offers a picture of the model with the standardized parameter estimates, and the squared multiple correlations (R^2).
The model accounted for 46% of the Quality of Life during Displacement variance and for 14% of the Quality of Life Today variance. Temporary housing satisfaction and Temporary Housing Quality were both associated with Quality of Life during Displacement. Quality of Life Before was only marginally associated with Quality of Life Today and Psychological Vulnerability was only marginally associated with Quality of Life during Displacement. Individual Resilience Capability was associated with Temporary Housing Satisfaction both directly and indirectly through Individual Preparedness. Individual Resilience Capability was also associated with Temporary Housing quality and Quality of Life Today. Finally, Place attachment was associated with Temporary Housing Satisfaction and with Quality of Life Before.

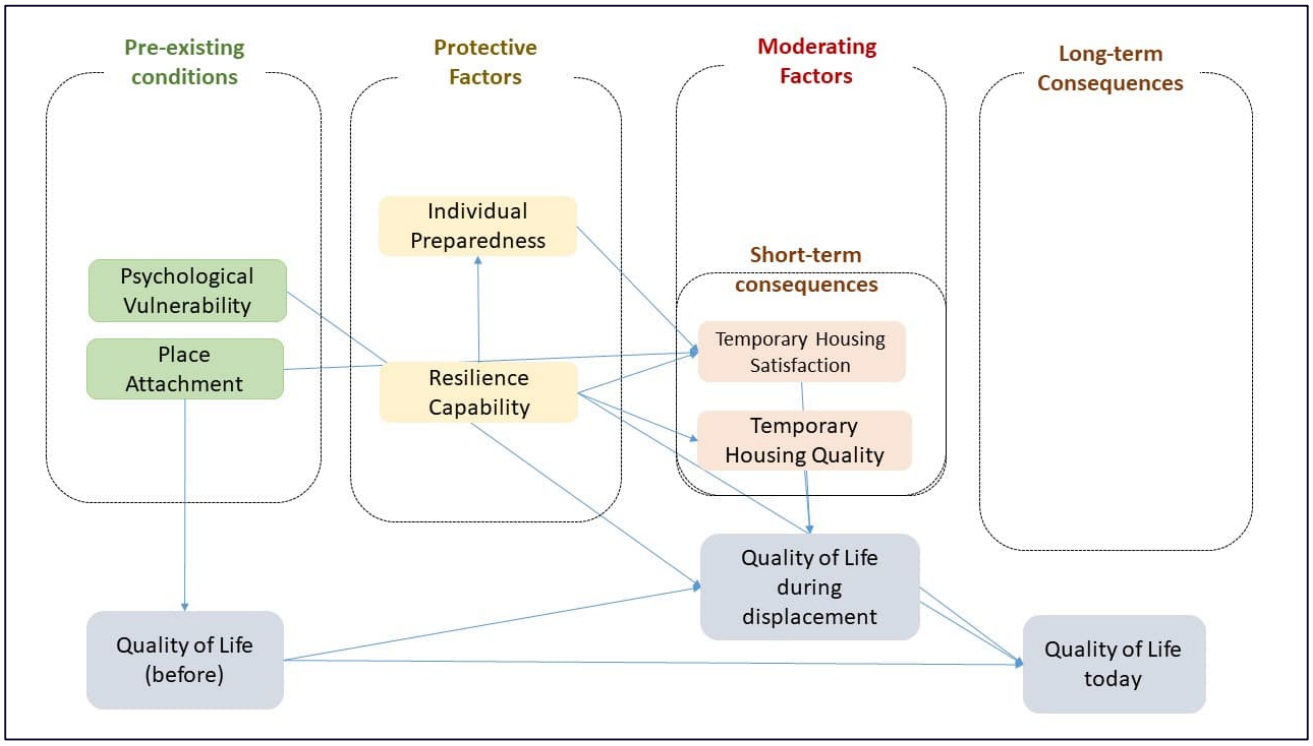

Figure 34. The variables included in the path analysis

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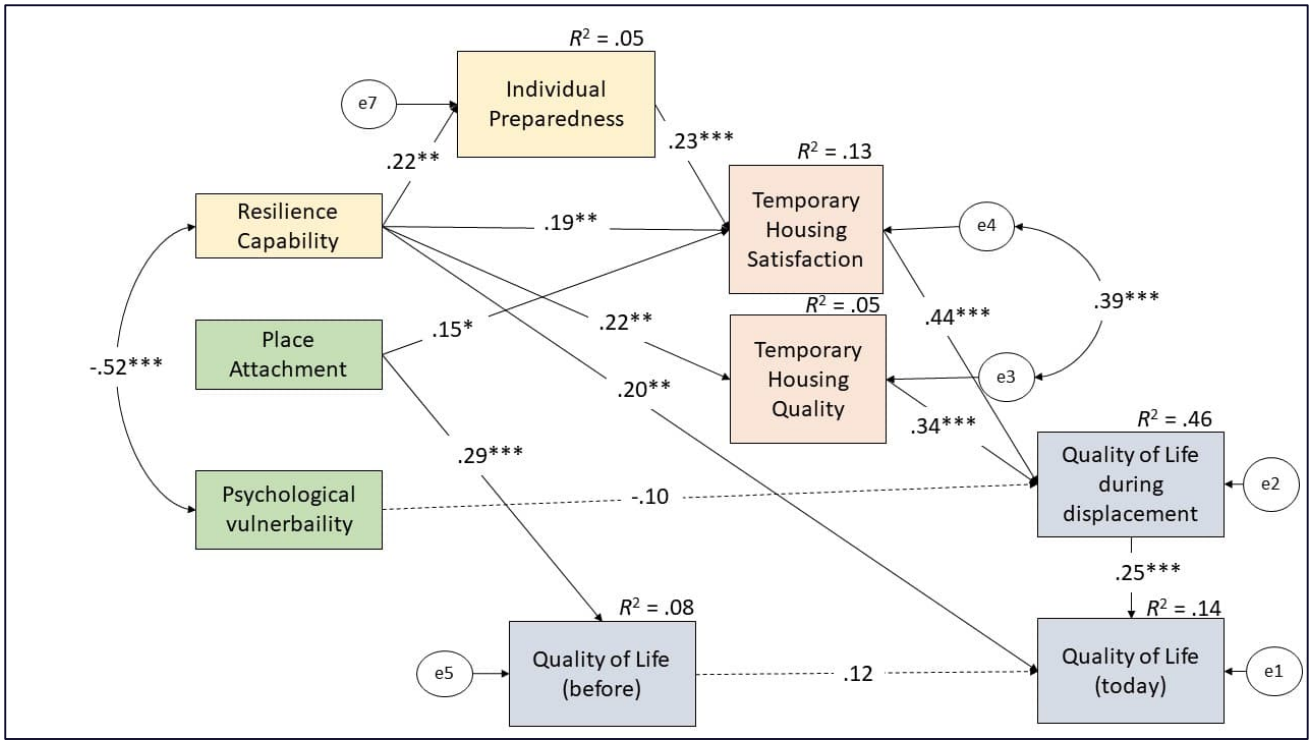

Figure 35. The model tested in the path analysis

Results showed that the quality of life during displacement had an impact on the quality of life measured today that goes beyond that of the quality of life before the event. This means that the experience faced by the evacuees was so disruptive that it affected their lives even today.

The most proximal antecedents of quality of life during displacement were the satisfaction with the temporary housing characteristics and the perceived quality of the temporary housing. These two variables accounted for 46% of the variance in the quality of life during displacement, which is a notable amount. Previous regression analyses showed that the low level of natural beauty and the low satisfaction with the overall climate was among the most predictive variables in determining satisfaction with different aspects of life during the displacement. Likewise, among the housing characteristics, the following were deemed as more relevant: the environment surrounding the house (which was deemed depressing); the place where the house was located (which was not judged to be very nice); and the lack of an own personal space in the house. These results show that dissatisfaction was related to the surrounding environment and not the lack of personal life or social relationships.

A notable result of the path analysis is that evacuees that possessed a lower individual resilience capability were also more likely to be under-prepared before the disaster occurred, and this, in turn, led to lower satisfaction with the temporary housing and a lower quality of life during the displacement, which in turn is reflected in a lower quality of life today. Individuals low in resilience capability were also less happy with the quality of the temporary housing and, in turn, with the satisfaction of the temporary housing experience, but they were also less satisfied with the quality of life today.

Those evacuees who had a lower place attachment before the disaster were experiencing a lower quality of life before the event but also were less protected from the disaster when this occurred because they showed a lower satisfaction with the temporary housing characteristics and, in turn, lower satisfaction with the temporary housing experience and a lower quality of life today.

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Being a psychologically vulnerable individual before the disaster is related to a low resilience capability but only marginally related to the experience of low quality of life during the displacement.

Overall, these results seem to indicate that the disruptive quality of the experience faced by evacuees during their displacement was not related to specific aspects of the temporary housing quality or practical problems with their life during displacement but, most of all, to the experience itself. Being temporarily suspended in life seems itself a reason for discomfort. Results show that individual resilience was the main protective factor that reduced displaced persons' suffering. Place attachment also played a positive role, although to a lesser extent.

We can suggest some tentative explanations for these results. The primary role of individual resilience capability is easy to explain. Individuals who possess a strong resilience capability are likely to bounce back quickly after hard times and recover quickly from a stressful event reducing the negative impact of the displacement experience.

On the other hand, the reason why those participants who were more attached to the place and to the community they lived in before the disaster were better capable of reducing the negative effect of the displacement experience is more difficult to explain. We can only speculate upon possible explanations. One reason is that typically, individuals who are highly attached to their place and refer to it with positive emotions such as pride and love often incorporate the place into self-schemas, and this might reduce their vulnerability and improve their psychological resilience. The place dimension includes varying aspects of place, including spatial level, degree of specificity, and social or physical features of the place. We might imagine that a greater focus on the external environment (the place in general) at the expense of the more internal and intimate environment of one's home protected people who were forced to leave their homes during the tragedy from the negative effects of displacement. Place attachment has also been viewed as a dimension of social capital (Ehsan & De Silva, 2015); thus, our study reveals that stronger personal bonds with the place and the community can psychologically protect individuals from negative consequences associated with crises.

4.3. Summary Table of Main Findings

Table 19. Predictors of outcomes in post-disaster survivors displaced in temporary housing.

	Outcomes							
Predictor	Quality of Life during Temporary Housing	Post-Traumatic Stress after the disaster	Health Impairment after the disaster	Well-being (today)	Quality of Life (today)	Economic Vulnerability (today)	Physical Vulnerability (today)	Risk Awareness (today)
Place Attachment (before)	✗	✗	✗	✗	✗	✗	✗	✗
Economic Vulnerability (before)	✗	✗	✗	✗	✗	✓	✗	✗
Physical Vulnerability (before)	✗	✗	✓	✗	✗	✗	✓	✗
Risk Awareness (before)	✗	✗	✗	✗	✗	✗	✗	✗

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Individual Preparedness (before)	✗	✓	✗	✗	✗	✗	✗	✗
Quality of Life (before)	✗	✗	✓	✗	✗	✗	✗	✗
Type of seismic event	✗	✓	✗	✗	✓	✗	✗	✗
Type of Temporary Housing	✓	✗	✗	✗	✗	✗	✗	✗
Density	✗	✗	✗	✗	✗	✗	✗	✗
Length of Displacement (months)	✗	✓	✗	✗	✗	✗	✗	✗
Still in Temporary House	✗	✗	✗	✗	✗	✗	✗	✓
Damage	✗	✗	✗	✗	✗	✗	✗	✗
Temporary Housing Satisfaction	✓	✗	✗	✗	✗	✓	✓	✓
Temporary Housing Quality	✓	✗	✗	✗	✗	✗	✗	✗
Experience with death (during)	✗	✗	✗	✗	✗	✗	✗	✗
Perceived Social Support (during)	✗	✗	✗	✗	✗	✗	✗	✗
Protection Net (during)	✗	✗	✗	✗	✗	✗	✗	✗
Resilience Capability	✗	✓	✓	✓	✓	✗	✓	✗
Psychological Vulnerability	✓	✗	✓	✓	✗	✗	✗	✗
Personal Responsibility	✗	✗	✗	✗	✗	✗	✗	✗
Age	✗	✗	✗	✗	✗	✗	✓	✗
Gender	✗	✗	✗	✗	✗	✗	✗	✗
Education	✗	✗	✗	✗	✗	✗	✗	✗

5. Discussion

5.1. Identify who is most vulnerable

This case study showed that individuals who have suffered a disaster could be made even more susceptible to negative consequences because they have lost their homes (declared inhabitable) and were displaced in a temporary housing solution. Survivors who have been displaced show a significant decrease in their quality of life, more symptoms of post-traumatic stress disorder, higher health impairment, lower well-being, higher economic vulnerability, higher

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physical vulnerability, and higher risk awareness. These negative dimensions all together form a coherent cluster of low quality of life indicators. However, our study consistently showed that among the crisis-affected population studied, those lower in personal resilience capability and, to a lesser extent, lower in place attachment suffered more and were more vulnerable in the specific context (see Table 19).

5.2. Understand why some are more vulnerable

In this case study, we tested how the low quality of life indicators was predicted by four groups of variables: (a) variables existing before the disaster, (b) structural aspects of the disaster, the displacement, and the temporary housing solution (c) social variables present during the displacement (d) individual characteristics of the survivors (see Table 19).

Of the variables that existed before the disaster (a), lower individual preparedness before the disaster, lower economic wealth, and lower physical health were particularly predictive of higher discomfort.

Among the structural aspects (b), having experienced the 2016 Central Italy Earthquake, being displaced in a tent or camper, having been displaced for more time in the temporary solution, being less satisfied with the temporary displacement solution, and having perceived lower overall quality of the displacement solution, were particularly predictive of lower quality of life.

Among the social variables present during the displacement (c) (i.e., perceived social support and protection net during displacement) none was directly relevant in predicting low quality of life.

Among the individual characteristics (d), being more psychologically vulnerable, possessing less trait resilience capabilities, and being older were particularly predictive of higher negative consequences. Lower individual resilience capability, therefore, was a strong predictor of higher vulnerability, confirming the negative relationship between these two constructs.

5.3. How did social capital affect risk awareness?

We found no evidence that the size and/or number and/or the type of networks and groups an individual had access to before and during the displacement in temporary housing significantly influenced the acknowledgment of risks. In our study, therefore, social capital did not directly influence risk awareness. More specifically, having received more support and being in a larger social network during temporary housing does not impact subsequent individual fear and worry about earthquakes.

However, we found a significant negative association between post-traumatic stress disorder and preparedness (see Table 19). Preparedness also includes measures of social interaction, such as attending meetings held by schools or civic organizations to prepare for the earthquake, participation in earthquake hazard training activities or protection plan exercises, and knowledge of which institutions to contact for help when a crisis occurs. Preparedness is effectively built through community engagement with security professionals. Therefore, we interpret these findings as evidence that social capital positively impacts disaster resilience, probably not by directly increasing individual risk awareness but by increasing “social” variables, such as community preparedness.

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5.4. How did risk awareness affect vulnerability and resilience?

We found a positive effect of being more prepared (preparedness) before a disaster on having fewer symptoms of post-traumatic stress disorder and being more satisfied with the housing solution, which in turn increased quality of life (see Table 19). Preparedness, therefore, could be a protective measure against the adverse psychological effects of displacement, reducing vulnerability.

5.5. How does social capital affect the nexus resilience-vulnerability?

We found no evidence that the size and/or number and/or the type of networks and groups an individual had access to before and during the displacement in temporary housing directly influenced vulnerability.

However, we found that individual preparedness before the event significantly reduced post-traumatic stress disorder symptoms and improved satisfaction with the temporary housing, which in turn increases the quality of life, thus reducing the displacement's negative effects on well-being (and reducing vulnerability). As measured in this study, preparedness can also be interpreted as a social capital variable, although atypical. Preparedness was also weakly but significantly positively correlated with social support (r = .178, p = 0.14), since preparedness, as measured in this study, is also socially constructed through the information and interactions between the individual and its community. In this regard, we found some evidence that social capital, in the form of preparedness, reduces vulnerability by reducing post-traumatic stress disorder symptoms and improving quality of life.

Moreover, place attachment was found to improve temporary housing satisfaction reducing the negative psychological effects of being displaced. Place attachment refers to the extent to which the identity of the individual is connected with the place and the community. In a certain sense, therefore, social capital, in the form of place attachment, seems to reduce the vulnerability of displaced individuals.

Coherently with previous studies (Flores et al., 2014) our results confirm the role of social capital variables, such as the sense of belonging to the community (place attachment) and preparedness among community members. Coherently with previous studies, our results also confirm the absence of the direct role of other components of social capital (i.e., support received from community groups and individuals) in determining survivors' wellbeing.

New to previous studies, our investigation found a primary role of individual resilience capabilities in predicting survivors' wellbeing when controlling for all the other potential variables. We interpret this result as a sign that social variables are nonetheless relevant because individual resilience is a trait that is built socially through interactions with significant others throughout life. Thus, finding a prominent role of resilience does not imply that social capital does not have any role but that it does not have any direct role because the prominent effect of resilience obscures it. As evidence for this argument, we found a positive correlation between both social support (r = .523; p <.001) and protection net (r = .239; p <.001) with resilience.

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6. Conclusions

When a disaster strikes, it often impacts the buildings where people live. An earthquake, a landslide, a tsunami, a volcanic eruption, or a flood can result in residents being displaced from their homes, which are no longer considered safe. Initially, people are temporarily housed in temporary solutions such as tents, gyms etc., while waiting for the disaster to pass. When the disaster has passed, the evacuated people return to their homes. But some of these homes are no longer habitable, and the people who lived in them can no longer return to their previous homes. For these people begins a period of suspended life in which they are temporarily housed in temporary housing while their home is restored or rebuilt. Housing in temporary solutions can last months or years, but also forever for those who are particularly elderly.

Here we studied people who lived in temporary housing after a disaster (i.e., crisis-affected populations). We asked them to recall what their lives were like while housed in temporary solutions, and we measured several variables to understand what makes these people more or less vulnerable. We asked displaced people about their lives before the disaster, during the displacement, and after the displacement.

By considering a comprehensive variety of negative outcome indicators (i.e., quality of life, health impairment, well-being, post-traumatic stress disorder, physical vulnerability, economic vulnerability, risk awareness) in task 4.2, we wished to investigate who is more vulnerable in a post-disaster temporary housing circumstance and why. Along with the measures of negative consequences described previously, specific measures of individual resilience capability, social capital, and risk awareness were included in the study to test their relative predictive power in determining the condition of vulnerability in the specific case study, controlling for other variables (e.g., age, economic well being, length of displacement. etc.).

The results highlighted several important findings. The first finding is that displacement is a source of serious suffering. Those who have been displaced show a lower quality of life than those who have not been displaced, both during displacement and even now, years later. Those who were unable to return to their homes for a period of time because their homes were unusable feel less happy even now, years later, than those who returned to their homes shortly after the event. Those who were displaced showed more symptoms of post-traumatic stress disorder in the three months following the disaster than those who were not displaced. They also reported that the disaster produced more health impairment. But also, they are still more physically and emotionally distressed today compared to those who did not experience the displacement.

This first result is consistent with the literature showing that having experienced a displacement in a temporary solution is often accompanied by negative psychological consequences (Cofini et al., 2015; DeSalvo et al., 2007; Fussell & Lowe, 2014; Jere et al., 2014; Kukihara et al., 2014).

However, our results add something new to the literature. Previous studies, in fact, had not tried to identify the origins of this vulnerability but had limited their focus to individual factors such as age or education. Our study, unlike other similar studies, measured many individual, environmental, and

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social variables at different points in time with the precise aim of identifying the main predicotors of vulnerability induced by the experience of displacement, controlling for as many factors as possible.

Having controlled for the effect of different variables, we found that a variable particularly important in predicting vulnerability during displacement was the individual's trait resilience capability. This is the individual's ability to adapt to change. Those who lack the ability to adapt to change are particularly vulnerable to the discomfort induced by being forced to leave their home for a period of time. The length of the displacement did not have a relevant impact. Individual resilience is a personality trait (Di Fabio & Saklofske, 2018; Oshio et al., 2018), but some studies suggest that perhaps it could be increased if social support increases (Gooding et al., 2012). As evidence for this argument, we found a positive correlation between both social support and protection net with resilience. Future studies should therefore examine and understand what factors (including social capital) enhance individual resilience capabilities. Special attention should be devoted to investigating these relationships by using longitudinal designs that measure social capital (at time 1) and resilience (at time 2). The second predictor of discomfort in displaced individuals was related to the satisfaction with the overall displacement experience and to the characteristics of the environment where the displacement was located (which was perceived as depressive and not as good as desired). The evacuees' discomfort was not linked to specific aspects of the homes (the restricted space, lack of light, lack of privacy, distance to one's works and studies, etc.). Instead, it was linked to dissatisfaction with the overall displacement experience. This can be explained by assuming that the experience of losing one's home and living in a "suspended life" in a temporary home is itself a trauma on top of the disaster experience. However, some data also seems to indicate that it is likely that it is not just the experience of losing one's home but the fact of losing the environment of life in which one's home was embedded that determines the strong distress in the evacuees. Previous literature indeed points to the fact that existing social networks are dismantled during relocation, thus eliminating a crucial source of social buffer, which might potentially mitigate evacuees' discomfort (Di Gregorio & Soares, 2017). Moreover, it has indeed been noted that relocating the elderly is especially a problem due to their need for social spaces and organized activities that enable them to meet others (Johnson, 2007). It has been emphasized that temporary housing should not only provide shelter but also offer everything to return to normal life, such as being in a place with easy access to services and the workplace or providing affordable transportation, proximity to the former home, and maintaining neighborhood ties and support networks (Johnson, 2007).

The third predictor of low quality of life in displaced individuals is the lack of place attachment before the disaster. Place attachment is the degree to which an individual is attached to the place where he/she lives and the extent to which the place is part of his/her identity. Those who identified more with the place and the community they lived in before the disaster were more resilient because they were better capable of reducing the negative effect of the displacement. This is probably because they have incorporated the place into their self-schemas and have strengthened their psychological well-being (Scannell & Gifford, 2010). Place attachment can be considered part of the individual's social capital (Ehsan & De Silva, 2015), thus stronger personal bonds with the place and the community might psychologically protect the individuals from negative consequences associated with crises, provided that evacuees are not displaced far away from their places and communities. Place attachment therefore, would be a sort of protective factor.

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6.1. Limitations

A major limitation of the present study is the reliance on individual's memory capability in recollecting the information related to what happened before and during the disaster and how the individual felt. Some of the recollected information might suffer from individuals' memory bias, that is, the individual might inadvertently distort the information during the recall (Bond et al., 2020; Norris & Kaniasty, 1992). On the other hand, first-hand survivor vividness in memories for disastrous events usually persists for years after a disaster survival event occurred, a phenomenon known as flash-bulb memories (Finkenauer et al., 1998). Several studies applying a retrospective research paradigm, such as ours, have been conducted after the occurrence of important negative personal events (Anke & Fugl-Meyer, 2003; Canino et al., 1990; Kuwabara et al., 2008; Nomura et al., 2016; Toyabe et al., 2006). The results showed that the method, although not perfect, is still useful to investigate different types of mental processes. Moreover, our study focuses on participants' current and future well-being and the current psychological consequences of the disaster. It is well known that current wellbeing relies not on the authentic experience but on the memory of that experience (Redelmeier & Kahneman, 1996; Stragà et al., 2017; Wirtz et al., 2003). Therefore, relying on retrospective evaluations may even improve our capacity to predict participants' current and future wellbeing.

7. Recommendations

7.1. Recommendation #1

What. Compatibly with the severity of the emergency, avoid displacing people for long periods (more than one month) from their homes as much as possible.
Why. The study indeed revealed that being displaced for more than one month from one's home is a highly disruptive and stressful psychological experience that goes far beyond simply experiencing the disaster.
How. To reduce the likelihood that people will have to leave their homes following a disaster, it is essential to act on the preparatory phase. For example, it is necessary to carry out structural interventions to make buildings more resistant to natural disasters of all kinds (seismic events, but also floods, tornadoes, landslides and volcanic eruptions). For this purpose, all traditional policies (laws and incentives) can be used as well as more innovative policies, such as behavioral interventions (nudges) (Thaler & Sunstein, 2008). For example, because people tend to place more value on a “warranty for seismic retrofitting” than on actuarial value, a warranty where the government guarantees all repair costs in the event of earthquake damage to the house if the homeowner implements seismic retrofitting has been shown to increase the perceived value of seismic retrofitting by an average of 33%, which is more economically efficient than an ex-ante subsidy (Fujimi & Tatano, 2013). Other suggestions in the same vein include increasing the perceived value of gaining security, attaching new moral value to safety behaviors, and reframing security into a “freedom from disasters, crises, and other threats” perspective (Cheek et al., 2022; Speranza et al., 2019),

7.2. Recommendation #2

What. Improve individual trait resilience capability.

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Why. The study clearly revealed that the major protective factor against the stressful event of being displaced resides in the individual trait resilience capability. It is important to note that this result emerged after all other possible factors that contribute to the negative impact of displacement (structural and otherwise) were controlled for. In fact, our study examined a very large number of possible predictors of vulnerability.
How. Trait resilience capabilities are generally linked to personality traits (Di Fabio & Saklofske, 2018; Oshio et al., 2018) and higher age (Cohen et al., 2016). As such, it is difficult to improve them. Most of the interventions are therapy- or mindfulness-based (Joyce et al., 2018). However, the level of resilience among younger adults was related to their availability of social support (Gooding et al., 2012), leaving open the possibility that individual trait resilience could be improved through an increase in social support. In this regard, group-based peer support interventions to promote resilience have been used and seem successful (Burton et al., 2018; Ramchand et al., 2017).

7.3. Recommendation #3

What. Pay close attention to the quality of the environment surrounding the temporary housing and the place where the temporary housing is located when planning displacement sites.
Why. The study found that the satisfaction with the environment/location was more predictive than the satisfaction with the internal aspects of the house in reducing the negative impact of displacement.
How. To improve the quality of the environment/place/location surrounding the temporary housing, a better displacement plan should be implemented before the event occurs. In particular, displaced people seemed to suffer for having lost their "surroundings" that symbolized their community. Displacement sites should seek to replicate the lost community environment or be located in such a way that the original community environment is preserved and easily accessible to residents.

7.4. Recommendation #4

What. Improve place attachment.
Why. Those participants who were more attached to the place and to the community they lived in before the disaster were better capable of reducing the negative effect of the displacement probably because they incorporated the place into self-schemas, and this strengthens' ones' psychological well-being.
How. To improve place attachment, city planners could design environments that increase place attachment by creating spaces that afford different opportunities for meaning-making by diverse user groups, and municipalities could motivate citizens to populate those places (Raymond et al., 2017). Place attachment is created by the interconnection between the environment and the individual through social behavior (Low & Altman, 1992). For example, it was found that interventions aimed at increasing learning about local history increased place attachment, civic engagement intentions, and generalized social trust (Stefaniak et al., 2017). In support of our claim, recent research showed that place attachment was positively associated with both preparedness intentions and behavior when controlling for socio-demographic predictors (Wallis et al., 2022).

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8. Annexes

APPENDIX

Variables included in the study

Variable	Description	Construct	Source	Item
				Screening Questions
Screening	Eligible respondents are those who experienced an earthquake	**affected popolation**		[Recorded by the interviewer] Di you experience a seismic event? [0] __No [1] __Yes
				Natural variables
Disaster	Type of disaster	**Control variable**		1. Which of these seismic events have you experienced? (If you experienced two events refer only to the most recent) 1] ___ the 2009 earthquake in Abruzzo (L'Aquila). 2] ___ the 2012 earthquake in Emilia (Italy) [3] ___ the 2016-17 earthquake in Central Italy
				Disaster and displacement
Time-lapse since the event	Time-lapse since the event	**Control variable**		[Recorded by the interviewer according to date of data collection and seismic event] How much time has it passed since the event occurred? _____ numerical input (years)
	Severity of the shock	**Control variable**		[Recorded by the interviewer according to seismic event] Severity of the shock _____
Place (before)	Place of residence before disaster	**Control variable**		2. Where did you live when the earthquake happened? _____ (Village, Municipality, Province).
Duration/place attachment (before)	Duration/place attachment	**Control/Resilience**		3. How long had you lived in that location before the event? _____ (years).
Place attachment (before)	Place Attachment Scale	**Control variablesocial capital**	(Scannell & Gifford, 2010)	4. Thinking about where you lived at the time of the event, how much do you agree or disagree with each of the following statements? (a) The community reflected who I was (b) I was proud of my city (c) Green areas there were special (d) When I was away, I missed my community.

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				(e) I was fond of the green areas there. (f) I was fond of that city (g) I felt connected to the community. (h) There lived people similar to me (i) That city was special to me (j) I was respectful of what that city represented. (k) Natural areas were special to me.
Quality of life (before)	General life satisfaction before the disaster	**outcome**	(Cantril, 1965) (Kahneman & Deaton, 2010) (Gomez et al., 2013; Krueger & Heckhausen, 1993)	5. Think about your life before the earthquake. How would you rate your life on a scale where 0 represents the worst possible life and 10 represents the best possible life?
Physical Vulnerability * (before)	Self-rated health Connection with WP3	**Vulnerability**	American Life Panel (https://alpdata.rand.org/) Survey on Well Being (n. 20) - Well Being and Health -Module - Rate General Health Question - ms20_RH001 GENERAL HEALTH RATING (WHO generalised health assessment) See (Bombak, 2013) for a Review	6. In general, would you say that your health before the earthquake was ... Poor Satisfactory Good Very Good Excellent
Employment status (before)	Employment status	**Vulnerability**		7. What was your employment status before the earthquake? [1] __ Student [2] __ Employee [3] __ Self-employed [4] __ Unemployed [5] __ Retired
Economic vulnerability 1 (before)	Available income	**Vulnerability**	ISTAT (He et al., 2020)	8. Before the earthquake, could you please indicate what income class your household's total annual net earnings were in? [1] ___ 0 € [2] ___ Up to € 10,000 [3] ___ 10.001 € - 15.000 € [4] ___ 15.001 € - 20.000 € [5] ___ 20.001 € - 30.000 € [6] ___ 30.001 € - 50.000 € [7] ___ Over 50,000 9. How many people were in your family (including you)? ____. 9a. How many of these were minors? |__| Calculate a per capita household income by dividing the total household income by the number of household members.

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Risk awareness (before)		**Risk Awareness**		10. In the years prior to the earthquake that affected you, how much did you think about earthquakes? 1 Not at all 7 Very much
	Affective risk perception	**Risk Awareness**	(Ferrer et al., 2016) Kaufman et al. (2019)	11. In the years prior to the earthquake that affected you, how concerned were you about earthquakes? 1 = Not at all 7 = Very much
	Perceived likelihood	**Risk Awareness**	Kaufman et al. (2019)	12. In the years prior to the earthquake that affected you, how likely did you think an earthquake was to occur? 1 = Not at all 7 = Very much
Earthquake Individual Preparedness (before)	Mullis-Lippa Earthquake Preparedness Scale (MLEPS) Earthquake Preparedness Scale	**Risk Awareness/Resilience**	(Mulilis et al., 1990)	13a. Prior to the earthquake, to your knowledge, did you or anyone in the household have a seismic inspection done on your property (to find out if your house was earthquake resistant)? [1] __ No, it had not been done. [2] ___ Yes, it was done. [3] ___ Don't know/don't remember/do not answer 14. To your knowledge, was your home earthquake proof at the time of the earthquake? [1] ___ No, it was not. [2] ___ Yes, it was earthquake-proof [3] ___ Don't know 15. Before the event, did you know you lived in an earthquake-prone area? [1] ___ No [2] ___ Yes 16. Prior to the event, had you ever heard of any seismic risk information campaigns in your area? [1] ___ No [2] ___ Yes 17. Prior to the event, had you read any materials on earthquake preparedness? [1] ___ No [2] ___ Yes 18. Prior to the event, had you listened to or carefully watched radio or television messages about earthquake preparedness? [1] ___ No [2] ___ Yes 19. Prior to the event, had you attended meetings held by schools or civic organizations to prepare for the earthquake? [1] ___ No [2] ___ Yes 20. Prior to the event, had you ever participated in earthquake hazard training activities? [1] ___ No [2] ___ Yes [3] ___ Do not remember 21. On the date of the event, did you know whether or not your Municipality had a Civil Protection Plan? [1] ___ No, I did not know if the Municipality had a plan or not. [2] ___ Yes, I knew that the municipality had a plan.

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[3] ___ Yes, I knew the City did NOT have a plan.
22. On the date of the earthquake, did you know whether or not the Civil Defense Plan had been published (e.g., on the City's website or on City bulletin boards)?
[1] ___ No, I did not know if the Municipality had published the plan or not.
[2] ___ Yes, I knew that the City had published the plan.
[3] ___ Yes, I knew that the City had NOT published the plan.
23. Before the event, did you know if your municipality had organized any drills on the Civil Protection Plan?
[1] ___ No, I did not know.
[2] ___ Yes, I knew they had been organized.
[3] ___ Yes, I knew there were NO drills organized.
24. Before the event, did you personally participate in Civil Protection Plan exercises?
[1] ___ No
[2] ___ Yes
25. At the date of the earthquake did you know if in your Municipality there were civil protection voluntary associations?
[1] ___ No, I did not know.
[2] ___ Yes, I knew they existed.
[3] ___ Yes, I knew there were NO such associations.
26. Prior to the event, do you feel that evacuation drills were conducted regularly in case of an emergency at school?
[1] ___ No
[2] ___ Yes
[3] ___ Don't know
27. Prior to the event, did you conduct emergency evacuation drills at your workplace?
[1] ___ No
[2] ___ Yes
[3] ___ Don't know
[4] ___ Not applicable (I did not work or I worked in a place for which drills were not provided: farming, agriculture, ...)
28. At the time of the earthquake, were you a member of a civil protection volunteer association?
[1] ___ No
[2] ___ Yes
29. At the time of the earthquake, were any of your close friends or relatives members of civil defense volunteers?
[1] ___ No
[2] ___ Yes
[3] ___ Don't know
30. When the earthquake occurred, did you know what to do?
[1] ___ No
[2] ___ Yes
31. Immediately after the earthquake, did you know what you were going to do in the next two or three days?
[1] ___ No
[2] ___ Yes
32. When the earthquake happened, was the information you already had helpful?
[1] ___ No
[2] ___ Yes

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[3] ___ Not applicable (I had no information)
33. When the earthquake occurred, did you know which institutions to contact for additional information?
[1] ___ No
[2] ___ Yes
34. When the earthquake occurred, was it easy to get information about what should/could be done?
[1] ___ No
[2] ___ Yes
35. Was the information you received about what you should/could do that was given to you sufficiently clear?
[1] ___ No
[2] ___ Yes
[3] ___ Not applicable (I had no information)

36. At the time of the event, did you have the following items on hand at your residence to use immediately after the earthquake?
a. A working flashlight?
No
Yes
b. extra batteries for the flashlight?
No
Yes
c. working transistor radio?
No
Yes
d. extra batteries for the transistor radio
No
Yes
e. knowledge of the location of an emergency broadcast station on the radio dial?
No
Yes
f. a complete first aid kit?
No
Yes
g. at least 4 liters of water in plastic containers?
No
Yes
h. at least a 4-day supply of dehydrated or canned food?
No
Yes
i. a working fire extinguisher?
No
Yes
j keys needed to operate shut-off valves and switches?
No
Yes
37. At the time of the event, did you know the location of the following utility shut-off switches and valves?
a. water shutoff valve?
No
Yes
b. gas shut-off valve?
No
Yes

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				c. electric power shut-off valve? No Yes 38. At the time of the event, were your cabinets (e.g., wall cabinets for dishes, food, supplies) securely fastened with latches? [1] ___ No [2] ___ Yes 39. At the time of the event, were the following items in your residence securely fastened to the walls? a. Water heater? No Yes b. tall furniture (e.g. bookcases)? No Yes c. heavy objects placed high on walls (e.g., mirrors, pictures, plants)? No Yes 40. At the time of the event, did you know the location of an emergency room or hospital in your area? [1] ___ No [2] ___ Yes 41. At the time of the event, was your home insured against earthquakes? [1] ___ No [2] ___ Yes
Type of area (before)	Type of area before	**Control**		[Filled in by the interviewer after the interview] Which of the following best describes the area in which the person lived before the event? [1]__ Village / rural area (fewer than 3,000 people) [2]__ Small town (3,000 to15,000 people) [3]__ Town (15,000 to 100,000 people) [4]__ City (100,000 to 1,000,000 people) [5]__ Metropolitan area (over 1,000,000 people)
Type of area (before)	Type of area after	**Control**		[Filled in by the interviewer after the interview] Which of the following best describes the area in which the person lived when the event occurred? [1]__Village / rural area (fewer than 3,000 people) [2]__ Small town (3,000 to15,000 people) [3]__ Town (15,000 to 100,000 people) [4]__ City (100,000 to 1,000,000 people) [5]__ Metropolitan area (over 1,000,000 people)
				After Time1 (during displacement) Time2 (after displacement)

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Displacement status (vulnerable group)	Having been displaced from the pre-disaster house or not	**affected population**	42. Following the earthquake, did you stay in a temporary housing solution? [1] __ No [go to question 57] [2] __ Yes [go to question 42a].
	The day they went out of their home	**Control**	42a. In particular, do you remember on what day you had to leave your home? 2009 Abruzzo (L'Aquila):__ 6 April 2009 2012 Emilia: __ 20 May 2012 __ May 29, 2012 2016-17 Central Italy: __August 24, 2016, __30 October 2016,__ January 18, 2017
Displacement Type		**Control**	43. After the earthquake, in which temporary solution did you stay, and for how long, and in which municipality? When A - Immediately after B - In the medium term C - In the long term D - Now Type of accommodation* For how long Municipality *examples of accommodations: [1] private car/camper/private tent [2] free 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 me (e.g. second home) [8] container module or P.M.A.R. (Prefabricated Modular Removable Housing Units) [9] M.A.P., S.A.E., M.A.P.R.E., P.M.R.R. (Temporary Housing Modules, Emergency Housing Solutions, Rural Prefabricated Emergency Housing Modules - Prefabricated houses or however of rapid realization, often in wood, to one or two plans to the maximum, monofamiliar, bifamiliar or disposed to row - Rural Modular Removable Prefabricated) [10] C.A.S.E. (Ecocompatible Sustainable Anti-seismic Complexes - three-story buildings, with underground parking, in a green environment) [11] Other (Specify: _____)
Displacement subsidy		**Control**	44. Did you apply for the Contribution for Autonomous Accommodation (CAS)(*)? [1] __ No [2] __ Yes, but I did not receive it. [3] __ Yes, and I received it. (*)or the new Contribution for Self-Settlement (NCAS), or the Contribution for Rent (CCL), or the Contribution for Temporary Housing Hardship CDA.

Density (Time 1)	n. of inhabitants/ m^2	**Control**	45. How many people lived in the same household (including you)? _____ Numerical input _____ Numerical input

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			46. How big was the house _____ m^2
Distance (Time 1)	Distance of the new town from the old town	**Control**	[Filled in by the interviewer after the interview] How far are the new town from the one you were when the event occurred? _____ km
Displacement duration prediction confirmation (Time 1)		**Control**	47. During your stay in the temporary living arrangement, had you made a prediction about how long you would spend in that situation? [1] __ No [go to question #49] [2] __ Yes [go to question #48]. 48. Tell us whether this prediction turned out to be wrong or correct? [1] __ Totally wrong [2] __ Somewhat wrong [3] __ Fairly correct [4] __ Very correct 49. Are you still in the temporary housing solution? [1] __ No [go to question #53] [2] __ Yes [go to question 49b]. 49b. When do you think you will be able to go to a permanent home (in the city/area where you lived before the earthquake)? [1] __ Never [2] __ In _____ months (translate years into months, if possible) 50. How certain do you feel that the answer given to the previous question is true? [1] __ Not at all certain 2] __ A little certain [2] __ Fairly certain [2] __ Very certain 51. If you believe that you will no longer be able to go to a permanent home in the city/area where you lived before the earthquake, how much regret does this cause you? (skip this question if it does not apply to you) [1] __ Very little regret [2] __ Very little regret [3] __ Somewhat sorry [4] __ Very sorry 52. If you believe you will be able to go to a permanent home in the city/area where you lived before the earthquake, how much regret does it cause you that you will have to wait months/years before you can go there? (skip this question if it does not apply to you) [1] __ Very little regret [2] __ Very little regret [3] __ Somewhat sorry

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			[4] __ Very sorry
Housing Characteristics (Time 1)	**Control**	Readapted from (Caia et al., 2010)	53. Think about the housing solution you have used the longest (see response to question 43) and rate each of the following statements that relate to the related characteristics indicating how much you agree or disagree with each. (1 = strongly disagree, 2 = disagree, 3 = nor agree nor disagree, 4 = agree, 5 = strongly agree) PRIVACY 1. I have my own personal space in the house 2. Who is outside can see what happens inside (R) NOISE 1. The house is well insulated from external noise 2. External noise is heard when you are at home (R) SPACE / DENSITY ' 1. There is little space inside the house (R) 2. The space available is adequate for my needs NATURAL LIGHT 1. The natural light entering through the windows or doors is not satisfactory (R) 2. The windows allow the right amount of natural light to pass through HOT COLD 1. The thermal insulation of this house is poor (R) 2. It is rarely too hot or too cold QUALITY 1. This house is a low-quality building (R) 2. In this house, I experienced no ruptures or breaks OVERALL COMFORT 1. Overall I am comfortable in this house 2. This house is bad accommodation (R) VIEW - SURROUNDING ENVIRONMENT 1. The environment surrounding the house is depressing (R) 2. The place where the house is located is very nice PLACEMENT 1. The house is near all facilities relevant for me (e.g., work, schools, hospital, public services, pharmacy, shops, theatre, and cinema) 2. The house is far from my relatives and dears (R)
Level of satisfaction with aspects of life during the displacement (Time 1)	**Outcome**	(Schkade & Kahneman, 1998)	54. How satisfied were you during the displacement with each one of these specific aspects of your life? Job prospects –5 (extremely dissatisfied) to +5 (extremely satisfied) Educational opportunities –5 (extremely dissatisfied) to +5 (extremely satisfied) Financial situation –5 (extremely dissatisfied) to +5 (extremely satisfied) Personal safety –5 (extremely dissatisfied) to +5 (extremely satisfied) Social life –5 (extremely dissatisfied) to +5 (extremely satisfied) Outdoor activities –5 (extremely dissatisfied) to +5 (extremely satisfied) Natural beauty –5 (extremely dissatisfied) to +5 (extremely satisfied)

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				Overall climate –5 (extremely dissatisfied) to +5 (extremely satisfied) Cultural opportunities –5 (extremely dissatisfied) to +5 (extremely satisfied)
Quality of life (Time 1)	General life satisfaction during temporary housing	**Outcome**	(Cantril, 1965) (Kahneman & Deaton, 2010) (Gomez et al., 2013; Krueger & Heckhausen , 1993)	55. Think about your life during your stay at the temporary housing solution. How would you rate your life on a scale where 0 represents the worst possible life and 10 represents the best possible life?
Perceived social support (Time 1)	A short version of the perceived social support scale F-SOzU K-6 - Connection with WP3	**Social capital/Resilience**	(Lin et al., 2019)	56. Think about your life during your stay at the temporary housing solution. How much do you agree or disagree with each statement? (1 = completely disagree, 7 = completely agree) - I experienced a lot of understanding and security of others. - I knew a very close person whose help I could always count on. - If necessary, I could easily borrow something I might need from neighbors or friends. - I knew several people with whom I liked to do things. - When I was sick, I could without hesitation ask friends and family to take care of important matters for me. - If I was down, I knew to whom I could go without hesitation
Protection net (Time 1)		**Social capital**	(Bruine de Bruin et al., 2020)	57. After the event, how much help did you feel from: 1=very little to 5=very much (a) relatives (b) friends (c) neighbors (d) your colleagues/employers (f) other persons (g) national institutions (Civil Protection Department, Government, Commissioner for Reconstruction) (h) local institutions (Regional Civil Protection, Mayor, health workers, volunteers, etc.)
Post-traumatic stress (Time 1)	SPAN Scale (Startle, Physiological arousal, Anger, Numbness) Connection with WP3	**Vulnerability**	<--- item 17, 14, 11, 5 derived from Davidson (1997) (Davidson et al., 1997; Meltzer-Brody et al., 1999)	58. In the 2-3 months following the event, how often did you experience these moods and how intensely? Have you been physically upset by reminders of the event? [0] Never, [1] Almost never [2], occasionally [3] almost every day [4] Every day How intensely? [0] Not at all [1]slightly [2] moderately [3]Very [4] Extremely Have you had difficulty concentrating? [0] Never, [1] Almost never [2], occasionally [3] almost every day [4] Every day How intensely? [0] Not at all [1]slightly [2] moderately [3]Very [4] Extremely

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				Have you found it hard to imagine having a long life span fulfilling your goals? [0] Never, [1] Almost never [2], occasionally [3] almost every day [4] Every day How intensely? [0] Not at all [1]slightly [2] moderately [3]Very [4] Extremely Have you been avoiding any thoughts or feelings about the event? [0] Never, [1] Almost never [2], occasionally [3] almost every day [4] Every day How intensely? [0] Not at all [1]slightly [2] moderately [3]Very [4] Extremely
Type of area (Time 1)	Type of area after	**Control**		[Filled in by the interviewer after the interview] Which of the following best describes the area in which the person lived after the event*? [1]__Village / rural area (fewer than 3,000 people) [2]__ Small town (3,000 to15,000 people) [3]__ Town (15,000 to 100,000 people) [4]__ City (100,000 to 1,000,000 people) [5]__ Metropolitan area (over 1,000,000 people) *consider the new town where the citizen spent most of its time
				Consequences
Experience with death and suffering (Time 2)	Participants' experience with death and suffering by friends or relatives	**Vulnerability**	Direct experience index (Lichtenstein et al., 1978)	60. Did someone you know die as a result of the disaster? [1] __ At least one close friend or relative [2] __ Someone I know (other than a close friend or relative) [3] __ No one I know 61. Has anyone you know suffered (suffered serious physical or psychological consequences but did not die) as a result of the disaster? [1] __ At least one close friend or relative [2] __ Someone I know (other than a close friend or relative) [3] __ No one I know For analysis: sum up the responses (ranging from 2 to 9).
COVID-19 (Time 2)	How COVID-19 emergency impacted don the displaced peopla	**Vulnerability**		62. If you are still in a temporary solution, how much do you think this condition worsened the impact of the COVID-19 emergency, compared to if you had been/are in your home? [1] __ being here or in my home would not have made a difference [2] __ being in my home would have made it a little easier to cope with the emergency [3] __ being in my home would have made the emergency much easier to deal with.
Damage (Time 2)	The intensity of structural damage to the house	**Vulnerability**		63. After the event, how was your home rated in terms of habitability? (scale from A to F) According to the AeDES form, the habitability of buildings is classified into 6 categories: [1] __ A - Habitable building,

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				[2] __ B - Building temporarily uninhabitable (in whole or in part) but accessible with emergency measures, [3] __ C - Building temporarily uninhabitable to be reviewed in depth, [4] __ D - Building partially uninhabitable, [5] __ E - Building uninhabitable, [6] __ F - Building uninhabitable due to external risk. 7] __ Don't know / don't remember
				Now
Life satisfaction (Time 2)	General life satisfaction present	**Outcome**	(Cantril, 1965) (Kahneman & Deaton, 2010) (Gomez et al., 2013; Krueger & Heckhausen , 1993)	64. Think about your life right now. How would you rate your life on a scale where 0 represents the worst possible life and 10 represents the best possible life?
Life satisfaction (Time 3)	General life satisfaction Future	**Outcome**	(Cantril, 1965) (Kahneman & Deaton, 2010) (Gomez et al., 2013)	65. Think about your life in 10 years. How would you rate your life on a scale where 0 represents the worst possible life and 10 represents the best possible life?
Well-being (now)		**Outcome**	(Ware & Sherbourne, 1992)	66. How have you felt in the last 30 days? - nervous (1=all the time to 5=none of the time) - feeling calm and peaceful (1=all the time to 5=none of the time) - having a lot of energy (1=all the time to 5=none of the time) - feeling downhearted and blue (1=all the time to 5=none of the time) - feeling worn out (1=all the time to 5=none of the time) - feeling happy (1=all the time to 5=none of the time) - feeling tired (1=all the time to 5=none of the time)
Physical Vulnerability * (now)	Self-rated health Connection with WP3	**Vulnerability**	American Life Panel (https://alpdata.rand.org/) Survey on Well Being (n. 20) - Well Being and Health -Module - Rate General Health Question - ms20_RH001 GENERAL HEALTH RATING (WHO generalised health assessment) See (Bombak, 2013) for a Review	67. Overall, would you say that your health right now is ... 1 Excellent 2 Very Good 3 Good 4 Fair 5 Poor

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Individual Resilience Capability (now)	Brief Resilience Scale (individual ability to recover from stressful conditions). Connection with WP3	**Resilience**	(Smith et al., 2008)	68. Indicate the degree to which you agree with each of the following statements (1 = completely disagree, 7 = completely agree) - I tend to bounce back quickly after hard times - I have a hard time making it through stressful events (R) - It does not take me long to recover from a stressful event - It is hard for me to snap back when something bad happens (R) - I usually come through difficult times with little trouble - I tend to take a long time to get over set-backs in my life (R)
Psychological vulnerability (now)	Psychological Vulnerability Scale	**Vulnerability**	(Sinclair & Wallston, 1999)	69. Indicate the degree to which each of the following statements describes you: (1 = completely disagree, 7 = completely agree) - If I don't achieve my goals, I feel like a failure as a person - I feel entitled to better treatment from others than I generally receive - I am frequently aware of feeling inferior to other people. - I need approval from others to feel good about myself. - I tend to set my goals too high and become frustrated trying to reach them. - I often feel resentful when others take advantage of me.
Personal responsibility for preparedness (now)	Belief on personal responsibility for earthquake preparation	**Risk awareness**	(Mulilis & Duval, 1995, 1997)	70. Indicate to what extent, today, you feel personally responsible for your preparedness with respect to the occurrence of a major earthquake. 1 = Not at all/ 7 = Totally 71. Indicate to what extent, today, you feel that the City and State should be responsible for making sure you are prepared for the occurrence of a major earthquake. 1 = Not at all/ 7 = Totally Level of personal responsibility is calculated by subtracting each person's level of responsibility attributed to external agents (e.g., the federal government) from his or her level of indicated personal responsibility. These computations yield scores for each person ranging from a +6 indicating a response of total responsibility (7) on the personal responsibility item and not at all responsible (1) on the external agents' item, to a -6 that represented total attribution of responsibility to external agents (7) versus no personal responsibility regarding self.
Risk perception (now)	Affective risk perception	**Risk awareness**	(Ferrer et al., 2016) Kaufman et al. (2019)	72. Now, how much do you think about earthquakes? 1 = Not at all/ 7 = Very much 73. Right now, how concerned are you about earthquakes? 1 = Not at all/ 7 = Very much
	Perceived likelihood	**Risk awareness**	Kaufman et al. (2019)	75. Now, how likely do you think it is that a similar earthquake will occur in the future? 1 = Not at all/ 7 = Very much
				Socio-economics demographics

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Age (now)	Age	**Vulnerability**		76. How old are you? ____
Gender		**Vulnerability**		77. Gender: [1] __ male [2] ___ female
Education (now)		**Vulnerability**		78. Highest level of education [0] __ elementary [1] __ middle [2] __ high school [3] __ university
Employment status (now)	Employment status	**Vulnerability**		79. What is your current employment status? Student Employed Self-employed Unemployed Retired
Economic vulnerability 1 (Time 2)	Available income	**Vulnerability**	ISTAT (He et al., 2020)	80. Could you please indicate what income class your family's total annual net income is in now? [] 0 € [] Up to € 10,000 [] 10,001 € - 15,000 € [] 15.001 € - 20.000 € [] 20.001 € - 30.000 € [] 30.001 € - 50.000 € [] Over 50,000 81. How many people are in your family now (including you)? ____. Calculate a per capita household income by dividing the total household income by the number of household members.
				Open-ended question on key aspects of dissatisfaction during displacement
				82. If you have been offered a temporary housing solution, what are the main reasons you are satisfied or dissatisfied with the solution you have been offered? (Answer is optional) _____ _____

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