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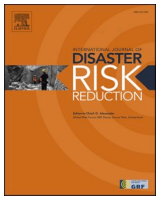

Between oblivion and drastic evidence: How local communities cope with seismic risk by forgetting and remembering

Sonia Brondi [a,*], Lucilla Benedetti [b], Rocco Claudio Tanga [c], Raquel Bertoldo [d]

[a] University of Padova, Italy
[b] Aix Marseille Univ, CNRS, IRD, INRA, Coll France, CEREGE, Aix-en-Provence, France
[c] Università G. D'Annunzio Chieti-Pescara, Italy
[d] Aix Marseille Univ, LPS, Aix-en-Provence, France

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ABSTRACT

Drawing upon a socio-constructivist perspective, this paper aims to gain insight into how two communities in the Italian Apennines region - differentially exposed to severe earthquakes in the past - remember, understand and plan for seismic phenomena. Avezzano was completely devastated in 1915, while the last significant event in Sulmona dates to 1706. However, both communities have indirectly experienced recent serious seismic events (e.g., L'Aquila earthquake in 2009 and Amatrice earthquake in 2016) as well as directly experienced lesser local tremblors. Interviews with citizens (N = 37) and stakeholders (N = 18) were conducted in the two cities and content-analysed with the support of NVivo software. The results show substantial differences in how respondents understand seismic events, access this information and prepare preventive strategies depending on their place of residence and role. The Avezzano community shares a more detached view, while the Sulmona community gives a more concerned picture. Moreover, the stakeholders tend to present an optimistic scenario, while citizens express a more critical viewpoint. Overall, the interview contents may be organised around two main oppositions: fatalism vs. empowerment in the face of an earthquake threat; and the will to forget about this risk vs. the need to remember it. The positioning on these two oppositions is defined by psychological, social and structural characteristics of individuals, and give rise to different representations of seismic risk and management. Such representations have practical implications for how the issue is addressed and faced in the communities' everyday life.

1. Introduction

The seismic crisis that has affected Italy since the L'Aquila earthquake in 2009 brings to the fore the need to re-assess how seismic risk (defined as the risk of damage from earthquake to a building, system, or other entity) is perceived and managed in the country. The long "accumulation" periods of some seismic regions like the Apennines confront societies with the difficulties of grasping, through a human temporal perspective, hazards that evolve at a geological scale. Still, Italians have long coped with seismic environments and they have significant direct or indirect experience with earthquakes (e.g., Ref. [1].

Across the lifetime of human settlements, communities develop contextually relevant social knowledge about their local environment. This knowledge sometimes mixes social memory, myths, and/or religious beliefs into common-sense knowledge that supports local people in their daily lives [2,3]. Because these contextualised social knowledges can provide insights into the locally relevant logics behind seismic preparedness – or the lack of it –, constructivist approaches are especially well-equipped to orient local risk management strategies.

This study proposes to compare how two localities sharing a similar geographical situation, and a similar vulnerability to earthquakes, prepare for seismic events when their last seismic experience is more or less distant: Sulmona, a city where the last significant seismic event dates back to 1706, and Avezzano, a city devastated by an earthquake in 1915.

The literature of the adoption of seismic risk preparedness has mainly described which variables increase protective behaviours uptake, that is, those actions adopted by individuals and communities "that have the capacity to either reduce immediate risk of damage and loss during an earthquake, or to prepare for post-impact conditions that might adversely affect survival probabilities" (e.g., construction

* Corresponding author.
E-mail address: sonia.brondi@unipd.it (S. Brondi).

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reinforcement or retrofitting, but also having supplies of essential goods or insurance) [4]; p. 1663). Systematic literature reviews have demonstrated the paramount role risk perception, fatalism [4], institutional trust and past experience play in risk preparedness [5]. In the following sections, we will briefly present the ways in which these studies have provided interesting descriptions of seismic adaptation – yet failed perhaps, through their assumptions, to capture a contextually relevant community response to seismic risk. Then we will present how the use of comprehensive study approaches such as social representations theory [1,3] would contribute to the development of more contextualised and meaningful local strategies for disaster risk management.

1.1. Seismic risk perception

Risk perception is a widely-used concept in risk management, which accounts for individual estimates of the dreadfulness of a danger weighted by its probability of occurrence [6]. The seismic preparedness literature often considers risk perception as a proxy for risk preparedness [7,8], assuming that people are rational and have the means to prepare. This assumption has limited the capacity of this literature to explain why even when risk perception is high, risk preparedness is often not observed [9,10].

First, we must recall that "human behaviour is primarily driven by *perception* and not by facts, or what is understood as facts by risk analysts and scientists" [11]; p. 93, italics added). Therefore, people working with public safety and health need to be especially attentive to the different factors influencing risk perceptions [12]. Based on the observation that lay risk assessments follow similar patterns Slovic et al. [13] proposed to use factorial analysis to identify the logic behind risk perception. Slovic et al. [13] show that perceived risk varies along a two-dimensional space of dreadfulness vs. familiarity, where risks that are regarded as potentially more catastrophic are often related to higher risk perceptions and stronger attitudes towards regulation. Earthquake risks, along with other natural hazards have been reported to be less risky than other less familiar technological issues [14].

These perceptions are informed by culturally shared elements, individual and collective memories that compose the fundaments of our shared symbolic lives [2,3].

Then, considering the culturally shared basis on which individuals frame their estimates of risk exposure, shared heuristics around individual risk perception have been observed as important factors influencing how certain risks are collectively (1) acknowledged and amplified (e.g., mad cow disease, swine flu) or (2) ignored and attenuated (e.g., climate change) [6].

Our own analysis of the shared risk perception heuristics surrounding seismic risk in the Italian Apennines region will be oriented by culturally shared, contextually specific elements. In the following section we present another important element with significant effects on risk perception: institutional trust [5].

1.2. Institutional trust

Trust in risk management is based in emotional ties people establish with institutions and it can take two different forms depending on what is under scrutiny: calculative trust and relational trust [15]. Calculative trust informs the perceiver of an institution's capacity to provide an appropriate response to risk situations. In order to assess calculative trust, detailed information about past events is analysed. Relational trust on the other hand is based on emotional bonds the individual experiences towards an institution. This type of trust is especially sensitive to information concerning the "relations" between institutions and society at large including norms and values. Therefore, information about corruption, negative personal experiences or indirect information about how this institution is connected to other less trustworthy individuals or organisations has significant and lasting effects on experienced trust.

Analyses of institutional trust in the context of earthquake risk management have illustrated how the lack of trust might undermine individual protective action [4]. Green [16] shows how land squatters concerned over corruption in Turkey increasingly relied on vernacular knowledge of building construction, which they considered as more trustworthy than "official" knowledge. In this way, a significant number of edifices in Istanbul have been built using opaque and non-standard construction methods because of a breach of relational trust.

Another qualitative study comparing representations and seismic adjustment measures of participants in Turkey, USA and Japan [3] have shown that Turkish participants are "permeated by the widespread belief that the character and moral fibre of the country was weak and corrupt" [3]; p. 385). Overall, these studies showed the negative effects that lack of trust – especially relational trust – have on individual response to seismic risk.

1.3. Risk experience

Risk experience is another important predictor of risk perception and of protective behaviour in response to natural hazards [5]. Yet the literature has described the relation between risk experience and preparedness as both positive and negative.

A first group of studies describes how experiencing an earthquake significantly heightens, directly or indirectly, risk perception and protective behaviour uptake (e.g., Ref. [17]. A second group of studies finds that more risk experience might also be associated with *less concern* [4, 18,19]. One interpretation for this inverse relationship is the normalization effect taking place when previous experiences have not resulted in severe consequences for the individual. In such cases a "desensitisation" to risk awareness messages results [20]. describe how most people experiencing an earthquake do so from areas far from the epicentre, where the effects of the tremblor are reduced. And because of the shared media event Celsi et al. taking place around an earthquake [1], people living far from the epicentre associate their experience with the magnitude reported in the epicentre, something misleadingly reassuring for the majority of people who are less severely affected [20]. Another interpretation that could justify lower risk perception after a seismic experience is the belief that, because a community has been hit recently, it would be relatively safe in the next decade [10].

These studies have shown how the relationship between experience and risk perception is in no way simple and depends on contextual, historical and cultural factors. In the next section, we will present one of the ways through which risk experience informs individuals of whether, and how, they can act to prevent or mitigate seismic risk. Trust in institutions therefore enters fully among the factors to consider when investigating the perception of risk and the response of individuals to earthquakes.

1.4. (Lack of) control and fatalism

Earthquake disaster management agents often "take for granted that earthquakes do not kill people, buildings do" [4]; p. 1663). This basic fact of earthquake risk management allows us to frame seismic risk preparedness in a way that opens possibilities of action through self-efficacy, or the belief that individuals *can* prevent or mitigate seismic risk [21].

Self-efficacy is fundamental in risk mitigation because individual or collective intention to act is actuated to the extent that the individual controls the situation or disposes of the necessary resources to enact a desirable behaviour [22]. In the case of an earthquake, when people are exposed to earthquake reports focusing solely on widespread devastation they are less aware of what could have been done to prevent the risk of building collapse; they therefore understand the situation as less preventable [21]. On the other hand, when these reports also present accounts of *which* types of buildings tend to collapse – instead of reporting generalised building collapse – participants tended to rate similar events as significantly more preventable. This study

demonstrated how the focus of seismic event reporting reinforces self-efficacy and, consequently, the odds of adopting preventative efforts.

These studies indicate that "in the dominant representation of disasters, earthquake losses are seen as 'acts of nature' rather than 'acts of human beings'" [4]; p. 1673). If the perception that one is in control of a situation can increase risk preparedness, perceiving oneself as powerless has exactly the opposite effect. This narrative is specially prominent in highly religious seismic regions like northern Africa [23,24] where earthquakes and their catastrophic consequences are attributed to the "will of Allah" [24]. Local inhabitations in Agadir (Morocco) "were found overwhelmingly to believe that there was little or no reason to prepare for quakes since they could not recur as long as they were faithful to the tenets of the Qur'an" [24]; p. 221). These studies stress the importance of also considering shared cultural elements in risk preparedness research [25]. The use of social representations theory to analyse cultural elements is presented in the next section.

1.5. Representing earthquakes

Given the constructivist and symbolic basis of risk perception, we consider the social representations framework an appropriate one to understand how culturally shared meanings allow communities to understand, communicate and adapt to their seismic environment [2,3].

Social representations can be defined as "socially elaborated and shared forms of knowledge that have a practical goal and build a reality that is common to a social set" [26]; p. 48). They are molar concepts, including images, feelings and practices that are shared among members of a community [27] and imbued with meaning. These shared meanings are permeated by – or "anchored" in – cultural, historical and ideological elements that constitute the symbolic lives of these communities or groups [28,29]. For this reason, it is common to identify shared content that is indulgent to the image a group makes of itself in relation to others [30], or identity-protective content in the face of collective risk exposure [31]. We identified three studies using the social representations approach to analyse collective response to seismic risk.

The first of them [17] compared seismic risk representations and preparedness in Romania and France, examining how direct (personal) seismic experience and indirect (cultural or mediated) experience impacts seismic risk representations. The study showed that both types of experience (vs. the absence of experience) and salience of seismic concern heightened the complexity of the earthquake social representations, with implications on the resilience of individuals and communities (e.g., the use of risk-related knowledge for practical purposes, such as the adoption of risk mitigation behaviours).

The second of these studies [3] compared seismic risk representations between three seismically active regions in the US, Japan and Turkey: Seattle, Osaka and Izmir. Questionnaires and interviews provided data to analyse seismic risk adjustment measures (construction characteristics), risk perception and meanings associated with seismicity in these three countries with very different cultural approaches to seismic hazards. Results show that in all countries participants are highly aware of the seismic hazard, but this does not directly influence risk mitigation actions. North Americans present more risk preparedness and less perceived vulnerability to experience (severe consequences of) a quake than Japanese and Turkish participants. Qualitative analysis suggests adjustment in Japan and Turkey is undermined by feelings of fear and anxiety. To this, in Turkey is also added the distrust over corruption, as well as a fatalistic perspective on seismic events, interpreted as "acts of God".

The last of these studies analyses how social media platforms (Facebook and Twitter) have been used during two successive seismic crises in Italy, more particularly in L'Aquila (2009) and Emilia (2012) [1]. The analysis shows how (1) platform features; (2) the moment when they were used (immediate aftermath, following days and following weeks) and (3) the individual's location significantly impacted the characteristics of the messages shared. While immediate and first-hand descriptions of the catastrophe were more commonly shared by people in the most affected areas and through Twitter, information exchange and platforms to organise civil response for reconstruction were more often observed in Facebook. The study further found that due to the crisis content sharing and meaning making were supported mainly by these online platforms rather than by other media.

2. Aims

The literature elements reviewed above show the extent to which seismic risk perception is influenced by contextual cultural elements, trust in authorities, risk experience [5] and how together these aspects account for individual control or, on the contrary, for fatalistic positions in relation to seismic risk [4]. In a preparedness perspective, it is thus fruitful to better understand how communities located in a seismic region make sense of seismic risk.

The social representations approach was chosen as a theoretical and analytical frame to support the understanding of the local cultural specificities in seismic risk response. We set out to examine how relatively unaffected communities, located in the vicinity of other severely impacted communities represent – and deal with – seismic risk through direct or indirect[1] experiences: (1) of recent events in the surrounding areas; and (2) of past local seismic events, and the relationship with subsequent preparedness practices or intentions.

The study thus proposes to compare the social representations shared in two communities with different experiences of seismic events. The choice of localities that were not severely touched by the recent seismic crisis intended to explore shared content that would, in the absence of an actual earthquake, serve to justify protective actions.

3. Case studies

The study focused on two Italian communities located in a seismic Apennines region, where seismic risk has greatly impacted cities in their vicinity. The Apennines have been struck by two seismic events in the last 20 years, in 2009 in the L'Aquila area and in 2016–2017 in the Norcia-Amatrice area [32]. Those areas are located a few dozen kilometres north of the communities we choose to study (Fig. 1).

The two communities have different indirect experience of seismic events: Avezzano (Table 1), a city devastated by an earthquake in 1915 ($M \sim 7$; 30,000 fatalities among an estimate population in the area of ≈120,000 [[33,34]]) and then completely rebuild with more modern and resistant materials, implementing the anti-seismic regulations of that time; and Sulmona (Table 1), a city where the last significant earthquake ($M \sim 6.6$) happened in 1706 [35] and where the historic centre is still made up of ancient buildings not up to current anti-seismic standards.

This fieldwork was an integral part of a Mediterranean coordinated effort (RiskMed project in the framework of the Labex OT-MED[2]) to compare cultural understandings of floods and earthquakes in southern France, Italy and Morocco (see Ref. [36]. The methodological approach is described in the following section.

4. Method

Drawing upon a socio-constructivist perspective, this study was rooted in the situated cultural context and focussed on the citizens'

[1] Memories shared by family, friends, other community members or the media [17].

[2] This project (2016–2019) was funded by the Labex OT-Med (ANR-11-LABEX-0061), supported by the Investissements d'Avenir, French Government project of the French National Research Agency (ANR) through the A*Midex project (ANR-11-IDEX-0001-02). http://www.otmed.fr.

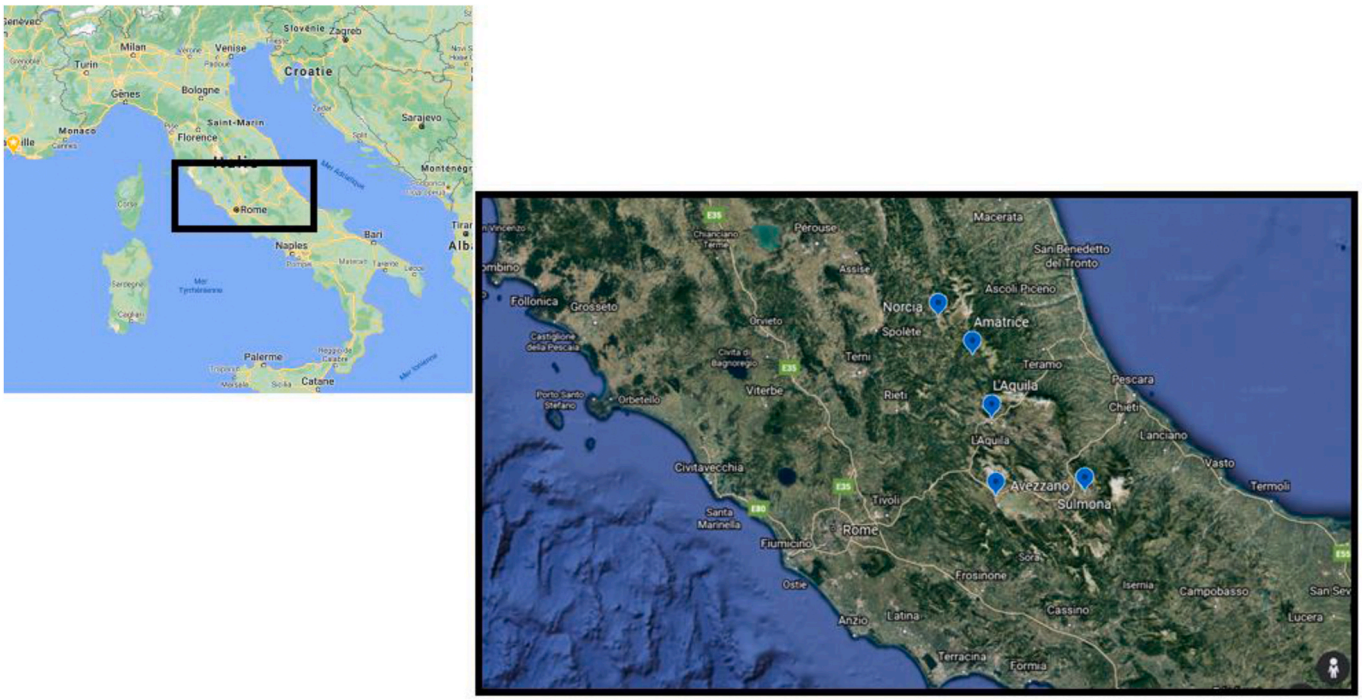

Fig. 1. Location of the studied communities (Avezzano and Sulmona) in relation to other communities having experienced earthquakes in the past 20 years in the Appenines (L'Aquila and Norcia-Amatrice) [Google Earth].

Table 1
Population and coordinates of the localities where this study was conducted.

	Population[a]	Location [lat.; long.]	Altitude
Avezzano	42,509	42.04 N/13.43 E	645 m
Sulmona	24,454	43.33 N/11.32 E	405 m

[a] Population in 2017, ISTAT (https://www.istat.it/en/).

viewpoint. In this sense, "if we value lay understanding about a topic, then it makes sense to ask an individual, or group, what they think about that topic" [37]; p. 66). Because of these differences in local seismic history, and how the recent seismic crisis might made people reassess these risks, we opted for a qualitative, *inductive* approach – where theory is based on empirical, contextually relevant analysis [38].

4.1. Participants

As in qualitative approaches sampling criteria is guided by the relevance of participants' experience with the topic, we divided our sample in two types of local informants: *local inhabitants* and *stakeholders*. People who are involved in seismic risk management, mitigation or civil security are here considered 'stakeholders' because they express, more than their personal viewpoint, a professional perspective on the subject. Stakeholders included architects, engineers, head-teachers, managers of the local Civil Protection, managers of the local technical offices, operational managers of the Italian Red Cross, and local policymakers. Local inhabitants are assumed to share local history through family, friends, and local acquaintances. Interviews were conducted until saturation was achieved (i.e. when no more content diversity was found for at least three interviews).

Overall, a total sample of 55 inhabitants of Avezzano and Sulmona was distributed as follows: 18 local inhabitants and 10 stakeholders from Avezzano; 19 local inhabitants and 8 stakeholders from Sulmona. We targeted a sample distribution corresponding as much as possible to the local demography. However, it should be stressed that we did not aim to have a representative sample of the local populations, but to increase the chances that content diversity would be voiced during interviews.

4.2. Procedure

Fieldwork began with a formal contact with the local Town Hall. In both cities either the Mayor or someone responding for Local Administration met with the research team, discussed possible issues, and put us in contact with key local informants.

Therefore, participants were invited in a variety of settings (i.e. participants' house or workplace, association offices, cafés) to participate in a semi-structured anonymous interview. Concerning stakeholders, as they are part of smaller professional circuits, snowballing sampling was used – i.e. when participants are invited to indicate other potential participants to be interviewed [38].

Individual face-to-face interviews were performed by a member of the research team. The interviews took place in a variety of settings (i.e. participants' house or workplace, association offices, cafés) and lasted about 45 min each. All the interviews were audio-recorded and fully transcribed. Participation was voluntary and written informed consent was obtained from all participants involved[3] (cf. also APA Ethics Code at https://www.apa.org/ethics/code).

The interviewer encouraged participants to talk about their own experiences through non-directive prompts and a list of open-ended questions. The interview grid was adapted by the research team from the RiskMed project core of common questions (see Ref. [36] taking account of specificities of the hazard and geographical areas analysed. After participants introduced themselves by answering some preliminary questions about their socio-demographic characteristics, the following topics were covered: local social memory of recent or past earthquakes, knowledge of the phenomenon, trust in public risk management, preparedness practices and place attachment.

[3] This project was approved by the committee for research ethics of the Aix-Marseille University (reference 2017-14-12-004).

4.3. Analysis

NVivo software was used to perform a content analysis integrating bottom-up coding procedures with theoretically oriented categories. The conversational turn was the unit of analysis.

First, the interviews were classified according to the two main variables: place of residence (Avezzano or Sulmona) and role (local inhabitant or stakeholder). Second, a coding system emergent from the data was developed. Third, nodes were organised top-down in three macro-categories: psychosocial issues, actors and phases (Table 2).

"Psychosocial issues" are theory-driven categories made up of theoretical constructs drawn from the literature; these were coded both according to their presence and absence on the basis of explicit statements (i.e., when the presence of a construct clearly emerged from the participant's words, or - on the contrary - when the participant explicitly highlighted its absence). "Actors" identifies who the interviewee refers to in the coded content. Finally, "phases" distinguishes the different temporal periods of the seismic event framing the interviewee's account. Each relevant conversational turn was coded simultaneously with one (or more) specific sub-category of psychosocial issues, actors, and/or phases. Psychosocial constructs were considered both in their presence and explicit absence for the interest in understanding the participants' perception of seismic risk, as well as their awareness about potential gaps in their own or others (family circle, other citizens, experts, institutions) on the issue.

5. Results

5.1. Knowledge, direct and indirect experiences

Knowledge and experience, the most typically cognitive constructs, account for most of the exchanges during interviews.

Knowledge refers to the set of information on the topic, deliberately sought or fortuitously encountered, as well as the sources and channels used to acquire such information. No relevant differences emerge across the "role" and "place of residence" sub-samples, except for the complexity of the contents expressed, which appeared much richer among interviewees of Sulmona than of Avezzano.

The technical aspects of seismicity – such as the geological causes of earthquakes, the localisation of faults, the distinction of seismic waves – were categorised under "knowledge". Results show that all actors considered were portrayed as knowledgeable. Interviewees attribute more knowledge to experts, institutions and even generically to other citizens than to themselves and their family circle. Experts and institutions, especially local ones, take responsibility for informing the public, a role that is self-attributed and widely recognized by local inhabitants. Knowledge is disseminated through brochures, public meetings, awareness campaigns and cultural initiatives, and has the dual purpose of informing and raising awareness of the topic. For example:

> "We have made brochures, which we have distributed to all secondary school children. They describe what a citizen must do in an emergency. We always have active phone numbers in case of emergency […] With these brochures, through the pupils, we have tried to reach their families." [Knowledge, Avezzano Civil Protection].

Table 2
Node tree.

Macro-categories	Sub-categories (i.e. nodes)
Psychosocial issues	Knowledge, Direct experience, Indirect experience, Concern, Place attachment, Intention, Practice (No knowledge, No direct experience, No vicarious experience, No concern, No place attachment, No intention, No practice)
Actors	I, Family circle, Other citizens, Experts, Institutions
Phases	Pre, During, Immediately after, After, Intermediate (between seismic events)

Moreover, local inhabitants declare that they also acquire information through other channels: the Internet, and specifically authoritative websites (e.g., that of the national institute of geology and volcanology, which monitors seismic events in Italy and around the world in real time); and direct communication with expert relatives, friends or acquaintances:

> "After the earthquake, the Civil Protection, the television and the schools … even the mass media … there was a lot of dissemination on how you should behave. […] For example, recently there was an initiative where the Civil Protection talked about the various risks in the event of an earthquake." [Knowledge, Sulmona Inhabitant]

> "We go in the schools to teach the risks present of this area … we go in the parishes … we organise practice drills planned precisely to make known and, above all, to involve the population." [Knowledge, Avezzano Civil Protection]

Participants described what they knew mainly in relation to earthquake preparedness. On the one hand, preparedness includes following the rules of conduct during seismic events to protect oneself and family members. Interviewees demonstrate being prepared individually for what happens *during* an earthquake. They express doubts however about how to proceed *immediately after* an event (e.g., knowing how to locate evacuation points). Preparedness also includes implementing the building standards in homes to avoid potential damage or collapses. Linked to this, local inhabitants admit a lack of knowledge about the issues of insurances and state incentives to afford such expenditure.

Direct and indirect experience refers to the familiarity with seismic risk developed personally or indirectly by having experienced first-hand or having heard about earthquakes from others. In this regard, the earthquake in L'Aquila (2009), about 50 km away from Avezzano and Sulmona, is unanimously considered a turning point for the affected communities. While causing little damage in both localities, it represents the moment of great awareness for everyone. The proximity to the epicentre and the most affected areas, the intensity of the quake, the number of casualties, are all factors that have shaped societal response, resulting in entirely revamped risk management and coping strategies. Moreover, participants frequently mention the subsequent direct experience with the earthquake in Norcia-Amatrice (2016), located about 100 km from both localities, and other minor seismic events felt by the population in the last decades. Local inhabitants in both municipalities, more than stakeholders, describe such experiences, offering a more intimate view. Specifically, interviewees describe in detail the memories of the moments in which earthquake surprised them and their family circle, as well as the immediate aftermath. Although the year is sometimes reported imprecisely, narratives include detailed and vivid autobiographical memories, like "flashbulb memories", suggesting the high emotional load of the experienced events.

> "I was in Sulmona and I remember feeling the earthquake that took place that night, the Sunday before the earthquake of L'Aquila … there was an earthquake in Sulmona, in our fault … and I remember hearing this rumble and I woke up scared from sleep because I realized that it was not a common sound […] And then I obviously remember the earthquake of L'Aquila, I remember that I felt it more or less of the same intensity as that of Sulmona. But I said to my husband: in my opinion, this time it was not 'ours' because I did not hear the same rumble … if it happened in L'Aquila - I told him - this time there will be deaths." [Direct Experience, Sulmona Inhabitant]

References to indirect experiences are present as well: the catastrophic earthquake in Avezzano (1915) is recalled, especially by its local inhabitants, who speak of it as a tragic event that however allowed the community to be reconstructed taking seismic risks in consideration. Finally, depending on their age declared during the interviews, participants mention other tragic seismic events (e.g., Irpinia, 1980) as indirect experiences.

"When I went to school, teachers taught me that, unfortunately, in 1915 Avezzano was razed to the ground." [Indirect Experience, Avezzano Inhabitant]

"Here, in 1915, after the earthquake, only one house did not collapse." [Indirect Experience, Avezzano Inhabitant]

5.2. Intentions and practices

Two forms of (potential) translation into action – concrete uptake of preparedness practices, and intentions – were coded. Such instances are less frequently mentioned by interviewees than knowledge, but more frequently than emotional content. It is also worth noting that intentions and practices were frequently addressed through the lens of what interviewees – and other co-citizens – *did not* do, suggesting that a certain degree of generalised inaction is perceived.

Intention refers to an action for personal purposes or professional interventions that has not yet been accomplished. These intended actions had to do, on the one hand, with acquiring more information when individuals felt this would improve their preparedness – e.g., information about home insurance and state incentives for home renovations, or about the assembly points for evacuation. By contrast, other intentions regarded concrete mitigation actions, that is, things they could do to be better prepared both at personal and professional level – e.g., sleeping with a whistle, preparing an emergency suitcase, asking an expert for/providing rapidly a house evaluation report, supporting effectively individual residents, moving house.

"My husband had said that he intended to put a roller staircase on the balcony so that if necessary … but then some things have remained suspended, we have not yet implemented them, but the idea is there" [Intention, Sulmona Inhabitant]

Concerning the "role" variable, stakeholders of both municipalities express more intentions than local inhabitants, possibly because their professional role leads them daily to consider or support a variety of actions they themselves could take. As to locality, Avezzano inhabitants speak more about intentions than Sulmona inhabitants do: this could be interpreted as due to the recency of a major seismic event in Avezzano.

Overall, findings suggest that expressed intentions should be understood more as ideals than as practices ready to be displayed. For this reason, frequent references to intentions suggest, albeit with due caution, a certain degree of immobility and inaction. Interviewees attribute to the experts the proportionally largest number of references to intentions compared to the other actors. References to intentions are frequent among stakeholders because they are professionally involved in damage assessments reports where the earthquake hazards are estimated before renovation funding is made available. Intentions are mentioned almost exclusively as related to the intermediate phase between quakes, suggesting that this is the best time to invest in risk evaluation and preparedness.

"The population, immediately after an emergency, is more intent on how to solve, how to deal with this emergency. As time passes, this urge decreases; so, at the time of an emergency, people are more inclined to try to do as much as possible. As the emergency moves away, this always decreases …" [Intention, Avezzano Civil Protection]

Practice refers to the set of actions implemented to cope with seismic risk. Regarding the variables considered in our analysis, the Sulmona interviewees, and especially the stakeholders, invoke a pro-active approach, indicating many actions taken to manage the issue effectively. By contrast, the Avezzano participants, and - once again - mainly the stakeholders, hold a detached position, in which such actions are not particularly mentioned. It is also worth noting that the Sulmona inhabitants underline the absence of practices more than Avezzano inhabitants do, highlighting how concrete actions are demanded especially by local inhabitants with less recent memories of a seismic event.

Local inhabitants more frequently invoke practices by experts and institutions (especially local ones) than by higher national governance levels. However, such discourse invoked *in*action more frequently than action, indicating a certain distrust in the risk management system. In this regard, interviewees made a clear distinction between local and regional/national institutions. Local institutions (e.g., City Mayors) are described as inactive because they do not receive the necessary funds to be able to act effectively, whereas regional and national institutions (e.g., Abruzzo Region Administrators, Italian Ministries, politicians at large) are instead regarded as inactive because they are considered as inefficient or even bad faith actors.

"I do not know whether to call it bad management because I realize that if there is no money there is little we can do. It is not a problem of my municipality, I believe; it is a widespread problem throughout the country. […] Maybe we do not count for much, from a political point of view we do not have a big say. […] I personally send my son to a private school where I know that the building is one of the safest." [No Practice, Sulmona Inhabitant]

"Today we are in such a deficit: the municipalities no longer have the funds, the state does not intervene … the discussion is very broad, I do not think anything can be done: the costs are too high." [No Practice, Sulmona Inhabitant]

The absence of concrete actions is also used to express self-criticism regarding oneself and other fellow citizens, describing e.g., how people "should" be more attentive to prevention. Statements on practices that are enacted (or not) varied considerably according to temporal phase. Interviewees underlined the importance of actions taken during the moments *after* a seismic event or *intermediate* between quakes. During these phases, vulnerable communities can prepare and protect themselves for another potential earthquake; however, it is in these moments that the absence of action is especially mentioned. Some practices - already cited when discussing the other constructs - include the organization of or participation in public initiatives to reinforce information about preparedness, or renovating construction with the help of state incentives or insurance incentives.

"We, my family and I, immediately after the earthquake of 2009 tried to verify our house. For example, my mother, who has already had damage in her house … some consolidation works have been done, minimal, but they were done." [Practice, Sulmona Mayor]

"We participated in an initiative that was proposed to us by an association, called 'active citizenship', and they asked us to prepare a video. Then, some directors and a screenwriter from Rome arrived and made us shoot a video, a short movie, which was screened throughout the territory of Sulmona and also arrived in Rome because there was, in November or early December, a forum on the problems connected to the earthquake and the video shot by the students was shown." [Practice, Sulmona Head-Teacher]

5.3. Concerns and place attachment

Affective constructs, associated with concerns and place attachment, are the least mentioned content, and often expressed indirectly.

Concerns here refers to the set of emotional states connected to the risk perception, such as anxiety, fear, alarm and a sense of vulnerability. Overall, household composition has an impact in how concerns are expressed: young people and adults express more concern than do the elderly; moreover, the presence or absence of children/family members to take care of appears to strongly affect the number of negative emotions mentioned about the seismic risk.

> "The terrible one was that of 2009, because when you have a family you are more aware both of the fear for yourself and the fear that something may happen to those around you, therefore to family members, children, wife and other loved ones." [Concern, Sulmona Inhabitant]

Sulmona citizens, especially the local inhabitants, invoke much more affective involvement in the issue than do those from Avezzano, who instead appear more detached. The community of Sulmona perceives itself as extremely vulnerable to earthquake, expecting a quake sooner or later, and this frequently fosters serious concern. By contrast, findings show that the Avezzano inhabitants feel safe and explicitly mention the absence of concern.

Described negative emotional states are profoundly personal, but at the same time they are also recognized in other people: family members and other citizens. Fewer concerns are raised by experts and institutions, which on the contrary have the task of remaining alert and effectively managing the different phases of the emergency.

> "In addition to keeping the population up to date on the emergency plans, as required by current legislation, the Administration has decided to carry out practice drills, at least once or twice a year, in order to keep the fear alive among the population." [Concern, Avezzano Technical Office]

Specifically, the concern expressed by local inhabitants revolves around the moment of the earthquake, or immediately after, and is less present in discourse about the other phases. The arousing fear of the emergency phases seems to be replaced by a latent sense of vulnerability when returning to everyday life. This finding reflects what has already been described as risk "normalization" strategies by populations that are routinely exposed to life-threatening environments [18]: it suggests the salience of seismic events in people's lives, but also their will to quickly recover normality.

> "Fear is what fools you. That is, the earthquake is a natural event, it can happen even now, we cannot do anything […] With the earthquake, no joke. In other words, a person must not be afraid because if he thinks about the earthquake and destruction he no longer lives […] you do not have to think about it, otherwise one no longer lives." [No Concern, Sulmona Inhabitant]

Place attachment refers to the symbolic and affective bonds between people and their living environments. It provides a sense of belonging to the community, constructs shared meanings and mediates change; in this way, place attachment is profoundly associated with a sense of local identity, which is at the same time collective (Hernández, Martín, Ruiz, & Hidalgo, 2010). Personal characteristics associated with the place of origin, which were not considered as variables in this study, but emerged during the interview anyway, affect the intensity of place attachment expressed by the individuals: those born abroad or in other areas of Italy who have been in Sulmona or Avezzano for just a few years appear to feel weak belonging to the community and are more inclined to leave the locality in the future.

Among those who do express place attachment, findings show that it is at a substantially high level, regardless of "role" and "place of residence" variables. These interviewees declare that they have developed strong bonds with their towns for many reasons: because they were born there; because they have all their affections there; and for the beauties of the place – especially among Sulmona inhabitants. They also state that they would not change their place of residence due to the seismic risk.

> "Fear can always be there, but I would not leave my town. We know that the earthquake happened here, it happened in L'Aquila, in Assisi, in Perugia, everywhere, so here in Italy you are not comfortable anywhere for the earthquake." [Place Attachment, Sulmona Inhabitant]

Those who express less place attachment do not exclude the possibility of leaving their city, but explain that this would be for work reasons, such as better career opportunities elsewhere. Few respondents wish their children to move to a safer place; the prevailing narrative is in fact that the whole of Italy is at risk of earthquake and unsafe, so it is better to stay in the town where they have family bonds.

6. Discussion

This study aimed at analysing how places exposed to similar earthquake risks but sharing different seismic experiences deal with seismicity in the present. A socio-constructivist perspective was adopted to explore how local inhabitants and stakeholders of Avezzano and Sulmona represent and anticipate earthquakes.

The findings, taken together, show a comprehensive picture of the seismic risk perception and management in the two communities examined. First, references to selected psychosocial constructs (i.e. knowledge, experience, concern, place attachment, intention, practice) are very recurrent, much more than those explicitly referring to their absence, suggesting a multi-faceted social representation of the issue. This representation, marked by a prevalence of cognitive constructs (i.e. knowledge and experiences), highlights the close relationship of such components with both affective (i.e. concerns and place attachment) and behavioural (i.e. intentions and practices) constructs, giving life to an articulated and composite picture.

As suggested by the literature (cf. [2,3], although among our interviewees the seismic risk is widely recognized and known, it is also rationalized in an effort to compensate for identity threats [31]. In addition to knowledge, direct or indirect risk experience plays a central role. However, more surprisingly given the literature, interviews show that earthquake experience is associated with concerns that are not necessarily followed by the implementation of related preparedness practices (cf [17].

Moreover, we found substantial differences between the social representation about seismicity in the different localities (Avezzano or Sulmona), and among people in different roles (local inhabitant or stakeholder). The Avezzano participants share a more detached representation of the seismic risk given that references to affective constructs are less present. By contrast, the Sulmona participants highlight a representation in which cognitive, affective and behavioural constructs coexist with each other in a relevant way. This highly articulated representation emerges above all in the narratives of the local inhabitants, but it is also present among the stakeholders: the Avezzano stakeholders tend to maintain a professional stance, responding from their role position; Sulmona stakeholders, on the other hand, often talk about personal experiences and report their point of view, offering a more "private" position. This difference may be interpreted through the lens of history: Avezzano was completely razed one century ago and rebuilt with more modern and resistant materials, in accordance with the anti-seismic standards of that time; moreover, Avezzano inhabitants do not expect another earthquake of similar magnitude in the short term because the previous one was relatively recent on a geological timescale. By contrast, Sulmona still has its historic centre with ancient – and therefore unsafe –buildings; and for their part, Sulmona inhabitants expect a strong earthquake in the short term because the previous one took place three centuries ago. Moreover, Sulmona is geographically located in a menacing situation at 405 m asl on a flat plain at the foot of ~2000-m-high relief (Monte Morrone 1926 m), with known past rock-falls (Gori et al., 2014). On the other hand, Avezzano is located at the edge of the Fucino plain (a former lake) at 695 m asl surrounding by rather distant high-level relief and locally at the base of ~1000-m-high hill. It is possible that this different geographical situation might also affect the perception of the local inhabitants in those localities, with inhabitants in Sulmona being in a much more visible natural hazards exposure such as earthquake and rock-falls than in Avezzano.

A further noteworthy difference concerns the "role" variable. On the

one hand, stakeholders tend to present an optimistic representation, in which there are few explicit references to the absence of the constructs considered; on the other hand, local inhabitants propose a more critical and articulated representation, in which both they themselves and, above all, the institutions are recognized as having merits, but also many limits and failures. This has profound implications on risk perception and management since it refers to institutional trust, seen in the literature as a crucial factor for the implementation (or not) of individual and community protective actions [4,5]. Specifically, concerns raised by local inhabitants can be traced back to both calculative and relational trust [15]; Bertoldo et al., 2020). Local inhabitants of both communities assess as inadequate the social institutions' risk management – described as providing theoretical knowledge to laypeople but failing to implement concrete actions. Moreover, confirming what is found at national level [39], the local inhabitants interviewed express little trust in social institutions, especially national ones, which are considered the main obstacles to more efficient risk management.

7. Conclusions

This study aimed to investigate how local inhabitants and stakeholders of two seismically active areas in Italy make sense of seismic risk, and prepare for a quake, in light of their distinct seismic history. To this purpose, interviews with local inhabitants and stakeholders in both the communities were collected and content analysed.

Overall, the findings may be organised around two main oppositions, which we suggest to name: fatalism vs. empowerment and forgetting vs. remembering.

The first continuum, i.e. fatalism vs. empowerment, proposes two opposite ideas of the seismic hazard. At one pole is the idea that earthquakes are unpredictable natural events, of which – taking into account the history of the territory – there is no doubt that they will occur; but it is not known when and how severely. This idea leaves ample room for feelings of fear and hope, contributing to construct a fatalistic approach to the issue. Preparedness actions are listed with little conviction since the majority view is that nothing could be done if the earthquake hits with great intensity or when people are in unsafe places (e.g., ancient buildings). At the opposite pole lies the idea that earthquakes are controllable natural events, at least in their effects. Although a fatalistic approach generally prevails, this dimension of self-efficacy often co-exists, highlighting simple but effective actions to be implemented in the event of seismic events or immediately afterwards to limit serious consequences for oneself and loved ones, and damage to one's homes.

The second continuum, i.e. forgetting vs. remembering, proposes two opposite coping strategies to face seismic hazard. At one pole is the coping strategy that concerns the collective will to not think about the risk, which people enact in order not to be overwhelmed by fears and to live everyday life serenely and without worries. At the opposite pole lies the coping strategy that concerns the collective need to remember and act upon memory. This mechanism has the function of keeping attention and alert high, even a long time after a seismic event, to avoid the triggering of a risky process of normalization that would lead to oblivion and inaction. On a collective level, this strategy, which is specifically supported by the targeted actions of institutions and experts, includes the reactivation of social memory through societal initiatives, for example on the occasion of the anniversary of significant earthquakes, but also the occurrence of other seismic events elsewhere. These moments become essential occasions for emotional social sharing [40], as well as - more generally - important social resources to face individual difficulties [31,41].

The positioning on these two main oppositions, defined by the intertwining psychological, social and structural characteristics of individuals [42], gives rise to different facets of the social representations of earthquakes and seismic risk. Such representations are not only forms of knowledge on a theoretical level, they also have practical implications for the way the issue is addressed and faced. In this regard, the study gives indications for local actors about how to use culturally shared ideas to foster seismic prevention. The results have shown some potential obstacles to the effective management of the risk along the three psychosocial dimensions considered (i.e. cognitive, affective, behavioural): rationalisation, oblivion, emotional vulnerability or detachment, disempowerment, delegation. They all act to justify inaction, especially on the long-term. Thus, while local actors should acknowledge them, they could also contribute to reinforce collective resilience by focusing on what inhabitants can actually do: the retrofitting is a primary example. In this sense, identity dynamics, also involving (local) places, play an important role and could act as prompts with protective psychosocial mechanisms. This could have significant beneficial effects at various levels: first, on the response and preparation for risk; second, on the overall openness for local learning, the community's empowerment and resilience; finally, on the (re)building of a stronger institutional trust.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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