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Mental health risks for cultural heritage professionals within the framework of disaster risk reduction: An exploratory study on the emotional impact of ruins after the 2016 earthquake in central Italy

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ABSTRACT

Across the disaster risk reduction (DRR) community, there is a growing recognition that protecting cultural heritage has a key role in strengthening community sense and resilience. Despite this, however, cultural heritage first aiders, that is, heritage professionals managing the activities of securing movable and immovable cultural heritage in emergencies after disasters, are not adequately recognized in the DRR framework with respect to the mental risks they face, working in the field of emergencies. This study aims to explore the specific quality of mental health risks for cultural heritage first aiders, analyzing the emotional impact of the sight of cultural heritage ruins on a sample of cultural heritage first aiders, compared with a sample of emergency psychologists and earthquake victims, together with exploring the possible role of collateral variables, such as personality traits. Participants were 30 Italian adults who have been involved, to different degrees and roles, in the 2016 Central Italy (Marche region) earthquake or immediately after, for post-disaster emergency activities. Results showed an interesting gradient of the emotional impact of heritage ruins, with heritage professionals at the apex of it. Moreover, heritage professionals showed a higher aesthetic-artistic sensitivity together with the presence of post-traumatic stress long after the disaster event, thus highlighting a specific profile of risk for mental health, which should be taken into serious account by the scientific community. A suggestion is finally proposed on the potential usefulness of including pre-disaster psychological training for cultural heritage aiders in the DRR strategies, also in light of the increasing need for a person-centered approach integrating Mental Health and Psychosocial Support (MHPSS) in the DRR framework.

1. Introduction

Across the disaster risk reduction (DRR) community, there is a growing recognition that protecting cultural heritage is a crucial step for protecting our sense of historical, cultural, and social identity, thus strengthening community resilience [1–3]. As Giovanni Boccardi, Chief of the Emergency Preparedness and Response Unit for the Culture Sector of UNESCO, highlighted during the 2018

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Understanding Risk Forum held in Mexico City, "[Cultural heritage] has been considered a secondary issue, as a luxury. But we have seen that, when there is a disaster or trauma, people need to hold on to their cultural landmarks and symbols. Heritage is the glue that binds people together as a community" [4].

Cultural heritage preservation has several objectives: a) *cultural memory*: cultural heritage preservation protects the history of the physical evidence of human passage and transfers value to the knowledge and skills of their ancestors; b) *useful proximity*: cultural heritage preservation can foster interaction between the environment, people, and communities; c) *environmental diversity:* as local community identity, cultural heritage preservation maintains local artifacts and local artisans in the flow of urban development; d) *economic gain:* cultural heritage preservation benefits the community by saving costs related to the construction of new buildings and visitor attractions [5].

Therefore, recovering cultural heritage from a disaster means repairing the *intangible* elements that build a sense of community (practices, representations, expressions, knowledge, and skills, that a given community, group, or individuals recognize as part of their cultural heritage) by repairing the *tangible* ones (the physical manifestations of culture produced, maintained and transmitted within a society and imbued with cultural significance) [6,7,8]. By the way, the sense of community, along with the concept of social support closely related to it, has proven to be a protective factor against various mental health consequences [9,10]. So, recovering cultural heritage from a disaster is also a key component in responding effectively to further possible disasters in terms of community resilience. To quote Spennemann and Graham [11]: "A community's ability to respond is influenced by many variables and their ability to come together as a group to forge a new future. This relationship is affected by their relationship to the environment before and after the catastrophic event".

Following this perspective, cultural heritage professionals (i.e., archaeologists, architects, and art historians) managing the activities of securing and safeguarding movable and immovable cultural heritage in emergencies after disasters – the so-called "cultural heritage first aiders" [7] – assume a relevant position in the framework for disaster risk reduction. In fact, as Gray et al. [12] suggest, the 2015–2030 Sendai Framework for Disaster Risk Reduction [49], representing a globally agreed-upon model for disaster risk reduction practices, emphasizes risk reduction and increased resilience through person-centered and all-hazard, all-state, and society approach. This means that more and more attention is being developed across countries on people involved in various ways in disasters, integrating Mental Health and Psychosocial Support (MHPSS) in DRR activities on the one side, and shifting paradigms in the field of MHPSS towards upstream approaches targeting preparedness and prevention, on the other side.

Despite this, however, cultural heritage professionals working in emergencies are not considered in the DRR framework, especially in the sense of their mental risks. Yet, their work is crucial, complex, and involves several interventions [7], going from a) *risk management*, before a disaster occurs, that is, a systematic preventive approach to identify, assess and reduce disaster risks, to b) *first aid*, immediately after the disaster has occurred, that is, a three-step work including situation analysis, damage and risk assessment, and securing and stabilization. The 2015–2030 Sendai Framework previously mentioned explicitly addresses the goals of protecting cultural heritage, increasing resilience, and enhancing recovery schemes to provide psychosocial support and mental health services for all people in need, but does not specifically mention "cultural heritage first aiders".

Similarly, the scientific trauma-related literature on the psychological impact of disasters on first responders, that is, those who must "preserve life, property and the environment" [13], p. 2), describes several studies (i.e., [10,14–20,44]; on mental health risks and problems (i.e., PTSD, depression, anxiety, sleep disturbances, alcohol/substance abuse, and suicide ideation) in several professional categories, such as firefighters and police officers, but does not identify similar researches having "cultural heritage first aiders" as the object of investigation [47].

This study is situated in an innovative position within this panorama, being the first attempt to explore the specific quality of mental health risks of "cultural heritage first aiders". Supported and refined in its intentions by the awarding of the 19th European Archaeological Heritage Prize to the Regional Coordination Crisis Unit of the Italian Ministry of Cultural Heritage and Activities and Tourism (UCCR-MIBACT-Marche), which took place in Maastricht 2017 on the occasion of the European Association of Archaeologists (EAA) Conference, the study emerges from a series of interdisciplinary meetings on the theme of post-seismic emergency, promoted in 2017 by the Department of Humanistic Studies (DISTUM) of the University of Urbino Carlo Bo (Italy): "MotusLoci-Interdisciplinary meetings on earth movements and psyche".

In particular, the meeting "Earthquakes. Archaeological, artistic and psychological perspectives", initiated a reflection on the ruins of the cultural heritage and their perception from antiquity to the present, with a specific focus on the severe earthquake that struck central Italy (in particular the Marche region) in 2106 and the subsequent interventions for the recovery of the cultural heritage, that suffered heavy damage and needed a complex range of intervention by cultural heritage professionals. For an overview of the damage to cultural heritage and the complexity of post-disaster interventions, you can see the reports prepared by the Ministry of the Interior, Marche Regional Fire Department [43], and the Regional Secretariat of the Ministry of Culture [45,46].

Starting from the comparison between heritage professionals who worked on earthquake damage (UCCR-MIBACT-Marche) and DISTUM faculty, both archaeologists and art historians, who analyzed the feelings related to ruins in different periods, and psychologists, who dealt with the psychological impact of ruins on the population and operators, the study, which also took advantage of an agreement with the then Superintendence of Archeology, Fine Arts and Landscape of the Marche region (SABAP-Marche), tries to explore the mental health risks of cultural heritage first aiders in order to assess how and to what extent exposure to ruins under emergency conditions affects them from an emotional point of view. In fact, what the cultural heritage first aiders we met with to refine our study emphasized about the emotional impact of the disaster is how much the heritage ruins have deep emotional meaning for them, who have a particular sensitivity in that sense. And so, how much the specific quality of their mental risk in the emergency situation might be related to the emotional impact of seeing the ruins although this is often not taken into account.

For all these reasons, this study aims to analyze the emotional impact of the sight of cultural heritage ruins on a sample of cultural

heritage first aiders, compared with a sample of emergency psychologists and earthquake victims, together with exploring the possible role of collateral variables, such as training/education (psychological or artistic) or individual characteristics (empathy, personality traits). The ultimate objective is to evaluate from our results the potential usefulness of pre-disaster psychological training for "cultural heritage first aiders" to be included in DRR activities involving cultural heritage for helping them in dealing with these complex emotional experiences during their emergency work and in being more prepared for these difficult situations.

2. Materials and methods

2.1. Participants

Participants were Italian adults (n = 30; ages = 30–60 years) who have been all involved, to different degrees and roles, in the 2016 Central Italy (Marche region) earthquake or immediately after, for post-disaster emergency activities (see Table 1 for socio-demographic characteristics of the sample).

They were divided into three groups. The first group was composed of heritage professionals from the Regional Coordination Crisis Unit of the Italian Ministry of Cultural Heritage and Activities and Tourism (UCCR-MIBACT-Marche) (n = 10; 3 men, 7 women; mean age 42.45 ± 4.7); the second group was composed of emergency psychologists (n = 10; 1 man, 9 women; mean age 52.33 ± 11.65) from Italian Associations for Emergency Psychology (Gepe Association and SIPEM SoS Marche); the third group was composed of citizens (n = 10; 3 men, 7 women; mean age 41.60 ± 7.55) living, at the time of the 2016 earthquake, in the Marche towns that were among the most affected by the earthquake, such as S. Ginesio (MC), Visso (MC), Arquata del Tronto (AP), and Castel Sant'Angelo sul Nera (MC).

Exclusion criteria were: a) poor knowledge of the Italian language; b) presence of medical and/or neurological conditions; c) mental disability (IQ < 80). Having been exposed to both the 1997 and 2016 earthquakes (i.e., inhabitants of Serravalle municipality) was an additional exclusion criterion for the earthquake-affected group.

The study was approved by the Ethics Committee for Human Research of Urbino University and supported by a formal agreement with what at the time was the Superintendence of Archeology, Fine Arts and Landscape of Marche (Sabap-Marche). All participants signed a consent form and participated voluntarily after a description of the study.

A workflow explaining the process of the entire study is described in Fig. 1.

2.2. Instruments

All participants were administered a battery of tests, consisting of a semi-structured interview and four self-report questionnaires.

The semi-structured interview, the *Cultural Heritage Ruins Scale* (CHRIS; see the Appendix), was developed ad hoc to measure the emotional impact of seeing cultural heritage ruins, by adapting the *Affect Grid* [51] and *Aesthetic Emotions Scale* [50], and by following the guidelines to using photo elicitation in psychology and mental health research [21,22].

Firstly, an extensive archive of photos of cultural heritage ruins from disasters was collected and then cleaned up, with the help of heritage professionals used as consultants (but not as participants), to arrive at the selection of 10 photos representative of different kinds of tangible cultural heritage as according to UNESCO [8] (See Fig. 2 for classification of categories of cultural heritage). The photos of heritage ruins were: recent (R; from the year 2000 and up) and ancient (A; from the year 1999 and down); immovable (I; i.e., buildings or churches) and movable (M; i.e., paintings or sculptures), black & white and color. Secondly, the semi-structured interview was built with the rationale of measuring: *a)* the full range of emotions, from positive to negative through mixed/neutral ones, and *b)*

Table 1
Socio-demographic characteristics of the sample (N=30).

Variable	Frequency no. (%)
Gender	
Males	7 (23.3)
Females	23 (76.7)
Marital status	
Single	9 (30)
In a stable relationship	5 (16.7)
Married or cohabiting	14 (46.7)
Widowed	1 (3.3)
Divorced	1 (3.3)
Educational level	
Diploma	4 (13.3)
Degree	22 (73.4)
PhD	2 (6.7)
Post-graduate specialization	1 (3.3)
Psychotherapy specialization	1 (3.3)
Current employment	
Not employed	1 (3.3)
Full time work	14 (46.7)
Part time work	4 (13.3)
Freelancer	10 (33.4)
Retired	1 (3.3)

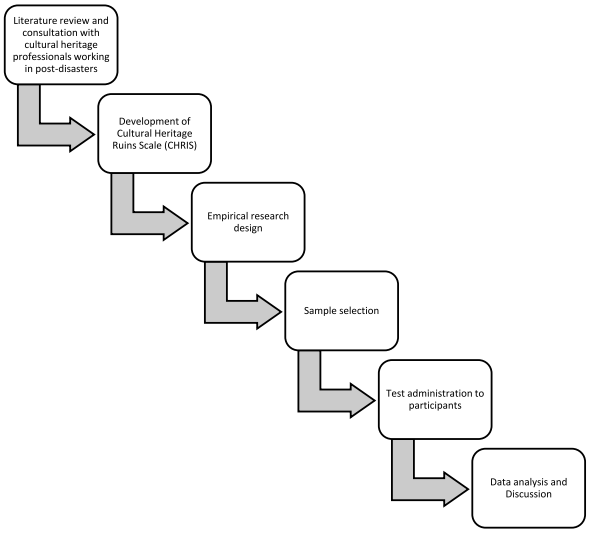

Fig. 1. Workflow of the study.

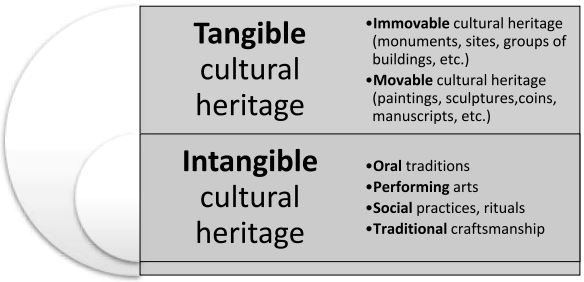

Fig. 2. The main categories of cultural heritage [8].

the two ways for emotional processing of external stimuli [23], from the immediate/fast (*the low road*) to the intellectual/slow (*the high road*) one.

The participant is shown one photo at a time and asked to: a) at first impact, say what emotion that photo arouses in him/her by placing a cross at a point on an affect grid that follows 2 axes: unpleasant-pleasant emotions (U–P) and activating-deactivating (A-D) emotions, thus choosing among 5 types of emotions: 1) unpleasant activating emotions (UA; i.e., it generates fear in me); 2) unpleasant deactivating emotions (UD; i.e., it depresses me); 3) pleasant activating emotions (PA; i.e., it energizes me); 4) pleasant deactivating emotions (PD; i.e., it calms me); 5) neutral emotions (N; i.e., it leaves me indifferent); b) thinking better of it, say what emotion best match his/her experience of that photo, by rating the intensity with which he/she feels each of 42 aesthetic emotions listed; c) say whether or not he/she likes the photo and why. The photos were presented in a randomized sequence.

Regarding the scoring: *a) for the affect grid*, the pleasure-displeasure score is taken as the number of the square checked, with squares numbered along the horizontal dimension, counting from 1 to 9 starting at the left. The activation-deactivation score is taken as the number of the square checked, with squares numbered along the vertical dimension, counting 1 to 9 starting at the bottom; b) *for the aesthetic emotions scale*, the intensity of the emotion ranges from 1 = not at all to 5 = very much; *c) for the free question*, answers are evaluated from a qualitative point of view.

Along with CHRIS, the following self-report questionnaires were administered to evaluate the presence of other personological and/or psychopathological dimensions*:*

1) The *Empathy Quotient* (EQ, [24,25], to assess emotional and cognitive empathy for highlighting the risk of over-involvement/identification with earthquake victims and affected sites. The EQ consists of 60 items, with 40 questions exploring empathy (such as the following: "I find it hard to know what to do in a social situation"; "I can tell if someone is masking their true emotion"; "I find it easy to put myself in somebody else's shoes") and 20 filler items included to distract the participants from the focus on empathy. Responses are given on a four-point Likert scale. Scores can range from 0 to 80 (with a cutoff score of fewer than 30 to differentiate adults with autism spectrum disorders). The EQ has shown acceptable psychometric properties [26], as did the Italian version [24].

2) The *Hexaco Personality Inventory-Revised* (100-item HEXACO-PI-R, [27,48], to assess basic personality dimensions. The HEXACO-100 is composed of 16 items to measure each of the six HEXACO factors, that can be understood as an extension of the Big Five personality traits: Honesty–Humility (H), Emotionality (E), Extraversion (X), Agreeableness (A), Conscientiousness (C), and Openness to Experience (O). Each dimension, in turn, comprises four facets which are assessed by four items each. All items are answered on a five-point Likert-type scale ranging from 1 = strongly disagree to 5 = strongly agree. Half of the items overall are

Table 2
Photos and related emotions at CHRIS across groups.

Photos/Emotions	Emergency Psychologists	Heritage Professionals	Citizens
Photo #AI-01			
PA emotions	2.10*	1.59	1.23
PD emotions	1.22*	1.21	1.00
N Emotions	2.54	1.98	1.80
UA emotions	2.41	2.71	3.00
UD emotions	2.51*	2.03	1.96
Photo #AI-02			
PA emotions	1.88*	1.59	1.27
PD emotions	1.53*	1.24	1.02
N Emotions	2.28	1.99	1.90
UA emotions	2.00	2.99	3.19*
UD emotions	2.15	2.11	2.09
Photo #AI-03			
PA emotions	1.67*	1.43	1.15
PD emotions	1.21*	1.12	1.00
N Emotions	1.96	1.75	1.70
UA emotions	1.89	2.53	2.84*
UD emotions	2.02	1.81	1.09
Photo #AI-03			
PA emotions	1.99*	1.74	1.26
PD emotions	1.90*	1.30	1.05
N Emotions	2.29	2.14	1.90
UA emotions	1.32	2.89*	2.81
UD emotions	1.65	2.35*	1.98
Photo #AI-03			
PA emotions	2.06*	1.75	1.16
PD emotions	1.97*	1.32	1.05
N Emotions	2.41*	2.07	1.68
UA emotions	1.88	2.81*	2.69
UD emotions	1.89	2.23	1.82
Photo #RI-06			
PA emotions	1.85*	1.66	1.19
PD emotions	1.24*	1.17	1.00
N Emotions	2.17	1.95	1.82
UA emotions	2.04	2.77	3.08*
UD emotions	2.22	1.93	2.01
Photo #RI-07			
PA emotions	1.72*	1.59	1.19
PD emotions	1.21*	1.15	1.02
N Emotions	2.17	2.02	1.82
UA emotions	1.98	2.82	2.94*
UD emotions	2.06	2.06	1.90
Photo #RI-08			
PA emotions	1.65*	1.61	1.30
PD emotions	1.06	1.12	1.00
N Emotions	2.24	1.99	1.89
UA emotions	2.35	3.26	3.31*
UD emotions	2.28	2.20	2.14
Photo #RI-09			
PA emotions	1.97*	1.84	1.34
PD emotions	1.74	1.38	1.14
N Emotions	2.22	2.14	2.02
UA emotions	1.58	3.11	3.20*
UD emotions	1.73	2.34*	2.29
Photo #RI-010			
PA emotions	2.04*	1.65	1.18
PD emotions	2.06	1.59	1.41
N Emotions	2.28*	1.88	1.43
UA emotions	1.43	1.97	1.68
UD emotions	1.64	1.71	1.43

reverse-scored. Respondents' scores are computed as the average across all responses belonging to a facet or dimension, respectively, after recoding the reverse-scored items. The HEXACO-100 showed strong psychometric properties [27], as the Italian version did in a large-scale test of measurement invariance of the HEXACO-100 across 16 languages spoken in European and Asian countries [48].

3) The *Screening Questionnaire for Disaster Mental Health* (SQD, [28,29], to assess post-traumatic stress disorder (PTSD) and depression in the long-term aftermaths of a disaster. SQD is an easy-to-use screening test composed of 12 items measuring both post-traumatic stress disorder (PTSD) and major depressive disorder (MDD). Answers are dichotomous, either "yes" or "no". 9 questions are related to PTSD, with 3 questions from each of the 3 subscales of PTSD diagnosis (i.e., intrusion, avoidance, and hyperarousal), and 3 questions are related to MDD and its symptoms (i.e, depressed mood, decrease in appetite, and fatigue or loss of energy nearly every day). The subscales of PTSD and MDSS are referred to as SQD-P and SQD-D, respectively. SQD total score was the sum of each item calculated by counting "yes" as 1 and "no" as 0, treating the scale as an interval scale. In SQD-P scores range from 9–6 = severely affected (possible PTSD) to 3–0 = slightly affected (little possibility of PTSD); in the SQD-D subscale scores range from 6–5 = more likely to be depressed to 4–0 = less likely to be depressed. The SQD has shown good psychometric properties [29], as did the Italian version [28].
4) The *Symptom Checklist 90-Revised Version* (SCL-90-R [30,31], to assess the presence and severity of symptoms of mental distress even in nonclinical populations. SCL-90-R is made of 90 items rated on a 5-point Likert scale indicating perceived discomfort during the last 7 days. It consists of nine subscales: Somatization (SOM), Obsessive–Compulsive (OBS), Interpersonal Sensitivity (INT), Depression (DEP), Anxiety (ANX), Hostility (HOS), Phobic Anxiety (PHOB), Paranoid Ideation (PAR), and Psychoticism (PSI). The three global indices of distress are Global Severity Index (GSI), positive symptom total (PST), and positive symptomatic distress index (PSDI). SCL-90-R showed good psychometric properties [30], as the Italian version did [31].

2.3. Procedures

Differences between the three groups (heritage professionals, emergency psychologists, and citizens living 2016 in the earthquake areas) were investigated. A Kruskal-Wallis test was used to determine whether or not there was a statistically significant difference between the medians. All statistical analyses were conducted using SPSS for Mac, version 28.0.

Since this research, in its theoretical-methodological framework, is highly sensitive to collective traumatic events, to make a less biased interpretation of the results, the data presented so far refer to test administrations carried out both before the outbreak of the Covid-19 emergency and Russo-Ukrainian war and before the last recent (November 2022) strong earthquake tremors in the Marche Region.

3. Results

Regarding CHRIS, heritage professionals and citizens show higher unpleasant emotions triggered by the sight of cultural heritage ruins than emergency psychologists (see Table 2).

More in detail, regarding photo #AI-01, emergency psychologists have significantly higher average scores on PA, PD, and UD emotions than the other groups. There are also very high U emotions scores across groups, compared to the other photos.

Regarding photo #AI-02, emergency psychologists have significantly higher average scores on PA and PD emotions than the other groups, while citizens have significantly higher average scores on UA emotions than emergency psychologists, with scores much closer to those of heritage professionals than to those of psychologists.

Regarding photo #AI-03, emergency psychologists have significantly higher average scores on PA and PD emotions than the other groups, while citizens have significantly higher average scores on UA emotions than the other groups, with scores much closer to those of heritage professionals than those of psychologists.

Regarding photo #AM-04, emergency psychologists have significantly higher average scores on PA and PD emotions than the other groups, while heritage professionals have significantly higher average scores on UA and UD emotions than the other groups.

Regarding photo #AM-05, emergency psychologists have significantly higher average scores on PA, PD, and N emotions than the other groups, while heritage professionals have significantly higher average scores on UA emotions than the other groups.

Regarding photo #RI-06, emergency psychologists have significantly higher average scores on PA and PD emotions than the other groups, while citizens have significantly higher average scores on UA emotions than the other groups, with scores much closer to those of heritage professionals than those of psychologists.

Regarding photo #RI-07, emergency psychologists have significantly higher average scores on PA and PD emotions than the other groups, while citizens have significantly higher average scores on UA emotions than the other groups, with scores much closer to those of heritage professionals than those of psychologists.

Regarding photo #RI-08, emergency psychologists have significantly higher average scores on PA emotions than the other groups, while citizens have significantly higher average scores on UA emotions than the other groups, with scores much closer to those of heritage professionals than those of psychologists. Citizens and heritage professionals show much closer and very high average scores on UA emotions for this photo, compared to the other ones.

Regarding photo #RM-09, emergency psychologists have significantly higher average scores on PA emotions than the other groups, while citizens have significantly higher average scores on UA emotions than the other groups, and heritage professionals have significantly higher average scores on UD than the other groups. Besides, citizens and heritage professionals show much closer scores on UD emotions, compared to psychologists.

Regarding photo #RM-10, emergency psychologists have significantly higher average scores on PA and N emotions than the other

groups, while heritage professionals show higher although not significant average scores on UA and UD emotions than the other groups.

Overall, in terms of the type of ruins, photos of immovable heritage (i.e., buildings or churches) elicit the most intense U emotions, while the movable heritage (i.e., paintings or sculpture) elicit the most P ones, transversely to groups, with little or no difference between ancient and recent heritage ruins (see Table 3).

Photo #AI-01 is one that elicits more (PA-PD-UA-UD) emotions in emergency psychologists, compared to the other groups. Photo #RI-08 is one that elicits more UA emotions in both heritage professionals and citizens, compared to emergency psychologists. Photo #RM-10 is the one that elicits more PD in both heritage professionals and citizens, compared to emergency psychologists (see Table 4). No participant wanted to answer the free question at the end.

Regarding EQ, emergency psychologists and heritage professionals show a higher although not significant degree of empathy, compared to citizens, but not so high as to suggest a particular, emotional over-involvement with respect to the post-earthquake situation (people and sites).

Regarding HEXACO-PI-R, heritage professionals show a significantly higher score in just two dimensions of Openness to Experience (OP), compared to the other two groups: Aesthetic Appreciation (AA) and Creativity (C). The AA scale assesses one's enjoyment of beauty in art and in nature; those with high scores have a strong appreciation of various art forms and of natural wonders. The C scale assesses one's preference for innovation and experiment; those with high scores actively seek new solutions to problems and express themselves in art.

Regarding SQD, citizens and heritage professionals show a higher degree of long-term post-traumatic stress, compared to emergency psychologists. Particularly, 3 years after the earthquake, citizens still seem to be severely affected (possible PTSD), heritage professionals appear to be moderately affected, and emergency psychologists are slightly affected (little possibility of PTSD).

Regarding SCL-90-R, the three groups show no significant clinical dimensions, except for Interpersonal Sensitivity, where emergency psychologists score higher than the other two groups but still have very low averages, below 0.5.

See Table 5 for a summary of the relevant results on these secondary scales.

4. Discussion

Considering the DRR framework in which the study can be located, several findings deserve comment and reflection.

Firstly, an interesting gradient of the emotional impact of heritage ruins seems to emerge, with heritage professionals at the apex of it, having the highest scores on unpleasant activating emotions, very similar to the scores of citizens who have been directly affected by the earthquake, and emergency psychologists at the bottom, with the highest scores in pleasant (both activating or deactivating) emotions. This finding seems to be in line with the feelings reported by the heritage professionals we spoke with at the beginning of the project, who emphasized the negative relevance of the sight of ruins in the emotional impact of the post-disaster emergency they had to work in, thus confirming the hypothesis of the specific quality of mental health risks of cultural heritage first aiders and opening a line of research deepening this area within the DRR framework.

Secondly, the fact that the photos of immovable heritage (i.e., buildings or churches) elicit higher unpleasant emotions than photos of movable heritage (i.e., paintings or sculptures), across the three groups, could bear witness to the hypothesis that the emotional impact of the cultural heritage ruins, particularly of those more representative of the sense of community (churches, for example), should not be underestimated as it could amplify the emotional difficulty of rebuilding the sense of local identity. In fact, the value of transmitting cultural heritage for making communities inclusive, safe, resilient, and sustainable is an integral part of the UN Agenda 2030 and the new international policy for Disaster Risk Reduction 2015–2030 [8,32,33]. However, the role of culture in these relevant challenges is an issue that actual scientific literature on community resilience has not yet adequately investigated [32]. So, this calls for further studies in order to help the vulnerable communities to be more prepared to prevent, cope with and recover from disasters.

Thirdly, heritage professionals, while showing a degree of empathy almost equal to emergency psychologists, scored much higher in the personality dimension of Openness to experience, particularly of Aesthetic Appreciation and Creativity, compared to them. From a general point of view, this is certainly understandable, as we could expect that professionals working in the field of cultural heritage have an aesthetic-artistic sensitivity, that is, a natural disposition toward beauty and aesthetic sense. Besides, it could be considered a protective factor against post-traumatic stress disorders, as some studies link Openness to experience to a more positive stress response [34,35]. However, in the specific context of cultural heritage recovery in post-disasters and from the perspective of cultural heritage first aiders, this deserves special attention because it could be interpreted, on the contrary, as a specific risk factor contributing,

Table 3
Type of heritage ruins eliciting different types of emotions at CHRIS.

	Movable Heritage	Immovable Heritage	p Value
PA emotions	1.66	1.53	*
PD emotions	1.47	1.14	***
Neutral emotions	2.03	1.99	–
UA emotions	2.32	2.70	***
UD emotions	1.94	2.26	***

*$p < 0.05$.
***$p < 0.001$.

Table 4
Type of photos eliciting the most frequent emotions at CHRIS across groups.

	PA Emotions	PD Emotions	N Emotions	UA Emotions	UD Emotions
Emergency psychologists	Photo #AI-01	Photo #AI-04	Photo #AI-04	Photo #AI-04	Photo #AI-04
Heritage professionals	Photo #RI-08	Photo #AM-04	Photo #/RM-09	Photo #RM-09	Photo #RM-10
Citizens	Photo #RI-08	Photo #RM-09	Photo #RM-09	Photo #RM-09	Photo #RM-10

Table 5
Summary of scores of the three groups on EQ, HEXACO-PI-R (Openness), and SQD.

	EQ Total	HEXACO-PI-R (Openness)		SQD Total
		AA	C	
Emergency psychologists	55.83	3.86	3.86	1.14
Heritage professionals	52.82	4.80*	4.45*	4.73
Citizens	49.56	2.48	2.65	6.30

Note: AA = Aesthetic Appreciation; C=Creativity.
*$p < 0.05$.

together with the high negative emotional impact of ruins, to a sort of heritage professionals group-specific vulnerability to the development of an overwhelming emotional experience, which might negatively affect not only their activities on ruins recovery but also their mental capacity of elaborating the whole post-disaster experience.

In this regard, it must be stressed that, according to the Sendai Framework [49], implementing integrated and inclusive measures that reduce vulnerability to disaster, increase preparedness for response and recovery, and strengthen resilience is relevant for developing DRR strategies in line with the UN 2030 Agenda for Sustainable Development. However, this attention to vulnerability is often considered only in relation to the populations directly affected by disasters, cutting off other vulnerable groups involved, such as post-disaster workers, who are at high risk of developing post-traumatic mental illness [47]. Our results highlight that more attention and scientific research are also needed on them, specifically on cultural heritage first aiders, in order to foster ad hoc DRR strategies for improving their preparedness and ability to cope.

Fourthly, strictly related to the previous reflection, heritage professionals, in a milder but similar way to citizens who have been directly affected by the earthquake, show post-traumatic stress long after the disaster event, thus highlighting a high risk for their mental health in the long-term perspective, that should be taken in serious account from the scientific community. This is in line with previous findings from our literature review [47], showing that first responders to disasters, such as firefighters or paramedics, are at high risk of depression, anxiety, sleep disturbances, alcohol/substance abuse, and suicide ideation. This data, together with the previous one, suggests a specific profile of mental health risks of cultural heritage first aiders that calls for more research, in accordance with the increasing interest in linking MHPSS and DRR activities and building consensus agreement on effective strategies for Disaster Mental Health risk reduction and for studying long-term impacts [12].

These results open up a number of suggestions for future research. Firstly, as already foretold, we suggest further attention to the emerging category of heritage professionals working in the specific context of post-disasters ("cultural heritage first aiders"), given the level of emotional overload they seem to exhibit that could contribute to psychopathological developments over time, if not properly elaborated or treated. Actually, continuous efforts are already being made to promote the integration of cultural heritage protection in the disaster risk management cycle from both cultural heritage experts and emergency responders, trying to facilitate new interdisciplinary approaches toward an integrated conservation and risk management for a comprehensive heritage protection strategy based on cooperation between different actors that provide the potential for resilience-building to disasters [36]. However, more actions are needed in this direction.

Secondly, we recommend including cultural heritage first aiders in the context of DRR studies increasingly focused on the mental health risk of first responders in disasters, in order to explore the psychological impact of disasters on this specific group of professionals and evaluate possible differences with the other first responders (i.e., firefighters and police officers), also in terms of specific protective/risk factors. Related to this issue, it could be interesting to evaluate if and how psychological training could be included in DRR activities involving cultural heritage, being potentially useful for cultural heritage first aiders to prevent the possible burden of post-traumatic stress and to help them manage the overwhelming emotional experience of working on heritage ruins.

In fact, the literature highlights that there are some pre-disaster psychological training programs, like psychological first aid (PFA [37–41]; or the HEROES project [42], that seem to be useful, for first responders in post-disasters, to increase confidence in their abilities and skills in emergency situations and to significantly reduce stress, depression, anxiety, and trauma symptoms in the long wave of the post-emergency. In fact, in our study emergency psychologists, who are protected by pre-disaster psychological training, are those that seem to show the lowest degree of the emotional negative impact of heritage ruins and the lowest severity of post-traumatic stress.

This study has some limits. The most relevant one is related to the small size of the sample and to its gender imbalance (with female predominance) that may have contributed to the fluctuation in scores, especially in terms of scores and types of emotions related to cultural heritage ruins. Further research in larger and more balanced samples is needed, also to explore the psychometric properties of

CHRIS, which could become a valid and interesting instrument in disaster risk reduction study areas specifically addressing cultural heritage to measure the emotional impact of ruins in post-disaster not only in the cultural heritage first aiders.

The second limitation, closely related to the first, regards the fact that this research has come to a screeching halt due to Covid-19, which erupted in 2020–2022 and forced us to stop the research for institutional and medical reasons and analyze just a few data already discussed. This choice was made also because this research is focused on the emotional impact of the sight of ruins and post-traumatic stress related to a specific traumatic event (2016 earthquake) and it is by definition highly "trauma-sensitive", particularly with respect to collective trauma. Although fortunately, the pandemic subsided at some point, since then other collective traumatic events have emerged internationally (the Russian-Ukrainian war) and locally nationally (the recent earthquake in the Marche region in November 2022) that we hypothesized might have invalidated the interpretation of the data if we had put together data taken before and after them.

Regarding the Russian-Ukrainian war and Covid-19, showing the participants photos of ruins (and thus destruction) at a historical moment when dramatic personal and national events are intertwined with bloody images of destruction and death in newspapers and television broadcast by the mass media would have introduced a huge bias in the emotional evaluation of the sight of cultural heritage ruins, as well as in the self-report of perceived stress levels sometime after the seismic event of interest in the research. Similarly, the administration of the above tests to participants mainly from the Marche region, who had already experienced the dramatic seismic event of 2016, at a time when the earth was again shaking strongly, increasing the level of alarm and distress of these populations, would have meant an equally difficult to avoid bias.

In conclusion, this study could be seen as the first step in a promising line of research exploring the specific profile of mental health risks of cultural heritage first aiders working in post-disasters by focusing on the emotional impact of heritage ruins that seems to elicit in them a highly distressing experience and that could amplify the emotional difficulty of the complex work in the post-emergency situation. Collecting more data on this could help in developing ad-hoc DRR strategies for improving the preparedness for the response to disasters of this group of professionals involved in the delicate activities of the recovery of cultural heritage having a deep meaning for the entire community affected by the tragedy of disaster.

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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.

Data availability

Data will be made available on request.

Appendix. Cultural-Heritage Ruins Impact Scale – CHRIS

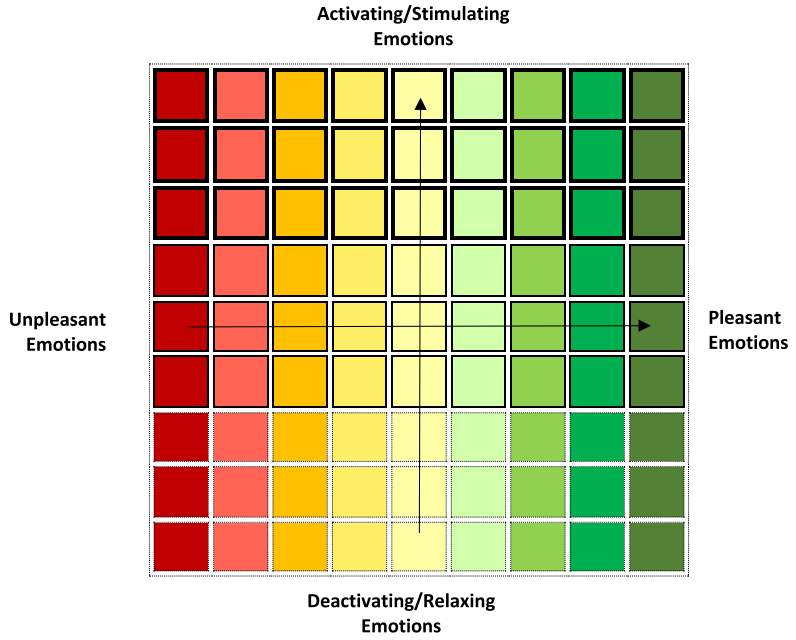
Interviewer's guide.

General delivery at the beginning of the interview: I will now show you a series of images. For each image I will ask you a few questions about the emotional impact it has on you.

IMAGE 1

A. At first glance, what emotions does the image arouse in you?

I ask you to indicate this by placing an x at a point on the grid. The grid is divided into 4 quadrants according to two axes: a) unpleasant/pleasant emotions (i.e., sadness vs. serenity) and b) activating/deactivating emotions (i.e., anxiety vs. calm).



B. Reflecting on this in more detail, what emotions do you feel when looking at the image?

For each emotion I will indicate, I ask you to tell me with what intensity you feel it. The intensity of the emotion ranges from 1 (Not at all) to 5 (Very much).

	Emotion Intensity				
Emotion	1 Not at all	2 Little	3 Quite a Bit	4 A lot	5 Very Much
1. I find it beautiful	☐1	☐2	☐3	☐4	☐5
2. It stimulates me intellectually	☐1	☐2	☐3	☐4	☐5
3. It depresses me	☐1	☐2	☐3	☐4	☐5
4. It calms me down	☐1	☐2	☐3	☐4	☐5
5. It intrigues me	☐1	☐2	☐3	☐4	☐5
6. I find it pleasant	☐1	☐2	☐3	☐4	☐5
7. It fascinates me	☐1	☐2	☐3	☐4	☐5
8. It generates fear in me	☐1	☐2	☐3	☐4	☐5
9. It gives me strength	☐1	☐2	☐3	☐4	☐5
10. It captures me	☐1	☐2	☐3	☐4	☐5
11. It baffles me	☐1	☐2	☐3	☐4	☐5
12. I find it ugly	☐1	☐2	☐3	☐4	☐5
13. It upsets me	☐1	☐2	☐3	☐4	☐5
14. It moves me deeply	☐1	☐2	☐3	☐4	☐5
15. It generates melancholy in me	☐1	☐2	☐3	☐4	☐5
16. It gives me energy	☐1	☐2	☐3	☐4	☐5
17. It generates anger in me	☐1	☐2	☐3	☐4	☐5
18. It enchants me	☐1	☐2	☐3	☐4	☐5
19. It bores me	☐1	☐2	☐3	☐4	☐5
20. It generates a feeling of alertness in me	☐1	☐2	☐3	☐4	☐5
21. It makes me feel safe	☐1	☐2	☐3	☐4	☐5
22. It amuses me	☐1	☐2	☐3	☐4	☐5
23. It generates sadness in me	☐1	☐2	☐3	☐4	☐5
24. It causes me confusion	☐1	☐2	☐3	☐4	☐5
25. It generates tension in me	☐1	☐2	☐3	☐4	☐5
26. It gives me a sense of precariousness	☐1	☐2	☐3	☐4	☐5
27. It causes me concern	☐1	☐2	☐3	☐4	☐5
28. It generates a feeling of nostalgia in me	☐1	☐2	☐3	☐4	☐5
29. It surprises me	☐1	☐2	☐3	☐4	☐5
30. It gives me a sense of oppression	☐1	☐2	☐3	☐4	☐5
31. I find it sublime	☐1	☐2	☐3	☐4	☐5
32. It activates me to do something	☐1	☐2	☐3	☐4	☐5
33. It leaves me indifferent	☐1	☐2	☐3	☐4	☐5
34. I find it strange	☐1	☐2	☐3	☐4	☐5
35. I find it unpleasant	☐1	☐2	☐3	☐4	☐5
36. It touches me emotionally	☐1	☐2	☐3	☐4	☐5
37. I find it distressing	☐1	☐2	☐3	☐4	☐5
38. It arouses my interest	☐1	☐2	☐3	☐4	☐5
39. It makes me feel guilty	☐1	☐2	☐3	☐4	☐5
40. It generates happiness in me	☐1	☐2	☐3	☐4	☐5
41. It makes me feel ashamed	☐1	☐2	☐3	☐4	☐5
42. It relaxes me	☐1	☐2	☐3	☐4	☐5

C. In general, do you like the image or not? Why?

THIS SEQUENCE IS REPEATED FROM (A) TO (C) FOR EACH PHOTO (FOR A TOTAL OF 10 PHOTOS). THE SEQUENCE OF PHOTOS IS RANDOMIZED.

PHOTO LEGEND.. **A** = Ruins from ancient disasters (up to 1999).

R = Ruins from recent disasters (since 2000).

I = Immovable real estate (buildings, churches, etc.)

M = Movable property (paintings, sculptures, etc.)

AI-01.

AI-02.

AI-03.

AM-04.

AM-05.

RI-06.

RI-07.

RI-08.

RM-09.

RM-10.

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