

How much stress is needed to increase vulnerability to psychosis? A community assessment of psychic experiences (CAPE) evaluation 10 months after an earthquake in L'Aquila (Italy)

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Abstract Since severe stress can induce mental disorder symptoms that interact with vulnerability factors, the Community Assessment of Psychic Experiences (CAPE) was evaluated in a population of 419 young adults who survived an earthquake; results were compared to a database of 1,057 'non-exposed' subjects. Unexpectedly, earthquake survivors showed lower CAPE scores for 'small' to 'medium' effect size. Post-trauma positive changes or re-appraisal for successful adaptation may explain these findings.

Keywords Community assessment of psychic experiences (CAPE) · Earthquake · Post-traumatic growth (PTG)

Introduction

Vulnerability–stress models emphasise the role of stress in the emergence of psychosis [12, 13, 16, 19, 21]. It is not known whether or not the potential relationship between stress and psychosis is a simple linear one and the quality and meaning of stressful experiences are unimportant, or whether the likelihood of developing psychotic symptoms could in some way increase in a manner similar to that of undesirability, threat or other features associated with events. Furthermore, different types of stressors could have

a different specificity to trigger and/or worsen schizophrenia symptoms in subjects with pre-existing vulnerability [7, 8]. A considerable number of psychiatric surveys have been conducted after natural calamities such as earthquakes, hurricanes, volcano eruptions and various other disasters, which document a whole range of psychiatric symptoms and disorders associated with these events [9]. It is reasonable to hypothesise that these events could interact with vulnerability factors in modulating stress reactivity [3].

On 6 April 2009, the town of L'Aquila (Abruzzo) in Central Italy was struck by an earthquake (EQ) with a Richter magnitude of 5.9; this main quake was preceded and followed by a large number of minor quakes. In the town of L'Aquila, many buildings collapsed, and large parts of the town were destroyed. Overall, 308 people were killed, 1,600 hurt, among which 200 were severely injured and hospitalised: more than 65,000 people had to leave their homes.

Since psychosocial stress is included in most aetiological models of mental disorder and severe stress can induce symptoms of mental disorder and interact with vulnerability factors, we decided to evaluate the Community Assessment of Psychic Experiences (CAPE) in a population of 419 high school students who survived the EQ, comparing them with a database of 1,057 comparison subjects. We hypothesised an increase in subclinical psychotic experiences within this student population as a result of psychosocial stressors due to the EQ.

Method

A total of 419 students in their final 2 years of high school accounted for the post-EQ sample (M/F: 43.2/56.8%; mean age \pm SD 17.7 \pm 0.6 years). Evaluation was carried out

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10 months after the date of the EQ (6 April 2009). All subjects were living in L'Aquila before the EQ, and all of them had been exposed to the EQ and its consequences. The school council approved the project.

The comparison group was assessed 1 year before the EQ and came from the same geographical area; they had attended the same schools and had a similar socio-economic background [4]. This group was composed of 1,057 students of similar age and sex distribution (M/F 41.9/58.1%, mean age \pm SD 17.9 ± 0.7 years): All students were attending the last 2 years of high school. Due to partial non-responsive individuals with missing responses, only 88.2% of administered questionnaires could be evaluated [4]. The current sample showed a response rate of 88.9%.

A self-report instrument, CAPE (see: <http://www.cape42.homestead.com/index.html>), has been developed to assess the frequency of clinical symptoms and symptom-related distress severity in a general population [17]. CAPE has 42 symptom items, covering three symptom dimensions (positive, depressive and negative). It uses a 4-point Likert scale (0 to 3 *recoded to 1–4*) to indicate symptom frequency ('Never', 'Sometimes', 'Often' and 'Nearly always') and a 4-point scale to indicate the degree of distress experienced due to the symptom, if present ('Not distressed', 'A bit distressed', 'Quite distressed' and 'Very distressed'). CAPE provides an overall score per dimension by adding up the number of positive answers to frequency questions with the score of distress questions (more details

about scoring are given at <http://www.cape42.homestead.com/files/CAPEdimensionscore2003.pdf>). For those items with 'never' frequency endorsements, overall score was not calculated. We used an Italian translated and validated version [4] of the assessment, and no other instruments or clinical interviews were administered. Conditions were the same for the comparison group.

Results

Table 1 shows CAPE scores in the two samples: Statistically significant differences were in the same direction, while the post-EQ group showed lower scores. CAPE negative and depressive symptoms, however, do not significantly differ. Effect size (ES) was computed as a measure of the strength of the relationship between comparisons. An ES of 0.2–0.3 might be considered a 'small' effect for Cohen's *d*, around 0.5 a 'medium' effect and 0.8 a 'large' effect [2]. Differences in ES range from 'small' to 'medium'. Scores related to positive symptoms showed the largest ES.

Discussion

Researches following disasters provide a unique opportunity to explore the effects of severe stress on mental health [1, 5]. We previously reported that, in the overall affected

Table 1 Community assessment of psychic experiences (CAPE) in student samples before and 10 months after EQ (mean and SD)

CAPE weighted scores ^a	Before EQ <i>n</i> = 1,057		After EQ <i>n</i> = 419		<i>t</i> (1,474) [§]		Effect size <i>d</i> ^d
	Mean	SD	Mean	SD			
Frequency							
Positive	1.65	0.39	1.56	0.34	4.12	<i>P</i> < .001	0.24
Negative	1.74	0.43	1.73	0.45	0.49	NS	0.03
Depressive	2.00	0.49	1.93	0.48	2.74	<i>P</i> < .006 ^c	0.14
Distress							
Positive	1.78	0.49	1.55	0.45	8.24	<i>P</i> < .001	0.48
Negative	2.14	0.60	1.89	0.57	7.30	<i>P</i> < .001	0.42
Depressive	2.49	0.64	2.24	0.65	6.61	<i>P</i> < .001	0.39
Overall ^b scores							
Positive	1.67	0.35	1.53	0.32	6.82	<i>P</i> < .001	0.41
Negative	1.86	0.45	1.77	0.45	3.34	<i>P</i> < .001	0.20
Depressive	2.18	0.52	2.04	0.51	4.59	<i>P</i> < .001	0.27

^a In order to account for partial non-response, scores were weighted for the number of valid answers per dimension. The weighted score per dimension is the sum score per dimension divided by the amount of items filled in by the subject

^b Overall = frequency + distress scores

^c Not significant after Bonferroni correction

^d Cohen's *d*, computed from means to SD

[§] Independent sample *t* test, Bonferroni correction *P* < 0.05/12 = 0.004

population, there has been an increase in psychotropic prescriptions [14]: This is why we expected a substantial increase in emotional disorders or psychopathological symptoms. Contrary to our hypotheses, we found lower CAPE score factors in the exposed group. As a matter of fact, all residents in the area struck by the EQ were ‘‘exposed’’ to the disaster, though, with a broad range of possible individual differences [14]. For example, the whole population was displaced within a 150 km area, and only 25% of these people were able to return to their own home within 6 months from the EQ. This is a very general index of population ‘distress’, and psychosocial stress is included in almost all aetiological models of mental disorders: Nevertheless, we tried to investigate a more strictly defined population (i.e. students of the same age group).

The choice of CAPE reflected our research interest, as we had an extensive pre-EQ exposure database [4]. Furthermore, CAPE has been widely studied in several cases of mental disorders and in non-clinical populations [6, 10, 17]. We are aware that the cross-sectional design of the study is a limitation; however, in the case of natural disasters, other designs would be very difficult to arrange. It is possible that only students with a smaller psychopathological impact had been included; nevertheless, all students taken into account lived in the area before the EQ. They came back to their schools after the initial 6 months of displacement: We are quite confident that this sample population experienced both EQ and after-EQ stress. To our knowledge, this is the first report exploring the impact of stress after a natural disaster in terms of subclinical psychopathological experiences measures. However, in opposition to our hypothesis, we observed statistically significant lower CAPE scores with small to medium ES. We believe that these findings could offer a challenge for the discussion of new perspectives.

Recently, Cougnard et al. [3] reviewed the hypothesis that common, non-clinical developmental psychosis expression may become abnormally persistent if synergistically combined with exposures (e.g. cannabis, trauma and urbanicity) that may have an impact on behavioural and neurotransmitter sensitisations. Cumulative stress and trauma exposure may increase this risk [16, 18]. However, it may be plausible that under the ‘umbrella’ of traumatic events, there are different types of events perceived with a wide variety of meanings, so that trauma research could shift from trauma to the subject [7]. As a matter of fact, Selten and Cantor-Graae [15] suggest stressful experiences to be considered either humiliating or not: The former could be compatible with the view of ‘social defeat’ as a risk factor for psychosis [15]; the latter—for example a natural disaster—although extremely stressful and traumatising, does not necessarily lead to ‘social defeat stress’.

This could explain why we did not find an increase in CAPE scores.

Though many researchers focus on the detrimental effects of trauma, others reported positive psychological or personal changes in the aftermath of traumatic events, which is conceptualised as post-traumatic growth (PTG) [20]. As a further explanation for our findings, not all clinical and subclinical symptoms could be captured within a theoretical construct (i.e. CAPE): Emerging issues, such as PTG, could buffer CAPE symptoms. However, different types of traumas may enable positive changes or re-appraisal for successful adaptation, while others do not. Furthermore, even though natural disasters and individual/interpersonal traumas are often considered as a whole [18], it may be suggested that psychological trauma involving a small community may lead to a different impact on the affected subjects. If interpersonal trauma, cannabis and urbanicity have been reported as factors that can change a generally good outcome of subclinical psychotic experiences to poorer outcomes, factors related to social coherence or social capital increase [11] could explain our findings. All these factors should in the future be taken into consideration, since a 10-month perspective could be too short a period to capture a CAPE dysfunctional increase.

Conflict of interest The authors declare no conflict on interest. No funding has been received for this work.

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