Validation of the Italian version of the Screening Questionnaire for Disaster Mental Health (SQD) in a post-earthquake urban environment

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Abstract

Introduction. Aim of this study was to implement and validate the Italian version of the Screening Questionnaire for Disaster Mental Health (SQD), a tool for the screening of post-traumatic stress disorder (PTSD) and depression in the long-term aftermaths of a natural disaster.

Methods. A convenience sample of 116 subjects living in L’Aquila after the 2009 earthquake were administered the SQD and two gold-standard instruments for PTSD and depression. Reliability, concurrent validity and convergent validity of SQD were estimated.

Results. Cronbach’s alpha was 0.86. Concurrent validity as measured by the Spearman correlation coefficient resulted statistically significant both for PTSD and depression SQD subscales, as well as convergent validity as measured by ROC-AUC method.

Conclusions. SQD is a valid, efficient and easy-to-use screening instrument for PTSD and depression after natural disasters.

INTRODUCTION

After a seismic swarm lasting some months, on 6 April 2009 an earthquake of magnitude 6.3 struck the city of L’Aquila, capital of the Abruzzo region of Italy, with a population of 72,000 and a local health district of 105,000 inhabitants. The L’Aquila earthquake caused the death of 309 people, with more than 1600 individuals injured, among which 200 were severely injured and hospitalized.

The earthquake spread about 5000 square kilometers, left at least 55,000 residents without housing, and destroyed the historical centre of the town, including a significant amount of economic activity and public services such as hospitals, outpatient and rehabilitation centers, and all grade schools. The Italian government reported official estimates of direct economic losses and reconstruction costs of eight to twelve billion euro.

All people were displaced in locations within a 150 km area from the town or in tents located in the urban area. Even 12 months after the earthquake, only 25% of the inhabitants were able to return to their homes. All experienced loss of property, damage to home, 5% were trapped under rubble with minor physical consequences, 15% lost a known person [1].

Studies conducted in the aftermath of disasters during the past 40 years have shown that there is a substantial burden of psychiatric disorders including post-traumatic stress disorder (PTSD), major depression, and anxiety among persons who experience a disaster [2]. In particular, the literature is consistent in showing that the extent of exposure to a disaster is probably the most important risk factor for the development of disaster-related PTSD. Therefore, persons who are direct victims of a disaster - for example, those who are injured during the disaster - have a greater likelihood of developing PTSD than other groups. Evidence also arises that major depression is a main public health issue in populations exposed to an earthquake, and that disruptive earthquakes have to be regarded as the...
main cause of the suicidal risk, particularly with regard to “quick trigger” suicidal episodes [3, 4].

In post-disaster settings, it becomes critical to set up long term support programs and interventions, targeting population at higher risk of post-disaster mental health impairment. Such programs require simple screening programs within the exposed population. Indeed, when being administered a questionnaire on mental health status many people, especially elders, feel fear to be stigmatized by a diagnosis of mental disorder as a consequence of disclosing one’s suffering. These difficulties in managing such screening programs require the use of simple interview-format instruments to be implemented in brief interviews, in order to optimize compliance of interviewed survivors. Several attempts were made, especially in post-earthquake environments, to develop simple screening instruments for the general population [5, 6]. With regard to high risk populations groups, a brief instrument showing good validity and practical usefulness is the Screening Questionnaire for Disaster Mental Health (SQD), which was developed after the Kobe 1995 earthquake in Japan and stands as an interview-format screening measure composed of simple phrases, which can be implemented in brief interviews [7].

Aim of this study was to implement and validate the Italian version of the SQD, obtaining an efficient and friendly-to-use tool for screening and research purposes in the long term aftermaths of the L’Aquila earthquake.

Table 1
Socio-demographic characteristics of the sample (no. = 116)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency no. (%)</th>
</tr>
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<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>55 (47.4)</td>
</tr>
<tr>
<td>Females</td>
<td>61 (52.6)</td>
</tr>
<tr>
<td><strong>Educational level</strong></td>
<td></td>
</tr>
<tr>
<td>Elementary school</td>
<td>19 (16.4)</td>
</tr>
<tr>
<td>Intermediate school</td>
<td>30 (25.8)</td>
</tr>
<tr>
<td>High school</td>
<td>53 (45.7)</td>
</tr>
<tr>
<td>University degree</td>
<td>14 (12.1)</td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>6 (5.2)</td>
</tr>
<tr>
<td>Student</td>
<td>18 (15.5)</td>
</tr>
<tr>
<td>Employed</td>
<td>66 (56.9)</td>
</tr>
<tr>
<td>Housewife</td>
<td>9 (7.7)</td>
</tr>
<tr>
<td>Pensioner</td>
<td>17 (14.7)</td>
</tr>
</tbody>
</table>

METHODS

Description of the original instrument

To develop the SQD, the post-traumatic symptom scale (PTSS-10) [8] as the base instrument was used. Answers are dichotomous, either “yes” or “no”. Six items from PTSS-10 that match DSM-IV [9] diagnostic criteria for PTSD were selected. These items are: “nightmares about the accident or disaster” (B-2), “fears when approaching the place of the accident or situations that remind me of it” (B-4), “tendencies to withdraw myself from others” (C-2), “difficulty with sleep” (D-1), “irritable feelings” (D-2), and “tendencies to jump or startle at sudden noises or unexpected movements” (D-5). In addition, 3 other items from DSM-IV criteria for PTSD were included: “recurrent and intrusive distressing recollections of the event” (B-1), “efforts to avoid thoughts, feelings, or conversations associated with the trauma” (C-1), and “markedly diminished interest or participation in significant activities” (C-4). In total, 9 questions, with 3 questions from each of the 3 subscales of PTSD diagnosis (i.e., B: intrusion, C: avoidance, and D: hyperarousal), were selected. Moreover, 3 items (A-1: depressed mood, A-3: decrease in appetite, and A-6: fatigue or loss of energy nearly everyday) from DSM-IV’s diagnostic criteria for major depressive episode (MDE) were added in order to screen for depression at the same time. It was because many prior studies report high prevalence of depression coexisting with PTSD [10-12]. Of the other diagnostic criteria for MDE, i.e., A-2: diminished interest, A-4: insomnia, and A-5: psychomotor agitation, were considered to match C-4, D-1, and D-2 from the diagnostic criteria for PTSD. Thus, 9 items on PTSD (B-1, 2, 4; C-1, 2, 4; D-1, 2, 5) and 6 items on MDE (A-1 through 6) were combined to create an easy-to-implement screening measure with a total of 12 questions. The subscales on PTSD (9 items) and depression (6 items) are referred to as SQD-P and SQD-D, respectively. SQD-P has as high efficiency of screening test for PTSD as that of other commonly used instruments. With regard to SQD’s convergent validity, those of SQD-P and SQD-D were analyzed by using the results from the Clinician Administered PTSD Scale (CAPS) [13] and the structured clinical interview for DSM-III-R (SCID) as gold standards respectively [14]. In the evaluation of SQD-D, its efficacy was found to be high, although its convergent validity was judged as needing further evaluation, mainly due to the fact that there were not enough cases of present major depression in the target population in order to divide into multiple strata. SQD also has the advantage that non-experts in mental health, such as public health nurses and clinical nurses, can use this measure after a brief training, and thus is easily incorporated into any local level post-disaster health services.

Instrument translation

The translation into Italian of the English version of SQD was a three-step process. In the first step, three native Italian speakers, bilingual in English, independently translated the original instrument
### Table 2
Current PTSD diagnosis by CAPS, and major depression diagnosis by BDI: median scores of SQD, SQD-P, CAPS, BDI and SQD-D with interquartile range (IQR)

| Current PTSD diagnosis by CAPS | PTSD (28 (24.1%)) | Partial PTSD (16 (13.8%)) | No PTSD (72 (62.1%)) | p-value
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>SQD</td>
<td>9.0 (4.0)</td>
<td>6.0 (5.0)</td>
<td>1.0 (4.0)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Median (IQR)</td>
<td>7.0 (3.0)</td>
<td>5.0 (4.0)</td>
<td>2.0 (3.5)</td>
<td>&lt;.005</td>
</tr>
<tr>
<td>CAPS</td>
<td>52.0 (15.0)</td>
<td>28.0 (16.5)</td>
<td>7.0 (12.0)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

| Current major depression diagnosis by BDI | Depression (10 (8.6%)) | No depression (96 (91.4%)) | p-value
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</tr>
</thead>
<tbody>
<tr>
<td>SQD</td>
<td>11.0 (5.0)</td>
<td>3.0 (4.0)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Median (IQR)</td>
<td>6.0 (4.5)</td>
<td>2.0 (3.0)</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>BDI</td>
<td>33.0 (8.0)</td>
<td>12.0 (9.5)</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

PTSD: post-traumatic stress disorder; CAPS; clinician administered PTSD scale; BDI: Beck depression inventory; SQD: Screening Questionnaire for Disaster Mental Health; CAPS: clinician administered PTSD scale; BDI: Beck depression inventory.

*(a)* Kruskall Wallis test; *(b)* Mann Whitney test.

into Italian. A collaborative pooled version of the questionnaire was then obtained from the three translations. In the second step, the pooled version was back-translated into English by a professional translator. A draft Italian version of the instrument for testing was obtained from the comparison between the original questionnaire and the back-translation. The third and final step consisted of testing the draft Italian version on an opportunistic sample of 40 Italian-speaking students (as many males and females) from the University of L’Aquila, at group meetings conducted by the authors; at the meetings, every item was read out aloud (with participants also following the text on paper-printed copies) and a group discussion followed, with students required to answer two questions for each items: “What does this statement mean to you?” and “Is there any other wording that enables this meaning to be expressed more clearly?”. The face validity of the questionnaire was not tested by quantitative methods, but through the group discussion just described. Answers were subsequently analyzed by authors (MV, FM, ST, and VS), leading to the final Italian version of the SQD (Appendix 1), whose psychometric properties were then tested.

**Sample and data analysis**

A consecutive sample of 116 subjects was recruited. Participants were administered by specialized and trained personnel both the SQD and the Italian versions of the clinician-administered PTSD scale (CAPS) [15] and the Beck depression inventory II (BDI-II) [16]. It is worth noting that this study differs from the Japanese study as to the use of BDI-II instead of SCID as the gold standard for diagnosis of depression. BDI is the most often used self-rating instrument for depressive symptoms, and stands as a prominent screening instrument.

Data were collected from May to July 2012 in home interviews in the 19 new towns that were built on the outskirts of L’Aquila, within the frame of specific preventive interventions promoted by the Department of Mental Health of the Health Agency of L’Aquila. Subjects ranged in age from 26 to 72 years, with a mean age of 43.5 (SD 10.9) years. The participants’ characteristics are shown in Table 1. All participants gave their written consent before each interview.

Cronbach’s alpha was used to estimate instrument reliability [17].

Scores of SQD were the summation of each item calculated by counting “yes” as 1 and “no” as 0, treating the scale as an interval scale. The sum distribution of both SQD-P and SQD-D were not normally distributed. Therefore, a non-parametric method was used for statistical testing. The Kruskal-Wallis test and the Mann-Whitney test were used to evaluate the differences in the median, and the Spearman’s correlation coefficient was used for correlation analysis.
RESULTS

Diagnosis by CAPS and BDI-II, and statistical results of screening measures

As shown in Table 2, 28 subjects (24.1%) were diagnosed to have current PTSD, and 16 subjects (13.8%) partial PTSD. The results from the total score of SQD, and those from the subscale SQD-P and the CAPS were found to be statistically significantly different among groups, i.e., current PTSD, partial PTSD, and no PTSD diagnoses. With regard to depression, 11 subjects (9.5%) were diagnosed by BDI-II as suffering from present major depressive episode. The results from the total score of SQD, and those from the subscale SQD-D and the BDI-II, showed statistically significant differences between one group with diagnosis and another without.

Reliability and validity of SQD

Cronbach’s alpha resulted 0.86 for SQD, 0.79 for SQD-P and 0.76 for SQD-D. All alpha values are consistent to those reported in literature and can be considered not redundant.

Concurrent validity as measured by the Spearman correlation coefficient resulted statistically significant (p < 0.01) both for PTSD and depression instruments: correlation between SQD-P and CAPS was 0.80, correlation between SQD-D and BDI-II was 0.76.

SQD efficiency was also tested by ROC-AUC analysis. With regard to PTSD, the AUC resulted 0.93 (SE 0.02) for SQD-P, using CAPS as the gold-standard. With regard to depression, the AUC resulted 0.90 (SE 0.04) for SQD-D, using BDI-II as the gold-standard.

LR values for strata of SQD-P and SQD-R by the gold standards (CAPS and BDI, respectively) are reported in Table 3.

With regard to PTSD, given a prevalence of 24.1%, the post-test probability of the stratum with the scores of 6-9 points in SQD-P is 92%, that of the stratum with 4-5 points is 31%, and that of the stratum with 0-3 points is almost zero. If we include also partial PTSD within the positive cases, prevalence arises to 37.9%, and the post-test probabilities become 95%, 46%, and 1%, respectively. Based on this post-test probabilities, findings from the Italian version of the SQD screening instrument confirm the original Japanese finding that SQD-P scores are suitable to be modeled and interpreted on three levels, i.e. 0-3 points as “slightly affected”, 4-5 points as “moderately affected”, and 6-9 points as “severely affected”.

With regard to depression, given a prevalence of 8.6%, the post-test probability of the stratum with the scores of 5-6 points in SQD-D is 99%, and that of the stratum with 0-4 points is 16%. Based on this post-test probabilities, findings from the Italian version of the SQD screening instrument confirm the first-study Japanese finding that SQD-D scores are suitable to be modeled and interpreted on two levels, i.e. 0-4 points as “less likely to be depressed”, 5-6 points as “more likely to be depressed”. Differently from the staminal Japanese study, the greater sample size of the current study allows to be confident in SQD-D as to its discriminating power.

DISCUSSION

Disasters are mass traumatic events involving large population groups and determining social and economic hardship on a large scale. Most post-disaster studies make use of structured screening instruments that have been shown to be valid for the assessment of PTSD and depression. Several items concern an epidemiological interpretation of data deriving from such screening methods. First, differing sensitivities and specificities of screening instruments and their potential role in shaping assessments of PTSD have been documented. Second, most studies assess PTSD and depression related to the disaster, ignoring pre-existing conditions. Third, screenings are typically conducted in a wide range of time after disaster, so that PTSD and depression prevalence measures have to be interpreted.
as period prevalence, and cross-study comparisons can be performed with extreme caution, particularly with regard to PTSD, where estimated prevalence after natural disasters ranges from approximately 5% [20] to 60% [21], with most reports in the lower half of this range. Therefore, reliability, validity and ease of administering of instruments for screening and public health purposes is well established in psychiatric epidemiology of post-disasters.

The SQD clearly fits this profile. The SQD was developed in Japan as an interview-format instrument that reflects the characteristics of the aftermath of a large-scale disaster. In wide populations, including senior citizens, it is crucial that screening questionnaires’ items are easy to understand also for the elderly and people with low educational level. As these people typically are reluctant or feel uncomfortable in completing self-reporting scales, the SQD interview format is far preferable. Moreover, it consists only of 12 yes/no items and has the advantage of being easily incorporated into local level post disaster services, as also non-experts in mental health can use it after a training.

This study attempted at evaluating the efficacy and validity of the SQD in an Italian post-disaster setting, like the urban environment of the city of L’Aquila after the disrupting 2009 earthquake. Overall, the Italian version of the SQD is an efficient screening tool: both the SQD-P and SQD-D revealed high discriminant efficacy according to ROC-AUC analysis, and good convergent validity according to stratum-specific likelihood ratio. Therefore, the Italian version of the SQD resulted an efficient screening tool for both PTSD (by using SQD-P items) and depression (SQD-D items), differently from the original version used in Japan which showed sufficient convergent validity only for the SQD-P subscale. Limitations for the use of SQD-D in the Japanese study derived mainly from spectrum bias, as the target population did not include a sufficiently wide variety of subjects for the evaluation of SQD-D convergent validity. The current Italian study included a higher number of participants than the Japanese study (116 vs 68) with a broader age range (all adult ages vs elders only), so that it does not suffer from the same methodological limitations, and allows generalizability of SQD use to different adult age groups. As both instruments are established and valid diagnostic tools, the use of different gold standards for the screening of depression, i.e. BDI-II in the current study and SCID in the Japanese study, should not be considered a serious limit of the current validation study, although it implies some methodological issues. In particular, differences should be considered in that SCID is a clinician-administered diagnostic instrument, whereas BDI-II is a self administered screening instrument. However, BDI-II has been extensively validated in several studies even in comparison with SCID, so its use as a gold standard for depression is warranted.

In conclusion, this study attempted to validate the Italian version of the SQD, originally developed in Japan: both the SQD-P subscale for PTSD and the SQD-D subscale for depression resulted reliable and valid, so that we recommend the use of SQD as an efficient and easy-to-use screening instrument for PTSD and depression, for epidemiologic and public health purposes in the aftermath of natural disasters like a disrupting earthquake.

Conflict of interest statement

There are no potential conflicts of interest or any financial or personal relationships with other people or organizations that could inappropriately bias conduct and findings of this study.

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Appendix 1

English version of the Screening Questionnaire for Disaster Mental Health

“People who have experienced [repeat the traumatic event] often report that their lives have changed dramatically and they are constantly under various kinds of stress. Have you experienced any of the symptoms listed below in the past month?”

Q1. Have you noticed any changes in your appetite? 1. Yes 0. No
Q2. Do you feel that you are easily tired and/or tired all the time? 1. Yes 0. No
Q3. Do you have trouble falling asleep or sleeping through the night? 1. Yes 0. No
Q4. Do you have nightmares about the event? 1. Yes 0. No
Q5. Do you feel depressed? 1. Yes 0. No
Q6. Do you feel irritable? 1. Yes 0. No
Q7. Do you feel that you are hypersensitive to small noises or tremors? 1. Yes 0. No
Q8. Do you avoid places, people, topics related to the event? 1. Yes 0. No
Q9. Do you think about the event when you do not want to? 1. Yes 0. No
Q10. Do you have trouble enjoying things you used to enjoy? 1. Yes 0. No
Q11. Do you get upset when something reminds you of the event? 1. Yes 0. No
Q12. Do you notice that you are making an effort to try not to think about the event, or are trying to forget it? 1. Yes 0. No

[ Score ]
SQD-P = Q3 + Q4 + Q6 + Q7 + Q8 + Q9 + Q10 + Q11 + Q12
SQD-D = Q1 + Q2 + Q3 + Q5 + Q6 + Q10

[ Guideline ]
SQD-P: 9-6 = Severely affected (possible PTSD)
5-4 = Moderately affected
3-0 = Slightly affected (currently little possibility of PTSD)
SQD-D: 6-5 = More likely to be depressed
4-0 = Less likely to be depressed

Italian version of the Screening Questionnaire for Disaster Mental Health

“Le persone che hanno sperimentato [evento traumatico, indicare] spesso riferiscono che la loro vita è radicalmente cambiata e che soffrono costantemente di stress di vario tipo. Lei ha sperimentato nell’ultimo mese qualcuno dei sintomi sotto elencati?”

D1. Ha notato qualche modificazione del suo appetito? 1. Sì 0. No
D2. Ha la sensazione di stancarsi facilmente o di sentirsi sempre stanco? 1. Sì 0. No
D3. Ha difficoltà ad addormentarsi o a dormire di notte? 1. Sì 0. No
D4. Nel sonno, ha incubi sull’evento? 1. Sì 0. No
D5. Si sente depresso? 1. Sì 0. No
D6. Si sente irritable? 1. Sì 0. No
D7. Avverte di essere ipersensibile a piccolo rumori o tremori? 1. Sì 0. No
D8. Evita luoghi, gente, argomenti che si riferiscono all’evento? 1. Sì 0. No
D9. Pensà all’evento anche non volendo? 1. Sì 0. No
D10. Ha difficoltà nel provare piacere in situazioni per le quali prima provava piacere? 1. Sì 0. No
D11. Si sente agitato quando qualcosa le ricorda l’evento? 1. Sì 0. No
D12. Avverte di fare uno sforzo per provare a non pensare all’evento, o nel tentare di dimenticarlo? 1. Sì 0. No

[ Punteggio ]
SQD-P = D3 + D4 + D6 + D7 + D8 + D9 + D10 + D11 + D12
SQD-D = D1 + D2 + D3 + D5 + D6 + D10

[ Linea guida ]
SQD-P: 9-6 = Severamente affetto (PTSD probabile)
5-4 = Moderatamente affetto
3-0 = Leggermente affetto (PTSD poco probabile)
SQD-D: 6-5 = Depressione probabile
4-0 = Depressione poco probabile