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Psychometric properties of acute stress disorder questionnaire for people exposed to Kerman earthquake

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Abstract:

BACKGROUND AND AIM: Some people exposed to disasters will suffer from acute stress disorder (ASD) due to the negative consequences of these disasters. Evaluating this disorder at a large scale requires a credible and standardized tool. Therefore, the current study aims to investigate the psychometric properties of the ASD questionnaire for people exposed to Kerman earthquake.

METHODS: This is a descriptive-tooling study, conducted on 435 men and women older than 18 years living in earthquake-affected areas of Kerman Province (Kouh-e-Banan). The study was carried out using the Persian translating of the English version of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition ASD questionnaire on accessible individuals living in temporary residence tents in two initial and final stages and different stages of validity and reliability evaluation was carried out. The findings were analyzed using descriptive statistics and Pearson's correlation coefficient.

RESULTS: During the evaluation of content validity, no questions were eliminated. To carry out factor analysis, sampling competence, and suitability of sample size were confirmed through Kaiser–Meyer–Olkin and Bartlett's tests. In the factor analysis stage, 14 items in three factors were defined. The factors were included reexperiencing and analysis, arousal (continuous irritability), and avoidance factors which together explained 59.43% of percentage distribution. In the next stage of evaluating divergent validity, the results indicated a significant and inverse correlation between ASD score and quality of life score ($r = -0.43$, $P = 0.002$) of the participants, while there was also a positive and significant correlation between ASD score and general health disorder score of the participants ($r = 0.47$, $P < 0.0001$). The reliability of the questionnaire was investigated using Cronbach's alpha, and inner class correlation coefficient was calculated to be 0.9.

CONCLUSIONS: The tool investigated in this study has suitable validity and reliability and is effective for use by psychologists and relief workers for necessary interventions and prevention of ASD in disasters.

Keywords:

Acute stress disorder, earthquake, Iran, Kerman, psychometrics, questionnaire

Introduction

Acute stress disorder (ASD) occurs immediately after adverse events under three conditions of direct experience, witnessing what has happened to others or knowledge of effects on family members or close friends and can cause problems in people's daily lives due to symptoms such as excessive alertness, mood changes,

irritability, stressful actions, and thoughts.^[1,2] Among the main factors and conditions of ASD, one can mention experiencing damaging occurrences and natural disasters such as earthquakes.

Earthquakes, as one of the common natural disasters, are unexpected, unpredictable effects. However, their psychological adverse effects can be predicted. The fear caused in people affected by earthquake

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is often very obvious and tangible. Therefore, one of the common adverse effects of such disasters is various psychological disorders in survivors.^[3]

As a result, various studies have introduced several psychological disorders including depression, anxiety, and posttraumatic stress disorder (PTSD), as some of the adverse effects of disasters. However, ASD has not been fully investigated in Iran, especially in the context of natural disasters. Furthermore, it is necessary to remember that clinical interviews and suitable psychometrics tools are required in order to evaluate the psychological conditions of people exposed to disasters. Due to the unpredictable nature of earthquakes and its widespread adverse effects, the possibility of screening through psychological interviews is limited due to limited time and facilities available. Therefore, clinical measurement tools that have passed precise psychometric tests and have suitable validity and reliability will be of great use under these special conditions.

In a study, the acute stress reaction (ASR) of 746 individuals living in South Kanton area was investigated after a large earthquake in Eastern Japan and the results indicated that 72.7% of the individuals had experienced at least one ASR and that 13% of the individuals were recognized as having high risk of PTSD 6 months after the earthquake. The factors determining the presence of ASR and PTS 6 months after the event included both direct and indirect factors. The interaction between ASR and PTS was also observed 6 months after the earthquake. This study, therefore, suggested early interventions after each earthquake.^[3] Another study was carried out in order to evaluate the Clinician-Administered PTSD Scale (CAPS-1) for measuring the psychological effects of wars. The reliability coefficient measured using retest approach was 0.86, while Cronbach's alpha was 0.92. Factor analysis using principal component analysis method also indicated high validity of the scale. Exploratory factor analysis (EFA) showed six main factors.^[4] During another study on factor structure of acute stress factors on victims of earthquake in China, the findings confirmed a four-factor model defined in the fourth edition of Diagnostic and Statistical Manual (DSM-IV).^[5] In another factor structure study, the suggested four-factor structure was not suitable for measuring ASDs in victims of Katrina hurricane in Texas emergency rooms. However, an alternative two-factor model was suitable for the gathered data. This model included a second-order arousal factor (which is strongly affected by the effects of reexperiencing, arousal and avoidance factors), which has a positive correlation with the dissociation factor.^[6] The psychometric study of the German version of ASD scale (ASDS) in parents of children undergoing heart

bypass surgery (61 individuals) and patients suffering from acute heart attack (52 individuals) in 1 month after the damage caused by these conditions indicated suitable reliability and validity as well as credibility of the German version of ASDS.^[7] The ASDS has suitable 95% sensitivity and specificity of 83% for identifying ASD among civilian survivors of terror attacks. The results of retest after 2–7 days were also strong ($r = 0.94$). One-third of people diagnosed with ASD were not at the risk of PTSD. Therefore, ASDS could be a suitable screening tool for identifying people at the risk of PTSD.^[8]

Since most of the aforementioned studies have in other countries and cultures different from Iranian culture and focus on different affected populations, the current study aimed to determine the psychometric properties of ASD questionnaire among people exposed to the recent earthquake in Kerman Province.

Methods

This was a descriptive-survey tooling study. A total of 150 men and women older than 18 years old and with highest experience regarding earthquakes were selected to participate in implementation of the initial stage of the questionnaire. After extracting the results of the initial stage, 435 individuals living in areas affected by the earthquake were selected for the main study. The samples were selected using convenient sampling by visiting temporary residence tents in the areas of Kerman Province affected by the earthquake.

Data gathering tool was based on an English questionnaire^[9] which was translated to Persian. This translation was again translated to English and then back to Persian and was implemented in the initial stage of the study. Answers were scored using Likert's scale (never, rarely, to some extent, to a great extent, often). At the start of the questionnaire, explanations regarding the aim and reason for the study were provided and then demographic characteristics of participants including gender, marital status, employment status, education, and experience of disasters were gathered.

Before the implementation, ten experts and faculty members in psychology, psychotherapy, and relief workers involved in rescue efforts in the earthquake-affected regions were selected to confirm the face validity of the questionnaire. The necessary changes were then made based on their opinions. The initial questionnaire was distributed among 150 men and women of 18-years or older with highest experience of natural disasters by visiting each person in temporary residence tents in the regions of Kerman Province affected by the earthquake. Since these regions were not stable or safe due to damage caused by the earthquake,

researchers coordinated with local Red Crescent authorities, and all necessary precautions were taken.

To create a valid and reliable tool, the following steps were carried out. For investigating face validity, shape, logic, attractiveness, logical sequence of items, and clarity and brevity of the items were evaluated according to the participants. In order to evaluate content validity, two criteria were used including content validity ratio (CVR) and content validity index (CVI). The first investigates the necessity of an item according to the participants, while the second determines the vagueness, relevance, and compatibility of items with the studied subject. For the first criterion, experts were asked to score each item from 1 to 3 using a three-level scale (necessary, useful but unnecessary, and unnecessary). These scores were used to calculate CVR.^[10]

For construct validity, the competence of the proposed tool for measuring the existing constructs was investigated. To this end, EFA and Varimax orthogonal rotation were used to improve the interpretability of extracted factors and evaluating construct validity with the minimum factor weight for accepting an item being set to 0.4. To investigate criterion validity (convergent and divergent), two questionnaires including the World Health Organization 26-item quality of life questionnaire (WHOQOL-BREF) and GHQ-28 general

health questionnaire were used.^[11,12] Each of these two questionnaires measures ASD in some of their items [as shown in Table 1]. One hundred individuals simultaneously answered all the three questionnaires.

The reliability of the proposed tool was measured using internal correlation, Cronbach’s alpha, and interclass correlation coefficient (ICC) approaches. Reliability was also measured using halving and retest approaches. In the retest approach, 100 individuals were answered the questionnaire twice in a period of 2–5 days. Alpha values higher than 0.7 were considered acceptable.^[13] Descriptive statistics such as frequency, percentage, and standard deviation and Pearson correlation coefficient were used for data analysis using SPSS Version 21 (SPSS Inc., Chicago, IL, USA) software.

Results

Among 435 participants, 81.5% were married, 58.6% had high-school or middle-school education, 41.4% had university education, and 51.9% were unemployed. The average age of the participants was 37.16 ± 11.74.

For face validity, appearance, logic, attractiveness, logical sequence of items and brevity of items were investigated according to the participants and necessary edits were carried out according to experts’ opinions. The results of content validity evaluation (CVR and CVI) showed suitable CVI for all questions with the lowest score being 0.91 (the acceptable content validity threshold was 0.79). In CVR evaluation, five questions have scores lower than the threshold (since the number of participants was 11 people, the comparison criterion for content validity was 0.59) in investigating the construct validity of the questionnaire, and in order to ensure the factorability of items, EFA was used. To this end, BT and Kaiser–Meyer–Olkin (KMO) values are reported in Table 1.

Table 1: The quality criterion of Kaiser-Meyer-Olkin sample size and the results of Bartlett’s test of sphericity

Factors	Analysis results
KMO statistic	0.919
Chi-square estimation for Bartlett’s test	1939.768
Degrees of freedom	91
Significance level of Bartlett’s test	$P < 0.0001$

KMO=Kaiser-Meyer-Olkin

Table 2: The rotated matrix of the questionnaire based on principal component analysis and varimax rotation

ASD	Component weight	
	1	2
1. Can’t get the thought of the incident out of your mind?	0.701	0.247
2. Having disturbing dreams about the incident?	0.762	0.158
3. Feel that the incident might happen again?	0.759	0.050
4. When you remember the incident, you feel agitated and restless?	0.763	0.169
5. Can’t show positive emotions such as happiness?	0.597	0.191
6. Do you feel that the incident hasn’t happened or isn’t real?	0.138	0.618
7. Can’t remember some aspects of the incident?	0.361	0.449
8. Try not to think about the incident?	-0.022	0.782
9. Resist going to places or having conversations that remind you of the incident?	0.347	0.634
10. Have problems for sleeping or remaining sleep?	0.698	0.279
11. Have angry behaviors or anger explosions?	0.744	0.180
12. Are vigilant for danger?	0.791	0.072
13. Can’t concentrate?	0.616	0.259
14. Get startled during excitements?	0.617	0.240

ASD=Acute stress disorder

According to the findings presented in Table 1, sampling competence was calculated using KMO test to be 0.919 which indicates suitable sample size for factor analysis. The significance level of Bartlett’s test of sphericity (BT) ($P < 0.0001$) indicated a suitable correlation matrix and factorability of items for factor analysis. The results of rotations and factor extraction are presented in Table 2.

Factor extraction and rotation were carried out according to the results presented in Table 1 and two components with eigenvalues higher than 1 were determined which together determine 59.43% of the distribution and 14 items are in the second component. These components include arousal component (reexperiencing and arousal) and collapsing component (analytic and avoidance). The results of criterion-related validity are shown in Table 3.

According to the findings presented in Table 3, evaluating divergent validity showed that there is a significant and inverse correlation between the ASD and quality of life scores ($r = -0.43, P = 0.002$). Furthermore, evaluating the convergent validity showed a significant and positive correlation between ASD and general health scores ($r = 0.47, P < 0.0001$). The results for reliability measurement using Cronbach’s alpha and test-retest approaches are presented in Table 4.

According to the findings presented in Table 4, the Cronbach’s alpha coefficient in the test– retest approach was 0.93 for ASD questionnaire and 0.94 and 0.65 for its components. The reliability measured through Cronbach’s alpha was also 0.89 for acute stress questionnaire and 0.89 and 0.56 for questionnaire components for all participants. ICC was also calculated to be 0.9 for the entire questionnaire and 0.91 and 0.67 for its components.

Table 3: The relation between acute stress disorder among earthquake survivors with general health and quality of life scores in order to determine convergent and divergent validity

Factors	General health (convergent)	QOL (divergent)
ASD		
Correlation	0.47	-0.43
Significance	<0.0001	0.002

ASD=Acute stress disorder, QOL=Quality of life

Table 4: The reliability measurement results for acute stress disorder questionnaire and its components in test-retest

ASD and its components	Internal similarity (n=96)		Reliability in test-retest approach (n=96)	
	α (n=96)	α (n=435)	95% confidence interval	ICC
Reexperiencing and analytical component	0.945	0.896	0.0-876.945	0.917
Arousal	0.653	0.566	0.0-549.776	0.678
Total (acute stress)	0.933	0.893	0.0-862.940	0.908

ICC=Interclass correlation coefficient, ASD=Acute stress disorder

Discussion

According to the findings presented in Tables 1 and 2, EFA identified two factors which were named arousing factor (reexperience and arousal) and collapsing factor (analytical and avoidance) based on scientific texts and opinions of clinical experts with experience working with PTSD patients.

The number of identified factors in this questionnaire was different from other studies. For example, the number of factors in a study focused on the standardization of acute stress resulting from war using EFA was reported to be 6.^[4] Another study investigating the factor structure of acute depression disorder for people exposed to earthquakes reported four factors.^[5] Furthermore, a study investigating the same tool on Katrina hurricane survivors proposed a two-factor model^[6] which is similar to the findings of the current study, confirming reexperience and arousal as cofactors with relation to the two other factors.

As can be seen, different studies introduce different factors for acute stress questionnaire, and this difference can be due to cultural, geographical, and population differences in these studies. Based on clinical experiences and therapeutic interventions for ASD and PTSD patients, it can be said that acute stress and anxiety symptoms can be affected by social and cultural differences under disaster situations, resulting in different manifestations. This means that convergence of symptoms can be different in different studies.

In the current study, reexperiencing and arousal are placed in a single factor, while these two factors are defined separately in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V). Our proposed reason for this difference is as follows. Experiencing disaster situations and the accompanying unexpected shocks resulting from them lead to formation of negative emotions, arousal, and irritability, which can explain the convergence of these symptoms in a single factor. Therefore, the content of this factor (arousing) in the current study mostly refers to symptoms related to remembering the incident, active, and arousing symptoms which creates a feeling of experiencing the disaster in a dream situation.

Afterward, alertness and readiness behaviors remain in patients resulting in sleep problems, irritable behavior, and anger.

The second in this study is consistent with analytical and avoidance experiences of individuals, which are mentioned separately in the DSM-V system. Clinical experiences confirm that people with problems in remembering certain aspects of the incident, or experience change, confusion, slow time flow and similar symptoms in their environment are not relaxed and comfortable in the current environment and consciously or subconsciously avoid facing thoughts, emotions, and people or locations in order to prevent the formation of negative memories or emotions in themselves. These conditions create a collapsing emotional, behavioral, and mood situation with the content of avoiding the current reality.

For determination of criterion-related validity, the results presented in Table 3 indicate that ASD is divergent from the quality of life and convergent with mental health disorders in individuals. Since two questionnaires selected for measuring these two factors are standardized and used frequently, their divergence or convergence with the questionnaire presented in this study can confirm the validity of ASD questionnaire.

According to the results of Table 4, reliability measured through Cronbach's alpha and test-retest approach in a period of 3-5 days are in an acceptable range and indicate suitable reliability of ASD questionnaire.

The results of a study using ASD questionnaire for investigating the complications caused by were also reported suitable reliability for the questionnaire in Cronbach's alpha and test-retest approaches.^[4] Psychometrics of the German version of ASD questionnaire on heart attack patients also confirmed the reliability and credibility of this questionnaire.^[7] Furthermore, this questionnaire also had suitable reliability for evaluating the civilian survivors of terrorist attacks.^[8] Suitable results for evaluating the reliability of the proposed questionnaire indicate that using this questionnaire under similar conditions can result in reliable and stable results.

Conclusions

The findings of this study indicated suitable validity and reliability of the ASD questionnaire which can be used under natural disaster conditions, especially earthquakes. According to the results of implementing this questionnaire, since factors present in the ASD questionnaire follow DSM-V criteria, this scale can be used to identify people at the risk of various disorders.

However, decisions regarding clinical situations of these individuals will require use of standardized questionnaires and clinical interviews in order to achieve reliable results.

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Conflicts of interest

There are no conflicts of interest.

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