

# Reliability, validity and psychometric properties of the Greek translation of the posttraumatic stress disorder scale

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## Abstract

The Greek version of the Davidson Trauma Scale (DTS) was developed to respond to the need of Greek-speaking individuals. The translated questionnaire was administered to 128 HIV outpatients (aged 37.1±9.1) and 166 control patients (aged 32.4±13.4). In addition to the DTS Greek scale, subjects were assessed with two other scales useful for assessing validity. For each factor analyses two components were extracted, based on Cattell's scree test. The two components solution accounted for 55.34% of the total variation in case of frequency variables and 61.45% in case of severity variables. The Cronbach's alpha coefficient and Guttman split-half coefficient of the DTS scale were 0.93 and 0.88 respectively. The test-retest reliability of the Greek version of DTS scale proved to be satisfactory. Individual items had good intra-class correlation coefficients higher than 0.5, which means that all questions have high levels of external validity. The psychometric strength of interview for post-traumatic stress disorder-Greek version it's reliable for its future use, particularly for screening subjects with possible diagnosis of posttraumatic stress disorder.

## Introduction

The structured interview for posttraumatic stress disorder (PTSD) was first developed and tested with reference to Davidson Trauma Scale (DSM)-III. The scale has

been recognized as one of the several interview-based measures of PTSD for diagnosis, assessment of symptom severity and treatment effectiveness.<sup>1</sup> Its primary purpose is to measure symptoms' frequency and severity and to evaluate treatment, for example measurement of symptom change over time, response prediction, and evaluation of differences between therapy, modalities in a research setting.<sup>2</sup>

The scale comprises of 17 items reflecting the DSM-IV criteria for PTSD, supplemented by two measures of survival and behavior guilt.<sup>3</sup> The structured interview has served both as a symptom severity instrument and as a diagnostic tool and has been designed to evaluate symptoms of PTSD in individuals with a history of trauma.<sup>4</sup> Each item is rated on 0-4 scale and represents a composite of frequency, severity and fictional impairment. Items can be categorized as follows: items 1-4, criteria B (intrusive re-experiencing); items 5-11, criteria C (avoidance and numbness); and items 12-16, criteria D (hyper arousal). For each item, the subject rates both frequency and severity during the previous week on a point 5-point (0 to 4) scale with a maximum score of 136 point. Subscale scores can be computed separately for frequency and severity.<sup>5</sup> The aim of the current study was to assess the reliability, validity and psychometric qualities of the Greek translation of the posttraumatic Stress Disorder Scale.

## Materials and Methods

The Davidson Trauma Scale (DTS) is a scale used in diagnosing and measuring symptom severity and treatment outcome in post-traumatic stress disorder (PTSD).<sup>5</sup> The Davidson Trauma Scale (DTS) is a 17-item self-rating scale that takes respondents only 10 minutes to complete. Each one of the 17 items corresponds to a DSM-IV symptom of PTSD,<sup>6</sup> and each symptom is rated on 5-point frequency (0=*not at all* to 4=*every day*) and severity Likert scales (0=*not at all distressing* to 4=*extremely distressing*). Respondents are asked to identify the trauma that is most disturbing to them and to rate, in the past week, how much trouble they have had with each symptom. From Davidson Trauma Scale (DTS) we can calculate a frequency score (range: 0-68), severity score (range: 0-68), and total score (range: 0-136). It can be used to make a preliminary determination about whether the symptoms meet DSM criteria for PTSD.

Two psychiatrists who are proficient in both English and Greek translated DTS into Greek. Then another psychiatrist independently translated the items of the Greek ver-

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sion of DTS back to English (back translation). The back-translated version was reviewed in order to establish whether is consistent with the original English version and thus the final Greek version of DTS was obtained.

In additional to the DTS Greek scale, subjects were assessed with two other scales useful for assessing validity. For criterion based validity, the SCL-90 and EPQ scales was administered as an independent evaluators. Psychometric Personality scale of extraversion, neuroticism, psychotism (Eysenck Personality Questionnaire, EPQ).<sup>7</sup> The Eysenck personality questionnaire consists of 84 entries evaluated by the patient with a yes or no. The purpose of this

questionnaire is to explore four dimensions of personality: psychotism (P), neuroticism (N) extraversion (E) and lying (L). The scales N and L are of particular clinical interest. The N scale is the best studied and is associated with a clinical diagnosis of neurosis or oral personalities according to psychoanalytic terminology. The E scale corresponds roughly to histrionic personalities. The P scale corresponds to obsessive-compulsive personalities and is unrelated to psychosis. Finally, the L scale controls the degree of hypocrisy of the examined party but can also be high in patients with psychosomatic disorders who are not pretending. A weighted Greek version is available.<sup>8</sup> Psychometric general psychosomatic burden scale (SCL-90).<sup>9</sup> The SCL-90 questionnaire is self-completed and measures 9 psychopathology parameters (as many as its subscales), which are: i) somatization, ii)

depression, iii) anxiety, iv) phobic anxiety, v) obsessive compulsive, vi) paranoid ideation, vii) psychoticism viii) hostility, ix) interpersonal sensitivity. The questionnaire includes 90 questions in total. All entries are rated from 0 to 4, giving a total score of 360. The scale is used to extrapolate 3 aggregate indexes: i) the general gravity index, ii) the positive symptoms distress index, iii) the set of positive symptoms. A weighted Greek version is available.<sup>10</sup>

The translated questionnaire was administered to 128 HIV outpatients aged 37.1±9.1 (range: 17-64) (76 male and 52 female) and 166 controls (98 male and 68 female) aged 32.4±13.4 (range: 19-92).

The present study was conducted at the Attikon University Hospital and the sample was randomly selected from Patients came from the Infectious Diseases unit of the Attikon Hospital, Athens, Greece. All sub-

jects complete the questionnaires by themselves. The average time to complete the questionnaires was 30 minutes.

### Statistical analysis

All statistical analyses were carried out with IBM SPSS Statistics V20.0 and we use 5% significant levels for all statistical tests. Explanatory factor analysis was contacted to investigate the factor structure and dimensionality of the 17-items Greek version of DTS scale.<sup>11</sup> Two components were extracted, based on Cattell's scree test. Cronbach's alpha,<sup>12</sup> and Guttman split-half coefficient<sup>13</sup> were used to evaluate interval consistency of DTS scale and of the two factors extracted for principal component analysis, in 294 subjects. A subgroup of subjects completed the questionnaire for a second time, one week later, in order to assess test-retest reliability. Intra-class cor-

**Table 1. Mean scores (range 0-10), standard deviation (SD) and communalities for each item of the scale.**

	Descriptive statistics		
	Mean	SD	Communalities
<b>Frequency</b>			
Have you had painful images, memories or thoughts of the event?	0.99	0.993	0.737
Have you had distressing dreams of the event?	0.63	0.815	0.649
Have you had painful images, memories or thoughts of the event?	0.49	0.778	0.583
Have you been upset by something which reminded you of the event?	0.93	0.894	0.639
Have you been avoiding any thoughts or feelings about the event?	1.08	1.129	0.520
Have you been avoiding doing things or going into situations which remind you about the event?	1.17	1.243	0.622
Have you had difficulty enjoying things?	0.92	0.922	0.477
Have you felt distant or cut off from other people?	1.09	0.987	0.590
Have you found it hard to imagine having a long life span fulfilling your goals?	0.79	1.054	0.478
Have you had trouble falling asleep or staying asleep? <sup>0.97</sup>	0.991	0.418	
Have you been irritable or had outbursts of anger?	1.13	0.921	0.513
Have you had difficulty concentrating?	1.18	1.108	0.469
Have you felt on edge been easily distracted or had to stay on guard?	0.77	0.876	0.470
Have you been jumpy or easily startled?	1.06	0.909	0.583
<b>Severity</b>			
Have you had painful images, memories or thoughts of the event?	1.33	1.474	0.738
Have you had distressing dreams of the event?	0.90	1.358	0.704
Have you felt as though the event was re-occurring?	0.76	1.403	0.529
Have you been upset by something which reminded you of the event?	1.16	1.282	0.661
Have you been avoiding any thoughts or feelings about the event?	1.23	1.574	0.603
Have you been avoiding doing things or going into situations which remind you about the event?	1.44	1.861	0.646
Have you had difficulty enjoying things?	1.40	1.674	0.567
Have you felt distant or cut off from other people?	1.77	1.927	0.653
Have you found it hard to imagine having a long life span fulfilling your goals?	1.16	1.618	0.478
Have you had trouble falling asleep or staying asleep?	1.39	1.505	0.538
Have you been irritable or had outbursts of anger?	1.44	1.376	0.708
Have you had difficulty concentrating?	1.51	1.518	0.606
Have you felt on edge or had to stay on guard?	1.07	1.369	0.533
Have you been jumpy or easily startled?	1.45	1.509	0.639

**Table 2. Pattern matrix of extract factors.**

	Frequency		Severity	
	Factor 1	Factor 2	Factor 1	Factor 2
Have you had painful images, memories or thoughts of the event?	0.014	0.851	-0.024	0.874
Have you had distressing dreams of the event?	-0.057	0.836	-0.114	0.91
Have you felt as though the event was re-occurring?	0.012	0.757	-0.07	0.771
Have you been upset by something which reminded you of the event?	0.11	0.732	0.083	0.756
Have you been avoiding any thoughts or feelings about the event?	-0.054	0.75	0.225	0.609
Have you been avoiding doing things or going into situations which things or going into situations which remind you about the event?	-0.012	0.795	0.187	0.668
Have you had difficulty enjoying things?	0.677	0.023	0.673	0.113
Have you felt distant or cut off from other people?	0.776	-0.014	0.738	0.1
Have you found it hard to imagine having a long life span fulfilling your goals?	0.687	0.008	0.624	0.097
Have you had trouble falling asleep or staying asleep?	0.567	0.125	0.718	0.023
Have you been irritable or had outbursts of anger?	0.765	-0.093	0.91	-0.109
Have you had difficulty concentrating?	0.756	-0.143	0.828	-0.078
Have you felt on edge, or had to stay on guard?	0.594	0.143	0.687	0.064
Have you been jumpy or easily startled?	0.683	0.128	0.804	-0.008

relation coefficients for the total score and each independent question was used to investigate the consistency between the two measurements.<sup>14</sup> Criterion based validity was evaluated by calculated Spearman's rho correlation coefficients between the score of DTS-Greek scale and of SCL-90 and EPQ scales and subscales.

## Results

### Factor analysis

Principal components analyses using Promax oblique rotation with a Kappa of 4 was performed on 294 individuals also for frequency variables and for severity variables. Variables 7, 10 and 17 do not fit well with the factor solutions and dropped from both analyses. Both factor analyses based on the correlation matrix. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was 0.900 for frequency variables and 0.924 for severity variables hence suggesting a high factorability for the sample. Bartlett's Test of Sphericity rejected the null hypothesis of an identity matrix in both factor analyses (frequency:  $\chi^2=1881.595$ ,  $df=91$  and  $P\leq 0.0001$ ; severity:  $\chi^2=2417.663$ ,  $df=91$  and  $P\leq 0.0001$ ) In Table 1, extracted communalities were fairly high in both factor analyses. This, in combination with the fact that extracted factors were well determined suggests that the sample size was adequate. For each factor analyses two components were extracted, based on Cattell's scree test. The two components solution accounted for 55.339% of the total variation in case of frequency vari-

**Table 3. Consistency of DTS scale and sub-scales.**

	Items	Cronbach's $\alpha$	Guttman split-half coefficient
DTS scale	1-17	0.930	0.878
Factors			
1	1.2.3.4.5.6	0.886	0.807
2	8.9.11.12.13.14.15.16	0.890	0.839

ables and 61.455% in case of severity variables. Initial eigenvalues of the two components were: factor 1=6.128 and factor 2=1.619 in case of frequency variables and factor 1=7.306 and factor 2=1.298 in case of severity variables. Table 2, for both analyses, presents which item load on the two components. As we can see, the 1, 2, 3, 4, 5 and 6 loading in factor 1. Factor 2 contained the items 8, 9, 11, 12, 13, 14, 15 and 16.

### Validity and reliability of DTS scale

#### Interval consistency reliability

Interval consistency of DTS scale in 294 individuals was evaluated by Cronbach's alpha and Guttman split-half coefficient (Table 3). Cronbach's alpha coefficient averages the inter-correlations between all the items in a particular test or sub-scale to give some indication of the extent to which a scale hangs together as a measure of a single dimension. Split-half reliability is another form of internal consistency reliability. In split-half reliability we randomly divide all items into two sets and we calculate the total score for each randomly divided half. A basic assumption of split-half reliability is that the two halves of the test should yield similar true scores and

error variances. Guttman split-half coefficient needs to be more than 0.80 to be acceptable. The Cronbach's alpha coefficients and Guttman split-half coefficient of the DTS scale were 0.930 and 0.878 respectively. The corresponding values for the sub-scales are presenting in Table 3.

#### Test-retest

In order to investigate whether the DTS scale is influenced by external factors, we used the test-retest method. Of the total 294 individuals participated in the study and initially answered the questionnaire. 98 were those who completed the questionnaire for a second time after one week. For each item the consistency between the two measurements was evaluated by intra-class correlation coefficients. Values equal to 0.40 give the distinction point between sufficient and insufficient reliability. The test-retest reliability of the Greek version of DTS scale proved to be satisfactory. Individual items had good intra-class correlation coefficients higher than the 0.5 (Table 4) which means that all questions have high levels of external validity. The coefficient for the total DTS score was very good and equal to 0.883.

**Table 4. Test-retest reliability.**

Questions	Intraclass correlation coefficients	95% CI
DTS total scale	0.883	0.826-0.922
Feeling unreal or cutoff from the world	0.779	0.671-0.852
Things look flat as if looking at a picture	0.686	0.531-0.790
Body feels as if it didn't belong to oneself	0.664	0.498-0.775
Not feeling frightened in normally frightening situations	0.586	0.382-0.722
Favorite activities no longer enjoyable	0.603	0.407-0.734
Feeling of being a detached observer of oneself	0.583	0.378-0.721
Flavor of meals no longer gives a feeling of pleasure or distaste	0.778	0.668-0.851
Body feels very light as if it were floating on air	0.792	0.689-0.861
No emotions felt when weeping or laughing	0.791	0.688-0.860
Feeling of not having any thoughts at all	0.700	0.552-0.799
Own voice sounds remote and unreal	0.714	0.573-0.808
Feel like hands or feet becoming bigger or smaller	0.647	0.473-0.763
Surroundings feel detached or unreal	0.763	0.647-0.841
Recently done things feel as if they took place a long time ago	0.717	0.578-0.811
See oneself outside as if looking in a mirror	0.741	0.613-0.826
Personal memories feel as if one had not been involved in them	0.741	0.613-0.826
When in a new situation. feeling as if it had happened before	0.743	0.616-0.828
Unable to feel affection towards family and friends	0.694	0.544-0.795
Objects look smaller or further away	0.722	0.586-0.814
Unable to feel properly things touched with hands	0.805	0.709-0.869
Unable to picture things in mind	0.615	0.426-0.742
Feeling detached from bodily pain	0.839	0.760-0.892
Feeling of being outside the body	0.795	0.694-0.862
Feeling mechanical and <i>robotic</i> when moving	0.792	0.682-0.861
Smell of things no longer gives feeling of pleasure or dislike	0.805	0.710-0.870
Detached from own thoughts like they have life of their own	0.748	0.624-0.831
Urge to touch oneself to be reassured of body existence	0.836	0.755-0.890
Unable to feel hunger or thirst	0.731	0.599-0.820
Previously familiar places look unfamiliar	0.689	0.535-0.791

**Criterion based validity**

In order to investigate the criterion based validity of the DTS scale we compare it against the SCL-90 and EPQ scale. The DTS scale presents highly correlation with the SCL-90 and all subscales ( $P < 0.0001$ ). Also DTS scale correlated highly with N, E and L subscales of EPQ scale (Table 5).

**Discussion**

At this study the Greek version of DTS was obtained by translated the self-rating Davidson Trauma Scale diagnosing and measuring frequency and severity symptoms in post-traumatic stress disorder (PTSD). The translation process was relatively straightforward with only small differences between the original and the back-translated version of the questionnaire. The Greek version of DTS scale. presents good internal consistency with Cronbach's  $\alpha = 0.930$  and Guttman split-half coefficient

**Table 5. Correlation of DTS with SCL-90 and EPQ scales.**

	Total DTS score		Spearman's rho
	N	P	
<b>EPQ scale</b>			
Psychoticism	291	0.048	0.411
Neuroticism	291	0.329**	0.000
Extraversion	291	-0.159**	0.007
Lie	291	-0.243**	0.000
<b>SCL-90 scale</b>			
Somatization	291	0.222**	0.000
Ob-comp	291	0.416**	0.000
Interper-sens	291	0.233**	0.000
Depression	291	0.395**	0.000
Anxiety	291	0.342**	0.000
Hostility	291	0.288**	0.000
Phobic anxiety	291	0.367**	0.000
Paranoid Ideation	291	0.322**	0.000
Psychoticism	291	0.399**	0.000
General symptomatic index	291	0.393**	0.000

\* Correlation is significant at the 0.05 level (2-tailed); \*\* Correlation is significant at the 0.01 level (2-tailed).



0.878 respectively. The test-retest reliability of DTS was satisfactory with high total intra-class correlation coefficients 0.883. Individual variables presenting high levels of external validity with intra-class correlation coefficients from 0.583 to 0.839.

## Conclusions

The Greek DTS presents good criterion base validity by showing significant correlations between the Greek Davidson Trauma Scale with the SCL-90 and EPQ scale. Davidson *et al.*<sup>4</sup> presented a factor analysis of the DTS with post-traumatic stress disorder yielded two dimensions also for severity and frequency. In this study we aimed to test this model in a sample of Greek population and found also a two factor structure. The DTS is a validated self-rating scale used in the diagnosis of post-traumatic stress disorder. The psychometric strength of PTSD-Greek version it's reliable for its future use, particularly for screening for subjects with possible diagnosis of PTSD.

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