VALIDATION STUDY OF THE TORONTO ALEXITHYMIA SCALE (TAS-26) IN CROATIAN POPULATION

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SUMMARY – The aim of this study was to validate the Croatian translation of the Toronto Alexithymia Scale (TAS-26). For this purpose, 194 volunteers from the general population, both genders, aged between 18 and 60, were tested on this scale after it had undergone a repeated back-translation procedure by an independent bilingual translator. The mean total score on TAS-26 (mean ± SD) was 72.9±8.4. Cronbach's α-coefficient for the entire scale was 0.71, indicating the scale to be sufficiently reliable. When analyzing the α-coefficient of reliability for the entire scale, it was found that upon removal of one of the factors, only 3 factors ('I have physical sensations that even doctors don't understand'; 'When I'm upset, I don't know if I'm sad, frightened, or angry'; and 'I have feelings that I can't quite identify') would determine the α-coefficient of the entire scale amounting to less than 0.67, which would indicate insufficient reliability of the scale. The aforementioned factors belong to the group of F1 facet factors, the facet around which most items are grouped (n=12) and therefore the scale would be reliable enough even without the three factors. The results of factor analysis in our study confirmed the four-factor structure wherein most items are saturated by the first factor (n=12), and it denotes the alexithymia facet F1 (difficulty identifying feelings). Five items are saturated by the second factor and it denotes the alexithymia facet F2 (difficulty describing feelings), and the third factor which denotes facet F3 (reduced daydreaming) also saturated five items, whereas the fourth factor which denotes facet F4 (externally oriented thinking) saturated four items. The four listed facets explain 47.2% of variance wherein the highest percentage (20.1%) is attributed to facet F1, with facet F2 accounting for 12.1%, facet F3 for 7.5%, and facet F4 for 6.6% of variance.

Key words: *Affective syndromes – diagnosis; Affective syndromes – classification; Reproducibility of results; Severity of illness index; Croatia; Psychometrics; Toronto Alexithymia Scale (TAS-26)*

Introduction

In 1973, Sifneos coined the term alexithymia (literally 'without word for feelings') suggesting a disturbance in affective and cognitive functioning and deficit in emotional regulation[1]. Since the 1970s, a number of attempts have been made to develop scales for measuring alexithymia construct, such as the Beth Israel Hospital Psychosomatic Questionnaire, the Alexithymia Provoked Response Questionnaire, the MMPI Alexithymia Scale and many others, but they all lack adequate reliability and/or validity[2].

In 1985, Taylor *et al*. developed the 26-item Toronto Alexithymia Scale (TAS-26)[3] and later, in 1994, Bagby *et al*. published a revised version TAS-20[4]. TAS is considered to be the best existing measure of alexithymia with good reliability and validity[2]. TAS-20 is a self-report questionnaire with a three-factor structure that captures three separate facets of alexithymia construct: 1) difficulty identifying feelings and distinguishing them from bodily sensations; 2) difficulty describing feeling to others; and 3) an externally oriented style of thinking (i.e. cognitive style characterized by preoccupation with the details of external events rather than thought content related to feelings

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and fantasies)[2-4]. TAS-26 retains 26 items clustered in four factors in accordance with the alexithymia construct: F1, difficulty to identify and distinguish between feelings and bodily sensations; F2, difficulty to describe feelings; F3, reduced daydreaming; and F4, externally oriented thinking[5,6].

The TAS-26 has demonstrated good psychometric properties[7], and so did the later TAS-20 version, but by eliminating the assessment of fantasy life, the TAS-20 partially fails to measure alexithymia as it was originally conceptualized[8,9]. That is why in our study we decided to validate TAS-26.

Using confirmatory factor analysis, the developers of TAS-20 demonstrated that the three-factor structure was replicable in clinical and non-clinical samples in Canada and USA[4]. TAS-20 has been translated into a number of European and Asian languages and showed that these translations in Spanish, Swedish and French proved to be consistent with factor structure of the English version[10-12]. Taylor *et al.* reported a two-factor solution of the German translation of TAS-20 using exploratory factor analysis, but did not apply confirmatory analysis[11]. The study by Haviland and Reise failed to replicate the three-factor solution of English version with confirmatory factor analysis in both a student sample and psychiatric sample[13].

Concerning TAS-26, Spanish adaptation of the TAS tested on college students proved to be a psychometrically sound measure of the alexithymia construct[14]. However, German version showed low reliability concerning the F4 scale (externally oriented thinking) and negative correlation of F3 (reduced daydreaming) with other TAS-26 scales[15].

The purpose of the present study was to validate the Croatian translation of TAS-26 in a healthy Croatian sample including both sexes and a wide range of ages and educational levels.

Subjects and Methods

Translation

The Croatian translation was developed by an English language translator and underwent repeated back-translation procedures by an independent bilingual translator. This procedure involves preliminary translation, followed by back-translation by a translator who is blind to the original English version of the scale. The back-translation is then compared with the original scale to detect any discrepancies. Items that contain discrepancies are retranslated and back-translated again, until the translation is satisfactory[16]. Only 2 items have not been translated in exactly the same way because of the fact that the English words 'sensation' and 'emotion' in Croatian do not differ greatly from the word 'feeling'.

Instrument

In this study, we used the Croatian version of the TAS-26, consisting of 26 items grouped into four facets: F1, difficulty to identify and distinguish between feelings and bodily sensations; F2, difficulty to describe feelings; F3, reduced daydreaming; and F4, externally oriented thinking. These facets are consistent with the description of the alexithymia construct by Nemiah and Sifneos. The subject replies to each item by circling numbers ranging from 1 to 5, with 1 meaning 'strongly disagree', 2 meaning 'moderately disagree', 3 meaning 'neither disagree nor agree', 4 meaning 'moderately agree', and 5 meaning 'strongly

Table 1. Sociodemographic characteristics of study subjects

	n	%
Gender:		
male	114	58.8
female	80	41.2
Education:		
elementary school	2	1.0
high school	52	26.8
college	140	72.2
Civil status:		
married	128	66.0
single	46	23.7
cohabitation	12	6.2
divorced	8	4.1
Employment:		
employed	170	87.6
unemployed	6	3.1
student	18	9.3
Habitation:		
rural	66	34.0
urban	128	66.0
Life standard:		
higher than average	42	21.6
average	146	75.3
lower than average	6	3.1

agree'. The result of the entire questionnaire is obtained by simply adding the numerical value of replies by each subject regarding the 26 items. The values of 74 and higher indicate alexithymic persons, whereas the values of 62 and lower indicate non-alexithymic persons.

Subjects

Study sample consisted of 194 (114 men and 80 women) volunteers (medical and non-medical staff) from the Sestre milosrdnice University Hospital Center in Zagreb, Zabok General Hospital in Zabok, students from the University of Zagreb, and employees of the Ministry of the Interior. The age range was between 18 and 60, mean age (mean ± SD) 34.3±10.2 years. Table 1 shows other sociodemographic data on the study subjects.

Statistical evaluation

Kolmogorov-Smirnov test was conducted to determine the distribution of data on TAS-26. Mean value and standard deviation were calculated for each item on the entire scale, as well as the Cronbach's α-coefficients of the scale in case an item was removed from the questionnaire. In order to determine the factor structure of the TAS-26 questionnaire, factor analysis with varimax rotation was carried out. Statistical analyses were performed with the SPSS for Windows v. 20.0 software.

Results

The questionnaire was answered and filled in correctly by 194 subjects. The possible range of overall results on the scale is from 50 to 99 points. In our study, the mean value of the total score obtained by the TAS-26 was (mean ± SD) 72.9±8.4. The minimal score was 50 and maximal 99. The distribution of the total score on the TAS-26 was normal. The one-sample Kolmogorov-Smirnov test was 1.175 with p=0.126.

The mean value and standard deviation were calculated for each item on the scale, as well as Cronbach's α-coefficients of the scale in case an item was removed from the questionnaire. Cronbach's α-coefficient for the entire scale was 0.71 and therefore it was reliable (Table 2).

Analysis of the main components was carried out to determine factor structure of the TAS-26 questionnaire. Prior to the analysis of the main components, the appropriateness of data for factor analysis was evaluated. The analysis of the correlation matrix discovered many coefficients of 0.3 and higher. The value of the Kaiser-Myer-Olkin measure was 0.72, which exceeded the recommended value of 0.6. Bartlett's sphericity test achieved statistical significance (χ^2=1943.6; df=325; p<0.001), pointing to the factorability of the correlation matrix. The next step determined the number of separation factors according to the Kaiser criterion. In this case, four components had the characteristic values above 1 and accounted for 47.2% of variance, in which the first component accounted for 20.1%, second for 12.1%, third for 7.5% and fourth for 6.6% of variance. In order to determine the construct validity of the questionnaire, the extracted number of components was rotated in accordance with the Guttman-Kaiser criterion into the varimax position. This provided an insight into certain facets of alexithymia. After the varimax rotation, the following structure was determined (items in Table 3 are ordered by factor saturation).

Discussion

The results of the factor analysis in our study confirmed the previously determined four-factor structure according to Taylor, Ryan and Bagby on the TAS-26 scale[3]. The above mentioned factors represent separate but conceptually linked facets of alexithymia. Some authors concluded that with respect to TAS-20, the TAS-26 scale was more relevant in evaluating the multidimensional construct of alexithymia since it includes all the facets of alexithymia in its original concept[6,17]. Due to this fact, we decided to validate the 26-item questionnaire instead of the 20-item one.

Most items, precisely 12 of them, were saturated by the first factor (Table 3), which indicates alexithymia facet F1 (difficulty identifying feelings), i.e. difficulties in identifying emotions and differentiating them from bodily sensations. The second factor saturated five items and it denotes alexithymia facet F2 (difficulty describing feelings), which is related to difficulties of expressing emotions verbally. The third factor which denotes F3 facet (reduced daydreaming) also

Table 2. Means, standard deviations and internal reliability coefficients (Cronbach's alpha) for TAS-26 if item deleted

TAS 1-26	Mean ± SD	Cronbach's α
When I cry I always know why	4.2±1.0	0.719
Daydreaming is a waste of time	2.3±1.0	0.695
I wish I were not so shy	2.7±1.1	0.690
I am often confused about what emotion I am feeling	2.1±1.0	0.671
I often daydream about the future	3.4±1.0	0.678
I seem to make friends as easily as others do	3.5±0.9	0.711
Knowing the answers to problems is more important than knowing the reasons for the answers	3.3±1.0	0.696
It is difficult for me to find the right words for my feelings	2.4±0.8	0.669
I like to let people know where I stand on things	3.9±0.8	0.704
I have physical sensations that even doctors don't understand	1.7±1.0	0.662
It's not enough for me that something gets the job done; I need to know why and how it works	3.7±1.0	0.700
I'm able to describe my feelings easily	3.5±0.8	0.718
I prefer to analyze problems rather than just describe them	3.5±0.9	0.701
When I'm upset, I don't know if I'm sad, frightened, or angry	2.2±1.1	0.665
I use my imagination a great deal	3.3±0.9	0.703
I spend much time daydreaming whenever I have nothing else to do	2.9±1.0	0.695
I am often puzzled by sensations in my body	1.8±0.8	0.679
I daydream rarely	2.7±1.1	0.719
I prefer to just let things happen rather than to understand why they turned out that way	2.6±0.9	0.686
I have feelings that I can't quite identify	2.1±0.9	0.659
Being in touch with emotions is essential	3.7±0.7	0.704
I find it hard to describe how I feel about people	2.2±0.9	0.672
People tell me to describe my feelings more	2.1±1.0	0.686
One should look for deeper explanations	3.4±0.9	0.692
I don't know what's going on inside me	1.7±0.9	0.670
I often don't know why I am angry	1.7±0.9	0.67

saturated five items and it is concerned with the lack of imaginative capacity, whereas one which denotes F4 facet (externally oriented thinking) saturated four items which describe a way of thinking more focused on external than on internal experience.

The four mentioned facets accounted for 47.2% of variance with the highest percentage belonging to F1 facet, which is comparable to the results of the study by Taylor *et al.*[3] reporting the result of 31.8% of total variance, also with the highest percentage of F1 facet (20.1% in our study and 12.3% in their study). The variances differ in other facets because in our study they were ordered according to size starting from the largest one (F2, F3 and F4), whereas in the mentioned study the order was F4, F2 and F3[3]. Turkish authors found the total variance of 44% on a sample of students, wherein F1 accounted for 20%, F2 for 15% and F3 for 9% of variance[17]. In the F4 facet, there were no items with the appropriate weight, so it was excluded from the scale and further study[17].

The mean value of the total score obtained on TAS-26 amounted to 72.9, which did not deviate significantly from the mean value obtained by Taylor *et al.* on TAS-20 (74.1 for males)[5]. The above mentioned

Table 3. Structural matrix of the Toronto Alexithymia Scale after performing factor analysis with varimax rotation

Toronto Alexithymia Scale	Component			
	F1	F3	F2	F4
I have feelings that I can't quite identify	0.781			
I often don't know why I am angry	0.724			
It is difficult for me to find the right words for my feelings	0.716			
I am often puzzled by sensations in my body	0.702			
I am often confused about what emotion I am feeling	0.699			
I have physical sensations that even doctors don't understand	0.696			
I find it hard to describe how I feel about people	0.694			
I don't know what's going on inside me	0.645			
When I'm upset, I don't know if I'm sad, frightened, or angry	0.558			
I wish I were not so shy	0.522			
I'm able to describe my feelings easily	-0.446			
When I cry I always know why	-0.306			
I spend much time daydreaming whenever I have nothing else to do		0.810		
I daydream rarely		-0.803		
I use my imagination a great deal		0.785		
I often daydream about the future		0.676		
Daydreaming is a waste of time		-0.461		
I prefer to analyze problems rather than just describe them			0.619	
One should look for deeper explanations			0.587	
I like to let people know where I stand on things			0.574	
It's not enough for me that something gets the job done; I need to know why and how it works			0.558	
People tell me to describe my feelings more			0.402	
Knowing the answers to problems is more important than knowing the reasons for the answers				-0.715
I prefer to just let things happen rather than to understand why they turned out that way				-0.642
Being in touch with emotions is essential				0.430
I seem to make friends as easily as others do				-0.363

authors obtained the mean value of 64.8 for females[5], which is in accordance with other studies that found a lower frequency of alexithymia in women[18,19].

Analysis of the results obtained pointed to satisfactory reliability of the questionnaire (Cronbach's α=0.71), indicating that all of the items mostly measure the same subject. Similar reliability (α=0.78) was obtained by the authors of the Spanish version of TAS-26 on their sample of 111 university students[14].

The stated reliability does not deviate significantly from the reliability of TAS-20 in a study by Swedish authors, who recorded α=0.79 for the 'difficulty identifying feelings' facet, α=0.77 for the 'difficulty describing feelings' facet and α=0.67 for the 'externally oriented thinking' facet[2].

By analyzing the α-coefficient of reliability of the entire scale if one item is removed, we conclude that only 3 items ('I have physical sensations that even doctors don't understand'; 'When I'm upset, I don't know if I'm sad, frightened, or angry'; and 'I have feelings that I can't quite identify') determine the α-coefficient of the entire scale lower than 0.67, which would indicate insufficient reliability of the scale. The mentioned items belong to the group of items from facet F1 (difficulty to identify and distinguish between feelings and bodily sensations) around which most items are grouped, and that is why the scale would be sufficiently reliable even without those three items. The question remains whether the results would be any different if we were able to use the literal translations of the

terms 'sensation' and 'feeling' in two of the mentioned items.

While comparing the α-coefficient values, we observed them to be highest in the following items: 'When I cry I always know why'; 'I seem to make friends as easily as others do'; 'I like to let people know where I stand on things'; 'I'm able to describe my feelings easily'; 'I prefer to analyze problems rather than just describe them'; 'I daydream rarely'; and 'Being in touch with emotions is essential'. The greatest number of the mentioned items belong to facet F4 (externally oriented thinking), which means that by removing almost an entire facet, the scale would still be sufficiently reliable. Similar reliability was found in the study by Simonsson-Sarnecki *et al*. on a sample of Swedish students[2]. It is interesting to note that the α-coefficient of the scale would be relatively low if we left out as many as three items ('Daydreaming is a waste of time'; 'I often daydream about the future'; and 'I spend much time daydreaming whenever I have nothing else to do') from facet F3 (reduced daydreaming) and the remaining two items in the facet would not contribute to decrease in the scale reliability. This fact might support the greater validity of using TAS-26 instead of TAS-20.

In conclusion, this paper has presented the validation procedure of the Croatian version of TAS-26 scale. This scale has demonstrated satisfactory reliability and specificity in the Croatian population and is suitable for further clinical use.

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Sažetak

VALIDACIJA TORONTSKE LJESTVICE ALEKSITIMIJE (TAS-26) U HRVATSKOJ POPULACIJI

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Cilj ove studije bio je validacija hrvatskoga prijevoda torontske ljestvice aleksitimije (*Toronto Alexithymia Scale*, TAS-26). U tu svrhu na uzorku od 194 ispitanika dobrovoljaca iz opće populacije oba spola, dobnog raspona od 18-60 godina, primijenjena je navedena ljestvica nakon što je prošla postupak povratnog prijevoda (*back-translation*) s nezavisnim dvojezičnim prevoditeljem. Srednja vrijednost (±SD) ukupnog zbira na TAS-26 bila je 72,9±8,4. Cronbachov α-koeficijent za cijelu ljestvicu iznosio je 0,71, prema kojem se ova ljestvica može smatrati dovoljno pouzdanom. Analizirajući α-koeficijent pouzdanosti čitave ljestvice ako se pojedina čestica ukloni zaključuje se da samo 3 čestice (Imam tjelesne osjećaje koje ni liječnici ne razumiju; Kada sam uzrujan(a), ne znam jesam li ljut(a), prestrašen(a) ili tužan/tužna; Imam osjećaje koje ne mogu u potpunosti odrediti) određuju α-koeficijent čitave ljestvice manji od 0,67 koji bi ukazivao na nedovoljnu pouzdanost ljestvice. Navedene čestice pripadaju skupini čestica facete F1 oko koje se grupira najviše čestica (n=12), stoga bi ljestvica i bez navedene tri bila dovoljno pouzdana. Rezultati faktorske analize u našem ispitivanju potvrđuju četvero-faktorsku strukturu, pri čemu je prvim faktorom zasićeno najviše čestica (n=12), a označava facetu aleksitimije F1 (poteškoće u identificiranju i opisivanju emocija). Drugim faktorom je zasićeno pet čestica i on označava facetu aleksitimije F2 (poteškoće u razlikovanju između emocija i tjelesnih senzacija uslijed emocionalnog pobuđenja), trećim faktorom koji označava facetu F3 (manjak fantazija) je zasićeno također pet čestica, a četvrtim koji označava facetu F4 (označava preokupaciju detaljima vanjskih zbivanja, uz značajno smanjen misaoni sadržaj vezan za osjećaje i fantazije) su zasićene 4 čestice. Četiri navedene facete objašnjavaju 47,2% varijance, pri čemu najviši postotak (20,1%) pripada faceti F1, faceti F2 12,1%, faceti F3 7,5% i faceti F4 6,6% varijance.

Ključne riječi: *Afektivni sindromi – dijagnostika; Afektivni sindromi – klasifikacija; Reproducibilnost rezultata; Stupanj težine bolesti; Hrvatska; Toronto Alexithymia Scale (TAS-26)*