

# Assessment of Affective temperaments in a Tunisian non-clinical population

## Evaluation des tempéraments affectifs dans une population non clinique Tunisienne

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### RÉSUMÉ

**Introduction :** L'auto-questionnaire d'évaluation du tempérament de Memphis, Pise, Paris et San Diego (TEMPS-A) est largement utilisé pour évaluer les tempéraments affectifs dans des populations cliniques et non cliniques.

**Buts :** Evaluer les propriétés psychométriques de la version Tunisienne du TEMPS-A et explorer les effets du genre et de l'âge sur les tempéraments affectifs.

**Méthodes :** TEMPS-A est un questionnaire auto-administré évaluant les tempéraments hyperthymique, dépressif, cyclothymique, irritable et anxieux. Sa version tunisienne a été administrée à 840 employés de l'hôpital universitaire de Monastir. Parmi eux, 547 ont rempli le questionnaire (taux de réponse = 65%).

**Résultats :** La cohérence interne et la fiabilité test-retest étaient bonnes pour les différents tempéraments à l'exception du tempérament dépressif. L'analyse factorielle a confirmé la structure en cinq facteurs du questionnaire avec un chevauchement pour la cinquième dimension entre les éléments dépressifs et anxieux. L'étude des corrélations a montré que les dimensions dépressive, cyclothymique, irritable et anxieuse du TEMPS-A étaient fortement liées ( $p < 0,001$ ). Les hommes avaient des scores plus élevés que les femmes au tempérament hyperthymique, tandis que les femmes avaient des scores plus élevés aux tempéraments anxieux, cyclothymique et dépressif. Les scores du tempérament cyclothymique diminuaient avec l'âge alors que les scores du tempérament anxieux augmentaient ( $p < 0,05$ ).

**Conclusion :** La version Tunisienne du TEMPS-A présente de bonnes propriétés psychométriques avec un chevauchement d'éléments dépressifs et anxieux. Les scores de tempéraments affectifs différaient selon l'âge et le sexe. Des études ultérieures avec des échantillons plus grands doivent être réalisées pour vérifier ces résultats.

### Mots-clés

Tempéraments affectifs, TEMPS-A, psychométrie, genre, âge, Tunisie.

### SUMMARY

**Background:** Temperament Evaluation of Memphis, Pisa, Paris and San Diego-Auto-questionnaire (TEMPS-A) is frequently used to assess affective temperaments in clinical and non clinical populations.

**Aims:** To assess the psychometric properties of the Tunisian TEMPS-A in a non-clinical population and to explore the gender and age effects on affective temperaments.

**Methods:** TEMPS-A is a self-administered questionnaire evaluating hyperthymic, depressive, cyclothymic, irritable and anxious temperaments. Its Tunisian version was administered to 840 employees of the University Hospital of Monastir. Among them, 547 completed the questionnaire (response rate=65%).

**Results:** The internal consistency and the test-retest reliability were good in general except for the depressive temperament. The factor analysis confirmed the five factors structure of the questionnaire with an overlap for the fifth dimension between depressive and anxious items corresponding to an anxiodepressive dimension. The study of correlations showed that the depressive, cyclothymic, irritable and anxious dimensions of TEMPS-A were strongly related to each other ( $P < 0.001$ ). Men had significantly higher scores than women in the hyperthymic temperament while women had significantly higher scores in the anxious, cyclothymic and depressive temperaments. For the age, the scores of the cyclothymic temperament decreased while the scores of the anxious temperament increased ( $P < 0.05$ ).

**Conclusion:** The Tunisian version of the TEMPS-A has good psychometric properties with an overlap between depressive and anxious items. Moreover, the scores of affective temperaments differed by age and gender. Subsequent studies with larger samples should be realized to verify these results.

### Key-words

Affective temperaments, TEMPS-A, psychometrics, gender, age, Tunisia.

## INTRODUCTION

Although the concept of temperament finds its origins with Hippocrates, Akiskal and Kretschmer have revived this concept (1). Akiskal postulated the existence of particular personality characteristics from which thymic episodes would emerge. This hypothesis was based on the observation of particular personality traits in bipolar patients during the pre-morbid period (1). These traits could influence the clinical expression and the course of bipolar disorders (2). In fact, affective temperament is defined as an overall mode of functioning present since childhood (3). It is a relatively stable dimension with biological origin and which is revealed through reaction traits and behavioral characteristics (4). Since that, the exploration of affective temperaments has been the subject of several studies (5-10). Most of them found that anxious, irritable, cyclothymic and depressive temperaments were more common in patients with affective disorders (11-14).

In 2005, Akiskal et al., formulated standardized criteria for temperaments and developed a self-report questionnaire: Temperament Evaluation of Memphis, Pisa, Paris and San Diego-Auto-questionnaire (TEMPS-A) (15). It is a self-administrated questionnaire that evaluates depressive, hyperthymic, cyclothymic, irritable and anxious temperaments in clinical and non clinical populations. Since its creation, many translations and validations of the TEMPS-A were done in different languages. It showed good psychometric characteristics in different validation studies (16-29). Moreover, it was noticed that there were some differences in temperaments according to gender and age (17,18,22,23,29). However, the influence of demographic factors on temperament's expression remains controversial.

In the Arab world, a Lebanese-Arabic version has been developed (19). Some Tunisian studies used the Lebanese version to assess the affective temperaments in the post-partum depression (30) or to describe the temperament profile in psoriasis patients (31). Results were interesting but limited by some cultural and linguistic differences between Lebanese and Tunisian populations (32). Although a Tunisian version of the TEMPS-A has been developed (33,34), its reliability and its validity have not been investigated yet. The objectives of this study were to assess the affective temperaments in a non clinical population using the Tunisian version of the TEMPS-A, to examine the psychometric properties of the Tunisian TEMPS-A and to explore the gender and age effects on affective temperaments.

## METHODS

### Subjects

The Tunisian version of the TEMPS-A was administered to 840 employees of University Hospital of Monastir according to inclusion criteria: no history of mental disorder and free and informed consent. Illiterate subjects or those who had mental disorder or severe visual disorder were not included in the study. Of these employees, 547 subjects completed the questionnaire which corresponds to a response rate of 65%. The mean age of the sample was  $37.29 \pm 9.99$  years. There were 310 women (56.7%) and 237 men (43.3%). The majority had completed high school (55%) and 38.4% had university degree. As for the professional activity, nurses and workers represented 38.4% and 33.2% of the study population. Depending on the field of professional activity, our population was distributed in care activities (50.3%), maintenance activities (38.4%) and administrative activities (11.3%).

### Instrument

The TEMPS-A is a self-report instrument developed by Akiskal et al. (15). It is a "yes" or "no" type self-report questionnaire composed of 109 items for men and 110 items for women in order to measure the temperamental traits of individual. Items are grouped into five dimensions: depressive (items 1-21), cyclothymic (items 22-42), hyperthymic (items 43-63), irritable (items 64-84) and anxious (items 85-110). The score of each dimension is calculated by adding 1 for each affirmative response.

For Translation-Adaptation, the translation team was obtained the consent of the designer of the TEMPS-A. The translation was made from English to literary Arabic by a team of five experienced psychiatrists (including two authors: AM and LG). We applied the original scale forward/backward translation procedure. The backward translation was done by a bilingual teacher who did not know the original version of the scale. He concluded that the two English versions were equivalent.

### Statistical analysis

All analyses were conducted using SPSS version 22.0 (SPSS Inc., Chicago, IL, USA). Test-retest reliability was verified after administering the questionnaire twice in 2 weeks interval to 30 subjects, by calculating Cohen's Kappa coefficients (35). Internal consistency was measured through the Cronbach Alpha coefficients. Its value can be considered as adequate when it is greater than 0.7

(36). Factor loadings were calculated using the principal component analysis with Varimax rotation. The factor analysis took into account all items of the questionnaire. Only items with factor loadings greater than 0.3, were retained. Correlations between temperaments were examined using Pearson's bivariate correlation. Gender and age differences between affective temperaments scores were tested using student's independent t-test and Pearson's correlation.

## RESULTS

### TEMPS-A reliability

The Cronbach alphas coefficients for the depressive, cyclothymic, hyperthymic, irritable, and anxious temperaments were 0.63, 0.82, 0.78, 0.80 and 0.85 respectively (Table 1). Thus, internal consistency was good for cyclothymic, hyperthymic, irritable and anxious dimensions and moderate for the depressive dimension. As shown in Table 1, the test-retest reliability coefficients ranged from 0.81 to 0.88 showing a good reliability.

**Table 1:** Internal consistency and test-retest reliability of the Tunisian TEMPS-A

Dimensions of the TEMPS-A	Cronbach's alpha	Test-retest reliability
	coefficients	coefficients
Depressive dimension	0.63	0.83*
Cyclothymic dimension	0.82	0.84*
Hyperthymic dimension	0.78	0.81*
Irritable dimension	0.80	0.88*
Anxious dimension	0.85	0.87*

\* $P < 0.01$

### TEMPS-A validity

The construct validity of the scale was studied using factor analysis that yielded five main factors. This showed that the Tunisian version of TEMPS-A has a five-factor structure (Table 2). Factor 1 was composed of 18 items, all of which belonged to the cyclothymic dimension of TEMPS-A. It represents cyclothymic temperament. Factor 2 was composed of 20 items; 17 items of the anxious dimension, 1 item of the depressive dimension (D13) and

**Table 2:** Factor structure after varimax rotation of the Tunisian TEMPS-A

Factor 1		Factor 2		Factor 3		Factor 4		Factor 5	
C22	0.465	A87	0.310	I64	0.461	H43	0.348	D1	0.521
C23	0.492	A89	0.423	I65	0.461	H44	0.532	D2	0.355
C24	0.439	A90	0.385	I67	0.470	H45	0.438	D3	0.407
C25	0.500	A91	0.329	I69	0.456	H47	0.378	D4	0.324
C26	0.411	A92	0.434	I70	0.421	H48	0.549	D6	0.337
C27	0.306	A93	0.358	I71	0.543	H49	0.536	I66	0.452
C28	0.380	A94	0.365	I72	0.569	H50	0.482	A85	0.471
C29	0.505	A95	0.381	I73	0.515	H51	0.600	A88	0.480
C30	0.561	A96	0.372	I74	0.623	H52	0.508	A94	0.403
C31	0.305	A97	0.446	I75	0.515	H53	0.524	A101	0.539
C32	0.510	A98	0.464	I76	0.331	H54	0.360	A102	0.578
C33	0.445	A99	0.483	I77	0.440	H57	0.334	A107	0.439
C34	0.478	A100	0.386	I79	0.321	H58	0.541		
C35	0.535	A105	0.651	I81	0.370	H60	0.356		
C37	0.418	A106	0.510	D19	0.391	H62	0.469		
C38	0.450	A108	0.359	H56	0.437	H63	0.434		
C39	0.475	A110	0.529	H61	0.444	D14	0.471		
C40	0.407	D13	0.351			C41	0.381		
		I68	0.434			I83	0.316		
		I84	0.572						

Loadings on a specific factor were selected according to coefficient absolute values  $\geq 0.3$ .

D=Depressive, C=Cyclothymic, H=Hyperthymic, I=Irritable, A=Anxious.

2 items of the irritable dimension (I68, I84). It represents the anxious temperament. Factor 3 consisted of 17 items; 14 items of the irritable dimension, 1 item of the depressive dimension (D19) and 2 items of the hyperthymic dimension (H56, H61). It represents the irritable dimension. Factor 4 was composed of 19 items; 16 items of the hyperthymic dimension, 1 item of the depressive dimension (D14), 1 item of the cyclothymic dimension (C41) and 1 item of the irritable dimension (I83). It represents the hyperthymic dimension. Factor 5 consisted of 12 items; 6 items of the anxious dimension, 5 items of the depressive dimension and 1 item of the irritable dimension (I66). This factor has a mixed structure and corresponds to an anxio-depressive dimension.

In order to obtain additional support for the validity of the questionnaire, we performed factor analysis for the five temperaments of the TEMPS-A (Table 3). This analysis extracted two superfactorial structure explaining 72.5% of the variance. The first factor contained four dimensions of TEMPS-A: depressive, cyclothymic, irritable and anxious. The second factor contained the hyperthymic dimension.

**Table 3:** Factor Analysis for the five dimensions of the Tunisian TEMPS-A

Dimensions of the TEMPS-A	F I	F II
Cyclothymic dimension	<b>0.84</b>	0.15
Anxious dimension	<b>0.81</b>	<0.1
Depressive dimension	<b>0.79</b>	-0.15
Irritable dimension	<b>0.75</b>	0.30
Hyperthymic dimension	<0.1	<b>0.97</b>
Variance (%)	50.9%	21.6%

#### Correlations within TEMPS-A dimensions

Most of the temperaments were associated with each other (Table 4). Depressive, cyclothymic, irritable and anxious temperaments were strongly correlated to each other ( $P<0.001$ ). Hyperthymic temperament was correlated with irritable and cyclothymic temperaments ( $P<0.01$ ).

#### Scores by gender and age

The mean scores of the depressive, cyclothymic, hyperthymic, irritable and anxious temperament subscales were  $8.34 \pm 3.15$ ,  $8.5 \pm 4.72$ ,  $9.95 \pm 4.39$ ,  $4.82 \pm 3.84$  and  $9.03 \pm 5.37$  respectively. Men had significantly higher

scores than women in the hyperthymic temperament while women had significantly higher scores in the anxious, cyclothymic and depressive temperaments. The distribution of the mean scores of the five affective temperaments by gender is shown in Table 5.

With the age, the scores of the cyclothymic temperament decreased significantly ( $r=-0.09$ ;  $P=0.029$ ), while the scores of the anxious temperament increased ( $r=0.08$ ;  $P=0.039$ ). Even though, these correlations were weak.

**Table 4:** Correlations among the five affective temperaments in the Tunisian TEMPS-A

Affective temperaments	Depressive	Cyclothymic	Hyperthymic	Irritable
Cyclothymic	<b>0.58**</b>	-	-	-
Hyperthymic	-0.03	0.13*	-	-
Irritable	<b>0.41**</b>	<b>0.56**</b>	0.19*	-
Anxious	<b>0.50**</b>	<b>0.55**</b>	-0.004	<b>0.51**</b>

\*\* $P<0.001$ ; \* $P<0.01$

**Table 5:** Mean scores of each temperament by gender

Affective temperaments	Mean scores $\pm$ S.D.	
	Men	Women
Depressive	$8.03 \pm 3.12$	$8.57 \pm 3.15^*$
Cyclothymic	$7.73 \pm 4.79$	$9.08 \pm 4.58^{**}$
Hyperthymic	$11.17 \pm 4.19^{**}$	$9.02 \pm 4.31$
Irritable	$4.81 \pm 3.94$	$4.82 \pm 3.77$
Anxious	$7.14 \pm 4.85$	$10.48 \pm 5.3^{**}$

\*\*  $P<0.01$ ; \*  $P<0.05$

## DISCUSSION

Our results showed that the Tunisian TEMPS-A had good test-retest reliability. Cyclothymic, irritable, anxious and hyperthymic temperaments had good internal consistencies. Our validation study confirmed the five-factor structure and found positive correlations between these temperaments as well as some differences according to gender and age.

Different versions of TEMPS questionnaire have been translated and validated in more than twenty-five languages and across fifteen countries (9,37). In our study, we translated the questionnaire to literary Arabic according to the forward/backward procedure (38,39). Reliability in terms of internal consistency was determined

by calculating Cronbach alpha coefficient which ranged from 0.63 to 0.85. This can be considered as a sign of a good internal consistency when it is greater than 0.7. These results are similar to those found in the meta-analysis of Elias et al., in which 27 studies were included (9). For all of these 27 studies, median Cronbach alpha values were 0.72 for the depressive temperament, 0.81 for the cyclothymic temperament, 0.79 for the hyperthymic temperament, 0.76 for the irritable domain and 0.82 for the anxious one. However in our study, the Cronbach alpha coefficient for the depressive temperament was the lowest one. In fact, the majority of studies found that the depressive dimension had the lowest internal consistency compared to other dimensions (18,19,21-24,27,29,40). For the test-retest reliability, we found values between 0.81 and 0.88 showing a good temporal stability. In general, values over 0.75 are considered to be excellent. However, not all the validation studies have measured this property. In the meta-analysis of Elias et al. (9), only nine studies assessed test-retest reliability. Median correlations were between 0.66 and 0.82. The Tunisian version of the TEMPS-A appears to be consistent, stable over time with a homogeneous structure.

The factor analysis performed for the Tunisian version of the TEMPS-A indicated the existence of five major factors. The five-factor structure of the TEMPS-A was confirmed in the majority of the validation studies (17,19,27-29,40). However, some other studies found six-factor, or three-factor structure (15,16,41). Two-factor solutions were also reported (23,25). These differences could be explained by the heterogeneous samples from studies and cultural particularities of each one of them.

A composite temperament made of the anxious and the depressive traits was found in the fifth dimension in our study defining the anxio-depressive dimension. This was also demonstrated in Turkish, Lebanese and Chinese studies in which anxious and depressive items formed a cluster together (17,19,29). This could be explained by the known comorbidity between anxiety and depression (42). Overall, the five structure of the TEMPS-A was supported in our study even there was an overlap in the fifth dimension which combined depressive and anxious traits.

Factor analysis performed for each temperament showed two superfactorial structure. The first factor contained depressive, cyclothymic, irritable and anxious dimensions. The second factor contained the hyperthymic dimension.

Similar conclusions were mentioned in Serbian and Chinese studies (27,29). Indeed, hyperthymic temperament is distinguished from the other temperaments (24). This phenomenon could be explained by the presence of common point between these four temperaments which would be the depressive component, present in different degrees (26,43).

The study of correlations found that depressive, cyclothymic, irritable and anxious temperaments were strongly correlated to each other. However, hyperthymic temperament was only correlated with irritable and cyclothymic temperaments. These results are in parallel with published findings from some studies in which all the temperaments except the hyperthymic one correlated to each other (19,22,27,28,40,44). The strongest positive correlation that we found was between cyclothymic and depressive temperaments. This was only obtained in the Lebanese and the Serbian studies (19,27). Moreover, the positive correlation between depressive and anxious temperaments was also noticed (15,19,25,29). These findings could be explained by the known comorbidity between anxiety and depression and the fact that cyclothymia includes depressive features (45). Even though, hyperthymic temperament was not correlated to any other temperaments in some studies (27,29) and negatively correlated in others (25,28), we found a significant positive correlation between hyperthymic, irritable and cyclothymic temperaments. That was also mentioned in Lebanese study (19) and could be explain by the presence of depressive and hyperthymic features in the cyclothymic temperament (46).

In our study, women appeared to be more cyclothymic, anxious and depressive while men were more hyperthymic. This result was also reported by other authors (16,19,20,22,27). In fact, depression and anxiety were more frequent in females (25,47). However, there were no differences in the irritable dimension between females and males as described in other studies (18,19). The association between gender and temperaments may result from genetic predisposition (25) and/or the traditional social roles and status of women in most communities (29).

With age, we found that cyclothymic temperament scores decreased on the one hand and the anxious temperament scores increased on the other hand. This negative correlation between age and cyclothymic dimension is in line with the results of other studies (17,19,23,40).



However, no significant change of temperament scores was observed in other studies (29,40). These differences found between age and temperament traits may suggest the influence of socio-demographic factors on affective temperaments.

Our study contains some limits. First, there is a recruitment bias since we chose hospital staff as a sample and since our study was conducted in one region of our country. Thus, the study sample is not representative of the Tunisian general population. A stratified larger sample would be a better to represent the general population. Second, the nature of the job of the participants is characterized by high level of stress and may interfere with affective temperaments and influence the questionnaire responses. In fact, cyclothymic and anxious temperaments are related to the level of experienced job stress (48). Third, we can also mention the fact that we did not use a valid instrument to verify the absence of history of mental disorder in participants. Finally, the concurrent validity was not realized. This validity is measured by comparing the validation instrument to a gold standard. In some studies, it was tested by other personality and temperament assessment tools, such as the Revised Personality Inventory or the Inventory of Temperament and Character (18,23).

**In conclusion**, the Tunisian version of TEMPS-A has sufficient reliability and good validity in a non-clinical sample. The five-structure of the questionnaire was verified except an overlap between depressive and anxious items defining an anxio-depressive dimension. The scores of affective temperaments differed according to gender and age. Subsequent studies in larger samples would verify these results. Furthermore, the validation of a shorter version of the TEMPS-A is needed in order to facilitate the assessment of temperaments.

**Declarations of interest:** None

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