

ORIGINAL ARTICLE

# Factorial Validity and Internal Consistency of Persian Version of the Revised Competitive State Anxiety Inventory-2 among Junior Female Taekwondo Athletes

Tahereh Bagherpour<sup>\*1</sup>, Hairul Anuar Hashim<sup>2</sup>

<sup>1</sup>Department of Physical Education & Sports Science, Damghan Branch, Islamic Azad University, Damghan, Iran

<sup>2</sup>Exercise & Sports Science Programme, School of Health Science, University Sains Malaysia, Malaysia

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## KEYWORDS

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**ABSTRACT:** A valid questionnaire is a precursor to a sound measurement process. This study examined the psychometric properties of the Persian version of the Revised Competitive State Anxiety Inventory – 2 (CSAI-2R). A total of 131 female Taekwondo athletes (Mean age =12.37 ± 2.52) from Damghan completed CSAI-2R at competition venues. Confirmatory factor analysis was used to analyze the structure of CSAI-2R; a 1-factor model and a 3-factor model. CFA results revealed adequate model fit of the 3-factor model ( $\chi^2= 189.52$ ,  $df =113$ ,  $P<0.001$ ; PCFI=0.72, ECVI=1.85, RMSEA =0.06, GFI=0.87). A satisfactory level of alpha coefficient for the subscales ( $\alpha =0.71$  for somatic anxiety, 0.62 for cognitive anxiety and 0.74 for self-confidence). In conclusion, the data provide support for the 3-factor structure of CSAI-2R among female Persian taekwondo athletes. Future studies may extend the evidence to different types of validity and reliability in different age groups and gender.

## INTRODUCTION

Anxiety is a negative emotional state in which feeling of worry; nervousness and apprehension are associated with activation or arousal of the body [1]. It is one of the most consistent predictors of sport performance affecting athletes of all level. Female athletes are more susceptible to anxiety compared to male athletes [2, 3].

This often results in greater decrease of their performance compare to the male athletes [4].

A greater understanding of anxiety has been attributed to conceptual development of anxiety construct [5]. Specifically; the introduction of multidimensional theory of anxiety has contributed to this effect. The multidimensional

\* Corresponding author: bagherpour\_ta@yahoo.com (T. Bagherpour).

dimensional anxiety theory postulates that anxiety is manifested in the form of cognitive and somatic components [5]. Cognitive anxiety is caused by negative expectations or low confidence level; whereas, physiological arousal reflects somatic component of anxiety [5]. Competitive State Anxiety Inventory-2 (CSAI-2) has been the most used instrument to measure anxiety within this framework [5]. Despite its popularity, some studies have highlighted its unstable factor structure [6, 7].

Responding to this limitation, a revision of the original 27 items questionnaire was undertaken [6]; involving intercollegiate and interscholastic athletes and the results indicated greater stability of the inventory 3-dimensional structure. Specifically, good model fits for the 3-factor structures of CSAI-2R (Comparative Fit Index (CFI) = 0.95, No-Normed Fit Index (NNFI) = 0.94, Root Mean-Square Error of Approximately (RMSEA) =0.054). The alpha coefficients were 0.81, 0.81, and 0.86 for cognitive anxiety, somatic anxiety, and self-confidence, respectively [6]. Studies using the revised CSAI-2 among Swedish [8], Spanish [9], Estonian [10], and French [11], Brazilian [12], Thai [13] and Malaysian [14] have indicated a stable factor structure and acceptable level of internal consistencies. For instance, the Malaysian version CSAI-2R was found to exhibit strong psychology properties involving 236 young males and females Malaysian Taekwondo athletes [14]. The results of CFA revealed a close model fit of the 3-factor model for CSAI-2R ( $\chi^2 = 170.197$ ,  $df = 116$ ,  $P < .05$ ; RMR =0.06; GFI =0.92; RMSEA =0.05). Furthermore, an acceptable reliability revealed for the three subscales (the alpha for somatic anxiety was significantly below the recommended level  $\alpha = 0.65$ ).

Despite the findings that support its factorial validity and internal consistencies as highlighted above, there appear to be some inconsistencies in the stability of the factor structure of this revised version. CASI-2R is best represented by 16-items in Spanish version (NNFI 0.97 and 0.045 for RMSEA), French version (CFI=0.94;

NNFI=0.93 RMSEA=0.05) and Brazilian version (CFI= 0.98; SRMR= 0.47; RMSEA= 0.5; NNFI= 0.97) [9, 11, 12].

Therefore, the objectives of the current study were to evaluate the factorial validity and the internal consistency of the Persian version of the CSAI-2R among Iranian junior female taekwondo.

## MATERIALS AND METHODS

The present study used a cross-sectional study design to examine the factorial validity and internal consistency of the Persian adapted CSAI-2R.

### Participants

A total of 131 junior female taekwondo athletes from Damghan states in 2014, (North Eastern of Iran) participated in this study. Participants' mean age was  $12.37 \pm 2.52$  yr old. They were active in both training and competitions at the time of data collection. Participants were primarily involved in state level competitions except some of the players who were in national-level competitions.

The size of the sample was determined using the recommended 5 to 10 participants per questionnaire items. Thus, the size of the sample was deemed adequate [15].

### Competitive State Anxiety Inventory – 2 Revised (CSAI-2R) [6]

Athletes' competitive state anxiety was measured using the CSAI-2R. It is a measure of competitive state anxiety. It consists of 17 items that measure somatic (items 1, 4, 6, 9, 12, 15, 17), and cognitive anxiety (items 2, 5, 8, 11, and 14) and self-confidence (items 3, 7, 10, 13, and 16). All the items are attached to a 4-point Likert scale ranging from 1 = *not at all* to 4 = *very much so*.

**Procedures**

Approval was obtained from the relevant authorities to conduct this study. Specifically, ethical approval was obtained from the corresponding author’s institution. Furthermore, approval was also obtained from the participating team head coaches to approach their athletes. Participation in this study was voluntary.

During the briefing session, participants were briefly explained about the nature of their participation in the study. They were informed that they can withdraw from the study at any time. Once they agreed to participate, they were required to fill up participants’ information sheet and signed the informed consent forms by themselves and their parents or guardians. CSAI-2R [6] was administered in-group sessions 15 min before a competition with the help of their head coach. They were asked carefully to read the items and honestly to respond to each item. Additionally, three research assistants helped the participants in the process of completing the questionnaires.

**STATISTICAL ANALYSIS**

Three statistical procedures were used to analyse the data. Descriptive statistics were used to summarize the data. Confirmatory factor analysis and Cronbach's alpha were used to examine the factorial validity and internal consistency of the questionnaire respectively. Maximum likelihood estimation procedure was used along with a range of fit indices to compare the models [16]. The selected indices were the chi-square statistics ( $\chi^2$ ), goodness of fit index (GFI) [17] and the root mean square

error of approximation (RMSEA) [4, 5]. Furthermore, the expected cross validation index (ECVI) and the parsimony-adjusted CFI (PCFI) were used. A good model fit is indicated by values of 0.90 or higher for the GFI [17]. For the RMSEA, values of 0.05 or lower indicate close fit while values less than 0.08 indicate acceptable fit [18]. An index recommended for comparing models in smaller samples is the ECVI. Models with smaller values indicate the best potential of replication in samples of equivalent size and precision of the ECVI can be presented in confidence interval. Lastly, PCFI takes into account the complexity of the model when calculating goodness of fit. PCFI values above 0.70 have been considered as indicating good fit, with higher values indicating better fit.

Two models were tested; the 1-factor model was tested to rule out the possibility of a unidimensionality of the questionnaire. The 3-factor model represents the proposed factor structure of the questionnaire.

**RESULTS**

CFA results indicated poor and inadequate model fit of the 1-factor model ( $\chi^2 = 523.69$ ,  $df = 119$ ;  $P < 0.001$ ; PCFI=0.21; ECVI=1.97; RMSEA=0.14; GFI=0.81). Next, a 3-factor without correlated error terms indicated acceptable level of model fit. However, allowing error terms to covary for somatic anxiety (item 12; I feel my stomach sinking) and (item 17; my body feels tight) further improved the fit of model ( $\chi^2 = 189.52$ ,  $df = 113$ ,  $P < 0.001$ ; PCFI =0.72, ECVI=1.85, RMSEA=0.06, GFI=0.87) (Table 1).

**Table 1.** Confirmatory Factor Analysis of the State Anxiety Scale

Model	X2	Df	$\Delta X2$	p	$\Delta df$	PCFI	ECVI	RMSEA	GFI	X <sup>2</sup> df
3-factor model	189.52	113	-	<0.05	-	0.72	1.85	0.06	0.87	1.67
1-factor model	523.69	119	334.16	<0.05	6	0.21	1.97	0.14	0.81	4.40

Moreover, results of Cronbach’s alpha revealed acceptable validity of the subscale as indicated in the low latent factor alpha coefficients for each of the subscales: CA=0.62, intercorrelations (Table 2). SC=0.74, SA=0.71. The results support the discriminant

**Table 2.** Latent factors Intercorrelation and Alpha Coefficients of the State Anxiety Scale

State Anxiety Subscale	Somatic	Cognitive	Cronbach Alpha
Cognitive Anxiety	0.08	-	0.62
Self-Confidence	-0.06	-0.08	0.74
Somatic Anxiety	-	-	0.71

Detailed descriptions of individual path loadings for both male and female samples are presented in Table 3.

**Table 3.** Detailed descriptions of path loadings

Item1	0.901
Item2	0.708
Item3	0.510
Item4	0.182
Item5	0.687
Item6	0.476
Item7	0.560
Item8	0.281
Item9	0.717
Item10	0.806
Item11	0.208
Item12	0.231
Item13	0.557
Item14	0.551
Item15	0.288
Item16	0.615
Item17	0.307

However, low standardized regressions weight suggests an issue in the subscale convergent validity

## DISCUSSION

The present study evaluated the factor structure of the Persian version of CSAI-2R using CFA junior female

Taekwondo athletes. Consistent with other adapted version [8, 14], the version tested in this study exhibits adequate psychometric properties.

Improvement in model fit was observed after correlating a pair of error term. Correlated error terms revealed shared variances of the associated indicators. Given the

items measure somatic symptoms, it is reasonable to assume some shared variance between these two items.

The results also support the discriminant validity of the subscale evident from low latent factor intercorrelations.

The inventory represents distinct constructs. Despite adequate overall model fit, the results suggest an issue with the convergent validity of the subscale. This can be observed in the low item loadings as shown in Table 3. This contradicts previous studies that have shown reasonably high item loadings. Such result is difficult to explain and it warrants further study to rule out the possibility of sample specific issue.

Internal consistency coefficients showed the sub-scales of the CSAI-2R (somatic anxiety, cognitive anxiety and self-confidence) demonstrate acceptable reliabilities more than recommended level except for the cognitive anxiety was marginally acceptable ( $\alpha = 0.64$ ) [14]. The Persian CSAI-2R yielded a factor structure that replicated the 3-factor model of cognitive anxiety, somatic anxiety and self-confidence.

### CONCLUSIONS

The revised factor structure of the CSAI-2 model (17 items) revealed adequate factorial validity and internal consistencies and may be used to assess competitive state anxiety and self-confidence in Iranian junior female athletes. However, further validations studies of the CSAI-2R are needed in order to generalize the factor structure invariance for different populations of interest.

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