

# Competitive State Anxiety Inventory–2R (CSAI-2R): Adapting and Validating Its Indonesian Version

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**Abstract** The Competitive State Anxiety Inventory (CSAI) is claimed to be the most popular measuring instrument used by researchers in revealing competitive anxiety in athletes. However, the research report stated that the instrument had psychometric weaknesses, so the CSAI was revised to CSAI-2R. Currently, there are not many tests on the psychometric properties of the latest version of the CSAI. The aim of this study is to test the CSAI-2R in the Indonesian version. A total of 200 elite Papuan Indonesian athletes (120 males, 80 females) whose mean age was 21.98 years, SD = 5.07 took part in the study. There are three instruments used in the study, namely CSAI-2R, Sport Anxiety Scale-2 (SAS-2), and Spirituality in Sports Test (SIST). The statistical analysis used Confirmatory Factor Analysis (CFA) and the internal consistency testing used Cronbach Alpha. The finding shows that the model fits on several parameters including RMSEA = .045, GFI = .919, CFI = .964, TLI = .955, PNFI = .717, and PGFI = .661. The factor loading value of each item ranges from .44 to .83 with squared multiple correlations ranging from .19 to .69. The reliability values range from .61 to .86. Overall, the convergent validity test shows a correlation coefficient value of .722, while the divergent validity test shows that the correlation coefficient value is not significant ( $r = -.120$ ). The conclusion of this study is that the Indonesian version of the psychometric property of the CSAI-2R is a valid and reliable competitive anxiety measurement instrument for measuring athlete anxiety.

**Keywords** Adaptation and Validation, Competitive

Anxiety, CSAI-2R, Sport Anxiety

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## 1. Introduction

In the discipline of sports psychology, anxiety is one of the most widely discussed psychological constructs [1]. This happens because experts believe that the anxiety that occurs in athletes is an important factor that determines whether athletes will come out as winners or losers [2,3]. Therefore, many measuring instruments to determine and understand the level of anxiety in sports have been developed [4] and the CSAI has become one of the most popular measuring instruments in the study of athletes' competitive anxiety [5,6]. However, some researchers revealed that there were doubts regarding the factorial validity of the CSAI [7]. Research that tested the CSAI reported that psychometrically the measuring instrument still has weaknesses [6]. Therefore, Lane et al. [8] question the validity of CSAI-2 as an instrument to reveal competitive state anxiety.

The first CSAI was developed by Martens, Burton, Rivkin, and Simon [5] by way of modifying the State-Trait Anxiety Inventory (STAI) developed by Spielberger, Gorsuch, and Lushene [9]. Although CSAI was developed from STAI, there are fundamental differences between the two measuring instruments. CSAI is constructed with a specific target of measuring the aspects of anxiety in the

context of sports, while STAI measures the aspects of anxiety in general. Even so, the initial version of CSAI is seen as having limitations because it is only unidimensional [6]. Therefore, Martens et al. [5] revised the initial version of the CSAI to be multidimensional by adding subscales such as cognitive anxiety, somatic anxiety, self-confidence, fear of physical harm, and generalized anxiety. In the validation test process, the last two constructs failed to appear so the CSAI-2 consists of three subscales (cognitive anxiety, somatic anxiety, and self-confidence).

Even though it has been revised, CSAI-2 has received some criticism. The terminology and statements used are seen as confusing [10] and the item selection process is carried out less stringently [6]. The number of the sample involved is considered to have weaknesses, as revealed by Lane et al. [8]. The sample size of only 80 to 162 cases resulted in a less reliable correlation coefficient [11]. The existence of these weaknesses was then used as the basis for revising the CSAI-2 [6].

The CSAI-2 test conducted by Cox et al. [6] is the answer to the criticism of the measuring instrument [5]. Conceptually, the three subscales that make up CSAI-2 have not changed, but the number of items has decreased from the initial 27 items to 17 items [6]. The latest version of CSAI-2 called CSAI-2R is seen as a more reliable measuring instrument for revealing athletes' competitive anxiety than the previous version [7,12]. Therefore, researchers who are interested in revealing the competitive anxiety of athletes are advised to use the CSAI-2R [6].

Up to now, testing the psychometric properties of CSAI-2R has not been widely carried out. The authors found only two documents that attempted to test the CSAI-2R, namely the French [12] and Swedish versions [7]. On the other hand, CSAI is claimed to be the most frequently used measuring instrument by researchers in revealing athletes' competitive anxiety [4,6]. Asia, more specifically in Indonesia, the instrument is also often used by researchers to determine the anxiety of athletes. Research that has been published and indexed on the government's scientific article search engine, Garba Rujukan Digital (Garuda; <https://garuda.kemdikbud.go.id/>), shows that there are 118 documents. But unfortunately, there is no detailed report on what the process of testing the validity and reliability of the instrument is like. We consider this a serious problem. As suggested by Cox et al. [6] the CSAI-2R needs to be continuously tested even though it is a revised version and an answer to the weaknesses of the previous version.

Based on the discussion above, we consider that more extensive testing is needed for each construct contained in the CSAI-2R. Therefore, this study aims to adapt and test the validity of the Indonesian version of the psychometric properties of CSAI-2R. There has been an adaptation and validation of the Indonesian version of the anxiety instrument, but it is not the CSAI-2R but the Sport Anxiety Scale-2 [13]. Thus, this study is the only research conducted specifically to test and present the CSAI-2R in the Indonesian version.

## 2. Materials and Methods

### 2.1. Participants

This research was carried out by involving elite Papuan Indonesian athletes. The sample was established by using the convenience sampling technique. Through this technique was obtained a sample of 200 athletes from various sports including individual sports such as boxing, swimming, athletics, archery, shooting, Kempo, and Muaythai and team sports such as football, volleyball, basketball, and handball. The number of male athletes is 120 while that of female athletes is 80 with an average age of 21.98 years and SD = 5.07.

### 2.2. Measures

There are three instruments applied in this study. First, the Competitive State Anxiety Inventory (CSAI) has been revised by Cox et al. [6] hence the name CSAI-2R. The CSAI-2R measuring instrument consists of 17 items spread into three subscales, namely somatic anxiety (e.g. I feel tense in my stomach), cognitive anxiety (e.g. I'm concerned about losing), and self-confidence (e.g. I'm confident about performing well). The CSAI-2R has four alternative answers, namely (1) not at all, (2) somewhat, (3) moderately, and (4) very much so.

Second, the Sport Anxiety Scale-2 (SAS-2) from Smith et al. [14]. The SAS-2 was used to test the convergent validity of this study. The SAS-2 property has been adapted and validated by Putra et al. [13] in Indonesia with validity values ranging from .51 to .88 and reliability values ranging from .71 to .88. The SAS-2 has three dimensions of anxiety, namely somatic anxiety (e.g. My body feels tense), worry (e.g. I worry that I will not play well), and concentration disruption (e.g. It is hard to concentrate on the game) with the total number of statements being 15. There are four alternative answer choices in the SAS-2, namely (1) not at all, (2) a little bit, (3) pretty much, and (4) very much. Third, the Spirituality in Sport Test (SIST) from Dillon and Tait [15] and Spittle and Dillon [16] is used to test discriminant validity in this study. SIST consists of 10 statements with six alternative answer choices. SIST has been adapted to Indonesian and found that the Indonesian version of SIST has a validity value ranging from .56 to .81 with a reliability value ranging from .81 to .91.

### 2.3. Procedure

This research began with the translation of the CSAI-2R into Indonesian. The translation was carried out by two experts. After this process was complete, the Indonesian version was submitted to a sports psychologist for review regarding the accuracy of the translation (see appendix). After passing this stage, the CSAI-2Rid instrument was tested in the field on Indonesian Papuan athletes, to determine the level of validity and reliability of the

Indonesian version of the CSAI-2R (CSAI-2RId). This research was conducted when elite Papuan Indonesian athletes were undergoing training so the data collection was carried out during a period or session of athletes undergoing training.

## 2.4. Statistical Analysis

The analysis of the research data was carried out using the Confirmatory Factor Analysis (CFA) approach. Some of the fit indexes used to test the fit of the model include (1) Chi-square and p-value, (2) The Minimum sample discrepancy function divided by degree of freedom ( $\chi^2/df$ ), (3), Root Mean Square Error of Approximation (RMSEA), (4) Parsimonious Goodness-of-Fit Index (PGFI), (5) Parsimonious Normal Fit Index (PNFI), (5) Goodness of Fit Index (GFI), (6) Tucker-Lewis index (TLI), (7) Normed Fit Index (NFI), and (8) Comparative Fit Index (CFI) [17-19]. To test the reliability of the CSAI-2R, an internal consistency approach was used by looking at Cronbach's Alpha coefficient. All of the analyses in this study were carried out with the help of IBM Amos version 26 (SPSS Inc, Chicago, IL) and IBM SPSS version 26 programs (IBM Corp, Armonk, NY).

## 3. Results

The research findings presented in Table 1 show the average value, standard deviation, skewness value, kurtosis, Cronbach's Alpha value, and the correlation among the factors with the total value. The normality test with skewness and kurtosis found that all values were between -1.96 and 1.96, so it can be stated that the data are normally distributed and can be continued with the next statistical analysis. The results of the reliability test using the internal consistency approach with Cronbach's Alpha found a range of values between .61 and .86. The results of the correlation analysis on each subscale show that each factor is significantly correlated. The self-confidence factor has a negative correlation coefficient, both with somatic anxiety and cognitive anxiety factors. When correlated with the total value, the three factors in the CSAI-2R have a highly

significant correlation coefficient.

The next analysis used the Confirmatory Factor Analysis (CFA). The criteria used in accepting the model fit were for chi-square p-value .05, CMIN/DF < 2, GFI = > 90%, AGFI, CFI, NFI, TLI = .90, RMSEA = .08, PGFI and PNFI = .60 - .90 [17-20]. The results of the testing of the model in the first analysis found the value of chi-square = 256.892, df = 116,  $P < 0.05$ ,  $\chi^2/df = 2.215$ , GFI = .867, AGFI = .824, CFI = .885, TLI = .812, RMSEA = .078, NFI = .812, PNFI = .693, PGFI = .657. These results indicate that the model is not fit. Considering that the model is not yet fit, the correlation among covariates was conducted based on modification indices [18] and the results show that the model is fit, as presented in Table 2.

Although the chi-square significance value ( $p < .001$ ), NFI, and AGFI did not meet the fit criteria, other parameters (e.g.  $\chi^2/df$ , GFI, CFI, TLI, RMSEA, PNFI, and PGFI) showed a fit model. Considering that the model meets the fit requirements, the researchers continued to analyze the factor loading value for each item [19] which composes the CSAI-2R construct. The test results are presented in Table 3.

All factor loading values are above .30, which indicates that the factor loading is quite good. In general, the rules that apply regarding loading scores are > .71 (excellent), > .63 (very good), > .55 (good), > .45 (sufficient), and .32 (insufficient) [11,20]. Based on the general rules above, there is no single item that is in the low criterion. The squared multiple correlations ranged from .19 to .69 and all items were significant at level .01.

The next analysis was conducted to test the convergent and divergent validity (Table 4). The convergent validity testing using the Indonesian version of SAS-2 [13] found the three dimensions in CSAI-2R with three dimensions in SAS-2 having a significant correlation coefficient. The statistic calculation based on the total value shows the same results, i.e. there was a significant correlation between CSAI-2R and SAS-2. The divergent test using SIST found that there was a significant correlation between the dimensions of cognitive anxiety and self-confidence, while the dimensions of somatic anxiety and the total value of CSAI-2R did not have a significant correlation.

**Table 1.** Means, standard deviations (s), normality testing, Cronbach's Alpha (a), and inter-factor correlations CSAI-2R (n = 200)

Factor	Mean $\pm$ s	Skewness	Kurtosis	A	CA	SC	Total
SA	12.09 $\pm$ 4.08	.67	-.36	.61	.64**	-.15*	.82**
CA	10.46 $\pm$ 3.76	.31	-.69	.63	-	-.17*	.79**
SC	15.86 $\pm$ 3.40	-.62	-.24	.86	-.17*	-	.29**
Total	38.41 $\pm$ 7.31	.24	.20	.74	.79**	.29**	-

Abbreviations: SA: Somatic anxiety, CA: Cognitive anxiety, SC: Self-confidence, a: alpha cronbach. \*  $p < .05$ , \*\*  $p < .01$

**Table 2.** Result of Model Test

Fit index	Initial Result of Analysis	Final Result
Chi-square/df/p	256.891/116/.001	154.844
$\chi^2/df$	2.215	1.408
GFI	.867	.919
AGFI	.824	.888
CFI	.885	.964
TLI	.866	.955
RMSEA	.078	.045
NFI	.812	.887
PNFI	.693	.717
PGFI	.657	.661

**Table 3.** Standardized solutions for factor loadings, error variances and squared multiple correlations (SMC) CSAI-2R

Item	Factor loading	Error variance	SMC
Cognitive anxiety			
Item 2	.76	.58	.58
Item 5	.79	.62	.63
Item 8	.62	.39	.39
Item 11	.61	.37	.37
Item 14	.71	.50	.51
Somatic anxiety			
Item 1	.79	.62	.62
Item 4	.59	.35	.35
Item 6	.46	.21	.21
Item 9	.80	.63	.63
Item 12	.44	.19	.19
Item 15	.48	.23	.23
Item 17	.47	.23	.23
Self-confidence			
Item 3	.70	.49	.49
Item 7	.66	.44	.44
Item 10	.83	.69	.69
Item 13	.69	.48	.50
Item 16	.50	.25	.25

Note: All results are significant at  $p < .01$

**Table 4.** Convergent and divergent validity testing

Factor	SA	CA	SC	CSAI-2R
SAS-2 Somatic	.769**	.465**	-.092	.626**
SAS-2 Worry	.599**	.754**	-.177*	.641**
SAS-2 Concentration Disruption	.688**	.653**	-.200**	.627**
SAS-2 Total Score	.771**	.744**	-.186**	.726**
SIST	-.129	-.228**	.150*	-.120

Abbreviations: SA: Somatic anxiety, CA: Cognitive anxiety, SC: Self-confidence. \*  $p < .05$ , \*\*  $p < .01$

## 4. Discussion

In this study, we have tested the Indonesian version of CSAI-2R or the CSAI-2Rid. The evaluation of the psychometric properties of the CSAI-2Rid reveals that the three dimensions in the CSAI-2Rid are correlated with each other. There is a positive significant correlation between the cognitive anxiety and somatic anxiety subscales, while the correlation in the self-confidence subscale tends to be negative. The result of this study confirms that of the previous research conducted by Lane et al. [8], which found that the three dimensions in CSAI-2 were significantly correlated and the direction of the negative correlation occurred on the self-confidence subscale of somatic anxiety and cognitive anxiety. Previous studies on the original version of CSAI-2R also found that the self-confidence subscale was negatively correlated with the cognitive anxiety and somatic anxiety subscales [6].

The reliability testing using the internal consistency approach with Cronbach's Alpha found a lower coefficient value when compared to the original version [6] and the Swedish version [7]. Even so, the Cronbach's Alpha value for each subscale which ranges from .61 to .86, and an overall reliability value of .74 is still acceptable because it is categorized as sufficient or moderate [21].

The result of testing the CSAI in other language contexts such as Swedish [7] and French [12] confirmed the study results, that the self-confidence subscale is negatively correlated with other subscales in the CSAI. The negative correlation coefficient is due to the statements in the self-confidence subscale (e.g. I feel self-confident) which tends to be positive and this was different from the statements in the other two subscales (e.g. I feel jittery [somatic anxiety], I am concerned about losing [cognitive anxiety]). Based on this fact, it is very logical that the correlation coefficient is negative.

Observing the overall score of CSAI-2Rid, we can see that the three subscales are significantly correlated at the  $p < .01$  level. In addition, the convergent validity test conducted with SAS-2 found that all dimensions were highly correlated and significant. The statistic calculation based on the total score reveals that the CSAI score is also positively and significantly correlated with SAS. The result of the analysis of the subscales in the CSAI and SAS reveals that the two instruments are developed based on trait-state anxiety theory [22]. The SAS divides the cognitive dimension into two subscales called worry and concentration disruption [23], while the CSAI maintains the cognitive aspect into one dimension [12]. This means that both CSAI and SAS have somatic and cognitive dimensions so the two subscales in the instrument are relatively similar. For example, on the somatic subscale, there is a statement saying, "My body feels tense." The statement is contained in the SAS (item number 2) and also in the CSAI (item number 4). On the cognitive subscale in the CSAI, there is the following statement:

"I'm concerned about performing poorly", while on the worry subscale in the SAS there is a statement that states: "I worry that I will play bad." The similarity of items in CSAI and SAS is what makes the two scores have a high and significant correlation.

The results of previous studies are confirmed by this study [12]. Although the SAS-2 theoretically reveals the trait aspect of anxiety while the CSAI is the state, both are anxiety measures that are constructed specifically in the context of sports [1,7,24,25]. The results of the previous studies that tested state and trait anxiety found that there was a significant correlation between state anxiety and trait anxiety [26]. On that basis, both SAS and CSAI are measuring instruments that reveal the level of anxiety in the context of sports [1,7,24,25]. In other words, this study proves that CSAI-2Rid can reveal the latent variable of athletes' competitive anxiety levels. This means that this research supports previous studies which found that the CSAI is a reliable measure in revealing the level of competitive anxiety in athletes [6,14,23,27].

The testing of the divergent validity of the Indonesian version of SIST found that based on the total score there was no significant correlation between CSAI-2Rid and SIST. The absence of a significant correlation between CSAI-2Rid and SIST confirms that the two instruments do measure a different construct. Theoretically, SIST is a measuring instrument that reveals the aspects of spirituality or religiosity in the context of sports [15,16], while the CSAI-2Rid is an instrument developed to reveal the levels of competitive anxiety [6,29]. Based on this theoretical concept, the absence of a significant correlation between the CSAI-2R score and the SIST strengthens the argument that the CSAI-2R is a psychometric property that specifically reveals the dimensions of athlete anxiety.

In this study, we have added and verified the testing of the CSAI [1,7,8,12] that the CSAI-2Rid is a valid instrument for measuring athletes' competitive anxiety. On this basis, CSAI-2Rid can be used to reveal competitive anxiety in athletes or sports contexts. This means that this study has added to several anxiety measurement instruments that have previously been developed and studied in the Indonesian context [13,30].

Despite extensive testing, this study has several limitations. First, the number of athletes involved in this study is relatively small. For the CFA analysis, this number has not been categorized as good [11]. Second, although the athletes who are the research subjects come from various sports, these athletes only represent Papua, Indonesia. Third, testing the psychometric properties of the CSAI-2R in this study did not include a measure of the direction of the athlete's interpretation of anxiety (facilitative versus debilitative) as it did in previous studies (see Jones and Swain [30]; Mellalieu et al. [31]) Therefore, based on the limitations of the study, it is suggested that further research should be carried out involving a larger sample in Indonesia and the direction of

the interpretation of anxiety (facilitative versus debilitating) should be included as part of the CSAI-2R test.

Therefore, the CSAI-2RId can be used to measure the competitive anxiety of athletes in Indonesia.

## 5. Conclusion

The results of this study enrich the evidence regarding the reliability of the psychometric properties of CSAI-2R. After in-depth testing, it can be stated that the Indonesian version of the CSAI-2R (CSAI-2RId) is a valid and reliable competitive anxiety measuring instrument.

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## Appendix

Scale items

No	Competitive State Anxiety Inventory-2R (CSAI-2R) Indonesian Competitive State Anxiety Inventory-2R (CSAI-2RId)
1	I feel jittery. <i>Saya merasa gelisah.</i>
2	I am concerned that I may not do as well in this competition as I could. <i>Saya khawatir tidak akan menampilkan permainan terbaik dalam pertandingan.</i>
3	I feel self-confident. <i>Saya merasa percaya diri.</i>
4	My body feels tense. <i>Tubuh saya terasa tegang.</i>
5	I am concerned about losing. <i>Saya khawatir akan kalah.</i>
6	I feel tense in my stomach. <i>Perut saya terasa kram.</i>
7	I'm confident I can meet the challenge. <i>Saya yakin akan dapat menghadapi pertandingan.</i>
8	I am concerned about choking under pressure. <i>Saya merasa tertekan.</i>
9	My heart is racing. <i>Jantungku berdegup kencang.</i>
10	I'm confident about performing well. <i>Saya yakin bisa bermain baik.</i>
11	I'm concerned about performing poorly. <i>Saya khawatir bermain buruk.</i>
12	I feel my stomach sinking. <i>Saya merasa sakit perut.</i>
13	I'm confident because I mentally picture myself reaching my goal. <i>Saya percaya diri karena sudah membayangkan akan menang.</i>
14	I'm concerned that others will be disappointed with my performance. <i>Saya khawatir orang lain akan kecewa dengan performa saya.</i>
15	My hands are clammy. <i>Tangan saya basah oleh keringat dingin.</i>
16	I'm confident of coming through under pressure. <i>Saya tenang menghadapi tekanan.</i>
17	My body feels tight. <i>Tubuh saya terasa kaku.</i>

Scoring key:

Somatic anxiety: 1, 4, 6, 9, 12, 15, 17; Cognitive anxiety: 2, 5, 8, 11, 14; Self-confidence: 3, 7, 10, 13, 16

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