Reliability and Validity of the Tromso Social Intelligence Scale (TSIS)

Walid Chater¹, Mahmoud Rebhi², Mouna Saidane², Noomen Guelmami³*, Anissa Bouassida²

¹Department of Education, Higher Institute of Continuing Education and Training, University of Tunis, Tunis, Tunisia
²Department of Human and Social Sciences, Higher Institute of Sport and Physical Education of Kef, University of Jendouba, Jendouba, Tunisia
³Postgraduate School of Public Health, Department of Health Sciences (DISSAL), University of Genoa, Genoa, Italy
Email: *noomen4@yahoo.fr

Abstract

Objective: Develop and test the psychometric properties of an Arabic-language version of Tromso Social Intelligence Scale (TSIS). Method: A total of 807 physical education students at Kef-Higher Tunisia's Institute of Physical Education and Sports with Mean age were 21.43 ± 1.79 participated in this study. Females (n = 414) outnumbered men (n = 397). Subjects were divided into exploratory and confirmatory groups and completed an adapted version of the Tromso Social Intelligence Scale (TSIS). Results: Principal component extraction results show three interpretable components. KMO indices and Bartlett tests confirm all components are suitable for analysis. The solution explained much of the variance. In addition, confirmatory factor analysis indicates acceptable index adjustment and factorial tool stability. The calculations of the internal consistency index for the three factors of the measurement scale demonstrate the good reliability of the instrument. Finally, according to the Fornell-Larcker criterion, the designed Arabic version has good convergent and discriminant validity. Conclusion: The Arabic version of the Tromso Social Intelligence Scale (TSIS) is a reliable and valid version and can be used to assess social intelligence in Tunisia and other Arab countries.

Keywords

Physical Education, Reliability, Scale, Social Intelligence, Validity

1. Introduction

The term of "social intelligence" refers to a more generic concept that is at the junction of a number of academic fields, such as philosophy, social science or

sociology, economics, legal science, psychology, and other related fields, as well as computer technology (Herzig et al., 2019).

Social intelligence was initially considered as "an ability to understand and describe intelligent action and behaviour in relation to others" (Thorndike, 1936). SI was originally conceptualised as a single concept (Boyatzis & Sala, 2004), but subsequently others described it as two personal intelligence, interpersonal and interpersonal intelligence (Gardner & Stough, 2002). Gardner discusses multiple intelligence and specifies two—interpersonal (the ability to read other people's moods, motives, and mental states) and interpersonal (the ability to access one's own feelings and use them to guide behaviour). Social intelligence is the capacity to do interpersonal activities and behave appropriately in relationships (Kaukiainen et al., 1999). It permits one to develop appropriate conduct to achieve a goal (Bjorkqvist, 2007). SI entails being intelligent about and in relationships (Hopkins & Bilimoria, 2008).

Social intelligence is defined as the capacity that enables a person to exhibit proper conduct in the pursuit of a certain purpose (Crowne, 2009). In point of fact, social intelligence denotes not knowledge about interactions but rather intelligence in how they are conducted. While, Emmerling & Boyatzis (2012) argued that social intelligence competency is the ability to recognize, understand and use emotional information about others that leads to or causes effective or superior performance.

Researchers have provided the broadest definition of social intelligence as the capacity to get along with others, social strategy or cases in society, awareness of the social issues of a group, and insight into the fleeting emotions or underlying personality features of strangers (Sanwal & Sareen, 2021).

Historically, performance-based tests have been used for measuring social intelligence (Lievens & Chan, 2017). The first approach to assess social intelligence was designed as a system of intellectual abilities that transcended the general intellectual element and was primarily associated with the ability to understand behavioural information (Chen & Michael, 1993; Romney & Pyryt, 1999; Shanley et al., 1971).

GWSIT was the first social intelligence test. The subtests included judging social circumstances, monitoring human behaviour, distinguishing psychological states via facial expressions (Hunt, 1928). During this time, several researches validated this approach. Many researches haven't confirmed social intelligence as a distinct element. Thorndike Jr. and Stein found that GWIST subtests and related methodologies are overloaded with verbal ability tasks, and inequalities in social intelligence are levelled by psychometric intelligence (Drago, 2004). Jackson created her social impact test to measure social intelligence by selecting the proper conduct in common scenarios. This approach was poorly recognized and strongly associated with the GWIST test.

All five main methods for measuring social intelligence: the Very Social Intelligence Test (GWSIT), the Social Insight Test, the 6 factors of behavioural cogni-

tion's test of Guildford and O'Sullivan, the empathic ability scale by Dymond (Dymond Rating Test), and Feffer's Role Taking Test, were associated with academic intelligence (Weis & Süß, 2005).

The Emotional Quotient—Inventory consists of 133 questions designed to assess the emotional and social intelligence of a person. It evaluates five important aspects of a person: interpersonal, interpersonal, stress management, adaptability, and overall mood (Bar-On, 1997).

The Emotional and Social Competence Inventory (Boyatzis et al., 2000) consists of 68 questions designed to measure an individual's emotional abilities and pro-social actions. It analyses four behavioural aspects: self-awareness, social awareness, self-management, and relationship management.

The purpose of the social intelligence scale Habib et al. (2013) was to design a robust, reliable, and ecologically valid instrument for measuring social intelligence in Pakistan. There are 98 items on the scale that measure social manipulation, social facilitation, social empathy, extroversion, and social adaptation.

The Manipulation, Empathy, and Social Irritability (MESI) scale (Frankovskỳ & Birknerová, 2014) consists of 21 items that measure three important components of a person's behaviour: manipulation, empathy, and social irritability.

Silvera et al. (2001) created the Tromso social intelligence scale, which consists of 21 questions evaluating three separate components of social intelligence: social information processing (SP), social skill (SS), and social awareness (SA). This instrument has exhibited robust psychometric properties and has been adopted in several countries (Dogan & Cetin, 2009; Rezaie, 2011).

On the other hand, few scales have been designed to measure the psychological factors of students in the Arab world and systematically in physical education. In particular, students in physical education must develop various psychomotor, emotional and cognitive skills (Guelmami et al., 2022) that must be measured. Since theories on student intelligence can vary from one academic field to another and social intelligence is a predictor of academic achievement, it is crucial to adapt a measurement instrument to assess the social intelligence of physical education students. However, measurement tools in this context are rare. In fact, no version in Arab countries has been found to assess social intelligence.

Therefore, the objective of our study and to adapt and validate a performance measurement tool, namely the Tromsø Social Intelligence Scale (TSIS) to physical education and sports students in Tunisia based on a comparison of the extracted factorial structures, Cronbach's alpha values, confirmatory factor analysis, convergent and discriminant validity.

2. Methodology

2.1. Participants

Recruitment of a total sample of physical education students (n = 807) was carried out. No exclusion criteria were used. The participants were enrolled at the

Higher Institute of Physical Education and Sports of Kef-Tunisia in a degree program in physical education. The age of the participants ranged from 19 to 27 years old. The average age was 21.43 ± 1.79 years. The number of female participants (n = 414, 51.3%) was comparable to the number of male participants (n = 397, 48.7%). Study participants were separated into two groups to perform both exploratory and confirmatory analysis. Exploratory data were obtained from 230 students aged 19 to 23 (M = 20.64 ± 1.31). Women (n = 95; 41.30%) and men (n = 125; 58.70%). While the confirmatory sample concerned 693 students aged 19 to 27 (M = 21.79 ± 1.65). There were males (n = 370; 53.39%) and females (n = 323; 46.61%) among the subjects.

2.2. Instrument

An Arabic-adapted version of the Tromso Social Intelligence Scale (Silvera et al., 2001) was administered to assess the level of social intelligence. The Tromso Social Intelligence Scale (TSIS) is a self-assessment instrument comprising 21 items distributed over three factors.

The TSIS measures intelligence based on three different subscales: a) Social Information Processing (SP): This subscale measures ability to understand verbal or non-verbal messages regarding relationships, empathy, and reading hidden messages as well as explicit messages posts. b) Social Skills (SS): This subscale measures basic communication skills such as active listening, assertiveness, establishing, maintaining, and breaking a relationship. c) Social Awareness (SA): This subscale measures the ability to engage in active behaviour in accordance with the situation, place and time.

Each of the three factors of the scale comprises 7 items which are measured on a 5-point Likert-type scale.

The initial version has good reliability with Cronbach's alpha internal consistency coefficients for information processing, social skills and social awareness at 0.81, 0.86 and 0.79 respectively.

2.3. Procedure

In the beginning, a professional translator, an Arabic-language teacher, an English language teacher and two bilingual academics with humanity expertise came together to create a translation committee. The first edition produced by the expert was discussed item by item to verify whether the meaning was adequate to measure the three dimensions. This was done by ensuring that each element kept the sense of the original version of the measuring tool.

Subsequently, a pilot test was conducted on 25 university students to first examine the tool adapted in Arabic.

Subsequently, two successive passages on two separate samples took place. Thus, two tests of the developed version of the scale were carried out on two separate groups of students two and a half months apart. The consent forms for the administration of the questionnaire were submitted simultaneously with the

questionnaires.

2.4. Statement of Ethics

This work has been approved by the Ethics Committee of the "High Institute of Sport and Physical Education, Kef, University of Jendouba, Jendouba, Tunisia", the "High Institute of education and continuing education of Tunisia". This research was also authorized by the University of Jendouba's Ethics Committee and was conducted in compliance with the "Declaration of Helsinki 2013" and its associated revisions.

After receiving an informed permission form, each participant was instructed to complete the surveys. They were advised that participation in the study was voluntary, and that any refusal need not be justified. The study was characterised as a study of the vicissitudes of school life, but the notions of commitment were not specified to prevent response bias.

2.5. Statistical Tools

During the exploratory phase, skewness and kurtosis tests were used to check the normality of the data, while during the confirmatory phase, multivariate normality was investigated. The skewness values greater than 7 or kurtosis values greater than 3 were determined to be non-Gaussian and have low psychometric sensitivity. During the confirmation phase, the Mardia coefficient of multivariate normality was also determined.

The principal component analysis with varimax rotation was used to perform the exploratory analysis. Using the Kaiser-Meyer-Olkin (KMO) statistic, sample adequacy was assessed to determine if the data were adequate for factor analysis. According to the value of KMO must be greater than 0.6 for the factorial solution to be accepted. Additionally, the chi-square value of Bartlett's sphericity test was calculated. The factors were kept if the eigenvalues were greater than 1 and the scree diagram was examined. In addition, an item was eliminated if its factor loading was less than 0.5 (Taherdoost et al., 2014).

The reliability of the instrument was assessed by calculating Cronbach's internal consistency coefficient. Cronbach's Alpha values greater than 0.70, 0.80, and 0.90 are considered acceptable, good, and excellent, respectively.

First-order confirmatory factor analyses were performed to study the factor structure of the instrument. Chi 2 and Chi 2/DDL: chi 2 must be negligible, although it is very sensitive to sample size; Chi 2/DDL must also be less than 3. The GFI and AGFI relative fit indices are suitable for values larger than 0.90. The parsimony indices TLI and CFI must be larger than 0.95. For a successful model fit, the measurement error indices RMR and RMSEA must be less than 0.60 (Hu & Bentler, 1999).

Calculation of mean variance extracted (AVE) and comparison of square roots of AVE values to correlation coefficients were used to assess convergent and discriminant validity, respectively.

SPSS for Windows, version 26 (IBM Corp.) and Amos's software for Windows, version 23, were used to perform the statistical analyses and examine the factor structure (IBM Corp.).

3. Results

Table 1 shows the means, standard deviations and normality indices (Skewness and Kurtosis) for all the items of the Arabic version of TSIS. The items distributions did not present any abnormality at the Skewness and Kurtosis level (between −1 and 1).

The findings suggest that it would be suitable to proceed with factor analysis using the SMDS-12 (KMO = 0.91; Bartlett test of sphericity = 3057,99; df = 210; $P < 0.001$). The principal component analysis pointed to a three-factor solution (the eigenvalues for the first, second, and third factors were 6.44, 4.54, and 3.03, respectively), which could explain up to 70.09% of the total variance, with items having lambda factor loadings that ranged from 0.687 to 0.89. The first component was responsible for explaining 30.64% of the overall variance, the second factor was responsible for explaining 21.60% of the variance, and the third factor was responsible for explaining 14.41% of the variance. The analysis of the scree

Table 1. Descriptive statistics of the Arabic version of the Tromso Social Intelligence Scale (TSIS).

	Mean	SD	Skewness	Kurtosis	Lamda
q1	3.33	0.91	−0.20	0.10	0.771
q2	3.32	0.93	−0.29	−0.05	0.769
q3	3.34	0.88	−0.38	0.36	0.772
q4	3.32	0.93	−0.21	−0.10	0.803
q5	3.29	0.99	−0.33	−0.27	0.802
q6	3.23	1.00	−0.21	−0.27	0.826
q7	3.21	1.05	−0.17	−0.24	0.687
q8	3.19	1.13	−0.05	−0.92	0.869
q9	3.14	1.14	−0.21	−0.75	0.890
q10	3.13	1.19	0.00	−0.97	0.869
q11	3.11	1.17	−0.08	−0.81	0.839
q12	3.23	1.23	−0.26	−0.94	0.885
q13	3.32	1.10	−0.04	−1.08	0.799
q14	3.32	1.07	−0.03	−1.04	0.783
q15	3.29	0.83	0.12	−0.56	0.765
q16	3.32	0.84	0.26	−0.47	0.792
q17	3.34	0.93	0.21	−0.80	0.850
q18	3.40	0.94	0.27	−0.79	0.804
q19	3.46	0.92	0.09	−0.81	0.750
q20	3.34	0.83	0.22	−0.46	0.772
q21	3.22	0.87	0.30	−0.56	0.783

plot provides more evidence that the three-factor solution is correct; there is a discernible shift in the slope that can be observed in the plot (Figure 1).

3.1. Reliability Analysis

The internal consistency of the three factors was calculated by the Cronbach's α to examine the reliability of the scale. Examination of the indices for the three factors of the scale yielded values greater than or equal to 0.80. This provides evidence for the internal consistency of the scale. Likewise, a good internal consistency was supported by the Cronbach's α indices, which had values of 0.893. 0.939, and 0.907 for the first, the second, and the third factor, respectively. Moreover, the corrected item-total correlation was calculated for each latent variable. The results show that the values were adequate, since they were located between 0.59 and 0.76 for the first factor, between 0.72 and 0.86 for the second factor, and between 0.69 and 0.79 for the last factor. These results confirm that the instrument has good reliability (Table 2).

3.2. Confirmatory Factor Analysis

The results of the indices from the CFA displayed a consistent first-order model with three factors, consistent with the theoretical model tested for the adapted version of the scale (see Figure 2).

The $\chi2/df$ value is 1.59. The GFI index is 0.96. The AGFI index is 0.95. Moreover, the RMSEA and the RMR were 0.029 and 0.30 respectively, CFI is 0.99 and TLI is 0.99. Therefore, the theoretical model, which is a priori posed, was correctly reproduced by the empirically collected data.

3.3. Construct Validity

3.3.1. Convergent Validity

By computing the average variance extracted (AVE), an evaluation of the convergent validity was carried out in accordance with the Fornell-Larcker criterion.
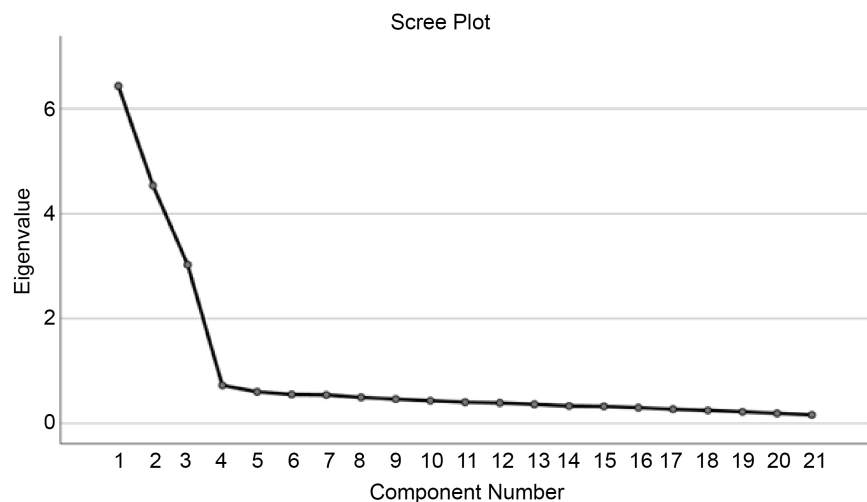

Figure 1. Scree plot of the ARABIC TSIS.

Table 2. Reliability of the scale.

	Cronbach's Alpha	Scale Mean if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I1		19.71	0.69	0.878
I2		19.72	0.69	0.878
I3		19.70	0.69	0.878
I4	0.893	19.72	0.72	0.875
I5		19.76	0.71	0.875
I6		19.81	0.76	0.869
I7		19.83	0.59	0.891
I8		19.25	0.82	0.927
I9		19.30	0.85	0.924
I10		19.31	0.83	0.926
I11	0.939	19.33	0.79	0.930
I12		19.21	0.86	0.924
I13		19.12	0.72	0.936
I14		19.12	0.72	0.936

Table 3. Descriptive statistics and normality of the confirmatory data.

Variable	Mean	Std. Deviation	skew	c.r.	Kurtosis	c.r.
I1	3.28	1.05	−0.35	−3.76	−0.05	−0.26
I2	3.29	1.04	−0.37	−3.97	−0.16	−0.88
I3	3.29	1.00	−0.42	−4.53	−0.12	−0.67
I4	3.26	1.05	−0.35	−3.78	−0.09	−0.50
I5	3.22	1.07	−0.31	−3.31	−0.42	−2.24
I6	3.21	1.09	−0.30	−3.23	−0.41	−2.22
I7	3.14	1.14	−0.23	−2.43	−0.56	−3.01
I8	3.12	1.20	−0.11	−1.19	−0.94	−5.03
I9	3.09	1.22	−0.11	−1.22	−0.94	−5.07
I10	3.12	1.23	−0.04	−0.45	−1.02	−5.47
I11	3.05	1.24	−0.07	−0.80	−1.00	−5.39
I12	3.08	1.26	−0.11	−1.15	−1.06	−5.71
I13	3.17	1.16	−0.07	−0.71	−1.09	−5.84
I14	3.16	1.16	−0.08	−0.82	−1.00	−5.37
I15	2.81	1.08	−0.02	−0.17	−0.45	−2.41
I16	2.84	1.13	−0.02	−0.25	−0.64	−3.46
I17	2.86	1.14	0.08	0.88	−0.59	−3.19
I18	2.86	1.13	0.13	1.43	−0.54	−2.91
I19	2.89	1.14	0.04	0.39	−0.70	−3.74
I20	2.84	1.10	0.01	0.13	−0.57	−3.06
I21	2.80	1.09	0.12	1.32	−0.57	−3.07
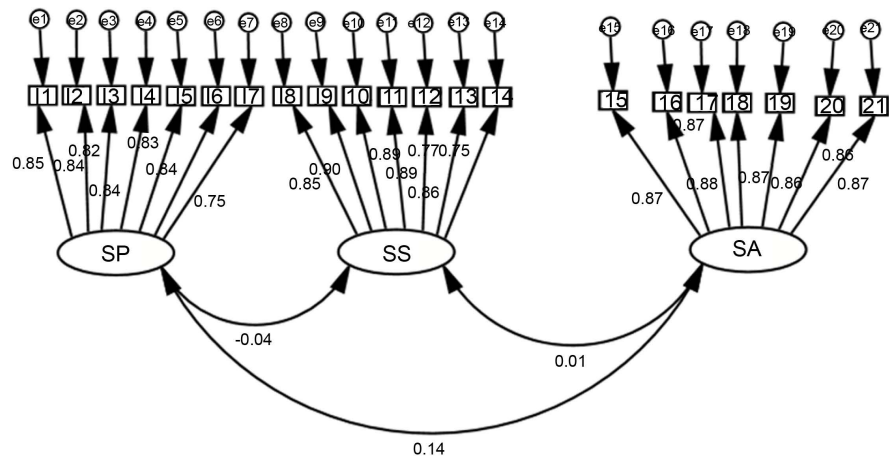
Figure 2. Confirmatory factor of the Arabic TSIS.

Values of the AVE that are more than 0.7 are regarded as being quite good, while a score of 0.5 is seen as being adequate. The AVE values for consumption were 0.68, while the value for confidence was 0.71, and the value for sharing was 0.76.

3.3.2. Discriminant Validity

When the variance that is shared between two separate latent variables is smaller than the variance that is shared between the latent variable and its indicators, discriminant validity has been established (i.e., items). Because of this, it follows that the square root of the AVE needs to be higher than the sum of all the correlations between latent variables. The comparison of the square roots of the AVE values that were displayed along the diagonal of the matrix.

The correlation coefficients demonstrate that the discriminant validity of the scale was sufficient.

SP, SS, and SA all had AVE values of 0.82, 0.80, and 0.81, respectively, and their corresponding square roots were those values. When compared with the correlation coefficients of the other constructions, each AVE value's results reveal that it has a larger value.

4. Discussion

The objective of this study was to adapt and validate an Arabic-language version of the questionnaire.

The results of the study confirm that the adapted version has adequate psychometric properties. Indeed, the results of the extraction of factors using the principal component extraction method suggest a solution of three interpretable factors. The KMO indices and the Bartlett test confirm all the items are adequate for the analysis. In addition, the solution succeeded in explaining a large proportion of the variance. Also, the Scree plot consolidates the presence of three factors with Eigenvalues greater than 1. While the confirmatory factor analysis shows good adjustment of the indices and factorial stability of the psychometric tool.

The results of the exploratory and confirmatory factor analysis were in line with several psychometric works on the instrument which established the measurement accuracy of the three factors (Cooper, 2021; Dogan & Cetin, 2009; Gini, 2006; Goswami, 2019; Habib et al., 2013; Park, 2007).

Regarding the reliability of the instrument, the calculated internal consistency indices confirm good reliability. These results are in line with the work of developing the initial version of TISIS (Silvera et al., 2001). Consistent with our study, there was no item deletion in the Turkish and Italian versions (Dogan & Cetin, 2009; Gini, 2006). The Turkish version evaluated on 719 students from Sakarya University also had adequate reliability tested by both classical Cronbach's alpha coefficients, test-retest reliability and Split-half reliability.

As a psychological construct, measures of the concept must be convergent and discriminant (Campbell & Fiske, 1959). However, no study has addressed these two criteria that we have proven for the instrument.

Although the self-assessment method allows for easy administration and is widely used, it faces several limitations. First, self-assessments of abilities or skills are often weakly correlated with measures of behaviour or performance (Kruger & Dunning, 1999). Second, self-report measures are very sensitive to response distortion or imitation of high-stakes tests (Tett & Christiansen, 2007). These measures can also be confounded by irrelevant variables, such as narcissism (Ames & Kammrath, 2004), self-confidence or self-efficacy (Mayer et al., 2016).

Developing social intelligence requires recognizing essential interpersonal skills and evaluating them based on their behaviors. The academic and social life of students is strongly influenced by their social intelligence. In particular, the university environment is very different from the college environment (Davis, 2010), and suggestions for students to use their social intelligence have been offered (as an example, Malik, Siddique, & Hussain, 2018). Moreover, the development of social intelligence promotes good interaction between teachers and students (Meijs, et al., 2010) and contributes to the creation of good relations in the classroom. This consistently leads to effective learning and improves student performance (Boukari et al., 2022).

5. Conclusion and Practical Implications

The results demonstrated that the items adapted in Arabic language are appropriate to present the three factors, while confirming the validity and reliability of the Arabic version of the TSIS. The results of this research can be included in future studies on social information as fundamental data, and they can also serve as an evaluation measure in intervention studies on students in Arab countries. Both of these applications are possible. In the field of sports and physical education research, social intelligence is still largely uncharted territory.

The adaptation of this measurement scale opens up a vast field of research in physical education. Indeed, offering a means of evaluating social intelligence can stimulate intervention research aimed at improving the social intelligence of

students in a specific interaction environment. Also, this research can help examine the links between forms of intelligence in the context of physical education.

Similarly, associations between social intelligence and other predictors of academic success and academic engagement may be questioned.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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