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Validating the Teacher and Classmate Support Scale for the Adolescents from Taiwan Region

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Abstract

The aim of this study was to develop a Teacher and Classmate Support Scale-Taiwan region Version (TCMS: TW) and test for its validation with a sample of 474 children and adolescents from Taiwan region. This cross- cultural research replicates the two-factor structure of the original scale. We found evidence of good internal, composite, and test-retest reliability for the TCMS: TW. The Average Variance Extracted (AVE) was obtained for both the convergent and discriminant evidence of validity. Further evidence for convergent validity also came from the Pearson correlation coefficients (r) among the TCMS: TW, academic achievement, life satisfaction, and self-esteem. Our study found measurement invariance across gender groups. Results of the study revealed that the TCMS: TW is a psychometrically sound instrument measuring teacher and classmate support.

Keywords

Teacher and Classmate Support, Cross-Cultural Research, Reliability, Validity, Measurement Invariance

1. Introduction

Social support is an important multidimensional construct in human growth and development. As Vygotsky (1981) wrote, "it is through others that we develop into ourselves" (p. 161). As a consequence, social support has become one of the most popular research topics in education and psychology (French, Dumani, Allen, & Shockley, 2018; Malecki & Demaray, 2002). Pertinent to child and adolescent development, in particular, support from teachers and classmates

has been shown as the powerful protective factor. For example, researchers have found that teacher and classmate supports positively relate to self-esteem, self-efficacy, life satisfaction, and academic achievement, but negatively associate with depression and problematic behaviors (Chang, Yuan, & Chen, 2018; Demaray & Malecki, 2002; Wit, Karioja, Rye, & Shain, 2011).

Although teacher and classmate supports are significant contributors to well-being of children and adolescents, there are inconsistent findings about gender differences in the extant literature (Chu, Saucier, & Hafner, 2010; Rueger, Malecki, Pyun, Aycock, & Coyle, 2016). Most recently, Rueger and colleagues (2016) noted that further research should focus on clarifying the complexity of gender differences regarding a youth's perceived social support based on using the instrument with psychometrically sound properties. Additionally, to compare female and male populations, every assessment measure must operate equivalently across gender. Otherwise, any interpretation of gender difference is ambiguous and questionable because it would be problematical to determine whether the differences are due to psychometric differences or to true attitudinal differences (Byrne, Stewart, Kennard, & Lee, 2007; Cheung & Rensvold, 2002).

The Teacher and Classmate Support Scale (TCMS; Manger & Olweus, 1994; Torsheim, Wold, & Samdal, 2000) is a psychometrically sound instrument measuring children and adolescents' perceived support from teachers and classmates. However, its validation has only been established with Western cultures. Moreover, there is evidence to suggest that an instrument that is psychometrically valid in one culture does not mean that it is the same for all other cultures. Indeed, such evidence regarding these psychometric properties needs to be derived from the validation of cross-cultural research (Tanzer & Sim, 1999; van de Vijver & Hambleton, 1996). Thus, the primary purpose of the current study is to develop a Teacher and Classmate Support Scale-Taiwan region Version (TCMS: TW) by translating the scale items into traditional Chinese and testing for its validity and measurement invariance across gender using the adolescents from Taiwan region.

2. Methods

2.1. Participants and Procedures

Eighth-grade and twelfth-grade students (N = 474) from one public middle school and one public high school in central Taiwan region participated in the current study. Participants were aged 13 - 18 years, with a mean age of 15.36 years (SD = 2.061). The sample consisted of 261 females (55.1%) and 213 males (44.9%). In addition, 50.8% of respondents were 8th graders (N = 241), and 49.2% were 12th graders (N = 233). Of the 474 total respondents, 158 (84 girls, 74 boys) were retested at a four-week interval as evidence of test-retest reliability. This group ranged from 13 to 18 years of age (M = 15.37, SD = 2.064) and included 80 eighth graders and 78 twelfth graders. Each respondent's parental consent was obtained prior to data collection. All questionnaires were administered to the participants during school hours by trained research assistants.

2.2. Measures

Demographics. All participants were asked to answer three demographic questions (i.e., sex, age, and grade levels). No other information concerning student demographics was asked for.

Academic achievement. Academic achievement was obtained by students' current cumulative grade point average (GPA). Total scores ranged from 0 to 4, with higher scores representing greater academic achievement.

Social Support from Teachers and Classmates. Students' perceived social support from teachers and classmates was measured using the Teacher and Classmate Support Scale-Taiwan region Version (TCMS: TW). The original TCMS is composed of 8 items that are structured on a 5-point Likert-style scale ranging from 1 (Strongly disagree) to 5 (Strongly agree), with higher values corresponding to a higher degree of perceived social support. The psychometric properties of the TCMS have been demonstrated and reported by previous studies that were mainly conducted in Western countries (e.g., Danielsen, Samdal, Hetland, & Wold, 2009; Torsheim et al., 2012); however, measurement based on a Chinese population has never been reported. Therefore, the TCMS was translated into the TCMS: TW by the authors. Additionally, in order to make sure the instrument completely captured the concept addressed by the original TCMS items, we applied the method of forward and backward translations.

Life Satisfaction. The Taiwan region Version of Satisfaction with Life Scale (SWLS; Wu & Yao, 2006) was used to assess adolescents' life satisfaction. The SWLS is single-factor and uses a 5-item short scale of self-report measurement to report reliability, validity, and factorial invariance across gender (see Wu & Yao, 2006). All five items are rated on a 7-point Likert-type scale ranging from 1 (Strongly disagree) to 7 (Strongly agree), with higher scores corresponding to greater life satisfaction. In our study, the internal consistency of the scale was α = .85.

Self-esteem. To assess participants' self-esteem, we used the Chinese Version of the Rosenberg Self-Esteem Scale (CRSES; Leung & Wong, 2008). The CRSES contains ten items rated on a 4-point Likert-type scale from 0 (Strongly disagree) to 3 (Strongly agree). Leung and Wong (2008) found that the CRSES was psychometrically sound with appropriate instrumentation. In the current sample, an internal consistency of α = .86 was identified for these ten items.

3. Results and Discussion

3.1. Confirmatory Factor Analysis (CFA)

Analyses were conducted using the Amos version 25. We performed a confirmatory factor analysis (CFA) to test whether the two-factor structure of the TCMS: TW could be replicated with the 474 adolescents from Taiwan region. Given that chi-square ($\chi 2$) is extremely sensitive to sample size, multiple model evaluation indices of fit were examined including: 1) a chi-square ($\chi 2$) statistic, 2) standardized root mean square residual (SRMR), 3) comparative fit index

(CFI), 4) the root mean square error of approximation (RMSEA), and 5) the Tucker-Lewis index (TLI). The TLI and CFI values range from zero to 1.00, with values close to .90 and .95 indicating acceptable fit and superior fit, respectively. Additionally, the SRMR and RMSEA values close to .08 and .06 reflect mediocre fit and good fit, respectively (Hu & Bentler, 1999).

As schematically portrayed in **Figure 1**, the factor loadings ranged from .66 to .92, and all factor loadings were significant, $p < .001$. The hypothesized model of the two-factor structure for the TCMS: TW exhibited an excellent fit with the sample data, $\chi 2$ (19, N = 474) = 44.09, $p = .001$, CFI = .99, TLI = .99, SRMR = .04, RMSEA = .05, 90% CI = [.03, .07]. Overall, the results revealed the two-factor model was replicated in the study and represented an exceptionally well-fitting model.

3.2. Measurement Invariance

In seeking evidence of measurement invariance for the TCMS: TW across gender groups, we conducted a Multigroup Confirmatory Factor Analysis (MGCFA) to test the four most common nested models; namely, the configural invariance, metric invariance, scalar invariance, and error variance invariance models. The changes in the CFI (ΔCFI) and TLI (ΔTLI) were used as the criteria for testing measurement equivalence across gender groups, with the value of equal to or less than .01 suggesting strong measurement equivalence (Cheung & Rensvold, 2002).

Configural invariance model. Establishing the configural invariance model (i.e., no equality constraints) is the initial step in testing measurement invariance (Byrne, 2016). Testing the configural equivalence showed an exceptionally well-fitting model to the data, CFI = .99, TLI = .98, SRMR = .04, RMSEA = .04, 90% CI = [.03, .06] (see **Table 1**), and all parameter estimates were statistically significant ($p < .001$).

Table 1. Tests for measurement invariance of TCMS-TW factor structure across gender groups: Goodness-of-fit statistics (N = 474).

Model	χ^2	*df*	*TLI*	*CFI*	*SRMR*	*RMSEA*	*RMSEA 90% CI*	*Model Comparison*	*ΔTLI*	*ΔCFI*
Model 1										
Configural invariance	72.31	38	.980	.986	.038	.044	.028, .059	-	-	—
Model 2										
Metric invariance	78.35	44	.983	.986	.039	.041	.025, .055	2 vs. 1	.003	.000
Model 3										
Scalar invariance	87.98	52	.985	.986	.039	.038	.024, .052	3 vs. 2	.002	.000
Model 4										
Error variance invariance	100.91	60	.985	.984	.039	.038	.025, .051	4 vs. 3	.000	.002

Note: TCMS-TW = Teacher and Classmate Support Scale-Taiwan region Version; χ^2 = chi-square; *df* = degree of freedom; TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; SRMR, Standardized Root Mean square Residual; RMSEA, Root Mean Square Error of Approximation. CI = Confidence Interval.

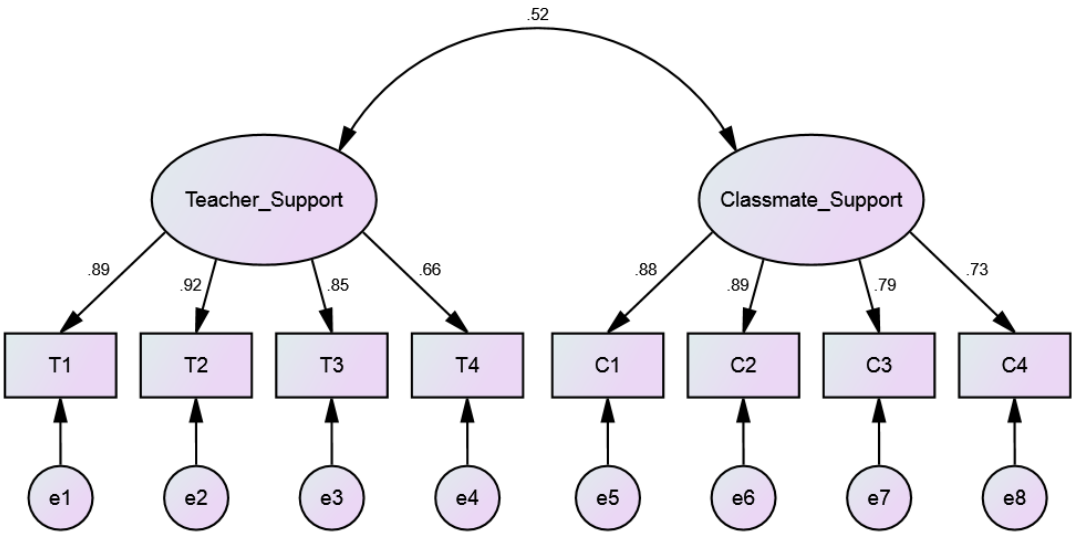

Figure 1. The factorial structure model of the teacher and classmate support Scale-Taiwan region Version.

Metric invariance model. Given that the configural equivalence had been established, metric invariance model was next analyzed by constraining all factor loadings to be equal across gender groups, and error variances and scale items' intercepts were freely estimated. Results indicated an excellent, well-fitting model for the sample data, CFI = .99, TLI = .98, SRMR = .04, RMSEA = .04, 90% CI = [.03, .06]. Model comparison between configural invariance and metric invariance (model 2 vs. model 1) lacked statistically significant changes, ΔTLI = .003, ΔCFI = .000 (see **Table 1**).

Scalar invariance model. After establishing the metric equivalence, we further tested the scalar invariance by constraining all the factor loadings and the scale items' intercepts to be equally across the gender groups and the error variances were freely estimated. The results revealed this model fitted the sample data excellently well, CFI = .99, TLI = .99, SRMR = .04, RMSEA = .04, 90% CI = [.02, .05]. In addition, there was no statistically significant difference in the model comparison (model 3 vs. model 2), ΔTLI = .002, ΔCFI = .000 (see **Table 1**).

Error variance invariance model. The error variance invariance model is the last step in the current study to establish measurement invariance across gender groups. To do so, we constrained all the factor loadings, the scale items' intercepts, and the residual variances to be the same for each gender group. Our results indicated that the error variance invariance model fitted the data very well, CFI = .98, TLI = .99, SRMR = .04, RMSEA = .04, 90% CI = [.03, .05]. Additionally, there was no statistical difference in fit between error variance invariance and scalar invariance model (model 4 vs. model 3), ΔTLI = .000, ΔCFI = .002 (see **Table 1**).

Taken together, these results suggested that the measurement invariance (i.e., configure, metric, scalar, and error variance) of TCMS: TW did hold across gender groups.

3.3. Reliability

We calculated composite reliability (CR) as the internal consistency (Fornell & Larcker, 1981) of the TCMS: TW, with values close to .60 and .70 showing acceptable and high levels of CR, respectively. For the Teacher and Classmate subscales, the values of CR obtained were .90 and .89, respectively. The total scale of composite reliability was .95. The results are indicative of good internal consistency for the two subscales and the whole scale. An Intraclass Correlation Coefficient (ICC) was computed for test-retest reliability. The ICC values for the Teacher and Classmate subscales and total scale were .82, .74, and .80, respectively. Taking these results together, the students' scores on TCMS-TW provided evidence of strong internal reliability and adequate test-retest reliability over a four-week interval (see **Table 2**).

3.4. Construct Validity

Construct validity evidence for the TCMS: TW is established through convergent and discriminant validity. Convergent validation evidence is exhibited when an instrument associates well with other measures believed to assess the equal construct. Pearson product-moment correlation coefficients (r) among measures were obtained for the convergent evidence of TCMS: TW (see **Table 3**).

Table 2. Summary of ICC, CR, and AVE for TCMS-TW.

TCMS-TW	*ICC* (*n = 158*)	*CR* (*n = 474*)	*AVE* (*n = 474*)
Teacher	.82	.90	.70
Classmate	.74	.89	.68
Total	.80	.95	.69

Note. TCMS-TW = Teacher and Classmate Support Scale-Taiwan region Version; ICC = Intraclass Correlation Coefficient; CR = Composite Reliability; AVE = Average Variance Extracted.

Table 3. Descriptive statistics and intercorrelations.

Measure	*n*	Mean	*SD*	*α*	Pearson correlations				
					(1)	(2)	(3)	(4)	(5)
1) Academic Achievement	474	3.448	.4977	-	-				
2) Self-esteem	474	28.67	5.804	.862	.141**	-			
3) Life Satisfaction	474	30.09	3.715	.852	.159**	.150**	-		
4) Teacher Support	474	14.58	3.336	.892	.264**	.410**	.159**	-	
5) Classmate Support	474	15.16	3.107	.893	.310**	.423**	.225**	.493**	-
6) Total TCMS-TW	474	29.75	5.568	.889	.331**	.481**	.221**	.874**	.853**

Note. $^{**}p < .01$; $^{*}p < .05$. TCMS-TW = Teacher and Classmate Support Scale-Taiwan region Version.

Teacher support was significantly positively correlated to Academic Achievement (r = .26, $p < .001$), Self-esteem (r = .41, $p < .001$), and Life Satisfaction (r = .16, $p < .001$). Perceived support from Classmates was significantly, positively related to Academic Achievement (r = .31, $p < .001$), Self-esteem (r = .42, $p < .001$), and Life Satisfaction (r = .23, $p < .001$). Similarly, bivariate-correlation coefficients for the whole scale of the TCMS: TW was associated with Academic Achievement (r = .33, $p < .001$), Self-esteem (r = .48, $p < .001$), and Life Satisfaction (r = .22, $p < .001$). Moreover, the Average Variance Extracted (AVE) was calculated to provide further evidence for convergent and discriminant validity (see **Table 2**). For Teacher support, Classmate support subscales, and total scale, the values of AVE were .70, .68 and .89, respectively. All the three AVE values were above the suggested cut-off point (=.50), indicating convergent validity was obtained (Fornell, & Larcker, 1981). Furthermore, discriminant evidence is obtained when each latent variable's AVE value exceeded the shared variance of the other variables (i.e., AVEs > r2). In our study, every AVE value was greater than the shared variance between the Teacher and Classmate latent variable (.522 = .27). Together, these results revealed that TCMS: TW had demonstrated good construct-related evidence for validity (see **Table 2**).

4. Conclusion and Future Research

In summary, we believe that our findings from the present study delineated here provide essential evidence supporting the fact that the TCMS: TW can be used on the children and adolescents from Taiwan region. In this cross-cultural research study, the psychometric properties of the TCMS: TW were established, as shown by its good reliability, validity, and measurement invariance across gender in a population from the Taiwan region. Although our study replicates and extends previous work in Western culture (e.g., Torsheim et al., 2000; 2012), future studies are needed such as using a more diverse sample (e.g., elementary school students) or conducting further cross-cultural research to confirm or disconfirm the findings described in this article.

Conflicts of Interest

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

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