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The Team Climate Inventory (TCI)

A Psychometric Test on a Taiwanese Sample of Work Groups

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Understanding the feasibility of applying the Team Climate Inventory (TCI) in non-Western cultures is essential for researchers attempting to understand the influence of culture on workers' perceived climate. This study describes the application of the TCI in such a setting using data from 203 administrators employed in a Taiwanese medical center. Reliability and factor analyses were performed to establish the feasibility and psychometric properties of the TCI Taiwan version. Reliabilities of both the four- and five-factor solutions exceeded .80. Factor analyses indicated a satisfactory four-factor structure, despite some variations in comparison with the U.K. version. The TCI Taiwan version is feasible and has acceptable psychometric properties. Further research is warranted regarding the degree to which disparities result from cultural differences and the specific nature of organizational systems in Chinese communities.

Keywords: *Team Climate Inventory; psychometrics; innovation*

Innovation is increasingly recognized as a key source of sustainable competitive advantage that organizations can use to confront the rapidly changing economic environment. The concept of innovation has attracted the attention of numerous scholars and practitioners from various disciplinary perspectives. Studies have suggested that creativity and innovation in

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products, work processes, and services are key contributors to long-term organizational survival and success (Anderson, De Dreu, & Nijstad, 2004).

West and Farr (1989) proposed that innovation can be defined as "the intentional introduction and application within a role, group or organization of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit role performance, the group, the organization or the wider society" (p. 16). Innovative behaviors at work are promoted by a combination of both individual characteristics and work environment factors. Research has identified various personal attributes related to individual creativity at work, including personality traits (Oldham & Cummings, 1996), cognitive styles (Baer, Oldham, & Cummings, 2003), and intrinsic motivation (Amabile, Conti, Coon, Lazenby, & Herron, 1996). In addition to the importance of personal qualities, numerous studies have demonstrated that work environment and social climates can foster or impede innovation and creativity at work (Amabile et al., 1996; Mathisen, Einarsen, Jorstad, & Bronnick, 2004; Oldham & Cummings, 1996; Patterson, Warr, & West, 2004). The literature suggests that the combination of a supportive and challenging environment sustains particularly high creativity in individuals and teams (see McLean, 2005 for a review).

The past two decades have seen growing research interest in assessing innovation climate (see Mathisen & Einarsen, 2004 for a review). Despite this growing research interest, two intractable and related difficulties have influenced climate research: defining climate and accurately measuring climate at different levels of analysis (Anderson & West, 1998). Two approaches have generally been adopted to defining climate: the cognitive schemata approach and the shared perception approach. The cognitive schemata approach conceives climate as the constructive representations of cognitive schema that individuals possess in relation to their work environments; whereas the shared perception approach defines organizational climate as shared perceptions of organizational policies, practices, and procedures (Schneider, 1990).

Controversy regarding the definition of climate led to the development of diverse measurement tools at different levels. In a recent review, Mathisen and Einarsen (2004) suggested that most instruments reviewed are designed to provide information about climate at the organizational level. The Team Climate Inventory (TCI), developed by Anderson and West (1998), is the only instrument reviewed that explicitly measures climate at the team or group level.

The concept of *climate for innovation* of a team has generally been defined as shared perceptions at the work group or organizational levels of the extent to which team processes encourage and enable innovation (Anderson & West, 1994). West's (1990) model of team climate for innovation identified four factors as essential to team climate: vision, participative safety, support for innovation, and task orientation. This theoretical model led to the development of the TCI, which was designed to be an instrument suitable for research as well as for use as a team development tool that could facilitate interventions to promote innovation in work groups.

Team Climate Inventory

Based on West's (1990) four-factor model, the TCI was developed to identify team climate factors essential for work group innovation. The initial psychometric properties were determined in a sample of the senior management teams of 27 U.K. hospitals. The original 116-item TCI underwent exploratory and confirmatory factor analyses, which resulted in a 61-item version (Anderson & West, 1998). A short form of the TCI consisting of 44 items was developed by extracting items that exhibited strong correlations with their own and other scales. Six of the 44 items are used to measure social desirability. The remaining 38 items were combined to create four scales: vision, participative safety, task orientation, and support for innovation. In accordance with the theoretical model (West, 1990), the four scales are described below.

Vision

Team vision consists of 11 items; team vision should be clear, negotiated, and attainable, and, ideally, should evolve out of the desire to achieve valued future outcomes. This dimension consists of four component parts: clarity (e.g., Item 27, "How clear are you about what your team objectives are?"), visionary nature (e.g., Item 28, "To what extent do you think they are useful and appropriate objectives?"), attainability (e.g., Item 29, "How far are you in agreement with these objectives?"), and sharedness (e.g., Item 30, "To what extent do you think your team's objectives are clearly understood by other members of the team?").

Participative Safety

Participative safety consists of 12 items. Participation is seen as a means of reducing resistance to change, and encouraging commitment and engagement.

This dimension is proposed to have four components: information sharing (e.g., Item 1, "We share information generally in the team rather than keeping it to ourselves"), safety (e.g., Item 7, "People feel understood and accepted by each other"), influence (e.g., Item 8. "Everyone's view is listened to, even if it is in a minority"), and interaction frequency (e.g., Item 5, "We keep in regular contact with each other").

Task Orientation

Task orientation consists of 7 items. High task orientation is characterized by reflexivity, constructive controversy, tolerance of minorities, and commitment to excellence. This dimension describes a general commitment to excellence in task performance, and hence consists of three components: excellence (e.g., Item 38, "Do you and your colleagues provide useful ideas and practical help to enable you to do the job to the best of your ability?"), appraisal (e.g., Item 39, "Do you and your colleagues monitor each other so as to maintain a higher standard of work?"), and ideation (e.g., Item 40, "Are team members prepared to question the basis of what the team is doing?").

Support for Innovation

Support for innovation consists of 8 items. Practical support for innovation and creativity denotes not just team outcomes and products but also creative suggestions regarding changes to team objectives, processes, and strategies. The dimension consists of components such as articulated support (e.g., Item 2, "Assistance in developing new ideas is readily available") and enacted support (e.g., Item 17, "Members of the team provide and share resources to help in the application of new ideas"). Additional details about the factors and components can be found in Loewen and Loo (2004).

Translated Versions of the Team Climate Inventory

The 44-item version of the TCI has been translated into various languages, including Swedish (Agrell & Gustafson, 1994), Finnish (Kivimaki et al., 1997), Italian (Ragazzoni, Baiardi, Zotti, Anderson, & West, 2002), and Norwegian (Mathisen et al., 2004). Although the TCI theoretical model consists of a four-factor solution, studies of factor structures and construct validity across cultures have yielded mixed results. Exploratory factor analyses revealed a five-factor solution in English, Norwegian, and Italian samples (Anderson & West, 1998; Mathisen et al., 2004; Ragazzoni et al., 2002), but a four-factor solution in a Swedish sample (Agrell & Gustafson, 1994). The Finnish case involved running factor analyses on two samples. One sample produced a best fit using a five-factor solution, whereas the other produced good fits for both four- and five-factor solutions (Kivimaki et al., 1997).

The fifth factor consists of four items related to interaction frequency, which were extracted from the participative safety factor in the theoretical model. Confirmatory factor analyses on the English, Finnish, and Norwegian versions indicated that the five-factor model exhibited marginally the best fit (Anderson & West, 1998; Kivimaki et al., 1997; Mathisen et al., 2004). Anderson and West (1998) proposed that differences in the five-factor structure may result from the confounding effects of job complexity. Thus, studies not only support the theoretical four-factor model of the TCI but also suggest that a fifth factor may be required to accommodate different cultures or job complexity.

This study attempts to establish the feasibility of the TCI Taiwan version. Below we describe the process of adapting the TCI for use in Taiwan by presenting the translation process and the results of psychometric tests, including reliability and factor analyses. The main output of this work is a translated measurement tool suitable for use by researchers and team innovation managers in organizations rooted in Chinese culture.

Method

Sample

The sample comprised 203 administrators and managers from 28 teams in a 3,000-bed medical center of Taiwan. Participants were 67.5% men and 32.5% women; ages ranged from 21 to 65 years, with about half of the sample between 31 and 40 years of age. Participants were highly educated, with 51.7% having graduate-level degrees and 21.7% having postgraduate degrees. In terms of job titles, 10 (4.9%) were senior-level managers, 59 (29.1%) were mid-level management, and 134 (66%) were entry-level or administrative staff.

The questionnaire was distributed to the team supervisor or a contact person for each team. Team members then completed the questionnaire anonymously and returned it to the supervisor or contact person, who then returned it to the investigators.

Developing a Taiwanese Version of the TCI

Two expert psychologists translated the 44 items from the English version of the TCI into Chinese, and these translations were then back-translated by a native English speaker. The back-translated version was then compared with the English version. No major differences were observed, with the exception of Item 13 "We have a 'we are in it together' attitude," which was identified as requiring a nonliteral translation. Following discussion with researchers at Assessing Services for Employment (ASE), Item 13 was translated as "We have a 'we are all in the same boat' attitude" in the Taiwan version. This translation issue was also significant in developing the Italian version of TCI (Ragazzoni et al., 2002). Six volunteer subjects were recruited for cognitive debriefing to ensure there were no difficulties in answering the translated version. Major differences were noted and corrected to ensure direct syntactic and semantic matches. The principal investigator for the Taiwan version and the project director conducted extensive discussions of problematic items. The TCI Taiwan version was then produced and readied for field testing.

Statistical Analyses

Psychometric analyses of the TCI Taiwan version included tests of internal consistency, analysis of principal components to test the theoretical structure of the TCI, intercorrelations between factors, and confirmatory factor analysis (CFA) to test the robustness of the four- versus five-factor solution. Statistical software used in this study included SPSS version 11 (2001) and AMOS (Analysis of Moments Structure) version 4.01 (Arbuckle, 1999).

Internal consistency reliability for each scale score was estimated using Cronbach's alpha coefficient. Item analyses were first conducted to determine whether items were sufficiently discriminative and internally consistent with the pertinent factor. Validity was tested using the construct approach. The TCI was theoretically constructed to represent four factors of team climate (vision, task orientation, participative safety, and support for innovation). After excluding six items related to social desirability, an exploratory factor analysis (EFA) was conducted using principal component analysis to test the assumption of whether the TCI contained four or five underlying factors. To ensure that it was appropriate to perform factor analysis on the data, Kaiser's measure of sampling adequacy was computed prior to performing the factor analysis (Comrey, 1978). The Kaiser–Meyer–Olkin measure of sampling adequacy was 0.942, and Bartlett's test of sphericity was significant ($p < .0001$), indicating that the sample was suitable for factor analysis. Factors were extracted using Kaiser's criteria and rotated to orthogonal simple structure using the varimax method.

An additional test of construct validity was performed using CFA to examine the robustness of the four versus five factor solution. The goodness-of-fit statistics of the nested model were compared between the obtained data and the specified or hypothesized structure, as recommended by Anderson and West (1994). For the four-factor model, the first factor contained the vision items, the second the support for innovation items, the third the participative safety items, and the fourth the task orientation items. For the five-factor model, a fifth factor, *interaction frequency*, consisted of four items extracted from the participative safety factor. Model adequacy was assessed through comparison of goodness-of-fit indices. Criteria to evaluate the fit of the models included (a) the ratio of maximum-likelihood chi-square to the degrees of freedom (χ^2/df); (b) the comparative fit index (CFI); (c) the Tucker–Lewis Index (TLI); and (d) the root mean square error of approximation (RMSEA). The following criteria were used to evaluate the goodness of fit: TLI and CFI should be close to or greater than 0.90 (Hu & Bentler, 1998), and an RMSEA value of 0.10 or lower (Browne & Cudeck, 1992). Regarding the χ^2/df, various rules of thumb ranging from 2 to 5 have been recommended as cutoff for goodness of fit.

Results

Scale Analyses and Internal Consistency

Table 1 shows the distribution of scale scores and reliability analysis in terms of the four- and five-factor models, respectively. For both the four- and five-factor models, the mean scores of subscales vision, task orientation, and support for innovation were 39.7 (SD = 6.28), 23.47 (SD = 4.15), and 28.56 (SD = 4.07), respectively. The mean score of the participation safety subscale was 44.8 (SD = 6.02) for the four-factor and 29.53 (SD = 4.09) for the five-factor model. For the five-factor model, the mean score of interaction frequency was 15.26 (SD = 2.17). All scales in both models met or exceeded the 0.8 level of internal consistency. In the four-factor model, the Cronbach's alpha coefficients ranged from .87 (task orientation) to .93 (vision). In the five-factor model, the fifth factor of interaction frequency had the lowest level of coefficient equaling .80. The psychometric results indicated that the internal consistency reliability for the TCI Taiwan version is very good.

Table 1
Descriptive Statistics and Internal Consistency

Scale	No. of Items	Mean	*SD*	α
Vision[a,b]	11	39.70	6.28	.93
Task orientation[a,b]	7	23.47	4.15	.87
Participative safety[a]	12	44.80	6.02	.91
Participative safety[b]	8	29.53	4.09	.88
Support for innovation[a,b]	8	28.56	4.07	.88
Interaction frequency[b]	4	15.26	2.17	.80

a. Factors specifically belonging to the four-factor model, including vision, task orientation, participative safety, and support for innovation.
b. Factors specifically belonging to the five-factor model, including vision, task orientation, participative safety, support for innovation, and interaction frequency.

Table 2
Interscale Correlations for the Four-Factor and Five-Factor Models

Scales	1. Vision	2. Task Orientation	3. Support for Innovation	4b. Participative Safety
1. Vision				
2. Task orientation	.622			
3. Support for innovation	.544	.663		
4a. Participative safety	.577	.650	.848	
4b. Participative safety	.575	.641	.872	
5. Interaction frequency	.512	.593	.706	.827

Note: The four-factor model contained Factors 1 (vision), 2 (task orientation), 3 (support for innovation), and 4a (participative safety). The five-factor model consisted of factors numbered 1 to 3, 4b (participative safety), and 5 (interaction frequency). All the coefficients in this table have a significance level of $p < .01$.

Interscale correlation analyses among the TCI scales, as listed in Table 2, showed that all scales were significantly and positively correlated ($p < .01$). The highest degree of intercorrelation existed between support for innovation and participative safety in the four-factor ($r = .848$) and five-factor ($r = .872$) models. The lowest intercorrelation was between the scales support for innovation and vision ($r = .544$) in the four-factor model, whereas for the five-factor model the lowest intercorrelation was between interaction frequency and vision ($r = .512$).

Exploratory Factor Analyis

Principal component factor analysis was conducted. By using Kaiser's criterion, the results indicated that five factors with eigen values exceeding 1.0 should be retained. On the other hand, a scree analysis revealed that the analysis should retain no more than four factors. To explore the extent to which the originally extracted factor structure could be reproduced using the current data set, it was decided to perform the analysis while retaining both four and five factors, respectively. Combining all scales in the four-factor model, they accounted for 60.2% of the total variance, whereas those from the five-factor model accounted for 63.2%.

Tables 3 and 4, respectively, list the four- and five-factor solutions and factor loadings for the TCI Taiwan version. For the four-factor solution, the normalized factor loading indicated that all but seven items exhibited the highest loadings on the factor to which they were originally referred. Three of these seven items belonged to the support for innovation scale (Items 17, 21, and 24), whereas two belonged to the participative safety scale (Items 7 and 8) and two to the task orientation scale (Items 43 and 44). Just three of these seven items (Items 7, 8, and 21) had factor loadings with their theoretical scale below 0.4. The present analysis revealed that the order and quantity of variance accounted for was as follows: (a) vision, accounting for 19.28% of the total variance; (b) support for innovation, accounting for 16.1% of the total variance; (c) participative safety, accounting for 16.05% of the total variance; and (d) task orientation, accounting for 8.79% of the total variance. The four factors were retrieved in a slightly different order to the original analysis (Anderson & West, 1998), in which the participative safety scale was retrieved ahead of the support for innovation scale.

Table 4 shows that the results of the five-factor solution exhibited weaker fit to the theoretical model than those of the four-factor solution. Ten items were not loaded most highly on the factor to which they originally referred, half of which (Items 10, 13, 16, 43, and 44) had factor loadings with their theoretical scale below 0.4. Factor 1 accounted for 19.37% of total variance and consisted of all the items theoretically designed to refer to that construct, and one item from the task orientation scale. Factor 2 accounted for 14.16% of the variance, and included five items from the theoretical support for innovation scale, and two items originally intended for the participative safety and task orientation scales respectively. The third factor, accounting for 11.32% of the variance, included all items from the interaction frequency scale and three items from the participative safety scale. Factor 4 accounted for 10.23% of the variance and included items from the theoretical participative safety scale and three items intended for

Table 3
Four-Factor Model: Loadings of Factor Analysis for the Team Climate Inventory (TCI) Taiwan Version

Factor	Item	Factor 1	Factor 2	Factor 3	Factor 4	Theoretical TCI Scale
1. Vision	33	0.812				Vision
	29	0.793				Vision
	36	0.770				Vision
	28	0.767				Vision
	30	0.751				Vision
	34	0.720				Vision
	37	0.708				Vision
	32	0.707				Vision
	31	0.689				Vision
	27	0.664				Vision
	35	0.622				Vision
	43	0.438			(0.436)	Task orientation
2. Support for innovation	7		0.752	(0.264)		Participative safety
	10		0.738			Support for innovation
	2		0.700			Support for innovation
	8		0.698	(0.247)		Participative safety
	11		0.690			Support for innovation
	6		0.590			Support for innovation
	25		0.578			Support for innovation
	3		0.467			Support for innovation
3. Participative safety	26			0.717		Participative safety
	20			0.703		Participative safety
	16			0.699		Participative safety
	23			0.659		Participative safety
	14			0.624		Participative safety
	19			0.587		Participative safety
	13			0.575		Participative safety
	17		(0.488)	0.562		Support for innovation
	1			0.483		Participative safety
	44			0.475	(0.428)	Task orientation
	24		(0.402)	0.458		Support for innovation
	5			0.426		Participative safety
	21		(0.383)	0.409		Support for innovation
4. Task orientation	40				0.800	Task orientation
	41				0.773	Task orientation
	39				0.671	Task orientation
	38				0.544	Task orientation
	42				0.428	Task orientation
Percentage explained variance		19.277	16.104	16.046	8.794	

Note: Numbers in parentheses denote the loading of the particular item onto its theoretical scale.

Table 4
Five-Factor Model: Loadings of Factor Analysis for the Team Climate Inventory (TCI) Taiwan Version

Factor	Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Theoretical TCI Scale
1. Vision	33	0.815					Vision
	29	0.794					Vision
	36	0.769					Vision
	28	0.769					Vision
	30	0.752					Vision
	34	0.717					Vision
	37	0.709					Vision
	32	0.708					Vision
	31	0.691					Vision
	27	0.659					Vision
	35	0.626					Vision
	42	0.410				(0.407)	Task orientation
2. Support for innovation	24		0.713				Support for innovation
	25		0.638				Support for innovation
	6		0.624				Support for innovation
	21		0.609				Support for innovation
	23		0.575		(0.436)		Participative safety
	44		0.520			(0.379)	Task orientation
	43		0.509			(0.388)	Task orientation
	17		0.504				Support for innovation
	19		0.492		(0.485)		Participative safety
3. Interaction frequency	26			0.686			Interaction frequency
	20			0.607			Interaction frequency
	5			0.597			Interaction frequency
	16		(0.499)	0.577	(0.190)		Participative safety
	14			0.575			Interaction frequency
	1			0.514	(0.407)		Participative safety
	13		(0.424)	0.513	(0.372)		Participative safety
4. Participative safety	2				0.761		Support for innovation
	10		(0.395)		0.643		Support for innovation
	7				0.617		Participative safety
	8				0.596		Participative safety
	11		(0.510)		0.543		Support for innovation
	3				0.468		Participative safety

(continued)

Table 4 (continued)

Factor	Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Theoretical TCI Scale
5. Task orientation	40					0.791	Task orientation
	41					0.771	Task orientation
	39					0.681	Task orientation
	38					0.570	Task orientation
Percentage explained variance		19.367	14.155	11.322	10.228	8.158	

Note: Numbers in parentheses denote the loading of the particular item onto its theoretical scale.

the support for innovation scale. The fifth factor, representing 8.15% of the variance, came from the theoretical scale task orientation.

Confirmatory Factor Analysis

To ensure the robustness and nested model of the four- and five-factors solution, the fit statistics were used to assess how well each theoretical model fitted the observed data, including χ^2/df, the CFI, the TLI, and the RMSEA. First, a one-factor model in which all items were loaded onto a single factor was applied (one-factor model). Next, correlated and uncorrelated two-factor models were applied, where one factor contained all items from the participative safety and support for innovation scales, and another contained those in the vision and team orientation scales. These two models differed in that the first permitted factor intercorrelation (two-factor correlated), whereas the second did not allow such intercorrelation (two-factor noncorrelated). The same procedure was applied for the four- and five-factor models, where items were allocated to their respective factors based on the theoretical structures.

The results shown in Table 5 indicated that the five-factor correlated model had the best fit to the theoretical model (χ^2/df = 1.984, TLI = 0.863, CFI = 0.872, RMSEA = 0.070), closely followed by the four-factor correlated model (χ^2/df = 2.019, TLI = 0.858, CFI = 0.867, RMSEA = 0.071). Each additional factor slightly improved the goodness of fit for the pertinent factor model to the data, as indicated by the change of χ^2/df from 3.427 to 1.984 and TLI from 0.662 to 0.863. Generally, the correlated models displayed better fit than the non-correlated models, suggesting that all factors in the TCI are intercorrelated.

Table 5
Confirmatory Factor Analysis of the Team Climate Inventory Taiwan Version

Model	χ^2	*df*	χ^2/df	TLI	CFI	RMSEA
One factor	2278.935	665	3.427	0.662	0.680	0.115
Two-factor noncorrelated	1781.185	665	2.678	0.766	0.779	0.091
Two-factor correlated	1666.715	664	2.510	0.790	0.801	0.086
Four-factor noncorrelated	1853.283	665	2.787	0.751	0.765	0.094
Four-factor correlated	1330.729	659	2.019	0.858	0.867	0.071
Five-factor noncorrelated	2127.794	665	3.20	0.694	0.710	0.104
Five-factor correlated	1299.584	655	1.984	0.863	0.872	0.070

Note: TLI = Tucker–Lewis Index; CFI = comparative fit index; RMSEA = root mean square error of approximation.

Discussion

This study focused on determining whether the theoretical model of the TCI is applicable to Taiwan. Generally, the study results indicate that the concepts embodied in the TCI can be conveyed to Taiwanese people. Most tests of the psychometric properties of the Taiwan version of the TCI are satisfactory, suggesting that the translated version is feasible for use in Taiwan. In terms of internal consistency, the reliability of both the four- and five-factor solutions significantly exceeds the usually accepted level (> .80). The exploratory factor analyses demonstrated that the four-factor solution represented a significant proportion of the total variance, whereas items in the fifth factor of frequency of interaction cannot be easily separated from the original factor of participative safety. The CFA analyses demonstrate that the correlated four- and five-factor models both exhibited good fit with the current data. Although the CFA fit indexes of the five-factor model displayed better fit than those of the four-factor model, the differences between the fit indexes are marginal. Clearly, the Taiwan version of the TCI demonstrates the robustness of the instrument in terms of both reliability and measurement constructs of team climate.

In several countries, the TCI has been demonstrated to yield reliable scale scores measuring either four or five factors of team climate. The findings from the English (Anderson & West, 1998), Norwegian (Mathisen et al., 2004), Italian (Ragazzoni et al., 2002), Finnish (Kivimaki et al., 1997), and Canadian (Loo & Loewen, 2002) samples indicate that the model should be revised to display a five factor structure. In contrast, the findings of Anderson and West (1994) and Agrell and Gustafson (1994) indicate that the originally proposed the four-factor structure should be retained. In Taiwan, the results of EFA and CFA support the theoretical four-factor structure. Controversy continues regarding whether a fifth factor of interaction frequency should be incorporated into the instrument. Anderson and West (1998) proposed that differences in the factor structures may result from the confounding effects of job complexity. Although this study proposed a four-factor structure in the Taiwan version, further research is required to determine whether a fifth factor is necessary to accommodate different cultures or degrees of job complexity. However, it is suggested that the four-factor model be preferred in Taiwanese samples given the small differences between the fit of the four and five factor models. Being guided by theory is probably wisest where statistical differences are small.

All four scales were found to intercorrelate positively, replicating the pattern of results obtained using the original TCI scales. Similar to the Norwegian version of TCI (Mathisen et al., 2004), the most notable relationship existed between support for innovation and participative safety (r = .85). Previous studies have argued that the high correlation between these two scales may represent significant shared variance between factors, indicating an overlap in their underlying dimensions and a possible halo effect (see Mathisen & Einarsen, 2004 for a review). However, the fact that the mean interitem correlations between these two scales vary between .5 and .7 suggested that the items listed in both scales represented varied attributes rather than being too similar and reflecting problems related to redundancy. It is necessary to differentiate separate factors based on the findings of criteria validity and practical purpose. Studies have demonstrated that the four factors differ in terms of criterion validity, demonstrating the need to differentiate separate factors. For example, support for innovation has been shown to be a particularly good predictor of team innovation (Mathisen & Einarsen, 2004). Additionally, keeping a number of factors rather than a composite score may increase practical value of this instrument. Loewen and Loo (2004) suggested that using the TCI and its underlying factors can act as a powerful diagnostic tool for team climate interventions. Directing the TCI survey feedback toward specific factors may be more effective than adopting an unspecified composite approach.

In the original English version, the factors were retrieved in the following order: vision, participative safety, support for innovation, and task orientation (Anderson & West, 1994). In the Taiwan version, the analysis results in an order as follows: vision, support for innovation, participative safety, and task orientation. The first extraction scale in Taiwan is identical to the English, Finnish, and Norwegian versions, but different from the Italian (Ragazzoni et al., 2002) and Swedish (Agrell & Gustafson, 1994) versions. Differences in order retrieval among countries may reflect not only differences in sample characteristics but also differences in organizational cultures between these countries.

According to the study of international differences in organizational culture by Hofstede (2001), significant differences existed between Taiwan and the United Kingdom, particularly in three dimensions related to innovation (i.e., uncertainty avoidance, individualism, and power distance). Compared to the United Kingdom, organizational culture in Taiwan is characterized by large power distances, high uncertainty avoidance, and low individualism. This is especially true for the medical center examined in this study, in which organizational context is manifested in a tall hierarchy and strong centralization. Taiwanese managers are likely to favor attempts at innovation if proposed new ideas are supported by individuals with status, power, and resources (Shane, Venkataraman, & Macmillan, 1995). Therefore, increased emphasis is placed on support from supervisors for innovation in Taiwan, rather than an emphasis on participation as an important factor characteristic of work organizations in the United Kingdom.

Collaborative teamwork is crucial for high-quality patient care and for the development of new and improved ways of providing that care. Team climate is a key characteristic of successful and innovative teams in health care settings (Ouwens et al., 2008; Proudfoot et al., 2007). However, to date no well-established instrument measuring team climate for innovation has been available in Taiwan. The translation and psychometric testing of the TCI has important practical values. The TCI can be used as a diagnostic tool in organizational climate surveys, team building, and development. Reliable and valid measures of team climate are also enormously useful as a guide for quality improvement when evaluating the effects of interventions on team climate. Additionally, the translated TCI can be used in research on cross-cultural differences in team climate and associated factors.

Although this study illustrates the feasibility of applying the TCI to Taiwan, it is also important to recognize its limitations. This study does not fully establish the psychometric properties of the TCI in Taiwan, and thus further assessment of reproducibility and validity is necessary.

Conclusions

In conclusion, this study has presented empirical data illustrating the feasibility of applying the TCI in Taiwan. This translated version of the TCI appears to be a practical and reliable instrument for application to the working population in Taiwan. This study concludes that the four-factor structure possesses the best fit to the data in terms of EFA and CFA and offers the best fit too to the theoretical model that underpins the instrument. Evidence that adding a fifth factor to the tool may offer incremental value is worth further exploration, particularly to determine whether this fifth factor offers incremental predictive validity over the four-factor solution. This factor structure issue raises important questions regarding how attributions and perceptions of team climate can be influenced by differences in culture and/or job complexity. Further research on international differences in conceptualization of team climate dimensions is warranted.

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