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Abstract

This study reports the factor structure of a Korean version of the 16-item Wong and Law Emotional Intelligence Scale (WLEIS) for a sample of 161 Korean university students. Confirmatory factor analysis supported the four-factor model of the WLEIS: (1) self-emotional appraisal, (2) others' emotional appraisal, (3) use of emotion, and (4) regulation of emotion. However, improvement of the model fit after removing three items suggests the need for future research on the cross-cultural measurement invariance of the WLEIS.

Keywords

emotional intelligence, factor analysis, validity, university students, Korean

Introduction

Two theoretical models of emotional intelligence (EI) dominate the current research literature. Ability EI is an intelligence, defined as "the ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate emotion in the self and others" (Mayer & Salovey, 1997, p. 5). Trait EI is a "constellation of emotional self-perceptions located at the lower levels of personality hierarchies" (Petrides, 2010, p. 137). Research supports the relationship between trait EI and positive life experiences, including life satisfaction, academic success (Austin, Saklofske, & Mastoras, 2010; Schutte et al., 2010), and both mental and physical health (Austin, Saklofske, & Egan, 2005; Keefer, Parker, & Saklofske, 2009; Parker, Taylor, & Bagby, 2001).

Cross-cultural studies of ability EI are challenging because judging correct responses is difficult and cultural display rules vary among ethnic groups resulting in East-West response differences. Alternatively, self-report tests require respondents to rate their typical behaviours on a Likert-type scale and consequently, assessing trait EI appears less difficult than performance testing. However, cross-cultural EI assessment raises the key issue of measurement invariance. The Schutte Emotional Intelligence Scale (SEIS; Schutte et al., 1998) shows different factorial structures even within Western cultures (Austin, Saklofske, Huang, & McKenney, 2004).

Differences in emotional expression across cultural groups (Matsumoto, 1993; Matsumoto & Ekman, 1989)

may be a key issue when examining the factorial invariance in EI measures. Chan (2004) found the SEIS contained many uninterpretable items for teachers from Hong Kong; only 12 items remained from the original 33 items. Poor functioning items might be culturally biased, reflecting differences between Western and Chinese cultures in the meaning and reporting of emotional behaviors and experiences.

The Wong and Law Emotional Intelligence Scale (WLEIS; Wong & Law, 2002), developed in Hong Kong, has been examined in cross-cultural studies. The 16-item self-report WLEIS, based on the Mayer and Salovey (1997) EI model, measures four dimensions: Self emotional appraisal (SEA) measures the individual's ability to understand their emotions, others' emotional appraisal (OEA) is the ability to recognize and understand other people's emotions, use of emotion (UOE) is the tendency to motivate oneself to enhance performance, and regulation of emotion (ROE) assesses the ability to regulate emotions.

The WLEIS was cross-validated with several East Asian groups from China (Law, Wong, & Song, 2004; Shi &

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Wang, 2007; Wong & Law, 2002) and Japan (Fukuda et al., 2011) supporting the four-dimensional structure (Fukuda et al., 2011; Law et al., 2004; Shi & Wang, 2007), the predictive validity with life satisfaction (Fukuda et al., 2011; Law et al., 2004), and discriminant validity with the five-factor personality dimensions (Law et al., 2004; Shi & Wang, 2007; Wong & Law, 2002). The WLEIS is a promising cross-cultural EI measure. The purpose of the present study was to further examine the factorial structure of the WLEIS with Korean university students.

Method

Participants

Korean university students whose first language is Korean were recruited from universities in and outside Seoul, South Korea. A sample included 161 students, 78 males and 83 females ($M = 20.75$ years, $SD = 2.04$).

Measure

The WLEIS (Japanese version) was translated into Korean by a bilingual native Korean researcher, and blindly back-translated by another bilingual native Korean researcher to ensure language equivalence. Japanese and Korean are linguistically similar and consequently, one round of back-translation was required as language equivalence is relatively easily achieved. The translated WLEIS retained the original 16 items and the 7-point Likert-type response format.

Procedure

The current research was part of a larger study following ethical procedures established in Korean universities. Information about the study was given to students in their classes, and those who volunteered to participate received a pen. Participants completed the WLEIS in group testing sessions of about 10 minutes.

Analysis

Missing values, comprising less than 1% of data, were imputed by a stochastic regression imputation method using the LISREL 8.80 (Jöreskog & Sörbom, 2006). Confirmatory factor analysis was conducted using LISREL 8.80 and the following four measures of fit were used to evaluate the model adequacy: chi-square, nonnormed fit index (NNFI; Bentler & Bonett, 1980), comparative fit index (CFI; Bentler, 1990), and root mean square error of approximation (RMSEA; Steiger, 1990). Values $\geq .90$ show acceptable fit for the NNFI and the CFI, and values $\leq .08$ are acceptable for the RMSEA (Kline, 2005).

Table 1. Descriptive Statistics, Correlations, and Reliabilities Among the Four WLEIS Subscales

Subscales	<i>M</i>	<i>SD</i>	SEA	OEA	UOE	Internal consistency
SEA	5.09	1.07	—			.80
OEA	5.02	0.97	.46**	—		.74
UOE	5.07	1.01	.45**	.26**	—	.74
ROE	4.53	1.10	.12	.24**	.23**	.83

Note. WLEIS = Wong and Law Emotional Intelligence Scale; SEA = Self-Emotion Appraisal; OEA = Other's Emotion Appraisal; UOE = Use of Emotion; ROE = Regulation of Emotion. $N = 161$. Pearson correlation coefficients. ** $p < .01$ (two-tailed tests).

Results

Descriptive Statistics, Correlations Among the Four Subscales, and Internal Consistency Reliability

Means and standard deviations of the subscales, the correlations between the subscales, and reliability are reported in Table 1. Except between SEA and ROE, the correlations were statistically significant. Reliabilities for all domains and the total WLEIS were satisfactory following Nunnally and Bernstein's (1994) recommendation of .70 or higher for acceptable reliability.

Factor Analysis

Two models tested the fit to the observed data. The full model consists of the four correlated factors; each comprised of four items. The second model (restricted model) was a second-order factor model consisting of a general EI factor and the four aforementioned first-order factors. The second-order factor model has been supported in other studies (Fukuda et al., 2011; Kafetsios & Zampetakis, 2008; Law et al., 2004; Whitman, Van Rooy, Viswesvaran, & Kraus, 2009; Wong & Law, 2002). Both models tested are congeneric models (Lee, Dunbar, & Frisbie, 2001), which consist of free lambda loadings and a diagonal theta matrix that estimates residual variances; no residual covariances were fit to the data.

The indices for the both models indicated a good fit to the observed data (Table 2). The results of the chi-square difference test was significant, $\Delta\chi^2(2) = 6.344$, $p = .042$; thus the full model best described the observed data. Factor loadings and variance explained by the four factors and squared multiple correlations for each indicator are reported in Table 3. The factor loadings of the full model are presented in Figure 1. The majority of items show excellent factor loadings ($>.70$), three have very good factor loadings ($>.63$), two show fair factor loadings ($>.45$), and one item has a poor factor loading ($>.32$; Comrey & Lee, 1992). All

Table 2. Fit Indices for the Full and Restricted Models

Model	NNFI	CFI	RMSEA	90% CI		Minimum fit function χ^2		
				LL	UL	χ^2	df	p
Full	.951	.960	.062	-0.079	0.043	155.572	98	<.001
Restricted	.948	.957	.062	-0.079	0.044	161.916	100	<.001

Note. NNFI = nonnormed fit index; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI, confidence interval; LL, lower limit; UL, upper limit.

Table 3. First-Order Factor Loadings and Variance Explained for the Wong and Law Emotional Intelligence Scale

Item	Parameter estimates		Squared multiple correlations for the indicator	Average variance explained by the constructs
	Unstandardized	Standardized		
1	1.110	0.709	.502	.537
2	1.006	0.806	.649	
3	1.104	0.849	.721	
4	0.660	0.523	.274	
5	0.791	0.652	.426	.431
6	1.071	0.755	.570	
7	0.639	0.468	.219	
8	0.833	0.712	.507	
9	0.584	0.444	.197	.443
10	0.883	0.633	.400	
11	1.070	0.762	.581	
12	0.962	0.769	.592	
13	0.820	0.631	.398	.551
14	1.030	0.773	.597	
15	1.109	0.757	.573	
16	1.049	0.796	.634	

factor loadings and correlations between the underlying factors are statistically significant except for the correlation between the SEA and the ROE. Correlations among the four WLEIS dimensions range from small to large though mostly in the moderate range (Figure 1).

Since three items—Item 4 (“I always know whether or not I am happy”), Item 7 (“I am sensitive to the feelings and emotions of others”), and Item 9 (“I always set goals for myself and then try my best to achieve them”), from the full model showed lower factor loadings, a four-factor structure without these three items (13-item WLEIS), was also examined. The indices for this third model indicated a good fit to the observed data, NNFI = .958, CFI = .968, RMSEA = .061, 90% CI [-0.083, 0.036]. The Akaike information criterion (AIC) indicates that this model (AIC = 157.944) has a relatively better fit and fewer parameters when compared with the full model (AIC = 233.316). However, the 16-item

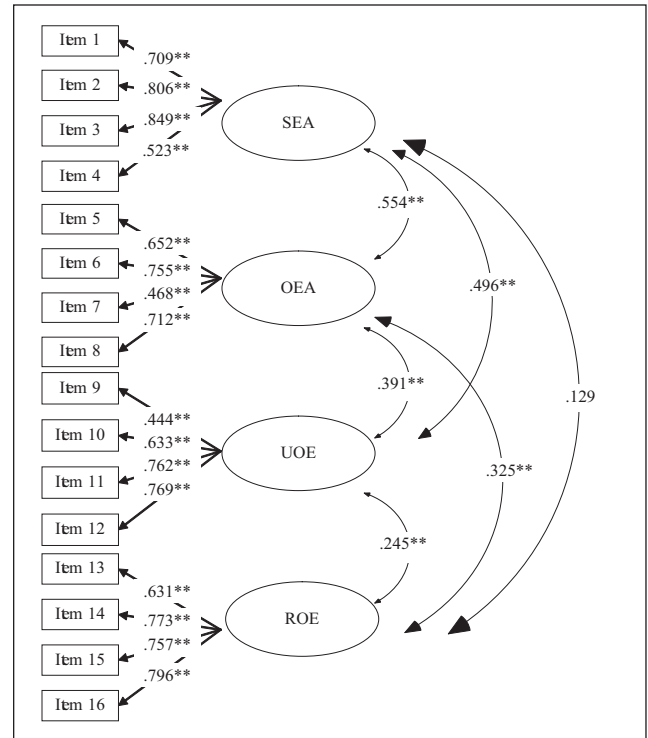


Figure 1. Four-factor confirmatory factor analysis model of the Wong and Law Emotional Intelligence Scale (full model)
 Note. SEA = Self-Emotion Appraisal; OEA = Other's Emotion Appraisal; UOE = Use of Emotion; ROE = Regulation of Emotion.
 ** $p < .01$

WLEIS was selected as the appropriate model for the following reasons: (1) Confirmatory factor analysis is generally conducted for theory testing instead of theory generating to ensure a strong theoretical foundation to test the model fit; (2) the 16-item WLEIS fits well to the observed data; and (3) the three items in question still meet the minimum requirement of .32 for interpretable data (Comrey & Lee, 1992). Removing the three items would potentially require modifying the original theoretical framework, which would then need to be applied in future work with a similar sample. The authors did not feel that this was justified in the current context.

Discussion

The Korean version of the WLEIS retained the original four-factor structure and added support for the reliability of the scale as well as evidence of the generalizability of the WLEIS in non-Western cultures.

More research is necessary to clarify the inconsistent intercorrelations among the SEA and ROE subscales in contrast to the studies reporting statistically significant correlations among all subscales (Fukuda et al., 2011; Ng,

Wong, Zalaquett, & Bodenhorn, 2007; Wong & Law, 2002). This may be because of cultural factors in processing emotions, sampling characteristics, or the subscale and item composition. Future studies, including mediating variables such as individualism and collectivism, may elucidate the inconsistent intercorrelations since these cultural orientations can impact emotional perceptions and expressions. Removing Items 4, 7, and 9 improved the model fit. Comparing the Japanese results (Fukuda et al., 2011), at least two of the lower loading items (items 7, 9) seem to be unique to the Korean sample. Research is required to conclude whether these items truly reflect unique cultural factors or are just less effective items. An item response theory approach would provide clarification regarding item functioning questions.

Although the sample size was small, 100 to 200 subjects are considered a "medium" sample size. Furthermore, the models tested here meet Kline's (2005) factor structure recommendation that they should be comprised of at least three indicators per factor; the WLEIS has four indicators per factor. Larger studies are now required to replicate, or challenge the findings of this study and to examine the convergent and discriminant validity of the Korean version of the WLEIS.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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