

Factor Structure of Japanese Versions of Two Emotional Intelligence Scales

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This article reports the psychometric properties of two emotional intelligence measures translated into Japanese. Confirmatory factor analysis (CFA) was conducted to examine the factor structure of a Japanese version of the Wong and Law Emotional Intelligence Scale (WLEIS) completed by 310 Japanese university students. A second study employed CFA to examine the factor structure of a Japanese version of the Schutte Emotional Intelligence Scale (SEIS) completed by 200 Japanese university students drawn from the first study. A four-factor model was replicated for both the WLEIS and for the SEIS. Structural equation modeling indicated that higher WLEIS and SEIS scores were related to higher self-reported satisfaction with life.

Keywords: *emotional intelligence, factorial structure, life satisfaction, SEIS, validity, WLEIS*

INTRODUCTION

The construct of emotional intelligence (EI) has drawn considerable interest in many different countries following its introduction by Salovey and Mayer (1990) and Goleman (1995). From both a research and measurement perspective, two distinct models of EI are currently described in the literature (e.g., Mayer, Caruso, & Salovey, 2000; Parker, Saklofske, & Stough, 2009; Petrides & Furnham, 2001; Roberts, Zeidner, & Matthews, 2001; Zeidner, Matthews, & Roberts, 2009). The ability model defines “emotional intelligence 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). The trait model defines EI as “a constellation of behavioural dispositions and self-perceptions concerning one’s ability to recognize, process, and utilize emotion-laden information” (Petrides & Furnham, 2003, p. 40). The differences in these two models are evident; the ability model views EI as an intelligence or cognitive ability, and trait EI is viewed more as a personality characteristic.

Ability EI models are measured by objective performance tests while trait EI models are most often assessed by self-report tests. While there are advantages to the use of the objective EI performance tests, the challenge is to determine what to consider as a correct response. This is a critical point in conducting cross-cultural studies because culture impacts societal norms and standards related to emotional expressions and recognitions (Matsumoto & Ekman, 1989). On the other hand, self-report EI measures indicate typical attributes of the individual’s thoughts, feelings, and behaviors in certain situations. Although the self-report measures have disadvantages such as response bias, these issues can be better managed than finding solutions to the fundamental scoring issue of the performance measures. Therefore, using self-report tests in cross-cultural settings appears to be a sensible approach.

The central focus of contemporary EI research includes efforts to establish consistent theories and models, establish EI as a universal construct, and develop psychometrically sound measures. Cross-cultural studies are required to support all three purposes. In cross-cultural research, a measurement developed in one culture is studied in another. This process does not simply involve translations of the items of the scale. Researchers must examine whether the measurement of a psychological construct that was originally formulated in a single culture is applicable and meaningful in another culture (i.e., cross-culturally valid). This requires several prerequisites including a culturally sensitive adaptation of the instrument, and then demonstrating the same “structure” across cultures (Matsumoto & Juang, 2004).

There is a growing number of EI measures developed in Western countries, but there are very few created specifically in Eastern countries. With this as a background, it is noteworthy that the Wong and Law Emotional Intelligence Scale

(WLEIS; Wong & Law, 2002) was developed in Hong Kong followed by several published studies investigating the reliability and validity of this scale. On the other hand, even though some EI measures are already well-known, the psychometric properties of these measures have mainly been established in Western cultures. For example, the Schutte Emotional Intelligence Scale (SEIS; Schutte, Malouff, & Bhullar, 2009; Schutte et al., 1998) is one of the best-known EI tests; however, published studies examining its psychometric properties are based primarily on samples from Western countries. Consequently, the applicability of this measure in Eastern culture is not well examined and such findings are awaited.

In this study, the WLEIS and SEIS, described in more detail next, were selected from available EI measures because they are both accessible, brief self-report measures, and are comprised of four subscales that also yield a total EI score. In addition, both measures are based either on the EI conceptualizations of Salovey and Mayer's original theoretical model (1990) or Mayer and Salovey's revised theoretical model (1997). The original model consists of three categories of abilities: appraisal and expression of emotion, regulation of emotion, and utilization of emotions in solving problems. The revised model emphasizes the conceptualization of potential intellectual and emotional growth in its four branch model of emotional intelligence and consists of the following branches: (1) perception, appraisal, and expression of emotion; (2) emotional facilitation of thinking; (3) understanding and analyzing emotions and employing emotional knowledge; and (4) reflective regulation of emotions to promote emotional and intellectual growth. The domains of the WLEIS were developed following the four-branch model while the SEIS was based on the original theoretical model.

The WLEIS is a 16-item scale employing a 7-point Likert type response format. A total EI measure and four subscales are tapped by the WLEIS. Self-emotional appraisal (SEA) assesses the individual's self-perceived ability to understand his or her emotions. Others' emotional appraisal (OEA) measures the self-perceived ability to recognize and understand other people's emotions. The use of emotion (UOE) scale measures the self-perceived tendency to motivate oneself to enhance performance while regulation of emotion (ROE) focuses on the self-perceived ability to regulate one's emotions. Validation studies of the WLEIS have been conducted with Chinese participants in Hong Kong and two cities (i.e., Beijing and Shandong province) in China (Law, Wong, & Song, 2004; Li, Saklofske, Fung, & Yan, 2011; Shi & Wang, 2007; Wong & Law, 2002), Greek participants (Kafetsios & Zampetakis, 2008), and international students in the United States (Ng, Wong, Zalaquett, & Bodenhorn, 2007). General findings support the four-dimensional definition of the WLEIS among these cultural groups. In addition, an acceptable model fit has been reported for the second-order factor structure of the WLEIS, which consists of a general EI factor and the four subscales (Kafetsios & Zampetakis, 2008; Law et al., 2004; Wong & Law, 2002). Moreover, in response to the criticism that trait EI models are essentially proxies for conventional personality

constructs, these studies showed that the WLEIS is related but distinct from the Big Five personality dimensions.

The SEIS is a 33-item scale assessing trait EI using a 5-point Likert type response format. The SEIS composite score has demonstrated good reliability (Schutte, Thorsteinsson, Hine, Foster, Cauchi, & Binns, 2010); however, evidence for the scale's construct validity is somewhat less clear. Schutte et al. (1998) recommended using a total score to reflect a single factor or composite EI score, which has been supported in other studies (Brackett & Mayer, 2003). However, further studies have focused on the primary factors argued to comprise this measure. A four-factor solution has been reported (Ciarrochi, Chan, & Bajgar, 2001; Ciarrochi, Deane, & Anderson, 2002; Petrides & Furnham, 2000; Saklofske, Austin, & Minski, 2003). For instance, Ciarrochi et al. (2001) described the four factors of the SEIS as comprising perception of emotions, managing emotions in the self, social skills, or managing others' emotions, and utilizing emotions. Petrides and Furnham (2000) described a somewhat similar four-factor structure comprised of optimism/mood regulation, appraisal of emotions, social skills, and utilizing emotions. However, other studies have reported a three-factor structure (Austin, Saklofske, Huang, & McKenney, 2004), consisting of regulating/using emotions, optimism/positivity, and appraisal of emotions. While the number of specific factors found in the SEIS is still a point of contention, Gardner and Qualter (2010) compared three commonly used trait EI measures and concluded that SEIS appears to be a valid measure of global trait EI.

Although the factor structure of the SEIS is somewhat inconsistent among studies conducted in Western countries, studies from Eastern cultures to support either the three-, four-, or other-factor structure are lacking with the exception of one study of Chinese secondary school teachers from Hong Kong. EFA and CFA results supported the four factor structure of the SEIS but only with a reduced 12-item set (Chan, 2004). This raises the question of applicability of the SEIS in Eastern cultures: Does the factor structure approximate or differ from the original factor structure reported in Western cultures, and do some SEIS items need to be removed or modified as they do not meaningfully contribute to the EI construct in Eastern cultures? Therefore, cross-cultural studies examining the psychometric properties of the SEIS are required to demonstrate its universal applicability as well as the robustness of the EI construct.

Life satisfaction is frequently presented as a key indicator of EI criterion validity (Austin, Saklofske, & Mastoras, 2010; Gignac, 2006; Law et al., 2004; Schutte et al., 2010). Life satisfaction is defined as "a global assessment of a person's quality of life according to his chosen criteria" (Shin & Johnson, 1978, p. 478). As Tatariewicz (1976) indicated, happiness requires satisfaction with life as a whole. Consequently, it is essential to examine the overall evaluation of one's life to understand the degree of satisfaction and happiness in life. The Satisfaction with Life Scale (SWLS) is one of the most well-examined scales to measure global life

satisfaction (Diener, Emmons, Larsen, & Griffin, 1985). It consists of five items responded to on a 7-point Likert scale. In our study, this scale was used to assess the criterion validity of EI.

The purpose of the present study was to examine the factorial structure of the WLEIS and the SEIS with Japanese university students to determine the applicability of these scales in the Japanese culture. In addition, this study aimed to determine the convergent validity between these EI measures and to examine whether EI also correlated with life satisfaction as demonstrated in a number of studies (Austin, Saklofske, & Egan, 2005; Ciarrochi, Chan, & Caputi, 2000; Saklofske et al., 2003; Wing, Schutte, & Byrne, 2006).

STUDY 1

Method

Participants. A non-probability sampling method was used in this study. A sample of 310 Japanese university students were recruited from two universities located in the Hiroshima prefecture and from another university in the Chiba prefecture. Information about this study was given to students in their classes, and those who volunteered to participate received a small honorarium. The mean age was 20.27 years ($SD = 1.79$). The sample included 143 males (46.1%) and 167 females (53.9%).

Measure. The WLEIS was translated into Japanese by the first author, and blindly back-translated by a bilingual native Japanese and a native English speaker. As Berry (1980) indicated the goal of translation is to obtain instruments with conceptual equivalence—a literal translation of a measure is not sufficient for conveying its equivalence to different cultural groups (McGorry, 2000). Therefore, three rounds of back-translation were completed to ensure linguistic equivalence or retention of original meaning of the WLEIS. Since this back-translation process was conducted over a three-month period, and the translators were asked not to check their previous versions of translations in the second and the third translation phase, the problem of the translators being influenced by their previous translations was minimized.

Procedure. Participants who volunteered for this study completed the self-administered measure in one testing session. Ethics approval was received from the Conjoint Faculties Research Ethics Board at the University of Calgary in Canada for this study because the principal investigators are registered at this university even though the study was conducted in Japan.

Analysis. Using SAS 9.1, missing data (<1% of data) were imputed by a stochastic regression imputation method (Rubin, 1987). Maximum-likelihood confirmatory factor analyses (CFA) using LISREL 8.80 (Jöreskog & Sörbom, 2006) were conducted to evaluate the significance of each WLEIS factor loading and goodness of fit of models. The following four measures of fit were used in the evaluation of the adequacy of the models in CFA and SEM: chi-square; the non-normed fit index (NNFI; Bentler & Bonett, 1980); the comparative fit index (CFI; Bentler, 1990); and the root mean square error of approximation (RMSEA; Steiger, 1990). Values equal to or above .90 show an acceptable fit for the NNFI and the CFI, and values equal to or less than .08 are an acceptable fit for the RMSEA.

Results

Descriptive Statistics and Correlations among the Four WLEIS Subscales. The means and standard deviations of the four WLEIS subscales are presented in the left half of the columns in Table 1. These descriptive statistics are similar to those found in previous studies reported for Chinese students in Hong Kong by Wong and Law (2002) ($N = 149$, $M_s = 4.50$ – 4.71 , $SD_s = 0.91$ – 0.97) and Law et al. (2004) (Sample 1: $N = 418$, $M_s = 3.78$ – 4.15 , $SD_s = 0.96$ – 1.12 ; Sample 2: $N = 314$, $M_s = 4.27$ – 4.84 , $SD_s = 0.99$ – 1.20). However, these results differ slightly from those presented in other studies. Shi and Wang (2007) reported WLEIS scores of Chinese university students in Beijing and Shandong province in China (Male: $N = 907$, $M_s = 4.89$ – 5.54 , $SD_s = 0.77$ – 1.18 ; Female: $N = 550$, $M_s = 4.60$ – 5.50 , $SD_s = 0.76$ – 1.20). Ng et al. (2007) presented WLEIS data for international university students studying in the United States ($N = 628$, $M_s = 5.05$ – 5.70 , $SD_s = 1.17$ – 1.44), which also included Japanese international students ($N = 35$, $M_s = 5.02$ – 5.71 , $SD_s = 0.85$ – 1.18). To compare their results with the Japanese results presented here, we conducted independent samples t -tests under

TABLE 1
Descriptive Statistics and Correlations among the Four WLEIS Subscales

Subscales	<i>M</i>	<i>SD</i>	SEA	OEA	UOE
SEA	4.68	1.16	—		
OEA	4.23	1.26	.37**	—	
UOE	4.25	1.22	.32**	.21**	—
ROE	3.99	1.39	.32**	.25**	.28**

Note. SEA = Self-Emotion Appraisal, OEA = Other's Emotion Appraisal, UOE = Use of Emotion, and ROE = Regulation of Emotion. $N = 310$.

Pearson correlation coefficients. ** $p < .01$ (two-tailed tests).

the assumption of equal variances. The results suggested that there were significant differences between all the scores in our study and those of Japanese students in Ng et al. study, $t_{.025}(341) = \pm 1.960$, SEA: $t = 5.06$, OEA: $t = 4.21$, UOE: $t = 6.09$, ROE: $t = 4.22$.

The correlations between the subscales of the WLEIS are reported in Table 1. The small to moderate correlations among the four EI dimensions (ranging from $r = .21$ to $.37$) are in line with the results of Wong and Law's (2002) study (ranging from $r = .13$ to $.42$). These results show that the four dimensions are correlated but also tap unique aspects of the EI construct.

Internal Consistency Reliability. Internal consistency of the WLEIS was examined with Cronbach's coefficient *alpha* and was found to be satisfactory for all the domains following Nunnally's (1978) recommendation of .70 or higher suggesting acceptable reliability. The reliabilities are: .790 for SEA, .867 for OEA, .731 for UOE, and .882 for ROE. The reliability for the total WLEIS of .848 was also satisfactory.

Factor Analysis. A series of CFA were conducted to evaluate three different factor models of the WLEIS. The first model was a one-factor model, which has all 16 items comprising a single factor. The second model examined was the four-factor model of the WLEIS consisting of the four correlated factors, each comprised of four items. In addition, a second-order four-factor model, which has a general EI factor and four first-order factors, was examined since some studies reported evidence for the second-order four-factor model (Kafetsios & Zampetakis, 2008; Law et al., 2004; Wong & Law, 2002).

The results indicated a poor fit for the one-factor model of the WLEIS: NNFI = .415, CFI = .493, and RMSEA = .237 with 90% of confidence interval of .228–.247. On the other hand, the indices for the four-factor structure model indicated a good fit to the observed data: NNFI = .961 and CFI = .969, and RMSEA = .060 with 90% confidence interval of .049–.072. The factor loadings of the items to factors are presented in Figure 1. Most of the items of the WLEIS show excellent factor loadings ($>.70$) (Comrey & Lee, 1992) except two items on the SEA factor, which had loadings of .649 and .432, and two items on the UOE factor with loadings of .305 and .678. However, all the factor loadings were statistically significant. Table 2 reports the factor loadings and variance explained for the lower order constructs. The unstandardized and standardized factor loadings are reported in column one and two, respectively. In column three, squared multiple-correlations for each indicator, R^2 , are reported. The average variance explained by the constructs is reported in column four.

All correlations between the underlying factors were also significant. Although the correlation of .216 between OEA and UOE was small, all the other factor correlations were moderate in their magnitude (see Figure 1). Thus, the assumption

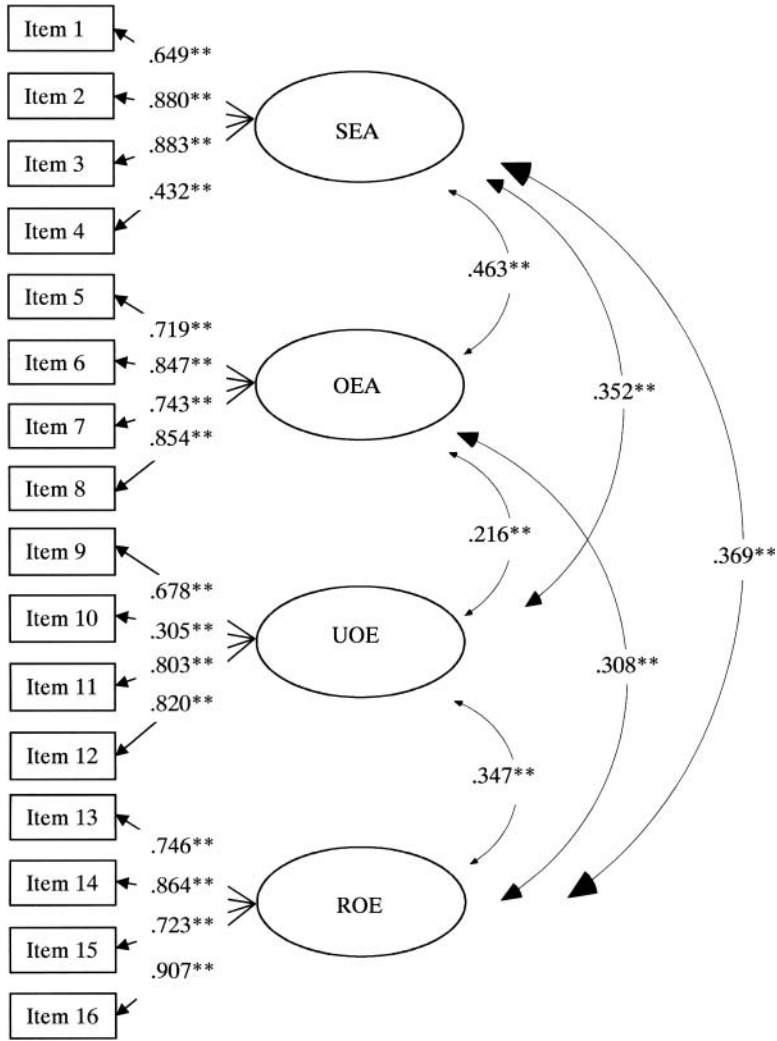


FIGURE 1
 Four-factor CFA model of the WLEIS.
 ** $p < .01$.

that the WLEIS factors are correlated was supported. These results further support a four-factor structure for the WLEIS in this Japanese university student sample, which aligns with the findings of previous studies (Kafetsios & Zarnpetakis, 2008; Law et al., 2004; Ng et al., 2007; Shi & Wang, 2007; Wong & Law, 2002).

TABLE 2
First-Order Factor Loadings and Variance Explained for the WLEIS

Item	Unstandardized Parameter Estimates	Standardized Parameter Estimates	Squared Multiple Correlations for the Indicator	Average Variance Explained by the Constructs
1	.935	.649	.421	.540
2	1.293	.880	.774	
3	1.278	.883	.779	
4	.676	.432	.187	
5	1.039	.719	.516	.629
6	1.336	.847	.717	
7	1.174	.743	.553	
8	1.167	.854	.729	
9	1.099	.678	.460	.468
10	.514	.305	.093	
11	1.311	.803	.645	
12	1.313	.820	.673	
13	1.229	.746	.557	.662
14	1.360	.864	.747	
15	1.210	.723	.523	
16	1.431	.907	.823	

Similarly, the second-order four-factor model also demonstrated a good fit for the observed data (Figure 2): NNFI = .961 and CFI = .967. The RMSEA also showed an acceptable fit: RMSEA = .061 with 90% confidence interval .050 – .073. Likewise for the four-factor model, all the factor loadings were statistically significant. Similar to Table 2 for the lower order constructs, Table 3 reports factor loadings and variance explained for the second-order construct. The second-order factor analysis replicated the less than .70 factor loading on two items on the SEA

TABLE 3
Second-Order Factor Loadings and Variance Explained for the WLEIS

Constructs	Unstandardized Parameter Estimates (Beta)	Standardized Parameter Estimates	Squared Multiple Correlations for the Indicator	Average Variance Explained by the Construct
SEA	1.098	.739	.547	.353
OEA	.721	.585	.342	
UOE	.553	.484	.234	
ROE	.639	.539	.290	

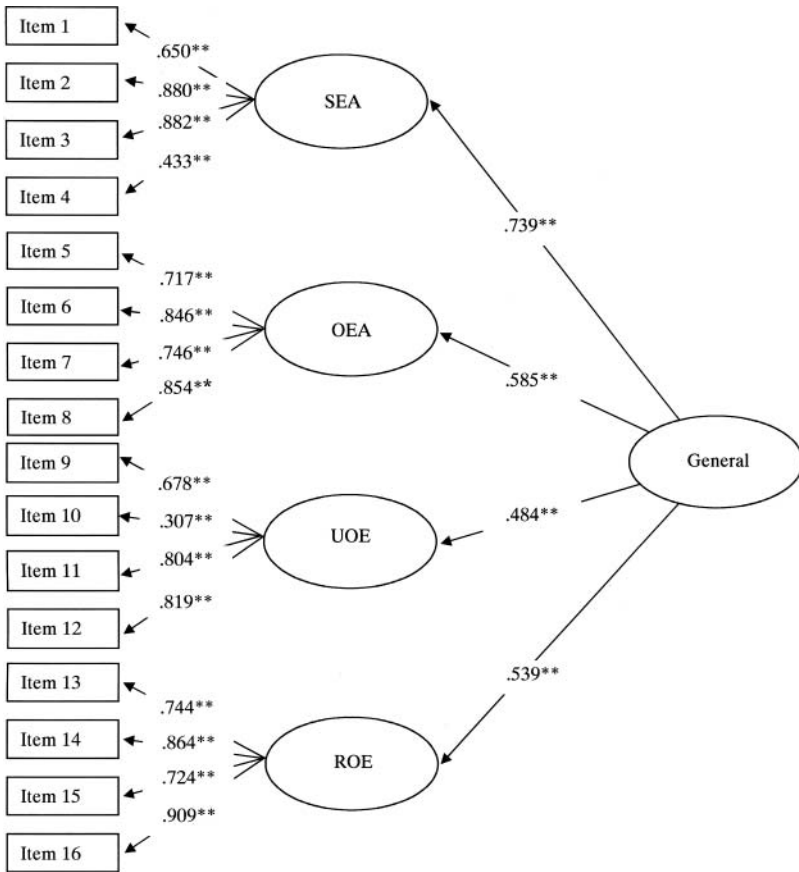


FIGURE 2
 Second-order four-factor CFA model of the WLEIS.
 ** $p < .01$.

factor, which had loadings of .650 and .433 and two items on the UOE factor, which had loadings of .307 and .678.

The chi-square difference statistic was used to test the improvement in fit as paths were added. The minimum fit function chi-square for the four-factor model was $\chi^2(98) = 210.270, p < .001$ while that of the second-order four-factor model was $\chi^2(100) = 216.188, p < .001$. The result of the chi-square difference test was not significant, $\Delta\chi^2(2) = 5.918, p = .052$, which suggests that both models described the data equally well. As Wong and Law (2002) stated, the theoretical expectation of the WLEIS consists of the four underlying factors of

the multidimensional EI construct, and these factors can be combined to form an estimate of the overall EI construct. The second-order factor model is supported in this study.

STUDY 2

Method

Participants. Two hundred Japanese university students from the two universities in the Hiroshima prefecture who completed the WLEIS also completed the SEIS as well as the SWLS. The mean age of the group was 20.55 years ($SD = 1.48$). The sample included 86 males (43%) and 114 females (57%).

Measures. The SEIS was used to examine EI of the Japanese university students and the SWLS was used to measure the level of their life satisfaction. The scales used in Study 2 were translated into Japanese by the first author, and blindly back-translated by a bilingual native Japanese and a native English speaker. As in Study 1, three rounds of back-translations were conducted to ensure linguistic equivalence.

Although researchers have proposed different factors for the SEIS, the following four factors described by Ciarrochi et al. (2001) were selected for examination in this study: emotion perception (EP), managing self-relevant emotions (MSE), managing other's emotions (MOE), and utilizing emotions (UE). Optimism reported in other four factors solutions was thought to be more reflective of Western cultural values, which might be less applicable to the Japanese culture (Heine & Lehman, 1995).

Procedure. Participants volunteered to complete the self-administered measures in one testing session. Ethics approval was received from the Conjoint Faculties Research Ethics Board at the University of Calgary in Canada for this study.

Analysis. Missing values comprised less than 1% of data. They were imputed using stochastic regression imputation in SAS 9.1. A maximum-likelihood CFA was performed to evaluate the factorial structure of the SEIS and structural equation modeling (SEM) was employed to examine the predictive validity of the emotional intelligence scales using LISREL8.80 (Jöreskog & Sörbom, 2006).

Results

Descriptive Statistics (SEIS and SWLS) and Correlations among the Four SEIS Subscales. The means and standard deviations of the four EI

TABLE 4
Descriptive Statistics and Correlations among the Four SEIS Subscales

Subscales	<i>M</i>	<i>SD</i>	EP	UE	MSE
EP	3.17	.55	—		
UE	3.71	.60	.38**	—	
MSE	3.35	.59	.47**	.54**	—
MOE	3.37	.58	.45**	.51**	.65**

Note. EP = Emotion Perception, UE = Utilizing Emotions, MSE = Managing Self-Relevant Emotions, and MOE = Managing Other's Emotions. *N* = 200.

Pearson correlation coefficients. ** $p < .01$ (two-tailed tests).

subscales are presented in the left half of the columns in Table 4. The moderate correlations, ranging between .38 and .65, suggest that the four dimensions were correlated but also represent unique aspects of the EI construct.

The means of the SWLS items ranged from 2.92 to 4.34 and standard deviations ranged from 1.52 to 1.71. The total SWLS mean was 18.56 ($SD = 6.10$) and differs slightly from those reported in other studies. For example, Schimmack, Radhakrishnan, Oishi, Dzokoto, and Ahadi (2002) reported a SWLS mean score of 20.08 ($SD = 6.18$) for the Japanese university students ($N = 147$) in their study.

Internal Consistency Reliability. Internal consistency for the SEIS was satisfactory for three domains: .836 for EP, .749 for MSE, and .723 for UOE. Based on Nunnally's recommendation, the reliability for UE was lower than desired, .681; however, according to DeVellis (1991), reliability estimates between .65 and .70 are minimally acceptable. The reliability of .894 for the total SEIS score was also very acceptable. The reliability .818 for the SWLS was also satisfactory.

Factor Analysis. Schutte et al. (1998) recommended using the general EI score while other researchers suggest either a three- or four-factor interpretation. Therefore, three CFA models were examined: a one-factor model, a four-factor model, and the second-order factor model. The third model is of interest since it reflects both the general and subfactors. However, because the factor structure of the SEIS for the Japanese sample is not known, the one- and four-factor models were examined first.

The results suggest a poor to mediocre fit for the one-factor model of the SEIS: NNFI = .794, CFI = .807, and RMSEA = .099 with 90% confidence interval .093 – .105. In contrast, the fit indices indicated an acceptable fit for the four-factor model of the SEIS: NNFI = .903, CFI = .910, and RMSEA = .066 with 90% confidence interval .059 – .072. The factor loadings of the items on each factor of the CFA analysis are presented in Figure 3. Although all loadings met statistical

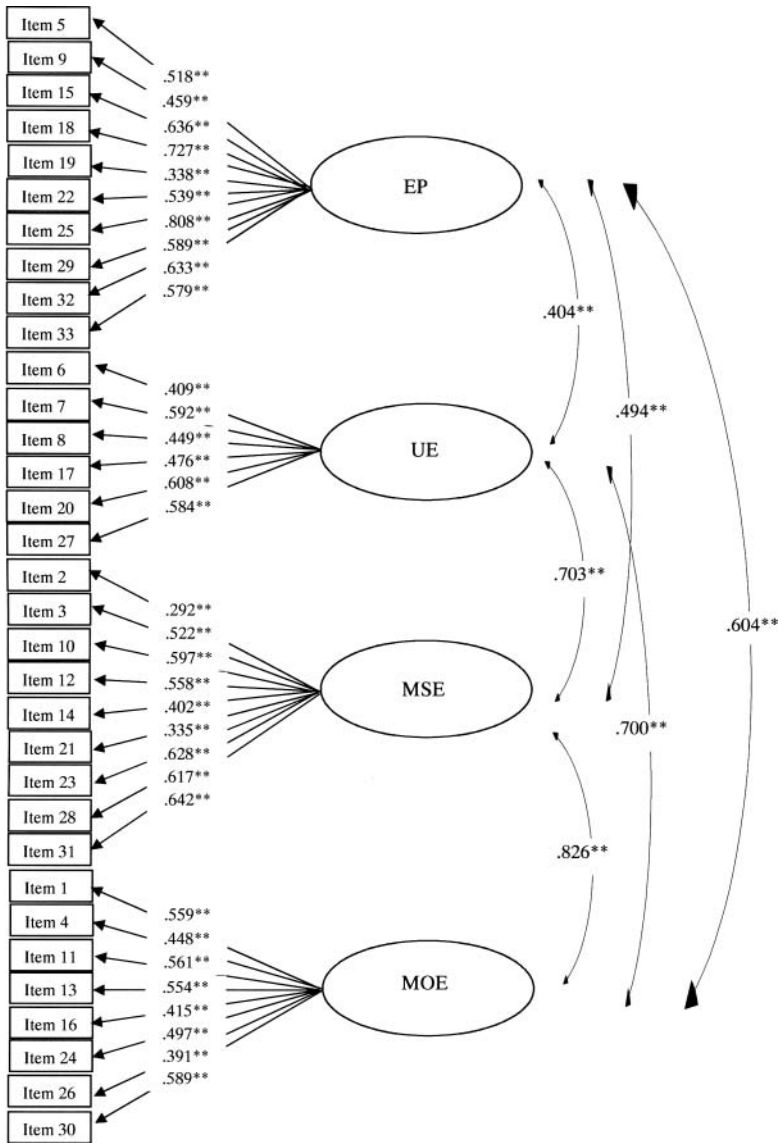


FIGURE 3
 Four-factor CFA model of the SEIS.
 ** $p < .01$.

TABLE 5
First-Order Factor Loadings and Variance Explained for the SEIS

Item	Unstandardized Parameter Estimates	Standardized Parameter Estimates	Squared Multiple Correlations for the Indicator	Average Variance Explained by the Constructs	
5	.594	.518	.269	.355	
9	.451	.459	.211		
15	.605	.636	.404		
18	.748	.727	.529		
19	.344	.338	.114		
22	.568	.539	.290		
25	.821	.808	.654		
29	.614	.589	.347		
32	.629	.633	.401		
33	.579	.579	.335		
6	.411	.409	.167		.276
7	.549	.592	.351		
8	.420	.449	.201		
17	.461	.476	.226		
20	.588	.608	.369		
27	.592	.584	.342		
2	.313	.292	.085	.276	
3	.551	.522	.272		
10	.600	.597	.356		
12	.544	.558	.311		
14	.337	.402	.161		
21	.385	.335	.112		
23	.644	.628	.395		
28	.698	.617	.380		
31	.623	.642	.412		
1	.550	.559	.312		.257
4	.460	.448	.200		
11	.555	.561	.315		
13	.626	.554	.307		
16	.403	.415	.172		
24	.441	.497	.247		
26	.450	.391	.153		
30	.491	.589	.347		

significance, only 18 items show excellent to good factor loadings ($> .55$). Six items show fair ($> .45$) and nine items had poor factor loadings ($> .32$). In addition, an item on the MSE factor presented as a non-interpretable factor loading, .292 (Comrey & Lee, 1992). Table 5 reports factor loadings and the explained variance for the lower order constructs of the SEIS. The unstandardized and standardized

TABLE 6
Second-Order Factor Loadings and Variance Explained for the SEIS

Constructs	Unstandardized Parameter Estimates (Beta)	Standardized Parameter Estimates	Squared Multiple Correlations for the Indicator	Average Variance Explained by the Construct
EP	.735	.592	.351	.647
UE	1.148	.754	.569	
MSE	1.828	.877	.770	
MOE	2.971	.948	.898	

factor loadings are reported in column one and two, respectively. In column three, squared multiple-correlations for each indicator, R^2 , are reported. The average variance explained by the constructs is reported in column four. Of note is that the correlations between the four factors were statistically significant.

The second-order factor model was then examined. The fit indices suggest that the second-order four-factor model of the SEIS was acceptable (Figure 4): NNFI = .904, CFI = .910, and RMSEA = .066 with the 90% confidence interval .059 – .072. The four parameter estimates from the EI construct were statistically significant as shown in Figure 4. However, similar to the results of the first-order CFA, only 16 items show excellent to good factor loadings (>.55), 10 items show fair (>.45), and 6 items show poor factor loadings (>.32). One item on the MSE factor still showed a non-interpretatable factor loading, .289 (Comrey & Lee, 1992). Similar to Table 5 for the lower order constructs, Table 6 reports factor loadings and variance explained for the second-order construct.

The chi-square difference statistic was used to test the improvement in fit as paths were added. The result of the four-factor model indicated minimum fit function $\chi^2(489) = 937.452, p < .001$ while that of the second-order four-factor model was $\chi^2(491) = 939.961, p < .001$. The result of the chi square difference test was not significant, $\Delta\chi^2(2) = 2.509, p = .285$, which suggests that both models describe the observed data equally well. However, based on the assertion by Schutte et al. (1998) for using the general EI score derived from the SEIS, the second-order factor model is supported in this study of Japanese university students.

Convergent Validity. The correlation between the total scores of the WLEIS and SEIS was calculated to determine the convergent validity of these two EI measures (Kerlinger & Lee, 2000). The results show these two measures to be highly correlated ($r = .758, p < .01$).

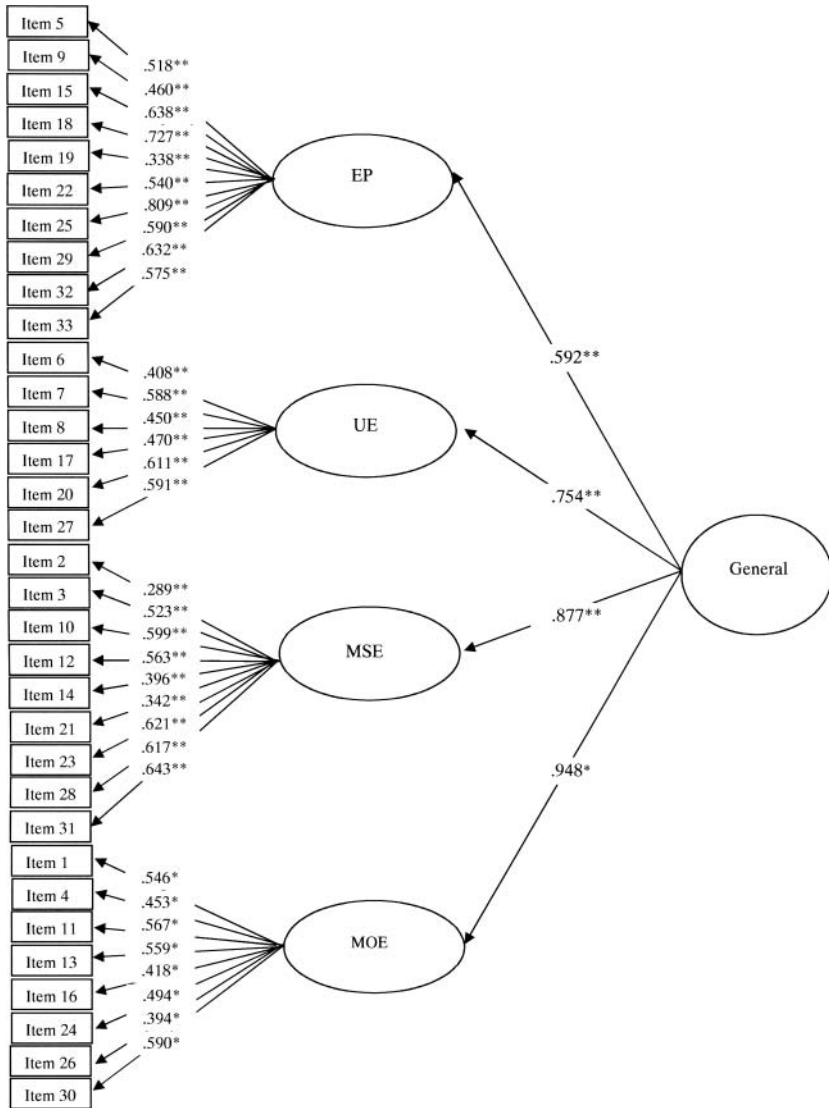


FIGURE 4
 Second-order four-factor CFA model of the SEIS.
 * $p < .05$. ** $p < .01$.

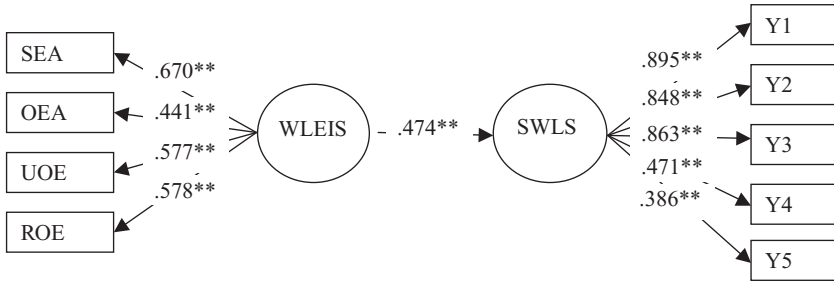


FIGURE 5
SEM model for WLEIS and life satisfaction.
** $p < .01$.

Predictive Validity. EI has been shown to be related to life satisfaction (Austin et al., 2005; Ciarrochi et al., 2000; Extremera & Fernandez-Berrocá, 2005; Saklofske et al., 2003; Wing et al., 2006). Prior to examining the predictive validity of the two EI measures using SEM, a CFA was performed to confirm the factor structure of the model for the Japanese university student data. The first model tested with CFA included the WLEIS correlated with a single factor model of SWLS (Lewis, Shevlin, Bunting, & Joseph, 1995; Shevlin & Bunting, 1994). The four parcels of the WLEIS are mean scores of the following subscales: SEA, OEA, UOE, and ROE. The five items (i.e., Y1, Y2, Y3, Y4, and Y5) are indicators of the factor labelled SWLS. The fit indices indicated a good fit to the observed data: NNFI = .930 and CFI = .950. The fit index of the RMSEA showed a mediocre fit: RMSEA = .087 with 90% confidence interval .061–.113.

SEM was then employed to examine the relationship between the latent variables and their indicators (i.e., observed variables). As shown in Figure 5, the magnitude of the standardized direct effect of EI, measured with the WLEIS, on satisfaction with life showed a medium effect, .474.

Similarly, a CFA was performed to confirm the factor structure of the second model, which included the SEIS correlated to a single factor model of SWLS. The four parcels of the SEIS are mean scores of the following subscales: EP, UE, MSE, and MOE. The fit indices indicated a good fit to the observed data: NNFI = .955 and CFI = .967. The RMSEA also showed an acceptable fit: RMSEA = .078 with 90% confidence interval .051–.106. As presented in Figure 6, the results of the SEM showed the magnitude of the standardized direct effect of EI measured with SEIS on satisfaction with life (SWLS) to have a medium effect, .406.

Thus, these SEM results indicate that higher EI, assessed by both the WLEIS and the SEIS, was related to higher self-reported satisfaction with life. This is consistent with the findings in other studies indicating that EI is associated with

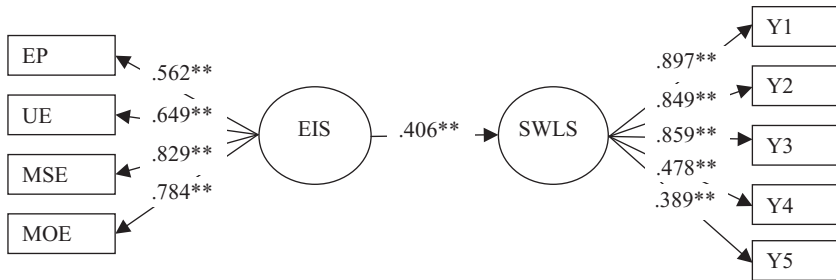


FIGURE 6
SEM model for SEIS and life satisfaction.
** $p < .01$.

life satisfaction (Brackett & Mayer, 2003; Carmeli, Yitzhak-Halevy, & Weisberg, 2009; Gignac, 2006; Palmer, Donaldson, & Stough, 2002).

DISCUSSION

The purpose of the present study was to evaluate the applicability of the WLEIS and the SEIS with Japanese university students in Japanese culture. The factorial structure of both scales and the convergent validity between these EI measures and life satisfaction were examined in two studies.

In Study 1, the CFA results for a sample of Japanese students supported the second-order four factor structure of the WLEIS described by Wong and Law (2002). In addition, the results from Study 2 supported the second-order factor structure for the SEIS described by Schutte et al. (1998) and the four first-order factors described by Ciarrochi et al. (2001). Some researchers may argue the point of examining the factor structure of the SEIS because other studies have already reported inconsistent factor structures (Austin et al., 2004). However, considering the fact that a study from Hong Kong did not support the factor structure of 33 items of the SEIS, the current study did demonstrate the potential use of the SEIS in Japanese culture.

Further examination of the psychometric properties of the WLEIS added support for the reliability of the scale. Internal consistency reliabilities for each domain of the WLEIS and the total scale were satisfactory. Although internal consistency reliabilities for total scale and three domains of the SEIS were satisfactory, the UE subscale had somewhat lower than desired reliability. Thus, caution is recommended when using the subscales of SEIS in Japan pending further study. In addition, further examination of this measure at the item level is required due to lower than desirable factor loadings on about half of the 33 SEIS items. This

implies that substantial revisions to the SEIS may be necessary if it is to be used in culturally different settings such as Japan.

Another contribution of this study is the demonstration of convergent validity evidence based on the total scores of the two EI measurements. While the high correlation of .758 between the two EI scales may, in part, be attributed to these measurements both having been developed based on the EI theory proposed by Salovey and Mayer, this finding offers some further support for the robustness of the EI construct across cultures and language groups, in this case with a sample of Japanese university students.

Another important finding is the predictive validity evidence for the EI scales in relation to self-reported life satisfaction. Both EI measurements significantly predicted the level of life satisfaction. Consequently, the higher one's EI score measured by the WLEIS or the SEIS, the higher one's level of life satisfaction is in this Japanese university sample. This mirrored the trend described in other studies that found EI is positively correlated with life satisfaction (Austin et al., 2005; Ciarrochi et al., 2000; Saklofske et al., 2003; Wing et al., 2006).

The overall findings in this study present preliminary evidence for the applicability of the WLEIS and the SEIS for use in Japan or at least with Japanese university students. Considering the fact that the WLEIS was developed in South East Asia, this study conducted in Japan does add some further evidence of the generalizability of the measure in non-Western cultures. Further cross-cultural development work needs to be done on the SEIS, and such studies using item level analyses would further contribute to our knowledge of EI as a universal construct. Moreover, since this study did not examine Japanese cultural impact on the EI construct, further studies are necessary to examine whether there are some EI attributes and skills unique to Japanese culture and whether they are captured by existing EI measures or require the development of more culturally sensitive and relevant measures.

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