

A Confirmatory Factor Analysis of the Wong and Law Emotional Intelligence Scale in a Sample of International College Students

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Abstract There is the need for a reliable and valid measure to facilitate emotional intelligence (EI) research on international college students (ICSs). The present study examined the factorial invariance of the Wong and Law Emotional Intelligence Scale (WLEIS), a trait EI measure, in a sample of 628 ICSs. A web-based survey was developed to facilitate data collection across the country. Results of a confirmatory factor analysis support the factorial invariance of the WLEIS in ICSs. Reliabilities and scale correlations further supported the psychometric properties of the measure for international students. Additional findings indicate possible country-of-origin difference on trait EI among different national groups.

Keywords Assessment · Emotional intelligence · Factor analysis · International college students

Introduction

The concept of emotional intelligence (EI) has gained much attention from researchers and practitioners across disciplines since its introduction in 1990 by Salovey and Mayer. Scores of studies have provided empirical evidence to support the concept's usefulness in understanding a wide range of human functioning (e.g., Austin *et al.* 2005; Brackett *et al.* 2004; Ciarrochi *et al.* 2002; Extremera and Fernandez-Berrocal 2006; Law *et al.* 2004; Slaski and Cartwright 2002). Studies on EI in recent years have also started to emerge from non-Western countries (e.g., Wong and Law 2002; Fukunishi *et al.* 2001; Bhattacharya *et al.* 2004). Researchers have also begun to investigate the relationship between culture/ethnicity and EI (e.g., Bhattacharya *et al.* 2004; Parker *et al.* 2005; Shipper *et al.* 2003; Van Rooy *et al.* 2005). However, little literature has examined EI in international college students (ICSs), who

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have been found to experience socio-emotional functioning and academic related issues of kinds both common to college students as well as unique to them (Pedersen 1991; Poyrazli *et al.* 2001). There is also a lack of EI measures that have been validated for use to study this student population.

This paper reports a validation study of the Wong and Law Emotional Intelligence Scale (WLEIS) (Wong and Law 2002) on a large sample of ICSs in the US. The WLEIS was originally developed based on Hong Kong samples and, to date, it has not been further validated on other populations. To this point, the use of the measure is limited to studies conducted by its original developers (Wong and Law 2002; Law *et al.* 2004) and two doctoral dissertations (Cintron 2005; Sitter 2005). The measure will be described in greater detail in the method section. Though the measure was noted to capture a limited portion of the trait EI domains (Tett *et al.* 2005), it seems to be a promising research tool because of its brevity, compared to existing trait EI measures, and its demonstrated psychometric properties. Additional validation studies on different populations will help to verify the measure's utility beyond that in the Hong Kong setting.

Professional standards for educational and psychological testing further underscore the significance of the present study. Such standards require that the validation process of a measure be ongoing with continuing efforts to establish the usefulness of the measure for specific populations and purposes (American Educational Research Association, American Psychological Association, and National Council on Measurement in Education 1999). Therefore, the main focus of the present study was to examine the replicability of the factor structure of the English version of the WLEIS as reported by its developers in a sample of ICSs.

International College Students

Despite the slight drop in 2003/04 and 2004/05 enrollments, international student numbers in US higher education have grown dramatically since the 1950s (Institute of International Education (IIE) 2005). In the 2004/05 academic year, there were 565,039 international students, constituting 4.0% of overall student enrollment. The growth of ICSs has resulted in such students becoming the focus of many studies.

The needs of international students are considerable because of the high levels of adjustment-related stressors they encounter (Chen 1999). These students face common developmental problems related to living away from their families for the first time (Pedersen 1991). They also encounter problems unique to their status as international students. Chen (1999) reviewed the literature and listed the following common stressors among international students' experiences: (a) second language anxiety, (b) educational stressors (i.e., performance expectations, system adjustment, and test-taking anxiety), and (c) social stressors (i.e., culture shock, social isolation and alienation, financial concerns, and racial discrimination and prejudice). In addition, these students also have to contend with legal issues; for example, facing possible deportation if they fail to maintain the required number of credit hours, even if they find their course load too difficult to manage (Collingridge 1999). International students in other Western countries besides the US have been found to face similar issues (Robertson *et al.* 2000). Though there is considerable literature on the needs and experiences of international students, Yoon and Portman's (2004) review of the literature revealed that there is a scarcity of assessment instruments developed or validated for the international student population. Findings on socio-emotional functioning of ICSs based on measures lacking demonstrated psychometric properties can result in misleading interpretations (Yoon and Portman 2004).

Parker *et al.* (2005) cautioned that special care is needed when using the EI construct in different cultures because culture can influence the experience and expression of emotions. This caution was supported by findings in the literature that showed cultural differences on experience and expression of emotions (e.g., Scollon *et al.* 2004). This is particularly important when studying international students in that typically they are immensely heterogeneous because they originate from diverse national and cultural backgrounds. The lack of a valid EI instrument interferes with research on the relationships between EI and the social and emotional functioning of ICSs. The present study represents an attempt to address the need for validated measures for use on international students, particularly in the study of EI.

Emotional Intelligence

EI, which refers to the ability of people to deal with their emotions, is rooted in the concept of “social intelligence” which was first proposed by Thorndike (1920) and later explicated by Gardner (1993) to include interpersonal and intrapersonal intelligences. Salovey and Mayer (1990) were the first to propose a formal conceptualization of EI. Currently, the literature presents two distinct views of EI: *ability* and *disposition*. From the ability approach, EI is perceived as a capacity to engage in valued behavior and entails a degree of mutability. Mayer *et al.* (1999) defined this as:

an ability to recognize the meanings of emotions and their relationships, and to reason and problem-solve on the basis of them. Emotional intelligence is involved in the capacity to perceive emotions, assimilate emotion-related feelings, understand the information of those emotions, and manage them. (p. 267)

Ability EI is assessed using performance measures; for example, the Mayer-Salovey-Caruso Emotional Intelligence Test (Mayer *et al.* 2002).

From the disposition approach, EI is a relatively stable tendency amenable to self-description (Tett *et al.* 2005). In terms of this approach, Petrides and Furnham (2003) defined EI as “a constellation of *behavioral dispositions* and *self-perceptions* concerning one’s ability to recognize, process, and utilize emotion-laden information” (p. 278). Petrides and Furnham proposed the term “trait emotional intelligence” (trait EI) to distinguish the disposition approach from the ability approach. The literature considers these two approaches as complementary (Tett *et al.* 2005). Trait EI is assessed via self-report measures; for example, the WLEIS.

Davies *et al.*’s (1998) review of the EI literature led them to explicate the dimensions of EI as follows:

1. *Appraisal and expression of emotion in oneself.* This relates to a person’s ability to become aware both of their mood and their thoughts concerning that mood.
2. *Appraisal and recognition of emotions in others.* This relates to a person’s ability to perceive and understand the emotions of others.
3. *Regulation of emotion in oneself and others.* This relates to a person’s ability to regulate his or her emotions; that is, to monitor, evaluate, and act to change one’s mood. Regulation of emotion also includes the ability to change the affective reactions of others.
4. *Use of emotion to facilitate performance.* This relates to the ability of the person to utilize his or her emotions by directing them toward constructive endeavors and performance.

Conceptually, individuals with higher levels of EI are able to make use of their emotion regulation mechanisms effectively to create positive emotions as well as to promote emotional and intellectual growth (Wong and Law 2002). Wong and Law developed their trait EI scales involving four domains in accordance with the schematic of EI of Davies *et al.*, which reflected Salovey and Mayer's (1990) conceptualization. However, it should be noted that several extant trait EI measures include a greater number of domains. For example, Tett *et al.*'s (2005) trait EI measure consists of 10 facets as proposed by Salovey and Mayer (1990) and Petrides and Furnham's (2003) has 15 facets. Detailed discussion of the various trait EI models is outside the scope of the present study. Research on EI is young and efforts to clarify the theories and measures of EI are still underway (Brackett and Geher 2006).

Despite the relatively short history of EI, empirical evidence supporting its usefulness in understanding a wide range of human functioning is being gathered (Tsaousis and Nikolaou 2005). Among the studies that involved college students, EI has been found to positively correlate to college academic performance (Parker *et al.* 2004; Schutte *et al.* 1998; Van der Zee *et al.* 2002), social network size and quality (Austin *et al.* 2005; Van der Zee *et al.* 2002). EI significantly accounted for quality of social interactions after controlling for personality variables (Lopes *et al.* 2004). EI was also found to moderate the relationship between stress and mental health among university students (Ciarrochi *et al.* 2002; Extremera and Fernandez-Berrocal 2006). Brackett *et al.* (2004) found EI to be associated with maladjustment and negative behaviors for college-aged males. Extremera and Fernandez-Berrocal's study (2006) on 184 university students found that mood repair, a trait EI factor measured by the Trait Meta-Mood Scale, positively predicted 4% of students' general health.

Despite many EI studies, very limited research has focused on or included ICSs. Hence, generalizability of the findings to this student population needs further empirical investigation. To the best of our knowledge, Rozell *et al.*'s (2002) EI study is the only one in peer-reviewed literature that involved ICSs in the US. They reported that international students rated lower on the EI measure as compared to domestic students. Rozell *et al.* noted that the observed differences might have been due to cultural differences and further research needed to be conducted to examine the causes of these cultural differences in terms of the EI measures. They asserted, "However, if one assumes that cultural test score bias is not the cause of the cultural differences, this finding indicates that individuals [*international students*] who are trying to succeed in business may discover that their opportunities are limited by their EI" (p. 286).

But, findings in that study were confounded by several issues. First, the study was based on Goleman's (1995) model of EI, which has been questioned in terms of its validity because of its expansiveness (e.g., Matthews *et al.* 2002). The model includes a vast array of skills that do not have scientific support for inclusion as domains of EI (Pfeiffer 2001; Sternberg 2001). Second, the study was limited to students from business majors. Of the 295 participants, there were only 76 international students in the study. The authors did not provide additional background information on these international students. However, international students are a very heterogeneous group of people. The authors did not note the limitations related to within-group difference when interpreting their findings on international students' EI.

Furthermore, Rozell *et al.* (2002) had not specifically examined the validity of the measure on international students in their study, though they did examine the validity of the measure on the whole research sample. Therefore, the findings of Rozell *et al.* may lead to a premature conclusion that international students are deficient in EI in comparison to

domestic students. Further research is needed to investigate what factors underlie the score differential between the student groups. Such cross-cultural comparative studies require research instruments that have demonstrated comparable psychometric properties on the groups being studied.

In view of the above, the purpose of the present study was to investigate the applicability of the WLEIS to ICSs by examining the measure's factor invariance in a sample of ICSs. It is acknowledged that international students are highly heterogeneous. However, due to subgroup sample-size limitation, the present study was not able to examine the factor structure of the WLEIS in each subgroup of ICSs. Therefore, the focus was limited to ICSs in general.

Materials and Methods

The authors developed an online survey to conduct the present study. Internet research poses some methodology concerns; for example, potential low response rates, self-selectivity of Internet users, technological issues with the deployment of the research tool, concerns over Internet security, multiple completions by the same individual, and uninvited respondents entering the sample (Heerwegh and Loosveldt 2002; Sills and Song 2002). Because of this, the authors had to carefully screen the data to remove 'suspicious' entries.

Despite the problems associated with web-based research, it has gained popularity in recent years. Such studies include research across a wide spectrum of subject matter (Sills and Song 2002). Web-based studies have been found to be a sensible means of achieving meaningful results for populations that regularly use the Internet in their daily lives (Sills and Song 2002), and we contend that ICSs are a good example in this regard. Notwithstanding the problems associated with web-based surveys, online procedures allowed the researchers to reach their target population more economically and extensively. We were able to recruit a large number of participants from campuses across the US who originated from many different countries, instead of only relying on students from limited locations.

Participants

We received a total of 691 response sets online. These responses came from ICSs residing in Washington, D.C. and 28 other states (i.e., AK, AL, AR, AZ, CA, CO, KY, FL, GA, ID, IL, IN, LA, MA, MD, MI, MN, MO, NC, ND, NY, OK, OH, PA, SD, WA, TX, and VA). Based on careful screening of the data, cases were deleted if they: (a) contained too many incomplete survey items that prevented meaningful analysis; (b) comprised identical item response ratings within and across instruments; and (c) were identical to another response set, indicating potential multiple submissions. This resulted in a final total of 628 usable response sets (344 females, 281 males, and 3 unidentified). The mean age for the sample was 26.2 years ($SD=5.1$). Twenty four participants did not report their age. There were nine non-degree students, 187 undergraduate students, and 341 graduate students.

Participants represented 92 countries from Africa, Asia, Europe, Latin America, North America, and Oceania. The nine most represented countries were India ($n=109$), China ($n=65$), Korea ($n=46$), Japan ($n=35$), Taiwan ($n=29$), Canada ($n=19$), Malaysia ($n=17$), Brazil ($n=15$), and Germany ($n=15$). National make-up of the participants to a large extent appears to match the list of leading countries of origin of international students. The Institute of International Education (2005) reported the following ranking of place of origin

for international students in 2004/2005: 1st, India; 2nd, China; 3rd, Korea; 4th, Japan; 5th, Canada; 6th, Taiwan; 9th, Germany; 14th, Brazil; and 20th, Malaysia.

Measure

Wong and Law Emotional Intelligence Scale

Wong and Law (2002) developed the measure based on Davis *et al.*'s (1998) summary of EI in the literature, which consists of four domains. These domains form the four subscales of the measure. Each subscale consists of four items. The samples on which Wong and Law based their development of the measure were Hong Kong undergraduate and graduate students and working adults.

Wong and Law (2002) used three groups of independent samples to develop the items and test their psychometric properties. The first group consisted of two samples: Sample One ($n=120$) comprised managers and students who assisted in item generation and Sample Two ($n=189$) was made up of undergraduate students who provided quantitative evidence in regard to item selection. The second group comprised "two cross-validated samples ($n=72$ and $n=146$) who provided quantitative evidence to confirm the factorial structure of the four EI dimensions and their relationships with the external criterion variables" (p. 252). The third group consisted of two other samples (i.e., 110 undergraduate students and 116 non-teaching employees in a university) used to test the various types of validity. Wong and Law did not provide additional demographic details of their samples.

Wong and Law (2002) selected a total of 16 items, four per dimension, because they had the largest factor loadings (average loading=0.80) on the dimensions. The four-factor solution explained 71.5% of the variance. The items on the measure are self-rated on a 7-point Likert-type scale (1 = *totally disagree* to 7 = *totally agree*). The four scales of measure are: *Self-Emotion Appraisal* (SEA), *Others' Emotion Appraisal* (OEA), *Use of Emotion* (UOE), and *Regulation of Emotion* (ROE). All items are positively keyed; and this poses as a weakness of the measure. A sample item from SEA is "I have a good sense of why I have certain feelings most of the time." A sample item from OEA is "I always know my friend's emotions from their behavior." "I always set goals for myself and then try my best to achieve them" and "I have good control of my own emotions" are items from UOE and ROE respectively.

The interscale correlations were mild to moderate in one sample ($r=0.13$ – 0.42) and higher in another sample ($r=0.60$ – 0.76) (Wong and Law 2002). The ranges of coefficient alphas for the scales reported in various studies in Wong and Law's article were 0.86–0.92 for SEA, 0.82–0.93 for OEA, 0.84–0.88 for UOE, and 0.71–0.91 for ROE. No test–retest reliability was reported.

Wong and Law (2002) tested the psychometric properties of the WLEIS with three groups of independent samples of undergraduate students. The convergent, incremental and discriminate validities of the measure were tested with additional independent samples. EI as measured by the WLEIS correlated significantly with job performance ($r=0.21$) and job satisfaction ($r=0.40$). The scales were also negatively correlated with powerlessness ($r=-0.13$ to -0.39) and positively correlated with life satisfaction ($r=0.16$ – 0.46) as hypothesized. The WLEIS was found to correlate moderately with EQ-i, a trait EI measure developed by Bar-On (2000) ($r=0.63$). The scales had minimal correlations with IQ estimates ($r=-0.19$ – 0.06). Incremental validity of the WLEIS was demonstrated by using it to predict life satisfaction in a hierarchical regression by controlling for the Big Five personality dimensions (Extraversion; Agreeableness; Conscientiousness; Neuroticism; Openness)

which shared a statistically significant portion of the variances of life satisfaction ($R^2=0.466, p<0.01$). The WLEIS significantly explained the additional portion of the variances of life satisfaction ($R^2=0.077, p<0.01$). Using factor analysis, Wong and Law examined the relationships among the four EI scales and the Big Five personality indicators and found that: (a) UOE and Neuroticism loaded together, (b) ROE and Conscientiousness loaded together, (c) SEA and OEA did not cross-load with the Big Five factors. Law *et al.*'s (2004) findings further supported the construct and criterion validity of the WLEIS.

Procedure

Sampling

The data on the WLEIS were collected as part of an online survey developed to study the social–emotional functioning of ICSs attending American universities. E-mail invitations were sent to international student advisors from the 20 universities with the highest enrollment of international students and from two other universities randomly selected in each state. The e-invite was also sent to those whose e-mails were found as contacts on the Association of International Educators' website. The researchers asked the advisors to forward the participation request to students in their universities. We also sent requests for participation to international students we know and asked them to forward the request to other international students they knew. The e-invite included the hyperlink to the website of the research. Students had a choice to enter into a sweepstakes to win one of 40 \$40 awards upon completion of the survey. Participation was anonymous; however, contact information of participants who entered the sweepstakes was gathered separately from their survey response in order to facilitate the drawing process.

Data Analysis

A confirmatory factor analysis (CFA) was conducted with LISREL 8.7 to test the fit of the four-factor model to the data. We used multiple criteria to assess the goodness-of-fit of data to the model as recommended in the literature (Tabachnick and Fidell 1996). After confirmation of the factorial validity of the WLEIS, we examined the scale means and variances and internal consistencies. It was also decided to include in the report descriptive statistics of the measure of subgroups according to country of origin with sample sizes greater than 25.

Results

Confirmatory Factor Analysis

Test of fitness of the WLEIS' four-factor structure for the whole sample yielded a χ^2 value of 479.03 with a degree of freedom of 98, which suggests that the hypothesized model is not entirely adequate. Nevertheless, finding a well-fitting model of which the χ^2 value approximates the degrees of freedom is quite unrealistic in most empirical research (Byrne 1998). Thus, a large χ^2 value only indicates that there is a need to modify the model in order to better fit the data. This is not surprising because each χ^2 value obtained in the CFA of WLEIS in previous studies also significantly exceeded its degrees of freedom (Law *et al.* 2004; Wong and Law 2002).

Root Mean Square Error of Approximation (RMSEA) value for our sample was 0.078 and the 90% confidence interval ranged from 0.071 to 0.085. The narrow confidence interval, a range of 0.014, suggested good precision of the RMSEA value, and 0.078 indicated acceptable fitness. Models whose RMSEA is 0.10 or more have poor fit. Both goodness-of-fit index (GIF=0.91) and adjusted goodness-of-fit (AGFI=0.88) indices were close to one, suggesting that the four-factor model fits the data quite well (Hu and Bentler 1995).

Normed Fit Index (NFI), Non-Normed Fit Index (NNFI), and Comparative Fit Index (CFI) are often used to evaluate the gain in improved fit from the independence model to the hypothesized model and values of NFI greater than 0.90 and NNFI and CFI greater than 0.95 indicate good fit (Hu and Bentler 1999). In our sample, the NFI, NNFI, and CFI values all equalled to 0.97, suggesting good incremental fit indices.

Standardized Root Mean Square Residual (SRMR) represents the average standardized residual value derived from the fitting of the correlation matrix for the hypothesized model to that of the sample data. A value less than 0.05 suggests a well-fitting model (Byrne 1998). The value of 0.044 for our sample represents the average discrepancy between the sample observed and hypothesized correlation matrices and can be interpreted as the model explains the correlations to within an average error of 0.044 (see Hu and Bentler 1995).

Using the joint criteria suggested by Hu and Bentler (1999), that NNFI and CFI were both greater than or equal to 0.96 and SRMR was less than or equal to 0.09, the four-factor structure of the WLEIS was found to have adequate fit to the data for the international student sample. As such, we proceeded to further examine the other psychometric properties of the WLEIS in our study.

Item and Scale Analyses

Cronbach's coefficient alphas for the four dimensions of WLEIS were 0.84 for SEA, 0.84 for OEA, 0.85 for UOE, and 0.87 for ROE. Alpha for the entire WLEIS was 0.91. These values are comparable to those reported by Wong and Law (2002) and Law *et al.* (2004). The distribution of each item was slightly negatively skewed with means ranging from 4.81 to 5.99 and standard deviations ranging from 1.07 to 1.60. These item descriptive statistics seem somewhat higher than those reported in Wong and Law's (2002) study ($M_s=4.25-4.94$ and $SD_s=1.20-1.43$).

The correlations among the four WLEIS dimensions were moderate to moderately high and in expected directions (see Table 1). These were somewhat similar to those found in one of the samples in Law *et al.* (2004) ($r=0.33-0.54$). Though the correlations between SEA and OEA and SEA and ROE were moderate to high in our sample, similar magnitudes were also found in Study 2 of Wong and Law (2002, p. 264). However, most

Table 1 Descriptive Statistics and Correlations Among the Four Dimensions of WLEIS

	\bar{X}	SD	SEA	OEA	UOE
SEA	5.48	1.19			
OEA	5.42	1.17	0.69*		
UOE	5.70	1.25	0.55*	0.50*	
ROE	5.05	1.44	0.73*	0.44*	0.49*

SEA = Self-Emotion Appraisal, OEA = Others' Emotion Appraisal, UOE = Use of Emotion, and ROE = Regulation of Emotion. WLEIS = Wong and Law Emotional Intelligence Scale. $n=628$. * $p<0.01$.

interscale correlations reported by Wong and Law in three other samples were mild to moderate.

Scale Means and Standard Deviations

Means and standard deviations of the four EI subscales are presented in Table I. Means in our sample ranged from 5.05 to 5.70 and standard deviations ranged from 1.17 to 1.44. These descriptive statistics were higher than those reported by Wong and Law (2002) ($M_s=4.50\text{--}4.70$; $SD_s=0.91\text{--}0.97$) as well as those by Law *et al.* (2004) ($M_s=3.78\text{--}4.15$; $SD_s=0.96\text{--}1.05$; and $M_s=4.27\text{--}4.84$; $SD_s=0.99\text{--}1.15$). The apparent means differences between studies might be related to characteristics of the samples or sampling bias. Wong and Law did not provide any normative data on the measure. Hence, the apparent differences in descriptive statistics cannot be interpreted meaningfully at this time. Further study is needed to clarify the difference.

The present study represents the first to examine the WLEIS on a large sample of ICSs. Though there was not a large enough sample size for any of the subgroups of students per country to perform CFA to investigate the factor structure of the measure, it was decided to report the means and standard deviations of the four subscales of students from five countries (i.e., India, China, Taiwan, Korea, and Japan) that had sample sizes greater than 25. Table II presents the results. This information may provide a point of reference for future studies that focus on examining race/ethnicity difference on EI.

Students originally from these five countries ($n=283$) represented 45.06% of the whole sample and 29 states of the US. Among them, there were two non-degree students, 58 undergraduate students, and 223 graduate students (including four postdoctoral fellows). One participant did not indicate academic status. Cronbach's alphas (see Table II) and interscale correlations were rerun for the reliability and validity of the four WLEIS dimensions for each group (country) of students.

Table II Means and Standard Deviations of WLEIS Dimensions for Five Countries

Dimension	Country	<i>n</i>	\bar{X}	<i>SD</i>	α
SEA	China	65	5.44	0.99	0.82
	Taiwan	29	5.49	1.21	0.84
	India	109	5.63	0.90	0.82
	Japan	35	5.71	0.96	0.84
	Korea	46	5.14	0.91	0.80
OEA	China	65	5.45	0.82	0.79
	Taiwan	29	5.42	1.04	0.87
	India	109	5.55	0.90	0.76
	Japan	35	5.17	1.18	0.90
	Korea	46	5.05	1.02	0.89
UOE	China	65	5.53	0.94	0.77
	Taiwan	29	5.70	1.08	0.88
	India	109	5.82	1.09	0.89
	Japan	35	5.54	0.85	0.76
	Korea	46	5.46	0.93	0.84
ROE	China	65	4.88	1.28	0.91
	Taiwan	29	5.02	1.24	0.90
	India	109	5.46	1.10	0.81
	Japan	35	5.02	1.16	0.88
	Korea	46	4.75	1.19	0.87

MANOVA results indicated that students from these countries differed with respect to the four dimensions of WLEIS (Wilks' $\Lambda=0.87$, $F(16, 843)=2.40$, $p=0.002$, $\eta^2=0.03$). Tests of between-subjects effects revealed that students from these five countries differed for SEA, $F(4, 279)=2.75$, $p=0.029$, $\eta^2=0.04$; OEA, $F(4, 279)=2.84$, $p=0.025$, $\eta^2=0.04$; and ROE, $F(4, 279)=4.30$, $p=0.002$, $\eta^2=0.06$; but not for UOE, $F(4, 279)=1.59$, $p=0.178$, $\eta^2=0.02$.

Post Hoc multiple comparisons with Tukey's HSD test indicated that the Indian students' ROE mean score was statistically significantly higher than that of Chinese ($p=0.017$) and Korean students ($p=0.006$). The 95% confidence intervals for these differences ranged from 0.06 to 1.10 and from 0.13 to 1.29, respectively. Indian students' OEA mean score was statistically significantly higher than that of Korean students ($p=0.03$). The 95% confidence interval for this difference was between 0.03 and 0.97.

As for the SEA mean scores, Korean students reported statistically lower levels than Indian students ($p=0.03$). The 95% confidence intervals for these differences ranged from -0.95 to -0.02 . Although Japanese students scored higher on SEA ($M=5.71$, $SD=0.96$) than Korean students ($M=5.14$, $SD=0.91$), this difference was not statistically significant. The 95% confidence interval of the difference was from -1.17 to 0.02 . All other pairwise comparisons of the four dimensions of WLEIS did not show any statistically significant differences between these countries ($ps>0.05$).

Discussion

The main purpose of the study was to examine the factor invariance of the WLEIS in international students. The CFA results represent the first evidence to support the factorial invariance and hence the utility of the WLEIS with ICSs. Coupled with its brevity and current findings on its factorial validity, we recommend the use of the WLEIS to investigate international students' EI and its correlates.

The confirmative findings allowed the researchers to proceed with further examination of other psychometric properties of the measure. The measure and its four subscales showed acceptable levels of reliability with international students. The reliability coefficients were comparable in magnitude to those reported by Wong and associates (Law *et al.* 2004; Wong and Law 2002). Interscale correlations for the entire sample were in the expected direction and within the range reported by Wong and Law (2002). These correlations further support the measure's content validity.

Studies on international students have tended to overgeneralize results to all international students without recognizing within group differences in this student population (Yoon and Portman 2004). This study is the first to examine ICS's country-of-origin differences on trait EI. The findings indicate that: (a) Indian students reported higher levels of ROE than did both Chinese and Korean students; (b) Indian students also reported higher levels of OEA and SEA than Korean students; and (c) Korean students reported the lowest levels on all four EI dimensions. Though the findings on country of origin difference on EI, an indication of race/ethnicity difference, are at best preliminary, they are in alignment with the literature on ethnic and nationality differences on trait EI (e.g., Ghorbani *et al.* 2002; Parker *et al.* 2005; Shipper *et al.* 2003). The findings also validate the call for attention to group differences when studying ICSs (Yoon and Portman 2004). The present study is limited in its scope and was not able to provide information that might shed light on the group differences on dimensions of EI among international students. We recommend future studies to focus on examining variables that underlie such differences.

The present study indicates that the WLEIS has acceptable reliability and validity to be used in researching the generalizability of findings regarding trait EI on ICSs in general, though caution should be taken with its usage with Korean students. And, researchers should consider controlling for country-of-origin when analyzing the data. We recommend further studies to investigate reasons leading to Korean students' overall lower EI scores.

Though the study included a large sample of international students across many states in order to ensure a better representativeness compared to many extant studies involving ICSs, and the countries represented among participants appear to closely match the ranking of leading countries of origin of international students, there remains several limitations. First, insufficient sample size for subgroups precluded CFA from being performed on group levels. The CFA findings only support the utility of the WLEIS for international students in general. Additional CFA studies on various national groups should be done to further verify the factorial invariance of the WLEIS.

Second, though utilization of a web-based design allowed for a large sample of participants, it was necessary to eliminate about 9% of the cases that were deemed unusable. Better measures to prevent multiple submissions and incomplete submissions could have been put in place. Online surveying is still a new research method. Limitations and external threats of validity have yet to be fully understood thus far. Therefore, interpretation of the findings needs to bear in mind the non-traditional sampling procedure used. Replicatory factor analytic study on the WLEIS using traditional sampling procedures should be carried out to verify findings of the present study.

Conclusion

Notwithstanding the limitations, this study represents the very first in the literature to study the factorial invariance of an EI measure in international students and provides empirical support for its use on this student population. We believe that the size of the sample, the vast geographic spread of participants, and a close match to the list of leading countries of origin for international students compensated the lack of randomization of the sample. We believe the findings extend the utility of the WLEIS in international students in general. The findings also accentuate the need to examine and account for within-group differences when studying this student population in general, and in particular, in regard to EI. This study further validates the professional standards for educational and psychological testing that require the validation process to involve continuing efforts to establish the usefulness of a measure for specific populations and purposes.

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