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MEASURING EMOTIONAL INTELLIGENCE IN A MALAYSIAN SAMPLE: AN EXPLORATORY FACTOR ANALYSIS

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ABSTRAK

Schutte et al. (1998) membangunkan 33 item skala kecerdasan emosi yang didakwa bersifat unidimensional. Petrides dan Furnham (2006) telah menjalankan analisis faktor untuk skala yang berkenaan sama dan mendapati empat faktor yang mendasari skala. Kajian tentang kecerdasan emosi telah dijalankan di Malaysia dengan skala yang telah diterima pakai, disesuaikan, dan dibangunkan oelh pengkaji tempatan. Kedimensian skala perlu ditunjukkan dengan jelas untuk meletakkan penemuan kajian kecerdasan emosi dalam konteks tempatan. Kajian ini meneliti struktur faktor versi dwibahasa (terjemahan Melayu oleh Abd Hamid dan Kimin, 2004) yang menggunakan utama paksi pemfaktoran dengan putaran ortogon varimax, dengan sampel Malaysia. Skala ini telah diberikan kepada 187 pekerja Malaysia di sebuah agensi kerajaan dan komuniti kolej. Analisis ini mendedahkan empat faktor yang mendasari skala yang padan dengan penemuan Petrides dan Furnham. Kebolehpercayaan didapati baik untuk tiga faktor dan tidak boleh diterima untuk satu faktor. Isu-isu berkaitan struktur faktor juga dibincangkan.

Kata kunci: kecerdasan emosi, analisis faktor, Malaysia

ABSTRACT

Schutte et al. (1998) developed a 33-item emotional intelligence scale which they claimed to be unidimensional. Petrides and Furnham (2006) conducted factor analysis on the same scale and found 4 factors underlying the scale. Studies on emotional intelligence had been conducted in Malaysia with scales that were adopted, adapted, and developed. The dimensionality of the scales needed to be clearly demonstrated to better put the findings within the local context. This study examined the factor structure of the bilingual version of the scale (Malay translation by Abd Hamid and Kimin, 2004) using principal axis factoring with a varimax orthogonal rotation, in a Malaysian sample. The scale was administered to 187 M[illegible]cy and a college community. The analysis revealed four fa[illegible]trides and Furnham's findings. Reliability was found to be g[illegible]e. The issues in the factor structure were discussed.

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Keywords: *emotional intelligence, factor structure, Malaysia*

INTRODUCTION

Evidence suggests that emotional intelligence (EI) has value at the workplace. Salesmen at Met Life insurance company in the United States who scored high on optimism achieved 37% higher sales than their colleagues who were pessimistic within their first 2 years of employment. "Learned optimism" is a construct of emotional intelligence (Cherniss, 2000, quoting Seligman, 1986). EI was found to have significant, positive relationship to organizational commitment among teachers in the United States (Anari, 2012) and employees of SME in Iran (Khalili, 2011). There is no universally agreed definition of EI. A definition of EI, proposed by Boyatzis, Goleman, and Rhee (2000, p.4), is as follows: "emotional intelligence is observed when a person demonstrates the competencies that constitute self awareness, self management, social awareness, and social skills at appropriate times and ways in sufficient frequency to be effective in the situation."

Studies have been conducted to develop scales that are concise and able to comprehensively measure EI. One such example is the work of Schutte et al. (1998) who developed a 33-item scale. The authors claimed that "The 33 items loading on factor one represented all portions of the conceptual model of

Salovey and Mayer (1990)" (p.171). This scale would be tempting for I/O psychologists who need economical and reliable scale. However, the study came under heavy critique from Petrides and Furnham (2006) especially on the method of factor analysis which they implied as rudimentary at best. The critics argued that if the scale had been developed based on a conceptual model then factor analysis would have shown the factor structures underlying the model. The critics conducted a confirmatory factor analysis using LISREL and found the lack of fit for the single factor model. Exploratory factor analysis by the critics revealed 4 factors underlying the scale. Prentice and King (2013) also derived a four factor solution using data from 261 casino workers. Their study used CFA based on Pearson Covariance Matrix and Maximum Likelihood Estimation.

Schutte's 33-item emotional intelligence scale had been used in Malaysian and showed good reliability. Liau et al. (2003) used the English version of the scale on 203 secondary school students. The Cronbach alpha in that study was 0.76. Exactly the same alpha value was obtained by Md Nawi and Redzuan (2011) in their study with 276 adult volunteers and non-volunteers. The Malay translation of the scale was tested among 161 university students and the reliability was 0.85 (Abd Hamid & Kimin, 2004). Another study found the alpha to be 0.88 when tested with 100 participants whose age ranged from 15 to 59 years (Andi, 2004). Both the English and Bahasa Melayu versions of the scale demonstrated good reliability. However, the factor structure of the scale was not examined as extensively. In one study with 127 university staff, Ngah, Jusoff and Rahman (2009) used Principle Axis Factoring with oblique rotations. The researchers removed seven items from the English version of the scale and found three factors namely utilization of emotion, regulation of emotions, and expressions of emotions.

Therefore, the objective of this study is to examine the factor structure of the EI scale developed by Schutte et al. (1998) by way of exploratory factor analysis. However, in this study, a bilingual (including Malay) version of the scale will be examined.

METHOD

Participants

In total, 187 employees participated in the study (45 males, 128 females and 1 not disclosed). The mean age of the sample was 33.22 years (*SD* = 7.10, min = 24, max = 56).

Materials

The questionnaire was developed by Schutte et al. (1998) and translated into Malay by Abd Hamid and Kimin (2004). It contains 33 items, three of which are reverse-coded (items 5, 28, 33). Respondents rate their agreements to such items as "I like to share my emotions with others" and "I am aware of the non-verbal messages that I send to others" on a 5-point Likert-type scale (1 = strongly disagree, 5 = strongly agree). The total score is the sum of all items, which can range from 5 to 165, with higher score indicating a higher emotional intelligence. The items are shown in Appendix A.

Procedure

Participants from a government defence agency and a community college completed the questionnaire when they were attending training programs. SPSS version 17 was used as the statistical analysis tool.

RESULTS

Data Screening

From 187 cases, 12 cases were eliminated using listwise deletion and 2 cases were eliminated as outliers, with 173 valid cases remained. The ratio of 5.24 cases per variable did not satisfy the minimum amount of data for factor analysis. This serves as a caution to the study.

Factor Analysis

To begin with, the normality of the data was checked. The skewness of the distribution was .12 (*SE* = .19) while a kurtosis of .04 (*SE* = .37) indicates that the distribution is flatter than normal. Kolmogorov-Smirnov with Lilliefors significance correction test statistic of .072 (*df* = 173, *p* = .027) indicates that the data is not normally distributed. This serves as a caution to the study.

Next, the factorability of the EI items was examined. Several well-accepted criteria for the factorability of a correlation were used. Firstly, an inspection of the inter-item correlation matrix revealed that all items but 1 (item 28, reverse-coded) correlated at least .3 with at least one other item, suggesting reasonable factorability. Secondly, Kaiser-Meyer-Olkin test of sampling adequacy value of .83, more than the recommended value of .60, indicated that factor analysis may be useful to be carried out on this data. Thirdly, Bartlett's test of sphericity was significant ($\chi^2 = 2073.61$, df = 528, $p < .01$), indicating that the

correlation matrix was not an identity matrix and that the items were related and therefore suitable to detect structure. Fourthly, except item 5 (reverse-coded), all of the diagonals of the anti-image correlation matrix were above .50. Finally, the communalities for all but 2 items (5 and 28, both reverse-coded) were all above .3, confirming that each item shared some common variance with other items. Given the overall indications, factor analysis was deemed to be able to be carried out but with caution.

Principal axis factoring was used as the preferred method for extraction to mitigate the risks of the potentially poor multivariate normality of the data. Kaiser criterion was applied to extract the structures (items with eigenvalues greater than 1). However, the criterion may not always obtain the best outcomes for some data sets (Costello & Osborne, 2005). The extraction produced a nine-factor model that explained 47% of the total variance. The first factor explained 23.7% of the variance while factors 2, 3 and 4 (eigenvalues from 1.5 to 2.5) explained 6.0%, 4.41% and 3.09%, respectively. Factors 5 to 9 (eigenvalues of just over 1) explained 1.55% to 2.65% of the variance each. Meanwhile, an inspection of the scree plot (see Fig. 1) revealed a four-factor model. The four-factor model was preferred because the number was more manageable. Furthermore, the scree plot is better than Kaiser's criterion at determining structures (Costello & Osborne, 2005). Table 1 shows the factor loadings of Varimax-rotated factors.

Next, 4 factors were fixed to be extracted and a model which explained 35.85% of the variance was produced. Both Varimax (orthogonal) and direct oblimin (oblique) rotations were subjected on the model to produce a solution. The solution from Varimax rotation was preferred because it was clear and relatively easier to interpret the meaning of the factors. The resulting solution from the oblimin rotation, although almost similar to the Varimax-rotated solution, had factor correlations below |.30| for 3 out of 5 relations, contained factors with items that were all negatively loaded, and contained items with positive and negative loadings on multiple factors.

Table 1. Factor loadings of varimax-rotated factors from the emotional intelligence scale[a]

Item number	Factor 1	Factor 2	Factor 3	Factor 4
q8	**.702**	.054	.040	.014
q9	**.602**	.208	.266	-.073
q10	**.586**	.018	.006	.230
q31	**.581**	.161	.358	.092
q14	**.578**	.241	.126	-.024
q6	**.559**	.189	.072	-.065
q24	**.529**	.138	.229	-.053
q2	**.505**	.021	.000	.135
q3	**.498**	.145	.064	.166
q23	**.478**	.007	**.389**	.067
q16	**.463**	-.004	.104	.146
q7	**.405**	.228	.037	.045
q30	**.336**	.284	.194	.142
q26	**.319**	**.317**	.221	.153
q18	.116	**.774**	.066	.052
q25	.049	**.660**	.231	.069
q32	.184	**.545**	.295	.024
q29	-.035	**.545**	.219	**.360**
q19	.204	**.421**	**.415**	-.119
q15	.284	**.380**	.174	**.302**
q4	.132	**.348**	.041	.204
q1	.282	**.311**	-.013	.061
q21	.072	.060	**.708**	.129
q22	**.405**	.178	**.585**	.105
q20	**.369**	.316	**.553**	-.104
q17	**.379**	.140	**.509**	.078
q27	.180	**.310**	**.370**	.118
q28r	-.039	.059	.198	-.055
q11	.216	.283	-.057	**.535**
q33r	.086	-.118	-.156	**-.432**
q13	.239	.242	-.005	**.406**
q12	**.339**	.121	.247	**.385**
q5r	-.017	.045	.095	**-.317**

[a]Factor loadings greater than |0.30| are shown in boldface.

The items along with their numbers are presented in Appendix A.

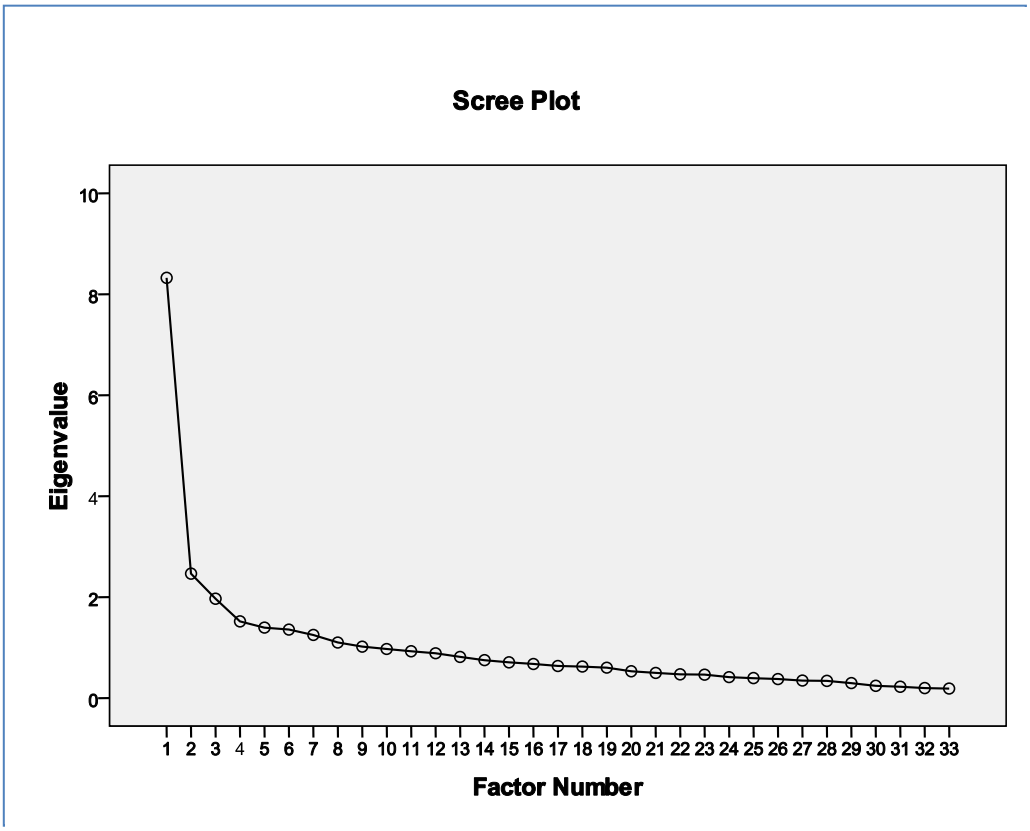

Fig. 1. Scree plot of 33 items in the Emotional Intelligence scale

Costello and Osborne (2005) suggested that researchers decide whether to eliminate an item that loads at .32 or higher on two or more factors. In this study, items with a primary factor loading of less than .30 or cross-loaded with .30 or above were eliminated. In a factor that contained items with positive and negative factor loading, items with negative loadings were eliminated to ensure a simple factor structure. As a result, 24 items were retained and 9 items that met the criteria were removed (12, 15, 19, 23, 26, 27, 5r, 28r, and 33r).

In the second iteration, principal axis factoring analysis was conducted on the 24 items, using both Varimax and oblimin rotations, extracting 4 factors that explained 39.65% of the total variance. Oblimin rotation failed to produce any pattern within 25 iteration limit. On the other hand, Varimax rotation produced 4 factors with almost equal amount of items in each. However, items that primarily loaded to the factors were not as semantically clear as the factors that emerged before the item reduction was carried out. The loss of clarity in the meaning of the factors after item reduction did not justify the increase of 3.8% in variance explained. Therefore, the four factors with all the 33 items from the first iteration were decided to be retained and further tested for internal consistency. The four factors were labelled 'Mood Regulation', 'Emotion Appraisal', 'Emotion Utilization', and 'Social Skills' as previously used by Petrides et al. (2000).

Subsequently, internal consistency of the four sub-scales was tested. However, only 3 scales obtained good Cronbach's alphas: .89 for Mood Regulation (14 items), .77 for Emotion Appraisal (8 items), .78 for Emotion Utilization (5 items). Social Skills (6 items) obtained an unacceptable alpha of .21. Further elimination of items did not yield much higher Cronbach's alphas.

Means of the factors were obtained based on the scores of the items primarily loaded on the factors. Higher scores indicated higher emotional intelligence; namely, higher ability in regulating mood, appraising emotion, utilizing emotion and better social skills. Employees were best at mood regulation (M=4.11, SD=.38), followed by emotion utilization (M=3.94, SD=.52) and emotion appraisal (M=3.77, SD=.47). The skewness and kurtosis for the scales and inspection of the histograms suggested that the distributions of the data could be considered as approximately normal. Although an orthogonal (Varimax) rotation was used, the factors were found to be correlated, ranging from weak to strong. Table 2 shows the descriptive statistics and correlations for the factors.

Table 2. Descriptive statistics and correlations for Mood Regulation, Emotion Appraisal, Emotion Utilization and Social Skills

Factor	*M*	*SD*	Skewness	Kurtosis	Cronbach's alpha	1	2	3
Mood Regulation	4.11	.38	.02	.01	.89			
Emotion Appraisal	3.77	.47	-.21	.93	.77	.48		
Emotion Utilization	3.94	.52	-.17	.30	.78	.57	.48	
Social Skills	3.31	.46	.102	.22	.21	.29	.34	.26

All correlations sig. at $p < .01$

Taken as a whole, the analyses indicated that four factor were underlying the emotional intelligence scale. Using the factors and retaining all 33 items, 3 factors demonstrated good internal consistency while 1 scale had an unacceptable internal consistency. The composite scores of the three factors had evidence of approximately normal distribution; therefore, the data was deemed suitable for further parametric statistical analyses.

DISCUSSION

Based on the data screening and factorability of the data, it was found that factor analysis was suitable to be carried out on the bilingual EI scale. A four-factor structure emerged from the 33 bilingual items based on principal axis factoring exploratory factor analysis using oblique rotation strategy (direct oblimin) as tested in a Malaysian sample. The four factors matched the factors proposed by Petrides and Furnham (2000) which were mood regulation, emotion appraisal, emotion utilization, and social skills with acceptable Cronbach's alphas, except for social skills.

In selecting the items to be retained in each factor, Costello and Osborne (2005) proposed that the factor with item loadings above .30, with no or few cross-loadings, and comprised of three or more items should be considered as best fit for the data. The first factor, mood regulation, comprised of 14 items (2, 3, 6, 7, 8, 9, 10, 14, 16, 23, 24, 26, 30, and 31) that described awareness of own emotions (e.g. "I am aware of my emotions as I experience them") and optimism (e.g. "I expect good things to happen"). This factor was also labelled as optimism by Petrides and Furnham (2000). Twelve items loaded above .40 while Items 26 and 31 cross-loaded on factor 3 but it was decided to retain them on this factor as their primary loading values were above .40 and just over .30 on factor 3.

The second factor, emotion appraisal contained eight items (1, 4, 15, 18, 19, 25, 29, and 32) pertaining to detecting and interpreting emotions (e.g. "By looking at their facial expressions, I recognize the emotions people are experiencing", "I can tell how people are feeling by listening to the tone"). Items 15 and 29 cross-loaded on factor 4 and item 19 on factor 3; but the items were decided to be retained based on the same justification. Furthermore, the items were also face valid.

The third factor, emotion utilization, comprised of five items (17, 20, 21, 22, 27) which have affinity to control and put the emotion to good use (e.g. "I have control over my emotions", "When I am in a positive mood solving problems is easy for me"). Four of the items cross-loaded on other factors; 3 items cross-loaded on another factor and 1 item cross-loaded on 2 other factors. The items were retained as they were face valid and high loading on this factor.

Social skills as the last factor consisted of 6 items (5 reverse-coded, 11, 12, 13, 28 reverse-coded, 33 reverse-coded). The items pertained to actions of a person in relation to others (e.g. "I like to share my emotions with others", "I arrange events others enjoy"). Item 12 cross-loaded on factor 1. Item 28 (reverse-coded) had a loading of below .30. However, the item was included in this factor together with the other reverse-coded items. As cautioned during data screening, item 5 "I find it hard to understand the non-verbal messages of other people" showed low anti-image correlation and low communality. Item 28 "When I am faced with a challenge, I give up because I believe I will fail" also showed low communality. Furthermore, based on the author's own experience in inspecting reliability and validity of scales, reverse-coded items tend to cause issues in internal consistency. Therefore, grouping them together would allow the factor to be dropped during analysis.

The factors were found to be correlated although varimax rotation was used. Varimax rotation is favored when there is a basis to believe that the factors should not be related to one another. In theory, it would be ideal that factors are only minimally related; however, in reality, a person will not be able to regulate

his/her mood without the ability to appraise the emotion. Therefore, some correlation among the factors should be expected (Petrides & Furnham (2000).

A researcher intending to measure EI using this scale should take note of the low reliability of the social skill factor or consider excluding this factor. Also, scale developers may need to consider avoiding reverse-coded items in Malaysia.

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