

The 9th International Conference on Cognitive Science

The place of emotional intelligence in the ‘intelligence’ taxonomy: Crystallized intelligence or fluid intelligence factor?

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Abstract

Despite over two decades of research, the construct of emotional intelligence (EI) remains elusive as recent researchers debate whether it can be considered a new form of ‘intelligence’ that fulfils the standard of an intelligence construct. The main objective of this study is to assess the place of emotional intelligence within the existing major factors of intelligence, particularly fluid intelligence (gf) and crystallized intelligence (gc). Second, it investigated the convergent validity of emotional intelligence when correlated with general cognitive intelligence (g). The Shipley-2 IQ test and the WEIS performance-based EI test were administered to 422 respondents. The results from the confirmatory factor analyses utilizing structural equation modelling (SEM) revealed that emotional intelligence does not adequately fit the intelligence taxonomy. Meanwhile, the relatively small EI/g correlation revealed that the WEIS is not a pure ability measure. Therefore, more research and the development of new EI measures are required to determine whether EI has an intelligence component.

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Selection and/or peer-review under responsibility of the Universiti Malaysia Sarawak.

Keywords: intelligence; emotional intelligence; assessment ; psychometrics; structural equation modelling

1. Introduction

Merging the term emotion and intelligence to form a single construct was both novel and relatively strange to psychologists and researchers in the 1990s [1]. The term ‘emotional intelligence’ was initially coined by the American psychologists Peter Salovey and John D. Mayer. The pioneers of emotional intelligence posited that problem solving and wise decision making require both thought and feelings or logic and intuition. They further asserted that certain individuals possess the ability to carry out sophisticated information processing of emotions to with and use emotions as a guide for thinking and behaving more effectively than others [1], [2]. Some of the questions triggered by the introduction of the concept include whether emotional intelligence really exists and if so, is it a new domain of human cognitive intelligence, does it develop in ways similar to cognitive ability, does it meet the standard of general intelligence, and is it empirically measurable? Despite certain uncertainties regarding this

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newly minted construct, it has nevertheless enriched the discussion on intelligence by emphasizing the importance of intelligence in succeeding in life in the 21st century.

The ‘big idea’ behind the initial emergence of emotional intelligence as a construct is that success in life and work depends on more than just the basic intellectual abilities measured by IQ tests [3], [4], [5], [1]. Possessing a high IQ is not sufficient to determine one’s success in work and life, as there are personal qualities other than traditional intelligence that are more important for success. A growing number of psychologists are becoming increasingly interested in research on emotional intelligence because of the notion that cognitive intelligence is narrowly defined and accounts for only a portion of the variance in outcomes [3]. The initial notion that there are personal qualities other than traditional intelligence that are more important for success was also prompted by the publication of Goleman’s [6] best-selling trade book, “Emotional intelligence: Why it can matter more than IQ?”. The book caught the eye of the media, the general public, and researchers as it detailed its discovery of a connection between emotional competencies and prosaic behaviour.

1.1. The major factors of intelligence: Fluid intelligence and crystallized intelligence

Among the early works on human intelligence is the concept of a general factor of intelligence. This idea was proposed by Charles Spearman, an English Psychologist who argued that all cognitive ability tests share something in common and scores on all these tests are positively correlated [7]. The idea that disparate ability test scores reflect a single general cognitive ability led Spearman to coin the term *g* factor [7]. His student, Raymond B. Cattell, agreed with Spearman’s general factor of intelligence, and paved the way for the concepts of crystallized versus fluid intelligence. Cattell posits that the general intelligence ‘*g*’ can be split into two discrete factors that are crystallized intelligence (*gc*) and fluid intelligence (*gf*) [8], [9]. These two abilities mutually interact and work together to produce overall individual intelligence, and is known as the Cattell-Horn *Gf-Gc* intelligence model. Crystallized intelligence (*gc*: acquired acculturated knowledge) assesses an individual’s breadth and depth of general knowledge and knowledge of a culture like verbal communication. On the other hand, fluid intelligence (*gf*: innate reasoning ability) requires the ability to think logically, reason, form concepts and solve problems in novel situations [8], [9], [10].

Several years later, the Cattell-Horn *Gf-Gc* dichotomy was expanded with the identification of a few additional abilities. Over time, additional factors like Short-Term Acquisition and Retrieval (SAR or *Gsm*), Visual Intelligence (*Gv*), Auditory Intelligence (*Ga*), Long-Term Storage and Retrieval (TSR or *Glr*), Cognitive Processing Speed (*Gs*), Correct Decision Speed (CDS), Quantitative Knowledge (*Gq*) and Reading/writing ability (*Grw*) were added to the model. It now consists of nine broad factors [11], [12], [13], [14]. Although the theory continued to be called the ‘extended *Gf-Gc* theory’, the nine broad abilities were treated as equal, and not part of any hierarchical structure [15]. By the time Horn expanded his research on the factors of intelligence, Carroll [16], [17] on the other hand, conducted an in-depth, comprehensive survey of factor-analytic studies on the factors of intelligence and identified factors similar to those in Cattell-Horn’s model with fluid intelligence and crystallized intelligence as major factors of intelligence.

In 1999, the “Cattell-Horn-Carroll” (CHC) theory of cognitive intelligence emerged as a result of an amalgamation of Cattell-Horn’s [18], [19] extended *Gf-Gc* theory and Carroll’s [16] three-stratum model of intelligence [20]. The most salient difference between the Cattell-Horn and Carroll’s model is the level of stratum; while Cattell-Horn model has only two stratum, Carroll’s model has three stratum or levels of abilities. For Cattell-Horn, stratum II refers to the ‘broad abilities’ (i.e. fluid intelligence, crystallized intelligence, visual Intelligence, Auditory Intelligence, Cognitive Processing Speed intelligence, etc.) that are positively intercorrelated. Stratum I refers to the ‘narrow abilities’ composed of approximately 70 fairly specific abilities associated with each of the broad abilities [13]. In contrast, Carroll’s stratum I and stratum II are also similar to Cattell-Horn model, but include a stratum III ability; a higher-order general intelligence factor (‘*g*’ factor) [16], [21]. In the CHC model of cognitive abilities, the general intelligence factor (*g*) is positioned at the apex of the hierarchy of the three stratum model; stratum I (narrow abilities), stratum II (broad abilities) and stratum III (general intelligence) [22]. As the CHC intelligence taxonomy is grounded on the empirical psychometrics theory of intelligence, it is considered the most comprehensive and empirically supported framework available for understanding the structure of human cognitive abilities [15], [23].

1.2. The initial conceptualisation of emotional intelligence: Human ability

The pioneers of emotional intelligence define emotional intelligence as “the ability to monitor one’s own and others’ feelings and emotions, to discriminate among them and to use this information to guide one’s thinking and actions” (p. 189) [1]. They argue that some individuals possess the ability to carry out sophisticated information processing about emotions, to reason with and to use emotions as a guide to thinking and behaviour more effectively than others. The founders of emotional intelligence perceive that the construct meets the traditional criteria for cognitive intelligence, which is known as ability-based emotional intelligence. Although the initial conception of emotional intelligence argues that it is a new kind of human ability, in recent years other researchers have used the term in markedly different ways, mixing the ability conception of emotional intelligence with personality traits. Recently, there are three main models of emotional intelligence: (1) ability-based emotional intelligence model; (2) mixed models of emotional intelligence; and the more recent (3) trait emotional intelligence. However, as the initial conceptualisation of emotional intelligence is considered an ability, the current study focuses on the ability-based emotional intelligence model only.

The present study has two primary objectives, which aim to gather evidence for the construct-related validity of an emotional intelligence scale, namely the Wong Emotional Intelligence Scale (WEIS) [24]. Overall, this study sheds light on the psychometric properties of an emotional intelligence test whose construct validity has been called into question [3], [25], [26], [27], [28].

As convergent validity is a part of construct validity, this study seeks to investigate the convergent validity of emotional intelligence tests, particularly the Wong Emotional Intelligence Scale when correlated with cognitive intelligence. This study is necessary as one of the questions that remain unanswered in emotional intelligence research is whether emotional intelligence is related to but distinct from general intelligence [25], [29]. The documented literature revealed that only two studies have examined the convergent validity of the WEIS and general intelligence. However, these studies utilised the Hong Kong Certificate Education Examination (HKCEE) as a proxy of cognitive intelligence [24], [30] and it was reported that no published studies have reported the relationship between the results of the HKCEE and cognitive intelligence [24]. In light of this, the current study attempts to replicate such findings by (1) utilising an empirically valid and reliable IQ test to assess cognitive intelligence and (2) expanding the research by assessing the convergent validity of emotional intelligence with fluid intelligence and crystallized intelligence.

Secondly, this research examines the place of emotional intelligence within the general intelligence taxonomy particularly in reference to fluid intelligence (*gf*) and crystallized intelligence (*gc*). The significance of this research manifests in its potential to provide clarity on the debated issue of whether emotional intelligence can be considered a standard group factor of intelligence with the same status as fluid intelligence or crystallized intelligence [31] and whether it is distinct from other cognitive intelligence factors [32]. Furthermore, recent research argues that as the construct of emotional intelligence remains in its infancy, it is lacking in the clarity of its conceptualisation and theoretical understanding [26]. Hence, the present research aims to provide clarity on these issues by examining the place of emotional intelligence within the context of the theoretical framework of human cognitive intelligence.

Research by MacCann [31] examined the location of emotional intelligence within the structure of cognitive intelligence, and its relation to the fluid intelligence and crystallized intelligence factors. Despite this, this research only chose dimensions of emotional understanding and emotion management to represent the emotional intelligence construct. Therefore, this study tries to bridge the gap by replicating the latter study by using an emotional intelligence test that covers all dimensions of the EI construct, particularly the (1) appraisal/understanding of emotion in one’s self; (2) appraisal/understanding of emotion in others; (3) regulation of emotion; and (4) use of emotion within the framework of “Cattell-Horn-Carroll” (CHC) theory of cognitive intelligence. In summary, it is believed that by understanding the extent to which current measures of ability based EI map the facets of intelligence, it would help us better understand the construct and refine the current test. As postulated by the American Educational Research Association (AERA), American Psychological Association (APA) and National Council on Measurement in Education (NCME) [33], such standards require the validation process of a measure to be ongoing, with continuing efforts to establish the usefulness of the measure for specific purposes.

1.3. Summary of the hypotheses

H1: EI maps the gc factor in the intelligence taxonomy

A research conducted by MacCann [31], revealed that the emotional intelligence construct loaded stronger on gc ($r = .71$) as compared to gf ($r = .45$). However, this research only chose dimensions of emotional understanding and emotion management to represent the emotional intelligence construct. Meanwhile, recent research conducted by MacCann, Pearce & Roberts [32], showed that recognition of emotion (a dimension of emotional intelligence construct) loaded only on gc, but not on gf.

H2: Emotional intelligence demonstrates evidence of convergent validity when correlated with g, gf and gc.

This hypothesis was developed based on the conceptualisation of emotional intelligence as an innate cognitive ability [1]. Meanwhile, emotional intelligence theorists suggest that emotional intelligence should be moderately correlated with general intelligence [2]. As emotional intelligence is conceptualised as a kind of intelligence, it might be related to both gf and gc [25]. As suggested by Fiori & Antonakis [25], individuals with high emotional intelligence scores would not only have wider emotion knowledge but also stronger problem-solving abilities in dealing with emotionally aroused situations. It is perceived that this latter aspect would not rely exclusively on the amount of emotion knowledge possessed, but also on the emotion-related cognitive processing resources available.

2. Method

2.1. Participants and procedure

The participants consisted of 422 undergraduate students ($n=422$) from one public university in Malaysia. The age of the respondents ranged from 19 to 26 years ($M = 21.29$, $SD = 1.86$). However, 48 respondents did not report their age. The respondents consisted of 31.8% male students ($n = 134$) and 67.5% females ($n = 285$). 3 of the respondents did not indicate their gender. In addition, the sample comprised of students from various faculties (Engineering, Human Sciences, Economics, Information Technology and Law). All participants were Malay.

The instruments were conducted during the credited co-curriculum class on a voluntary basis. Before administering the questionnaires, the researcher briefed the participants about the nature of the study and the questionnaires. The participants were debriefed upon completion of the questionnaire.

2.2. Measures

Cognitive ability. The Shipley-2 intelligence test was used to measure respondents' general mental ability; crystallized intelligence and fluid intelligence [36]. The nonverbal block patterns scale was used to assess respondents' reasoning ability, namely fluid intelligence. The block patterns scale is composed of 12 multiple-choice items based on the well-known Koh's cube designs. The vocabulary scale was used to gauge respondents' crystallized intelligence. This scale consists of 40 items and each item requires the respondent to look at a target word and then choose from four options the word that is closest in meaning. Each test requires 10 minutes to complete [36].

The Shipley-2 vocabulary scale has a good convergent validity with a vocabulary test of Wechsler Adult Intelligence Scale Third Edition (WAIS-III), with $r = .82$. Similarly, the block pattern scale of Shipley-2 has an acceptable convergent validity with a block design test of Wechsler Adult Intelligence Scale Third Edition (WAIS-III), with $r = .64$ [36].

Emotional intelligence. The respondents also completed a performance-based test of emotional intelligence, namely the Wong Emotional Intelligence Scale (WEIS) [24]. All of the items in the WEIS are developed based on the four ability dimensions of emotional intelligence: (1) appraisal/understanding of emotion in one's self; (2) appraisal/understanding of emotion in others; (3) regulation of emotion and (4) use of emotion to facilitate performance. In general, this scale has two parts, the first part consists of 20 scenarios and respondents are forced to

choose one answer that best reflects their likely reaction in each scenario. An example of the scenario and its possible behavioural responses is: *When someone keeps on arguing with you on some unimportant topics, you will: (A) Not respond to him/her and wait for him/her to stop. (B) Pretend to agree with his/her views and switch the discussion to other topics* (Others' emotional appraisal). Meanwhile, the correct option for each scenario was identified by criterion-related validity tests in the initial validation study [24]. If the respondents chose the correct choice for a scenario, then one point will be rewarded and vice versa.

The second part also consists of 20 ability pairs and respondents were forced to choose one out of the two types of abilities that best represent their strength. A typical example of the pairs is the ability to *understand others' true feelings by observing their behaviours* versus *ability tolerate physical pain* (Others' emotional appraisal). Similar to part A, if participants choose the emotional intelligence-related option for an ability pair, then one point will be awarded. As the scale consists of 40 items, the total score ranges from 0 to 40.

It is worth noting that the internal consistency reliability of the WEIS for the parent and student samples are .70 and .73 respectively [37]. The WEIS has an acceptable convergent validity ($r = .55$) with the Wong and Law Emotional Intelligence Scale (WLEIS) [38]. The WLEIS is a self-report, ability-based emotional intelligence measure that has the same dimensions as the WEIS [24].

3. Results and discussion

3.1. Preliminary analysis and examination of item fit

Prior to the item fit analysis, the assumptions of multivariate normality and linearity were evaluated through the SPSS software (version 19) and no violation was observed. Since the emotional intelligence test is dichotomously scored, it was exposed to the Rasch model (Winstep) software to assess the item fit and the reliability of the instrument [39]. The item polarity output revealed that item 9, item 11, item 12, item 15, item 17, item 19 and item 20 of Part A (scenarios) were weakly related to the construct ($r = .01$ to $.13$) as the correlation values are smaller than $.2$ [39]. Furthermore, the item misfit output also showed that these seven items were at the top of the item misfit table (Mean square outfit scores = 1.10 to 1.29). Since the item polarity and item misfit output revealed that these seven items were not good indicators of the emotional intelligence construct and were deleted. Deleting these items showed that this instrument was satisfactorily reliable whereby the cronbach alpha for 'item reliability' was .98 and the cronbach alpha for 'person reliability' was .69 [40]. Therefore, item 9, item 11, item 12, item 15, item 17, item 19 and item 20 of Part A (scenarios) were excluded in the succeeding analysis.

3.2. Locating emotional intelligence in the intelligence taxonomy: Confirmatory factor analysis

To examine the location of emotional intelligence in the intelligence taxonomy, two competing models of intelligence were developed. (See Figure 1). Model 1 is a two-factor model. The first factor refers to gf factor and the second factor refers to a combined gc/EI factor. The indicators for gf are gf-subset 1 and gf-subset 2. Gf-subset 1 consists of odd items parcel, conversely, gf-subset 2 consists of even items parcel [41]. Meanwhile, the indicators for factor 2 are gc-subset 1 (odd items parcel), gc-subset 2 (even items parcel), self-emotional appraisal (SEA), others' emotional appraisal (OEA), regulation of emotion (RE) and understanding of emotion (UE). At the apex of the intelligence structure, the g factor was located to represent the latent general intelligence construct as postulated by the CHC model of intelligence [15], [23], [22].

In contrast, model 2 refers to a three-factor model as it distinguishes emotional intelligence, fluid intelligence and crystallized intelligence. Factor 1 refers to gf, factor 2 refers to gc, while factor 3 represents EI. Similar to model 1, the indicators for gf and gc consist of their subset 1 (odd items parcel) and subset 2 (even items parcel) respectively. Likewise, the indicators for EI refer to SEA, OEA, RE, and UE, and the latent general intelligence (g) was located at the apex of the intelligence taxonomy hierarchy [15], [23], [22].

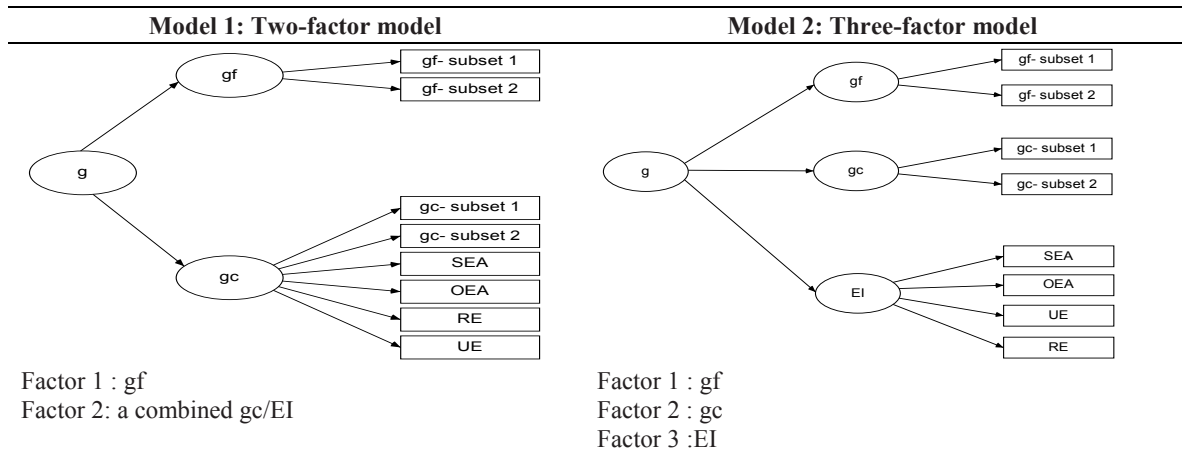


Figure1. The hierarchical confirmatory factor analysis of two competing models of intelligence

3.2.1. Confirmatory factor analysis for the two-factor model of intelligence

The measurement model (Model 1) was evaluated through Structural Equation Modelling with AMOS by using hierarchical confirmatory factor analysis (CFA) with Maximum Likelihood Estimation (MLE) to assess the adequacy of the model. Based on the several goodness-of-fit criteria, the result revealed that model 1 was not adequate, indicating a poor-fitting model with $\chi^2 (19) = 219.951, p = .000, \chi^2/df = 11.576, CFI = .758$ and $RMSEA = .158$. Model 1 insufficiently fitted the data based on few fit indices; (1) The normed chi-square was larger than .5 [43], [41]; (2) The CFI was smaller than .9 [43], [41]; and (3) RMSEA was larger than .08 [44], [41]. Hence, the two-factor model of intelligence indicated a poor-fitting model.

3.2.2. Confirmatory factor analysis for the three-factor model of intelligence

Similar to Model 1, the adequacy of Model 2 was also evaluated by using hierarchical confirmatory factor analysis (CFA) with Maximum Likelihood Estimation (MLE). The obtained results showed that Model 2 was a better-fitting model as compared to model 1 with $\chi^2 (17, N = 424) = 19.523, p = .299, \chi^2/df = 1.148, CFI = .997$ and $RMSEA = .019$. These goodness-of-fit indices indicated that the three-factor model of intelligence was a good-fitting model and more parsimonious model to represent the data. For instance, the non-significant chi-square test ($p < .05$) indicated that the model sufficiently fit the data [42]. The normed chi-square (< 2.0) suggested an excellent fit for the CFA model [43], [41]. The CFI ($> .95$) indicated a good-fitting model [45]. Finally, the RMSEA ($< .06$) suggested a good fit to the data [45].

Meanwhile, as the loading estimates (standardized factor loadings) for all of the indicators were larger than .5, (except RE factor) it signified that the indicators were satisfactorily good and related to the construct [41]. Nonetheless, RE has a loading estimate larger than .4. In addition, the path coefficient between g and gf ($r = .55$), g and gc ($r = .33$) and, g and EI ($r = -.36$) were all significant as the values were larger than .2 [41], [42]. Therefore, these findings revealed that gf, gc and EI were significant factors to g, however, the negative relationship between EI and g was unanticipated. (Potential explanations for this finding are discussed in the discussion section).

3.3 The convergent validity of EI when correlated with IQ, gf and gc

Pearson correlations were conducted to assess the convergent validity of emotional intelligence and cognitive intelligence [46]. In practice, it is rare to see a validity coefficient larger than .60 and validity coefficients ranging from .30 to .40 are commonly considered high [47]. In this study, EI was significantly related to g ($r = -.15, p < 0.01$) and gf ($r = -.14, p < 0.01$), albeit the validity coefficient value was not so high to suggest redundancy (See

Table 1). Nonetheless, the negative association between EI and g, as well as between EI and gf was unanticipated. At the same time, EI was not significantly related to gc ($r = -.08, p > 0.05$). Meanwhile, it is worth noting that all of the EI markers were significantly negatively correlated with g ($r = -.12$ to $-.15, p < .05$) except the ‘regulation of emotion’ marker. (Potential explanations for this finding are discussed in the discussion part below).

Table 1. The means, standard deviations and inter-correlation among EI and IQ, and their respective dimensions

		M	SD	1	2	3	4	5	6	7	8
1.	EI	22.80	4.45	-							
2.	SEA	7.24	1.69	.773**	-						
3.	OEA	4.53	1.50	.657**	.408**	-					
4.	RE	6.16	1.64	.646**	.294**	.246**	-				
5.	UE	4.87	1.64	.673**	.401**	.203**	.230**	-			
6.	IQ (g)	40.55	7.08	-.146**	-.123*	-.140**	.006	-.146**	-		
7.	gf	18.75	4.82	-.143**	-.124*	-.112*	-.023	-.134**	.775**	-	
8.	gc	21.80	4.52	-.076	-.061	-.099*	.034	-.086	.740**	.149**	-

Notes: EI = emotional intelligence; SEA = self-emotional appraisal; OEA = others' emotional intelligence; UE = use of emotion; RE = regulation of emotion; IQ = intelligence quotient; GF = fluid intelligence; GC = crystallized intelligence. (N = 422)

** $p < 0.01$; * $p < 0.05$

3.4. Discussion

The main objective of this study was to confirm the place of emotional intelligence in the existing factors of intelligence taxonomy. The hierarchical CFA result showed that the fit indices were unacceptable for the two-factor model (gf and a combined gc/EI) and good for the three-factor model (gf, gc and EI). Thus, this finding suggested the idea that EI assesses a kind of intelligence that is distinct from gf and gc, but, the notion that EI actually measures something new would be more contentious. However, since the relationship between EI and g was in the opposite direction ($r = -.36$), the idea that EI measures a new kind of intelligence failed to be accepted as it was against the “positive manifold” nature of intelligence taxonomy. Carroll [16] asserted that the intelligence structure is underpinned by its positive manifold. As such, scores on all ability tests (e.g., gc, gf, gv etc.) are positively intercorrelated. He further stated that for a putative new intelligence to be considered as a new domain of cognitive intelligence, it should show positive associations with the existing intelligence factors, while at the same time not highly overlapping with them. Therefore, the concept of emotional intelligence as measured by the Wong Emotional Intelligence Scale could not legitimately be considered as a new putative intelligence factor; hence, hypothesis 1 was not supported.

Second, this study sought to gather evidence on the construct validity of the WEIS, especially evidence on convergent validity. The obtained results showed that EI was significantly related to g ($r = -.15, p < 0.01$) and gf ($r = -.14, p < 0.01$), but not significantly related to gc ($r = -.08, p > 0.05$). However, as the magnitude of the correlation was small [48], evidence of convergent validity between EI and g, gf and gc could not be demonstrated. Furthermore, other than having a significant weak correlation, the correlation between EI and the g factors were in the negative direction and contradict the “positive manifold” nature of intelligence. As mentioned earlier, the “positive manifold” nature of intelligence taxonomy requires all the intelligence factors to be positively intercorrelated [16]. Therefore, the emotional intelligence construct as assessed by the WEIS did not demonstrate evidence of convergent validity with g, gf and gc; thus, hypothesis 2 was also not accepted.

3.5. General discussion

The results described above might not be surprising as a research conducted by Wong, Wong & Peng [30] also revealed that EI was negatively related to HKCEE (a proxy to cognitive intelligence) although the relationship was not significant ($r = -.11, p > .05$). Conversely, earlier research conducted by Wong, Law & Wong [24] showed that EI was positively related to HKCEE albeit the relationship was not significant ($r = .07, p > .05$). Hence, the finding that EI was negatively related to IQ remains consistent with the earlier study examined by Wong, Wong & Peng [30].

One possible explanation for these findings is that the WEIS may contain a non-ability component rather than ability component, as the findings suggest that it is distinct from IQ measure ($r = -.15$, $p < .05$). Furthermore, as this study supported a lack of association with gc and gf , it contradicts the expectation that the WEIS is an intelligence test (in this case a test would be expected to correlate to some extent with both gc and gf). Another possibility that explains why the WEIS did not support hypothesis 2 (H2: Emotional intelligence demonstrates evidence of convergent validity when correlated with g , gf and crystallized intelligence) is that this test may measure something different from what it is purported to measure. The WEIS is supposed to measure the latent construct of emotional intelligence that concerns the ability to process emotion-related information and to use this information for better life adjustment. However, the results of this study contradict this idea. Therefore, it can be inferred that the credence of the psychometric properties of EI particularly the WEIS remains an issue, and cannot be considered a pure measure of human cognitive intelligence.

4. Conclusion

The obtained results suggest that future research on ability-based emotional intelligence should concentrate on the development of a valid and reliable performance-based EI test that mapped into both gc [49], [31], [35] and gf [50], [31], so that it can be represented as an intelligence test. To date, the MSCEIT and the WEIS are the only broad-bandwidth ability-based EI measures (performance-based measure) that cover all dimensions of the emotional intelligence construct. As such, the existence of a wider range of measures would allow the development of an ability-based EI construct. However, similar to the WEIS, the psychometric properties and scoring methods of the MSCEIT have also been the subject of controversy [29], [51], [27]. A research conducted by Fiori & Antonakis [25] also showed that not all of the EI dimensions (as measured by MSCEIT) were positively related to IQ. For instance, their study revealed that managing of emotion (a branch of MSCEIT) was also negatively correlated to IQ ($r = -.02$). Hence, the findings of the negative association between the WEIS and IQ test in this study should not be surprising.

Meanwhile, recent researches also highlighted that there is a dearth of broad measures of performance based EI [28], and call for a fully operationalized measurement of an ability based emotional intelligence construct [27]. It is suggested that a strategy for investigating the status of EI as an intelligence is to call for a well-established information-processing approach to psychometric intelligence. As an analogy, if emotional intelligence is indeed an intelligence, then, it is expected to be linked by a specific emotional information-processing ability, where people with high EI would be able to process emotional contents more efficiently than those who have low EI. Finally, further work utilising a more diverse battery of cognitive ability tests also should be done to explain and resolve the issue of the adequate fit of the emotional intelligence tests within established cognitive intelligence models.

Acknowledgements

The authors would like to thank Naser Al-Areqe, Zailani Jusoh and Jamilah Jaafar for the invaluable knowledge.

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