Personality and Individual Differences 49 (2010) 490–496

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Further examination of emotional intelligence as a standard intelligence: A latent variable analysis of fluid intelligence, crystallized intelligence, and emotional intelligence

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ARTICLE INFO

Article history:
Received 16 February 2010
Received in revised form 3 May 2010
Accepted 10 May 2010
Available online 3 June 2010

Keywords:
Emotional intelligence
Factor analysis
Fluid intelligence
Crystallized intelligence
Sex differences

ABSTRACT

This study tests whether emotional intelligence (EI) is distinct from existing factors of intelligence after controlling for method factors in EI measurement. The relationship between EI, fluid intelligence (Gf), and crystallized intelligence (Gc) latent factors is examined in a sample of Australian undergraduates ($N = 207$). EI measures are all multiple-choice so as to control for response format, and the study also examines the effect of consensus scoring on the distinction of EI from Gf and Gc. Results show that EI forms a latent factor distinct from Gf and Gc, though strongly related to Gc, and that consensus scoring has only minor effects on the factor structure. EI and Gc factors show similar relationships with big five personality, relating only to Openness. Females tend to score higher on EI, whereas males tend to score higher on Gf and Gc. It is suggested that EI might be considered a different content domain for acquired knowledge than is typically examined by Gc tests, and may have different motivational pathways to development.

1. Introduction

Emotional intelligence (EI) was proposed as a new type of ability two decades ago, and has attracted intense research interest and controversy ever since (Mayer, Roberts, & Barsade, 2008). One controversial issue is whether EI can be considered a standard group factor of intelligence, with the same status as abilities such as auditory intelligence or visuo-spatial ability (Mayer, Caruso, & Salovey, 1999; Mayer, Salovey, Caruso, & Sitarenios, 2001; Roberts, Zeidner, & Matthews, 2001; Schulte, Ree, & Carretta, 2004). This paper provides further evidence relevant to this issue, examining whether EI can be distinguished from fluid intelligence (Gf; innate reasoning ability) and crystallized intelligence (Gc; acquired acculturated knowledge) after controlling for measurement issues in EI measurement that past research has not addressed.

A commonly accepted characterization of EI is the hierarchical four-branch model, where information processing abilities in the lower branches underlie the more strategic and complex abilities in the higher branches (Mayer et al., 2001). The four branches are *perception* (accurate perception and expression of emotion), *facilitation* (purposeful generation of emotions to aid problem solving), *understanding* (understanding the relationships between emotions, situations, and time courses), and *management* (regulation of one's own and others' emotions). The four-branch model conceptualizes EI as a set of maximum-performance ability constructs (known as ability-based EI). An alternative set of conceptualizations define and model EI as a set of typical-performance noncognitive constructs (known as trait EI). The current paper concerns only ability-based EI.

Debate regarding whether ability-based EI constitutes a new group factor of intelligence has focused on a nomological network of common intelligence-related and unique EI-related variance. Mayer et al. (1999) call this the correlational criteria—that test scores should be "similar to, but distinct from, mental abilities described by already established intelligences" (p. 270). Research to date indicates that EI relates to established intelligences, but not strongly enough to indicate redundancy. Meta-analyses report that the strongest link between EI and intelligence is for the understanding branch ($\rho = .39$), and that this relationship is primarily driven by Gc (Joseph & Newman, 2010; Roberts, Schulze, & MacCann, 2008). Meta-analyses also demonstrate that the big five personality domains relate differently to EI than to other established intelligences: EI shows the strongest link with Agreeableness, Gc shows the strongest link with Openness, whereas Gf is not strongly related to any personality domain (Ackerman & Heggestad, 1997; Joseph & Newman, 2010).

Almost all research on ability-based EI has been derived from the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, Caruso, & Sitarenios, 2003) and its pre-curser, the Multi-factor Emotional Intelligence Test (MEIS; Mayer et al.,

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doi:10.1016/j.paid.2010.05.010

1999). This may be a sub-optimal state of affairs, as the MEIS and MSCEIT test batteries have two unusual characteristics for ability tests. First, the majority of tests use a rate-the-extent response format rather than requiring a correct answer (e.g., test-takers rate the amount of happiness and sadness in a facial expression rather than deciding whether the expression is happy or sad). Second, all tests are scored according to the proportion of an expert or general screening sample that give a particular response (expert or consensus scoring). With these unique and unusual test characteristics, it is not clear whether empirical findings are due to test characteristics or to construct characteristics.

Davies, Stankov, and Roberts (1998) suggested that the empirical distinction of EI from established group factors of intelligence may be due to scoring methods rather than construct characteristics. They designed a study to examine whether consensus-scored tests formed a latent factor distinct from other tests, irrespective of content, but were unable to execute this design due to low reliability of some of the tests. Two further facts support the idea that EI may only be distinguishable from intelligence due to test characteristics. First, the conceptually similar concept of *social intelligence* has not historically been distinguishable from conventional cognitive abilities (Kihlstrom & Cantor, 2000). Second, meta-analyses suggest that *only* the multiple-choice MSCEIT tests (Emotional Understanding tests) relate to intelligence at $\rho > .30$ (Joseph & Newman, 2010).

The current study controls both response format and consensus scoring when examining the relationship between EI and existing group factors of intelligence. To address response format, all marker tests of EI are multiple-choice (rather than rate-the-extent). To examine whether consensus scoring affects the factorial distinction of EI from other established intelligences, a scoring manipulation was undertaken. The relationship between EI, Gf and Gc latent factors was examined under two conditions: (a) when Gf and Gc tests were scored dichotomously using standard rubrics, and (b) when Gf and Gc tests were scored by consensus. EI tests were scored by consensus in both conditions. If consensus scoring *does* act as a method effect, as Davies et al. (1998) suggest, then the correlation of EI with Gf and Gc should be higher when Gf and Gc are consensus-scored than when they are dichotomously scored. In addition, a general factor should account for greater variance when all tests are scored by consensus than when Gf and Gc are scored dichotomously.

1.1. Summary of hypotheses

H1: In structural analysis of Gf, Gc, and EI markers, EI will be separable from Gf and Gc, and more strongly correlated with Gc than Gf.

H2: Consensus scoring will act as a method factor. When Gf and Gc markers are consensus-scored rather than conventionally-scored: (a) correlations between EI, Gf, and Gc latent factors will be higher, and (b) a greater proportion of variation will be accounted for by a general factor in a Schmid–Leiman solution.

H3: Correlations with big five personality domains will differ for EI, Gc and Gf.

2. Method

2.1. Participants

Third-year undergraduate psychology students completing a psychological assessment course completed tests as part of their class work ($N = 207$, 136 females, 44 males[1]). Ages ranged from 19 to 59 years ($M = 21.9$, $SD = 3.7$).

[1] Demographic information was unavailable for 27 participants who missed session 1 (where demographics were collected).

2.2. Materials

2.2.1. Situational Test of Emotional Understanding – short form (STEU)

Participants completed 23 multiple-choice items from MacCann and Roberts (2008). Items assess the ability to correctly deduce which emotion would be generated by a situation. The STEU was scored by the consensus of the current sample.

2.2.2. Situational Test of Emotion Management – short form (STEM)

Participants completed 21 items from MacCann and Roberts (2008) where they needed to select the best of four possible alternatives for managing an emotional situation. The STEM was scored by the consensus of the current sample.

2.2.3. Blends and Changes test from the MEIS

The Blends and Changes tests from the MEIS test battery (Mayer et al., 1999) were combined in this paper due to concerns about low internal consistency of the tests considered separately ($\alpha = .46$ for Blends, .38 for Changes). The MEIS was scored by the consensus of the current sample.

2.2.4. Vocabulary test

In this 18-item test of Gc from Stankov (1997), participants must choose from five alternatives which word is the most similar to a target word. For example, *Revolve: A gun, Uprising, Turn around, Grow, Decide*.

2.2.5. Esoteric analogies

Eighteen items from Stankov (1997) test analogical reasoning. For example, *FIRE is to HOT as ICE is to: POLE, COLD, CREAM, WHITE*. This test is factorially complex, loading on both Gf and Gc (e.g., Roberts & Stankov, 1999).

2.2.6. General knowledge

In this 10-item test of Gc from Stankov (1997), participants are asked a factual question and must choose the correct answer from five alternatives. For example, *What is the outermost planet in the solar system? Venus, Saturn, Pluto, Uranus, Earth*.

2.2.7. Letter series

In this 12-item test of Gf adapted from Stankov (1997), participants are presented with several sequences of letters and instructed to determine which letter would occur next in each sequence. For example, *J K L M N O P Q?*

2.2.8. Nonsense syllogisms

This 12-item test was adapted from French, Ekstrom, and Price (1963). Participants are presented with a syllogism of two hypothetical premises and a conclusion, and asked to determine whether the conclusion represents good or poor reasoning. For example, *Some dogs are seals. Some seals bark. THEREFORE, some dogs bark (poor reasoning).*

2.2.9. Letter counting

This 12-item test was adapted from Stankov (1997) to assess working memory, which Kyllonen and Christal (1990) propose can be considered a key component of Gf. Participants were presented with between 8 and 10 combinations of the letters R, S, and T displayed serially on the computer 1 s apart, and then had to answer how many Rs Ss and Ts there were in the combination.

2.2.10. Five factor model of personality

This 120-item instrument from Johnson (2005) assesses five broad dimensions of personality (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism) using items from the International Personality Item Pool. In each item, participants