Measuring Emotional Intelligence: What Fails to Translate from Theory

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ABSTRACT

The ability to perceive, facilitate, understand, and manage emotion-related information is described as emotional intelligence (EI). Previous research has shown that the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) best describes EI with one-, two-, and four-factor models. However, the MSCEIT inadequately discriminates between the 1st and 2nd factors described in the four-factor model, which correspond to the Perceiving and Facilitating Branches. Recent studies have alternatively proposed two separate three-factor models of EI. Using MSCEIT data from 279 undergraduate students (161 female, 118 male), we conducted confirmatory factor analyses of one-, two-, and four-factor models, then compared those results to two different three-factor solutions. We found that a three-factor model, which combines the Perceiving and Facilitating branches, is the best.

INTRODUCTION

Emotional Intelligence (EI) is defined as one's ability to perceive, facilitate, understand, and manage emotion-specific information (Salovey & Mayer, 1990). These four skills are positively associated with the ability to use emotionally adaptive behavior to solve interpersonal problems (Mayer, Salovey, Caruso, & Sitarenios, 2003). Having a higher level of EI is predictive of better psychological health in adults (Lanciano & Curci, 2015; Mao et al., 2016), higher academic achievement and social functioning in adolescents (Rivers et al., 2012), and lower rates of criminal behavior (Curci et al., 2017; Fix & Fix, 2015; Megreya, 2015).

The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, & Caruso, 2002) is one of the most widely used measures of ability-based EI (Kong, 2014); it has been translated into Italian (Curci et al., 2013), Spanish (Sanchez-Garcia, Extremera, & Fernandez-Berrocal, 2016), and Chinese (Mao et al., 2016). It is designed to capture four distinct branches of EI: Perceiving (the ability to identify emotions in faces and pictures), Facilitating (using emotional information to assist cognition), Understanding (knowing how emotions can blend together and change over time), and Managing (influencing the emotional state of the self and others). Each of these four branches of EI is measured by two performance tasks. These tasks consist of either separate items or parceled items that require multiple responses to the same stimulus.

Numerous studies have examined the factor structure of the MSCEIT. These studies have concluded that the MSCEIT indicates one-, two-, three-, or four-factor models of EI, with the four-factor model having the most theoretical support (Fan, Jackson, Yang, Tang, & Zhang, 2010; Gignac, 2005; Mayer et al., 2003; Maul, 2012a; Palmer, Gignac, Manocha, & Stough, 2005). The one-factor model includes all eight tasks loading onto one general factor. The two-factor model splits the four EI branches and their corresponding scales into two areas: Experiential (combining the Perceiving and Facilitation tasks) and Strategic (combining the Understanding and Managing tasks). The four-factor model includes each branch as its own factor (Mayer & Salovey, 1997; Mayer, Salovey, Caruso, & Sitarenios, 2001). Two three-factor models have also been considered. The first of these models combines tasks from the Perceiving and Facilitating branches, while the second combines tasks from the Facilitating and Managing Branches (Palmer et al., 2005; Gignac, 2005; Rossen, Kranzler, & Algina, 2008; Curci et al., 2013; MacCann, Joseph, Newman, & Roberts, 2014). A three-factor model consisting of Perceiving, Understanding, and Managing factors has also been considered (Gignac, 2005; MacCallum and Austin, 2000; Mayer, Caruso, & Salovey, 1999; Rossen, Kranzler, & Algina, 2008), due to a lack of theoretical or structural distinction between the Perceiving and Facilitating branches (MacCann, Joseph, Newman, & Roberts, 2014).

When considering the one-, two-, three- and four-factor models, model fit improves as the number of factors increases (Mayer et al., 2003). A four-factor model has been previously identified as having the best fit, after applying constraints to the model's factor covariances (Mayer et al., 2003). These constraints were such that covariances between Perceiving and Facilitating and between Understanding and Managing were made equal (Mayer et al., 2003). Once these constraints are removed, the four-factor model has worse fit than the three-factor model (Gignac, 2005). Because of this, there is still debate as to which model has the best fit (Maul, 2012a).

One problem with the four-factor models, both the constrained and unconstrained models, is that there are an insufficient number of performance tasks measured by the MSCEIT (Bollen, 1989; Gignac, 2005). This measure was designed as a relatively quick test that could be easily administered, which explains the limited number of tasks (Mayer, Salovey, & Caruso, 2012). However, having a larger number of tasks per branch would provide better data for testing the four-factor model (Gignac, 2005). At a minimum, three indicators should load onto each factor to test the fit of any model (Bollen, 1989). Without at least three tasks per branch, the theoretical four-factor model (Mayer, Salovey, Caruso, & Sitarenios, 2003) may be inadequately supported. The present study examined one-, two-, three-, and four-factor models to determine which best explains the factor structure of the MSCEIT as it is currently designed.

METHOD

Participants

The respondents in this study were 279 undergraduate students (161 female, 118 male) who completed the MSCEIT in return for course credit. Their ages ranged from 18 to 50 years (M = 19.97, SD = 3.53). Participants identified their ethnicities as the following: 58.1 % Caucasian, 12.5% Hispanic, 12.2% Asian, 8.2% African American, 5.4% Pacific Islander, 0.4% Native American, and 3.2 % other.

Measures

The MSCEIT V2.0 (Mayer et al., 2003) is a 141-item scale composed of four branches. The Perceiving branch measures one's perception of emotional content. It is comprised of the Faces and Pictures tasks. In the Faces task, respondents are shown four images of faces. Participants must indicate the extent to which five specific emotions are present in each face with a five-point, numerical Likert scale. The Pictures task is similar to the Faces task; however, this task uses an abstract image or landscape as the target image. For each of the six target images, participants indicate the extent to which five specific emotions are present in each picture with a five-point Likert scale.

The Facilitating branch measures one's ability to use emotional information to facilitate thought. It is comprised of the Sensation and Facilitation tasks. In the Sensations task, respondents are asked to imagine feeling specific emotions. Participants then rate each of these feelings to the degree that they correspond to other adjectives. In the Facilitation task, participants must pick one of five emotions as best facilitating a cognitive activity.

The Understanding branch measures one's understanding of how emotions can blend together and change, reflected by the Blends and Changes tasks. In the Blends task, participants identify emotions that can be combined to create different emotions. In the Changes task, participants read scenarios where characters experience changes in emotions. Then they must pick a target emotion that best describes what each character in the scenario is feeling.

The Management branch measures one's ability to manage emotional outcomes, measured with the Emotional Management and Emotional Relationships tasks. In the Emotional Management task, respondents judge how well an action may serve to influence the mood of a character in a story. In the Emotional Relationships task, respondents determine how well a character's actions serve to influence another character's mood.

Scoring

To calculate scores on the MSCEIT, we used proportion consensus scoring. In this method, the score for an item is equal to the proportion of the norm group who gave that response (e.g., if 10% of the norm group selected option A for an item, then a respondent who selects A will receive a score of .10 on that item). Scores on the items are summed to calculate task scores, tasks scores are used to calculate branch scores, branch scores are used calculate total scores (Mayer, Salovey, Caruso, & Sitarenios, 2003).

Procedures

The MSCEIT was administered online as part of a larger study.

Data Analysis

We used a confirmatory factor analysis (CFA) to determine the goodness-of-fit for one-, two-, three-, and four -factor models of the MSCEIT data. We ran each model separately. First, we ran the one-, two-, and four-factor models to replicate analyses conducted by the authors of the MSCEIT (Mayer et al., 2003). In the four-factor model, we constrained the within-area covariances between factors one and two (Perceiving and Facilitating branches, respectively) and between Factors Three and Four (the Understanding and Managing branches) to equal each other. Next, we analyzed the same four-factor model, but without constraining these covariances. Third, we ran two three-factor models. The first three-factor model we analyzed (Three-Factor A) combined tasks from the Perceiving and Facilitating branches, but loaded tasks from the Understanding and Managing branches separately (Palmer et al., 2005). The second three-factor model (Three-Factor B) combined tasks from the Facilitating and Managing branches, but loaded the Perceiving and Managing branches separately (Curci, Lanciano, Soleti, Zammuner, & Salovey, 2013). Within each model, correlations between residuals were set to zero because we had no reason to believe additional underlying factors were present (Ullman, 2006).

We ran all analyses using the robust method in EQS 6 for Windows 10. To determine model fit, we assessed the following goodness-of-fit statistics: chi-square ($\chi 2$; non-significant values being better; Schreiber, Stage, King, Nora, & Barlow, 2006), normed fit index (NFI; good fit was indicated by NFI statistics >.95; Schreiber et al., 2006), Akaike information criteria (AIC; the lower, the better Schreiber et al., 2006), comparative fit index (CFI; good fit was indicated by CFI values >.95 Schreiber et al., 2006), and root mean square error of approximation (RMSEA; good fit was indicated by RMSEA values < .06 Schreiber et al., 2006). To select the best model, we also considered task loadings (which should be high) and between-factor correlations (these should be moderate, as befitting related but non-identical constructs).

RESULTS

When comparing the factor loadings between our tested models, we found progressively higher loadings between the one-, two-, and constrained four-factor models, which replicated previous findings (Mayer et al., 2003). The unconstrained four-factor model exhibited lower overall loadings than the constrained four-factor model, but higher loadings than the one- or two-factor models. When we compared two different three-factor models (Three-Factor Model A and Three-Factor Model B) to the aforementioned models, we found overall higher factor loadings for both than for the one- or two-factor models. However, when we compared loadings between the three-factor models and the two four-factor models, we found somewhat higher loadings in the both four-factor models. See Table 1.

After calculating the goodness-of-fit statistics between models, Three-Factor Model A was found to outperform every model we tested, except for the unconstrained four-factor model. While this unconstrained model exhibited a lower Chi-square than Three-Factor Model A ($\chi 2$ = 18.41 v.s. 21.72, respectively) and higher normed-fit index (NFI = .976 v.s. .971, respectively), both models reflected equal comparative-fit index and root mean squared error of approximation (CFI = .996; RMSEA = .024). See Table 1.

The point at which Three-Factor Model A and the unconstrained four-factor

Table 1

Loadings and Goodness of Fit Statistics for One-, Two-, Three-, and Four-Factor Models

	Model tested					
Variable	One-Factor	Two-Factor	Three-Factor A	Three-Factor B	Four-Factor	Four-Factor

model diverged in suitability was their intercorrelations between factors. While Three-Factor Model A demonstrated comparable intercorrelations to the other tested models, the unconstrained model had an impossibly high correlation between Factors One and Two (r = 1.02), as identified in previous work (Gignac, 2005; Palmer et al., 2005; Maul, 2012a). Thus we conclude that the MSCEIT is most adequately described by Three-Factor Model A, wherein the tasks from the Perceiving and Facilitating Branches are combined and the tasks from the Understanding and Managing Branches are loaded onto separate factors. See Table 2.

DISCUSSION

The purpose of this study was to determine which of five different factor-models best describes the MSCEIT. While we found better fit for both four-factor models compared to the one- and two-factor models, these four-factor models displayed very high correlations between factors one and two (r = .95 and r = 1.02); thus our data suggests these two factors are one and the same. This finding contradicts the theoretical four-factor model upon which the MSCEIT is based (Mayer et al., 2003). We preferred a three-factor model that loads the tasks from the Perceiving and Facilitating branches onto one factor, which is consistent with previous findings (Gignac, 2005; Palmer et al., 2005). We conclude that the MSCEIT, as it is currently designed, measures three dimensions of EI: Perceiving, Understanding, and Managing emotions, similar to the conclusions of previous studies (Gignac, 2005; Palmer et al., 2005; Maul, 2012a).

Our results, which we found favor a three-factor model of the MSCEIT, necessitate the proposition that the MSCEIT may inadequately measure the four-branch model of ability-based EI. This shortfall is potentially explained by one of the following conditions: 1) The MSCEIT has not been constructed with suitable tasks to measure its theoretical branches or with a suitable distribution of items across tasks, or 2) EI is comprised of three separate branches instead of the four, which requires the theoretical conceptualization of EI be reexamined. Each of these conditions will be explained in the remainder of this section.

Table 2

Correlations among Factors

Factors	Two-Factor	Three-Factor A	Three-Factor B	Four-Factor (UNC)	Four-Factor (CON)
I - II	.81	.81	.79	1.02	.95
I - III		.76	.76	.75	.75
I - IV				.66	.64
II - III		.89	.84	.81	.80
II - IV				.79	.80
III - IV				.84	.86

Note. UNC = unconstrained; CON = constrained.

The first possibility we'll address is that the tasks and items of the MSCEIT are inappropriate for the calculation of branch scores. The MSCEIT was created to capture four distinct branches of ability-based EI; branch scores are calculated based on their associated task scores (Mayer et. Al., 2003). Logically, each branch score is only reflective of an ability to the extent that the summation of its tasks is reflective of that same ability. Maul (2012b) proposed that the tasks included in the MSCEIT inadequately emulate the theoretical definitions of their respective branches. For example, the ability to perceive emotions is defined as one's ability to identify one's own and others' experienced emotions, as well as to express felt emotions (Mayer et al., 2002), but there are no tasks that capture one's ability to identify or express one's own emotions (Maul, 2012b). Similarly, the Facilitation branch does not incorporate tasks that require a respondent to actually use emotions (Maul, 2012b).

It is also possible that the small number of tasks per branch make it impossible to discern which factor structure of the MSCEIT is actually the most plausible (Gignac, 2005). The MSCEIT is comprised of two tasks per branch, but three or more indicators per latent variable are needed to discern factor structures (Bollen, 1989; Gignac, 2005). Additionally, only one study has conducted a CFA to examine the MSCEIT at the item-level and this analysis failed to yield a multifactor result (Maul, 2012a). Thus, the failure of the four factor models might be due to deficiencies at the item and task levels.

The MSCEIT is a very well-known and widely used test, but perhaps its theoretical backing, rather than the measure itself, needs to be reexamined. In the past 25 years, numerous studies have found that the MSCEIT can be described by three factors (Palmer, et al., 2005; Gignac, 2005; Rossen, Kranzler, & Algina, 2008; Maul, 2012b; Curci, Lanciano, Soleti, Zammuner, & Salovey, 2013; MacCann, Joseph, Newman, & Roberts, 2014). Some studies found the Facilitation branch to be indistinguishable from a general factor (Maul, 2012b), and others have favored a model that combines the Perceiving and Facilitating branches (Gignac, 2005; Palmer et al., 2005). Thus far, no researchers have been able to explain why the Perceiving and Facilitating branches are so inexorably linked, One researcher has suggested that a collective inability to find evidence for the existence of a Facilitating branch should necessitate the abandonment of the MSCEIT until it is better conceptualized (Maul, 2012b). We disagree. Certainly, the ability model of EI needs development. However, we argue that future research should consider all of the above possibilities, including the possibility that larger numbers and varieties of tasks are needed to measure all four branches of the theorized model.

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