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# The Factor Structure and Psychometric Properties of the Spanish Version of the Mayer-Salovey-Caruso Emotional Intelligence Test

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This research examined evidence regarding the reliability and validity of scores on the Spanish version of the Mayer-Salovey-Caruso Emotional Intelligence Test, Version 2.0 (MSCEIT; Mayer, Salovey, & Caruso, 2002). In Study 1, we found a close convergence of the Spanish consensus scores and the general and expert consensus scores determined with Mayer, Salovey, Caruso, and Sitarenios (2003) data. The MSCEIT also demonstrated adequate evidence of reliability of test scores as estimated by internal consistency and test–retest correlation after 12 weeks. Confirmatory factor analysis supported a 3-level higher factor model with 8 manifest variables (task scores), 4 first-level factors (corresponding to the 4-branch model of Mayer & Salovey [1997], with 2 tasks for each branch), 2 second-level factors (experiential and strategic areas, with 2 branches for each area), and 1 third-level factor (overall emotional intelligence [EI]), and multigroup analyses supported MSCEIT cross-gender invariance. Study 2 found evidence for the discriminant validity of scores on the MSCEIT subscales, which were differentially related to personality and self-reported EI. Study 3 provided evidence of the incremental validity of scores on the MSCEIT, which added significant variance to the prospective prediction of psychological well-being after controlling for personality traits. The psychometric properties of the Spanish MSCEIT are similar to those of the original English version, supporting its use for assessing emotional abilities in the Spanish population.

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*Keywords:* psychometric properties, emotional intelligence, MSCEIT, discriminant validity, incremental validity

Since Mayer and Salovey published their emotional intelligence (EI) construct in 1990 (Salovey & Mayer, 1990), much research has shown that the abilities to perceive, assimilate, understand, and regulate the emotions in oneself and others are important predictors of personal and social functioning (for a review, see Mayer, Roberts, & Barsade, 2008). Currently, there are two main theoretical approaches in EI research. Mayer and Salovey (1997) conceptualize EI as the ability to accurately perceive, assess, and express emotions; the ability to access and generate sensations that facilitate thought; the ability to understand emotions and emotional knowledge; and the ability to regulate emotions to promote emotional and intellectual growth. Based on this ability model, EI is considered similar to cognitive intelligence and includes the capacity to process emotional information (Mayer & Salovey, 1997). On the other hand, based on the EI trait model (also known as the mixed model), EI is defined as a constellation of emotional self-perceptions that are located in the lower levels of personality hierarchies (Petrides & Furnham, 2001).

Based on these different theoretical models, researchers have designed different assessment tools to evaluate EI. Therefore, trait models involve a constellation of emotion-related self-perceptions and dispositions and should be measured via self-report questionnaires, whereas ability models operationalize EI as a cognitive ability and should be measured via performance tests. A performance test is characterized as presenting different emotional tasks and decision-making problems to the participants, as opposed to self-reports that measure emotional self-efficacy.

Although both approaches have shown empirical evidence for predicting relevant personal outcomes, Mayer and Salovey (1997) argue that EI, as another kind of intelligence, is best described as a set of intelligences and, therefore, is best measured by ability-based tools (Mayer, Salovey, & Caruso, 2000). Following this reasoning, different instruments for measuring EI have been developed in recent years, such as the Multi-Emotional Intelligence Scale (Mayer, Caruso, & Salovey, 1999), the Situational Test of Emotional Understanding (MacCann & Roberts, 2008), and the Test of Emotional Intelligence (Blickle, Momm, Liu, Witzki, & Steinmayr, 2011). However, the EI performance test that is the most widely accepted in the research community is the one developed by Mayer and colleagues, known as the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, & Caruso, 2002; Mayer, Salovey, Caruso, & Sitarenios, 2003), which

AQ: 7

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tapraid5/z1t-assess/z1t-assess/z1t00415/z1t3021d15z | xppws | S=1 | 12/4/15 | 2:55 | Art: 2015-0351



was designed to assess the four-branch EI model (Mayer & Salovey, 1997).

The MSCEIT is composed of 141 items divided into eight tasks (two for each branch) that are designed to measure the four branches of EI: perceiving emotions, using emotions to facilitate thought, understanding emotions, and managing emotions (Mayer & Salovey, 1997). In general, the MSCEIT yields 15 scores: a total score, two area scores (experiential and strategic), four branch scores (corresponding to the four-branch model), and eight task scores (see Figure 1).

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The first two factors in the model, Perceiving and Facilitating, form part of the experiential area because of their close relation to sensations. Thus, the Perception factor has to do with the ability to perceive emotions in others, whereas the Facilitating factor refers to being able to use emotions to improve one's own thought process. On the other hand, the Understanding and Managing factors are part of the strategy area because they involve the ability to evaluate and plan action based on the information provided by sensations and emotions. The understanding factor refers to the ability to know how one's emotions change and also how other people's emotions change, altering their behavior over time. The managing factor refers to the ability to integrate logic and emotions to more effectively make decisions.

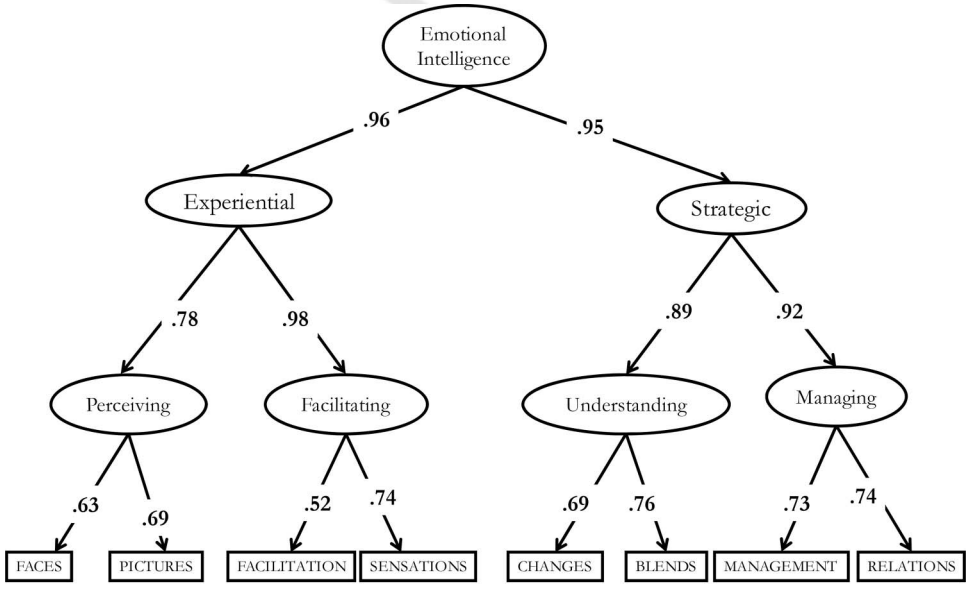
Each of the factors or branches is evaluated by means of two tasks. The ability to perceive emotions is determined by perceiving emotions in facial expressions and photographs; the Emotional Facilitating factor is measured by sensations and facilitation tasks, and the ability to understand emotions is assessed through one task for blending emotions and another for combining emotional changes or transformations. Finally, the ability to manage emotions is evaluated through an emotional management task and an emotional relations task.

Each of the eight MSCEIT tasks, in turn, comprises an item parcel; some items refer to the same stimulus, whereas others are free-standing. For example, a parcel structure appears when an individual is shown a face (the face task) and is asked to evaluate the presence of five different emotions on that face through a graduated, five-choice response format (e.g., from *no happiness* to *extremely happy*). The five items related to those emotions compose a parcel because they refer to the same face, although each item refers to a different emotion. However, other items require a response to a stimulus and are, in that sense, independent, although they also have five answer choices (e.g., judging a behavior's effectiveness in managing emotions from 1 = *very ineffective* to 5 = *very effective*; Mayer et al., 2003).

## Scoring Methods

The MSCEIT is objective because some answers are better and others are worse, as determined by general or expert consensus scoring. General consensus scores reflect the proportion of people in the normative sample who endorse each MSCEIT test item. Expert norms were obtained from a sample of 21 members of the International Society for Research on Emotions who provided their expert judgment on each item.

Thus, the score assigned to each item's answer choice is based on the proportion of persons who chose it as correct, whether by general or expert consensus. For instance, in the scores generated by general consensus, if the proportion of choices related to happiness was .10, .10, .05, .20, and .55 in the standardized sample, then a person who chooses 5, *extremely happy*, would score .55, whereas a person who chooses 1, *unhappy*, would score .10. The scores for the expert consensus were similarly based on each answer choice percentage, as selected by experts.




**Fit indices: $\chi^2$ (16) = 265.32; $p$ = .000; CFI = .97; NNFI = .94; RMSEA = .067**

*Figure 1.* Diagram of the Mayer-Salovey-Caruso hierarchical model. Fit indices and standardized factor saturations.

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The convergence of the two scoring procedures with other procedures developed in other contexts, cultures, or languages determines the usefulness of the scores. In this sense, analyses of MSCEIT standardization data ($n$ = 2,112) by Mayer et al. (2003) demonstrated a closer convergence between expert and general consensus scoring methods ($r$ = .908). Palmer, Gignac, Manocha, and Stough (2005), using an Australian sample, also found a strong relationship ($r$ = .993) between scores determined using American consensus weights and scores using Australian consensus weights. However, other studies have questioned the adequacy of this scoring system, especially with regard to general consensus (see, e.g., Davies, Stankov, & Roberts, 1998; Keele & Bell, 2009; Roberts, Zeidner, & Matthews, 2001).

## Factor Structure

Nevertheless, the factor structure underlying MSCEIT scoring has been at the center of intense controversy in the scientific literature. This structure determines the number of dimensions that must be measured and interpreted (Brackett & Salovey, 2006). Several studies have attempted to provide evidence in favor of the theoretical, four-branch structure. Some researchers have claimed that their studies support a four-factor MSCEIT structure that is consistent with the four-branch model (e.g., Brackett, Rivers, & Salovey, 2011; Day & Carroll, 2004; Mayer et al., 2002, 2003). Whereas others have doubts concerning the suitability of this factor structure, in most cases, these researchers have used a college student population (Fan, Jackson, Yang, Tang, & Zhang, 2010; Gardner & Qualter, 2011; Gignac, 2005; Palmer et al., 2005; Roberts et al., 2006; Rode et al., 2008; Rossen, Kranzler, & Algina, 2008) and proposed alternative one-, two-, three-, or four-factor models. Despite the proliferation of models, the hierarchical model (i.e., the MSCEIT's implied theoretical structure of eight tasks, four branches, two areas, and general EI) has been tested on a few occasions and yet is almost never proposed as the best model for later analyses, even though Mayer et al. (2002) thought that this type of test best determined the clustering of MSCEIT scores according to theory.

## Factorial Invariance

One of the research goals most tested in studies using MSCEIT scores is the comparison of target groups (cultures, gender, age, etc.). A preliminary step in these analyses should be the verification of the equivalence of MSCEIT measures among those target groups (Meredith, 1993). Thus, to provide more evidence of the suitability of the MSCEIT measurements, the factorial invariance of its scores among different groups has been tested, although in no case has the invariance of the hierarchical model been tested. For example, Gardner and Qualter (2011) tested invariance in two age groups (young vs. older adults) but used a three-factor model (the experiential area and the understanding and management branches). Karim and Weisz (2010) tested the cross-cultural invariance (Pakistani-French students) of the correlated four-factor (branch) model. In a study in which schizophrenia and normative samples were compared, Eack, Pogue-Geile, Greeno, and Keshavan (2009) could not find factorial invariance. According to their data, the four-factor model is best used for the normative sample, whereas for the sample of the population with schizophrenia, the best-fitting model was a modified two-factor model proposed by Eack et al. (2010).

## Evidence of Convergent and Discriminant Validity

MSCEIT areas, factors, and tasks are related to each other, although they are functionally different and do not conceptually or empirically overlap (Mayer et al., 2003; Palmer et al., 2005). However, the MSCEIT itself is relatively independent of other personality constructs, insofar as it shows moderate correlations with some measures of general cognitive skill that include nonverbal intelligence and, especially, verbal intelligence (Kong, 2014; Roberts et al., 2001; Van Rooy, Viswesvaran, & Pluta, 2005). Furthermore, the MSCEIT scores show evidence of discriminant validity with respect to other self-reported EI measures, analytical intelligence measures, and several well-being and personality variables (Brackett & Mayer, 2003; Brackett, Rivers, Shiffman, Lerner, & Salovey, 2006; Rossen & Kranzler, 2009).

## Evidence of Predictive and Incremental Validity

Low scores on the MSCEIT have primarily been associated with the male gender and with high illegal drug and alcohol use, violent behavior, low academic performance, and poor relations with friends (Brackett, Mayer, & Warner, 2004; Rossen & Kranzler, 2009), as well as with higher depression scores (Goldenberg, Matheson, & Mantler, 2006; Salguero, Extremera, & Fernández-Berrocal, 2012) and stronger desires for vengeance for interpersonal offenses (Rey & Extremera, 2014). There are many reasons for believing that EI plays an important role in predicting one's subjective sense of well-being and positive mental health. In fact, some studies have found positive relationships between the MSCEIT and psychological well-being (PWB) and life satisfaction using experimental (Brackett et al., 2006) and prospective designs (Extremera, Ruiz-Aranda, Pineda-Galan, & Salguero, 2011). AQ: 9

## Gender Comparisons

There is ample evidence of gender differences in MSCEIT scores in the literature (Brackett & Mayer, 2003; Brackett et al., 2004, 2006; Fernández-Berrocal, Cabello, Castillo, & Extremera, 2012; Palmer et al., 2005; Salguero et al., 2012). Moreover, the MSCEIT manual (Mayer et al., 2002) and recent meta-analytical studies suggest that women score higher on the four MSCEIT factors than men do (Joseph & Newman, 2010) and that gender might act as a moderator in EI studies (Kong, 2014).

## Overview of Studies

The MSCEIT was adapted into Spanish using back translation with a sample of 946 high school and university students (Extremera, Fernández-Berrocal, & Salovey, 2006), and it showed preliminary evidence that the reliability of the total scores (by area, branches, and subscales) is adequate when using Spanish samples. However, evidence of convergence between the Spanish and original English consensus methods, the factor structure underlying the scores, gender invariance, score stability (test–retest), and other evidence of validity based on the relationship with other variables in the Spanish version of the MSCEIT have still not been explored or analyzed.

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The main purposes of this research were to analyze the factor structure of the Spanish MSCEIT scores, its reliability, the test–retest stability, and the level of convergence between the Spanish consensus scores and the general and expert consensus scores determined with Mayer et al. (2003) data and gender invariance (Study 1). We also wanted to evaluate evidence of its discriminant validity by examining the relationship of its scores and conceptually distinguishing between personality traits and self-reported EI scores (Study 2). Finally, we examined evidence of the predictive and incremental validity of the Spanish MSCEIT scores to explain the significant variance in prospective (2-month) predictions of PWB by controlling for the relevant predictors of PWB, such as personality traits (Study 3).

## Study 1

This first study had several purposes. First, we wanted to provide proof of the convergence of these scores with those generated by the general and expert consensus of Multi-Health Services. Once convergence was demonstrated (i.e., if they were in agreement), we would proceed to the psychometric analysis of our data. To do so, we analyzed the evidence for the reliability and validity of scores from the Spanish version of the MSCEIT. To prove the reliability of the scores, we estimated the coefficients of internal consistency and their stability. Evidence for validity came from (a) the factor structure (by which we tested the hierarchical model by Mayer et al., 2002); (b) the cross-gender factorial invariance of this model, and whether invariance was demonstrated; and (c) the analysis of the differences in MSCEIT scores by gender.

### Method

**Participants and procedure.** The sample consisted of 3,448 Spanish college and high school students (69% females) ranging in age from 17 to 76 years ($M$ = 24.48, $SD$ = 10.67). The participants were first given a set of brief written and verbal instructions and were informed of their anonymity. Next, the MSCEIT v. 2.0 was administered to the participants in groups of 30 to 50. Finally, the participants were debriefed and thanked for their participation.

**Measures: Emotional intelligence test.** The Spanish version of the MSCEIT v. 2.0 (Extremera & Fernández-Berrocal, 2009; Mayer et al., 2002) was administered.

**Statistical procedures.** Non-CFA or factorial invariance analyses were conducted using IBM SPSS Statistics Version 19 software.

To analyze the test's factor structure, we conducted a maximum likelihood confirmatory factor analysis (CFA) of the hierarchical model (three-level higher factor model) by Mayer et al. (2002; see Figure 1) with EQS 6.0 software (Bentler, 1995). The scores that were directly used as observable indicators of the factors were the scores on the tasks, not on the original items. Similar to Mayer et al. (2002), and following the recommendations of Cattell and Burdsal (1975) and Hughey and Burdsal (1982), we combined the scores on the test item parcels, which shared characteristics that differentiated the tasks. To determine the overall model fit along with the chi square, we used indexes that were less sensitive to sample size, including the non-normed fit index ($>$ .90), the comparative fit index (CFI $>$ .90), and the root mean square error of approximation ($<$ .08; Kline, 2005).

Further evidence of validity was collected using multigroup analysis as a function of gender. For the invariance comparison, we followed the procedure applied by Wright, Lukowitsky, Pincus, and Conroy (2010), which was based on the recommendations of Chen, Sousa, and West (2005). To do this, we first separately tested the hierarchical model shown in Figure 1 for men and women to determine whether the model fit each group. In the multigroup analysis, we began by specifying a baseline model (Model 1) of configurational invariance in which no parameter was restricted, and it was assumed that the factor structure was the same for both groups. Afterward, restrictions were added to this baseline model, verifying its fit and comparing this fit to the model that preceded it, in the following order: (a) invariance of the first-order factor loadings (Model 2), (b) invariance of the second-order factor loadings (Model 3), (c) invariance of the third-order factor loadings (Model 4), (d) error variance equivalents (Model 5), and (e) equivalence of first- and second-order factor disturbances (Model 6). Invariance was assumed when each of the models fit and when its fit was not significantly worse than its predecessor. For model comparisons, we used the chi-square difference and change in the CFI. If there was any discrepancy, we preferred the change in the CFI; we considered a change $\leq$.01 as being indicative of invariance (Cheung & Rensvold, 2002; Rast, Zimprich, Van Boxtel, & Jolles, 2009; Wright et al., 2010).

### Results

**Convergence of scoring criteria.** We found a close relationship between scores assigned to the item responses using the Spanish consensus weights and scores using the American general ($r$ = .93) and expert ($r$ = .85) consensus.

Furthermore, the generated scores for the people in our sample were based on different criteria (American consensus, experts, and Spanish consensus) and are very highly and significantly correlated (see Table 1). All the correlations are above .90, except those related to the facilitating branches and tasks.

**Descriptive statistics and reliability.** Table 1 shows the means, standard deviations, and reliability of the scores generated from the scoring criteria of the Spanish normative sample. The 15 scores varied from 0.04 (the lowest score, which was for the pictures task; mean of 0.46) to 0.63 (the highest, corresponding to the faces task; $M$ = 0.50). For the total EI score, the values varied from 0.16 to 0.54 ($M$ = 0.43).

Concerning the internal consistency of the scores in our sample, the total MSCEIT has a reliability of .94, with area reliabilities of .92 for the experiential area and .98 for the strategic area. The reliability estimates of branch scores varied from .71 (Facilitating) to .92 (Perceiving).

Score stability evidence for scale reliability, which was estimated based on the correlation coefficient of the test–retest scores, was very good. All the correlations were above .7 except for the relationships task. For this test, the equality of means and variances between the two test applications was also verified, which enabled these high correlations to be interpreted as evidence of the scores' reliability and stability.

**Evidence of validity based on the internal scale structure: Factor structure.** Evidence of validity based on the internal structure of the Spanish version of the MSCEIT would be found if, based on the data, we were able to reproduce the theoretical model

Table 1
*Descriptive Means and Standard Deviations, Correlations of the Spanish Consensus Scores with the U.S. General and Expert Consensus, and Reliability (Internal Consistency and Test–Retest) of the Spanish Consensus Scores*

| Group of scales | Scales | *M* (*SD*) *N* = 3,448 | Correlations *N* = 3,448 U.S. consensus | Correlations *N* = 3,448 Expert consensus | Reliability internal consistency *N* = 3,448 | Reliability test–retest *N* = 349 |
|---|---|---|---|---|---|---|
| Global | Total | .43 (.06) | .98 | .97 | .94 | .81 |
| Areas | A. Experiential | .45 (.07) | .96 | .96 | .92 | .81 |
| | B. Strategic | .41 (.07) | .99 | .97 | .87 | .82 |
| Branches | 1. Perceiving | .47 (.10) | .99 | .98 | .92 | .83 |
| | 2. Facilitating | .42 (.07) | .85 | .85 | .71 | .82 |
| | 3. Understanding | .45 (.08) | .97 | .96 | .80 | .83 |
| | 4. Managing | .37 (.07) | .99 | .95 | .83 | .81 |
| Tasks | | | | | | |
| Branch 1 | A. Faces | .50 (.11) | .99 | .98 | .79 | .76 |
| | E. Pictures | .46 (.11) | .99 | .98 | .88 | .88 |
| Branch 2 | B. Facilitating | .44 (.08) | .70 | .68 | .64 | .79 |
| | F. Sensations | .39 (.08) | .95 | .95 | .66 | .80 |
| Branch 3 | C. Changes | .45 (.08) | .96 | .93 | .69 | .86 |
| | G. Blends | .46 (.10) | .96 | .98 | .66 | .80 |
| Branch 4 | D. Management | .38 (.07) | .98 | .91 | .67 | .86 |
| | H. Relations | .37 (.09) | .99 | .93 | .69 | .63 |

*Note.* Cronbach's alpha coefficient was used to calculate the internal consistency of the tasks. For the rest of the scores, the Spearman-Brown coefficient (split-half) was calculated. U.S. general and expert consensus scores were determined with Mayer et al. (2003) data.

of eight tasks, four branches, two areas, and an overall score (see Figure 1). However, this model showed identification and solution problems for the involved equations. According to Bollen (1989), in a second-order CFA, the higher order factors must have at least three factors in the lower order. In this model, however, only two lower order factors appeared for each higher order factor. To solve this problem of model identification, Rossen et al. (2008) suggested setting the factor saturations of the third-order factor over the second-order equal to one another or setting the variances of error of the second-order factors equal to one another. The second option was chosen for use in this research. Once the parameters were estimated, an inappropriate solution appeared (showing a negative variance of error of the first-order factor in the facilitating branch); therefore, following the recommendation of Chen, Bollen, Paxton, Curran, and Kirby (2001), we set the variance of error to .0001.

Once the identification problems were resolved, the fit indices revealed that the proposed model was adequate. Furthermore, all the factor saturations were relevant, significant, and suitable for the theoretical model. The second- and third-order factor model adequately reproduced the task correlations.

**Evidence of validity based on the internal scale structure: Factorial invariance by gender.** Before proceeding to the analysis of the gender differences in the MSCEIT scores, we needed to determine whether the MSCEIT scores were equivalent across men and women; thus, we tested the MSCEIT cross-gender measurement equivalence. However, factorial invariance can also be interpreted as more evidence for the validity of the test's underlying factor structure. The results of the invariance and the fit of the different models are shown in Table 2.

The fit of the hierarchical model is adequate for both men and women. Therefore, we proceeded to study the invariance. The first configurational invariance model also had good fit indices, which shows that the described factor structure is maintained for men and women.

As restrictions were added to the various models, the factorial invariance of the MSCEIT scores between the groups was confirmed. Although the change in chi square ($\Delta\chi^2$) was significantly different in some cases, the differences between CFIs in the nested models were never higher than .01. In practice, in the last model, the standardized factorial saturations were the same for men and women. Therefore, we may conclude that the MSCEIT is a robust instrument that has strong invariance between men and women, as demonstrated by their comparable scores.

**Evidence based on the relationship with other variables: EI and gender.** In our sample, women scored higher than men on all tasks, branches, areas, and total score. The differences between the mean scores are statistically significant ($p < .001$), and the effect size (Cohen, 1988), in general, may be qualified as medium (Cohen's *d* from 0.36 to 0.56). The widest differences are seen in the branches, the areas, and the total score (see Table 3).

## Discussion

The results of Study 1 demonstrate that the Spanish version of the MSCEIT is structurally and functionally very similar to the original English version, and that the criteria for scoring seem adequate and very close to those used by Mayer et al. (2002, 2003). Furthermore, with regard to the Spanish version and the sample of Spanish subjects, this study provides evidence for the scale's score reliability (the scale's internal consistency coefficients and stability) and validity, which is based on the internal test structure.

The estimates for the reliability of scores on the Spanish version of the test used for our sample are satisfactory. These values are

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Table 2
*Fit Indices of the EI Model by Gender and Multigroup Analysis*

| Model | *df* | $\chi^2$ | NNFI | CFI | RMSEA | Model comparisons | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Models | $\Delta df$ | $\Delta\chi^2$ | *p* | ΔCFI |
| Women ($n$ = 2,391) | 16 | 163.65 | .94 | .96 | .062 | — | — | — | — | — |
| Men ($n$ = 1,053) | 16 | 114.61 | .94 | .97 | .077 | — | — | — | — | — |
| Multigroup analysis: Factorial invariance by gender ($N$ = 2,391/1,053) | | | | | | | | | | |
| Model 1 | 32 | 278.25 | .94 | .97 | .047 | | | | | |
| Model 2 | 36 | 300.86 | .94 | .96 | .046 | 2–1 | 4 | 22.61 | .000 | .01 |
| Model 3 | 38 | 302.86 | .94 | .96 | .045 | 3–2 | 2 | 2.00 | .368 | .00 |
| Model 4 | 40 | 409.96 | .93 | .95 | .052 | 4–3 | 2 | 107.10 | .000 | .01 |
| Model 5 | 48 | 515.63 | .92 | .94 | .053 | 5–4 | 8 | 105.67 | .000 | .01 |
| Model 6 | 51 | 614.46 | .91 | .93 | .056 | 6–5 | 4 | 98.83 | .000 | .01 |

*Note.* •••.

very close to those found in other studies using the original English version (see, e.g., Brackett & Mayer, 2003; Mayer et al., 2002, 2003; Palmer et al., 2005; Rossen et al., 2008), even for populations whose original language is not English (e.g., Karim & Weisz, 2010) or when using versions in other languages (e.g., Iliescu, Ilie, Ispas, & Ion, 2013).

The CFA performed on the hierarchical model proposed by Mayer et al. (2002) and the invariance analyses provide empirical evidence in favor of the theoretical EI model based on the hierarchical structure of eight tasks, four branches, two areas, and a total EI score. This model, although it had good fit indices, had not been previously used as the baseline model of analysis (see, e.g., Fan et al., 2010; Gardner & Qualter, 2011; and Rode et al., 2008). We also verified that the MSCEIT scores have the same interpretation for men and women, which enables statistical comparisons of the two groups.

Thus, as evidence of validity is based on its relationship with other variables, we analyzed the relationship between MSCEIT scores and gender. We found that our results support those of other researchers: Women scored higher on the scale than men. As theoretically and from previous research it was expected that women would score higher, we interpret this difference as further evidence for the adequacy of the Spanish MSCEIT.

Table 3
*Comparison of Means of Men (1,053) and Women (2,391)*

| ••• | ••• | Mean | Standard deviation | Mean comparison |
|---|---|---|---|---|
| Total | Men | .4071 | .07239 | $p < .001$ |
| | Women | .4401 | .05239 | Cohen's $d$ = .56 |
| Experiential | Men | .4239 | .08364 | $p < .001$ |
| | Women | .4560 | .06346 | Cohen's $d$ = .46 |
| Strategic | Men | .3903 | .07623 | $p < .001$ |
| | Women | .4241 | .05706 | Cohen's $d$ = .53 |
| Perceiving | Men | .4495 | .10986 | $p < .001$ |
| | Women | .4832 | .08571 | Cohen's $d$ = .36 |
| Facilitating | Men | .3983 | .08031 | $p < .001$ |
| | Women | .4289 | .06358 | Cohen's $d$ = .44 |
| Understanding | Men | .4295 | .09008 | $p < .001$ |
| | Women | .4636 | .06864 | Cohen's $d$ = .45 |
| Managing | Men | .3511 | .07920 | $p < .001$ |
| | Women | .3847 | .06430 | Cohen's $d$ = .49 |

## Study 2

As other studies have shown, MSCEIT scores are clearly differentiated from EI measurements based on self-report scales (e.g., Brackett & Mayer, 2003; Brackett et al., 2006) and from other personality characteristics (Rey & Extremera, 2014). The purpose of this second study was to demonstrate that the four EI branches from the Spanish version of the MSCEIT are distinguishable from personality variables and self-report measures of EI, and, furthermore, that these self-report measures are less separable from personality measures. We therefore attempted to provide evidence of discriminant validity when comparing the Big Five and Trait Meta-Mood Scale (TMMS; Salovey et al., 1995) scales. AQ: 20

### Method

**Participants and procedure.** The participants were 621 Spanish undergraduate students (79% women) with ages ranging from 17 to 54 years ($M$ = 22.20, $SD$ = 4.66). The questionnaires were administered with written instructions and in paper-and-pencil format. The participants completed the questionnaires in groups and received course credit for their participation.

**Measures.**

***Emotional intelligence test.*** The Spanish version of the MSCEIT v. 2.0 (Extremera & Fernández-Berrocal, 2009; Mayer et al., 2002) was administered.

***Big Five Inventory 44. (BFI-44; Benet-Martínez & John, 1998).*** The BFI-44 is a 44-item, self-report inventory designed to assess the Big Five factors of personality: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience. The BFI-44 scales have shown substantial internal consistency, retest reliability, and clear factor structure. We used the Spanish version of the BFI-44, which has psychometric properties similar to those of the English version (Benet-Martínez & John, 1998). In Study 2, we found Cronbach alphas of .85, .62, .79, .83, and .78 for the Big Five dimensions of Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience, respectively.

***TMMS (Salovey et al., 1995).*** We used the modified Spanish version of the TMMS (Fernandez-Berrocal, Extremera, & Ramos, 2004). This instrument is composed of 24 items and provides an indicator of perceived EI. The respondents were asked to rate their

tapraid5/z1t-assess/z1t-assess/z1t00415/z1t3021d15z | xppws | S=1 | 12/4/15 | 2:55 | Art: 2015-0351



agreement with each of the items on a 5-point Likert-type scale ranging from 1 (*very much agree*) to 5 (*very much disagree*). The scale is made up of three subfactors: Attention to Feelings, Emotional Clarity, and Mood Repair. Attention to Feelings, assessed by the first eight items, is the degree to which people believe they pay attention to their feelings (e.g., "I think about my mood constantly"); Emotional Clarity, evaluated by the subsequent eight items, refers to how people believe they perceive their emotions (e.g., "I frequently make mistakes about my sensations"); and Mood Repair, assessed by the remaining eight items, refers to people's belief in their capacity to interrupt negative moods and prolong positive ones (e.g., "Although I sometimes feel sad, I usually have an optimistic outlook"). In this study, we found Cronbach alphas of .87, 88, and .85 for the TMMS Attention, Clarity, and Repair dimensions, respectively.

**Statistical procedures.** We performed three principal-axis exploratory factor analyses with direct oblimin rotation on the whole sample and on subsamples of men and women for the five Big Five scales, the three TMMS dimensions, and the four MSCEIT branches using the SPSS program for Windows (Version 19). Multiple criteria, including an examination of the scree plot, application of the Kaiser rule (eigenvalues $\geq 1$), and parallel analysis (O'Connor, 2000), were used to identify the optimal number of factors to retain.

## Results

In the first analysis of the whole sample, three factors were obtained. The eigenvalues of the first three factors were 2.6, 1.7, and 1.4, which explain up to a total of 48% of variance. After rotation, the remaining factor structure is clearly interpretable, with saturations over $\pm .40$ (except for Conscientiousness; see Table 4). Factor 1 is made up of four BF and two TMMS dimensions, Factor 2 is composed of four MSCEIT branches, and Factor 3 is made up of Neuroticism (BF, which is also saturated at $\pm .4$ with the first factor) and Attention (TMMS). Our results also show that the branches of MSCEIT are largely distinct from the personality measures rather than the TMMS subscales; for example, Factor 2 of the MSCEIT correlates .22 and $-.02$ with Factors 1 and 3, respectively.

This factorial solution is maintained almost intact when the analyses are separately completed by sex. The MSCEIT factor is always maintained separately from any other factorial combination. For women, although a fourth factor appears, the same structure is always maintained: MSCEIT forms a separate factor.

## Discussion

In this study, we attempted to provide evidence for the convergent and discriminant validity of scores on the MSCEIT. We also found that there was a closer relationship between personality and TMMS measures than between the personality scales and the MSCEIT.

First, we interpreted the clustering of the four branches into a single factor as evidence of convergent validity. These data coincide with those found by Brackett and Mayer (2003), Iliescu et al. (2013), and Koven and Max (2014). In these studies, the basic evidence for convergence was found in the strong branch correlations.

Concerning discriminant evidence, the data in this study agree largely with the conclusions of Van Rooy et al. (2005), in which the EI measures based on mixed models overlap more with personality measures than with the ability model. Specifically, several MSCEIT studies using the Big Five (see, e.g., Brackett et al., 2006; Iliescu et al., 2013; Rode et al., 2008) and the NEO-BFFI (Warwick & Nettelbeck, 2004; Webb et al., 2013) as personality measures support this conclusion. Concerning self-report EI scales, some authors use the TMMS (Koven & Max, 2014; Warwick & Nettelbeck, 2004), as we did, or the SREIS (Brackett et al., 2006; Webb et al., 2013, who also used the EQ-i). Both in our study and in those mentioned, a strong relationship between personality characteristics and self-report measures is found, whereas the relationships of these two measures with the MSCEIT scores are irrelevant. Moreover, our results are congruent with those of McCrae's (2000) work, according to which the Big Five covers most of what is measured by mixing the conceptions of EI.

## Study 3

The aim of this study was to determine the extent to which the MSCEIT would make significant, nonredundant contributions to

Table 4
*Factor Solution of Measures of Personality and Emotional Intelligence: TMMS and MSCEIT Using Principal Axis Factoring With Oblique Rotation (Pattern Matrix)*

| | | Full sample | | | Men | | | Women | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ••• | ••• | I | II | III | I | II | III | I | II | III | IV |
| Big Five | Extraversion | .51 | | | .59 | | | .64 | | | |
| | Openness | .45 | | | | | .43 | .52 | | | −.26 |
| | Agreeableness | .42 | | | .48 | | | .43 | | | −.28 |
| | Conscientiousness | .29 | | | .37 | | | | | | −.37 |
| | Neuroticism | −.46 | | .70 | −.59 | | | −.34 | .82 | | .39 |
| TMMS | Repair | .67 | | | .63 | | | .57 | | | −.53 |
| | Clarity | .62 | | | .63 | | | .45 | | | −.76 |
| | Attention | | | .64 | | | .78 | | .55 | | |
| MSCEIT | Managing | | **.54** | | | **.66** | | | | **.47** | |
| | Perceiving | | **.53** | | | **.47** | | | | **.56** | |
| | Understanding | | **.50** | | | **.70** | | | | **.43** | |
| | Facilitating | | **.50** | | | **.47** | | | | **.55** | |

tapraid5/z1t-assess/z1t-assess/z1t00415/z1t3021d15z | xppws | S=1 | 12/4/15 | 2:55 | Art: 2015-0351



prospective (2-month) predictions of the criterion variable (PWB) beyond what is accounted for by the influence of personality traits (Big Five dimensions).

## Method

**Participants and procedure.** The original sample included 502 Spanish undergraduate students who were enrolled in psychology and health science courses, volunteered for this study, and earned extra course credit for participating. Of this original sample, 465 undergraduate students (74% women) were aged 18 to 52 years ($M = 21.31$, $SD = 4.94$); they took the tests at two separate times, which were made available for later analyses. The questionnaires were completed in paper-and-pencil format in class under the supervision of research assistants. The MSCEIT and a measure of the Big Five personality traits were completed at Time 1 (approximately 1 month into the term); 2 months later, the participants were tested on a measure of PWB.

**Measures.**

***Emotional intelligence test.*** The Spanish version of the MSCEIT v. 2.0 (Extremera & Fernández-Berrocal, 2009; Mayer et al., 2002) was administered.

AQ: 25

***BFI-44 (Benet-Martínez & John, 1998).*** The BFI-44 is a 44-item, self-report inventory designed to assess the Big Five factors of personality: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience. The BFI-44 scales have shown substantial internal consistency, retest reliability, and clear factor structure. We used the Spanish version of the BFI-44, which has psychometric properties that are similar to those in the English version (Benet-Martínez & John, 1998). In this study (Study 3), we found Cronbach alphas of .82, .64, .76, .80, and .75 for each of the Big Five dimensions of Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience, respectively.

***PWB test (Ryff, 1989).*** This scale measures six dimensions of PWB: self-acceptance, environmental mastery, purpose in life, positive relations with others, personal growth, and autonomy. In this study, we used the shorter version of the Spanish scale of PWB (van Dierendonck, Díaz, Rodríguez-Carvajal, Blanco, & Moreno-Jiménez, 2008). The reliability of the composite PWB score ($\alpha = .88$) was high.

**Statistical procedures.** We conducted three hierarchical regression analyses (on the complete sample and by gender) using SPSS for Windows (Version 19). In addition to the Big Five and the overall EI regression parameters over PWB, we analyzed and interpreted the percentages of variance explained and the semipartial correlations of PWB with overall EI while controlling for the Big Five dimensions. According to Cohen (1988), in the social and behavioral sciences, a large effect explains 25% of the variance, a medium effect is approximately 9%, and a small effect is approximately 1%. To correctly interpret the semipartial correlations, we followed the recommendation of Hunsley and Meyer (2003). According to these authors, semipartial correlations are a very suitable measure of a variable's contribution to criterion prediction. Values from .15 to .20 represent an important contribution to the prediction, taking into account both the number of variables already included and the relationships between them.

## Results

For our regression equations, we first included the Big Five dimensions and then the total MSCEIT (see Table 5). T5

In the regression model, the five personality variables explained a relevant percentage of the variance. The variable with the most weight was Extraversion, followed by Neuroticism (for men, the inverse was found). The third variable with the most weight, EI, was entered in the second step.

The increase in the percentage of variance explained by adding EI is significant. The semipartial correlation of PWB with the overall EI, controlling for the Big Five dimensions, was .18 for the whole sample, .19 for men, and .17 for women. As EI enters the regression equation in second place after the Big Five variables, its contribution to predicting PWB may be considered substantial and relevant. We also took into consideration that for the whole sample, the only effect of MSCEIT on PWB was 6% ($.25^2 = 0.06$), which can be considered a medium-sized effect.

Table 5
*Hierarchical Regression Model for Predicting Well-Being (PWB, Time 2, After 2 Months) Based on the Big Five Dimensions and the Total EI Score (Big Five and EI Measured at Time 1)*

| Models | All ($N = 465$) β | All $R^2$ | All $\Delta R^2$ | Men ($n = 120$) β | Men $R^2$ | Men $\Delta R^2$ | Women ($n = 345$) β | Women $R^2$ | Women $\Delta R^2$ |
|---|---|---|---|---|---|---|---|---|---|
| Step 1: Big Five traits | | .25 | .25*** | | .19 | .19*** | | .29 | .29*** |
| Extraversion | .31*** | | | .23* | | | .33*** | | |
| Agreeableness | .04 | | | −.06 | | | .08 | | |
| Conscientiousness | .14** | | | .01 | | | .17** | | |
| Neuroticism | −.22*** | | | −.25* | | | −.23*** | | |
| Openness | .10* | | | .18 | | | .08 | | |
| Step 2: Big Five + EI | | .28 | .03*** | | .22 | .03* | | .32 | .03*** |
| Extraversion | .30*** | | | .21* | | | .32*** | | |
| Agreeableness | .01 | | | −.10 | | | .05 | | |
| Conscientiousness | .14** | | | .01 | | | .18*** | | |
| Neuroticism | −.22*** | | | −.23* | | | −.22*** | | |
| Openness | .10* | | | .17 | | | .08 | | |
| Total EI | .18*** | | | .20* | | | .18*** | | |

*Note.* •••.
* $p < .05$. ** $p < .01$. *** $p < .001$.

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## Discussion

Beyond the predictive ability of the personality traits as measured by the Big Five, the MSCEIT's ability to predict PWB provides empirical evidence that the Spanish version of the MSCEIT measures a construct that is related to other psychological variables. This would be expected according to the original theoretical models, which we should interpret as evidence of the scale's validity. As some researchers have noted, in the study of new theoretical constructs, such as EI, even findings that account for small amounts of variance independent of other well-known personality variables should be viewed as reasonable contributions to the understanding of the mechanism involved in human functioning (Mayer et al., 2000).

Other studies based on the original version of the MSCEIT provide empirically similar findings. For example, the studies by Brackett et al. (2006) and Higgs and Dulewicz (2008), as well as the review by Carmeli, Yitzhak-Halevy, and Weisberg (2009), show a close relationship between EI and PWB.

## General Discussion

The MSCEIT, which has become one of the most widely used instruments for measuring EI as a human ability, has demonstrated excellent psychometric properties in normal and clinical samples (Eack et al., 2009; Karim & Weisz, 2010; Mayer et al., 2000, 2003; Mayer, Salovey, & Caruso, 2012; Palmer et al., 2005). Current research on EI has shown that high MSCEIT scores are positively related to healthy personal and social functioning, and to academic and professional success in different contexts (see Mayer, Roberts, & Barsade, 2008; Mayer, Salovey, & Caruso, 2008, for reviews). Because of its wide applicability, the MSCEIT has been translated into different languages, including Spanish (Extremera & Fernández-Berrocal, 2009). The usual practice is to follow the International Test Commission (2005) guidelines, providing several different tests of agreement of the original and translated items. However, the evidence of validity based on test content is insufficient, and there are others that also provide justification for the use of certain tests and decision making based on test scores. It is therefore necessary to provide more evidence justifying MSCEIT use and supporting the inferences that are derived from its scores (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014).

The aim of this research was to analyze the factor structure and psychometric properties of the Spanish version of the MSCEIT (Extremera & Fernández-Berrocal, 2009) by means of several reliability analyses of its scores and their usefulness, based on evidence of validity found from the internal structure of the scale or its relationships to other relevant variables. In three studies using large participant samples, our results have supported the use of the Spanish version of the MSCEIT as a suitable instrument for measuring EI in the Spanish population.

In Study 1, we demonstrated close convergence between the Spanish consensus method and the original English scoring method that makes use of both general and expert consensus (Mayer et al., 2002, 2003) and found that scores on the MSCEIT showed excellent psychometric properties with high reliability and test–retest stability. Using CFA analysis, we also confirmed that the factor structure of the Spanish version is congruent with Mayer and Salovey's (1997) hierarchical model with eight tasks, four branches, two areas, and an overall EI score. Moreover, multigroup analyses supported MSCEIT's cross-gender invariance.

The last analysis in Study 1 and those in Studies 2 and 3 referred to a different source for evidence of validity based on the relationship with other variables. This approach involves the degree to which these relationships are consistent with the construct underlying the proposed test interpretations (American Educational Research Association et al., 2014). Thus, we found that women scored higher than men on the Spanish version of the MSCEIT, as was also the case in the original English version (Brackett et al., 2004, 2006; Mayer et al., 2002). Furthermore, the Spanish version leads to scores that are differentiable from instruments generated from the trait model and other scales that measure personality variables (Brackett et al., 2006; Webb et al., 2013). Finally, our data suggest that the scores from the Spanish version of the MSCEIT predict measurements of well-being reasonably well, as did the original English version (Brackett et al., 2006).

Despite the interesting contributions of this study, several limitations must be mentioned. First, we demonstrated the relationship of the MSCEIT to a series of personality variables. Nevertheless, as we have already mentioned, the MSCEIT has also been used in other spheres, such as education and labor. Future studies should provide evidence for the construct and predictive validity of scores on the Spanish version in these contexts. Second, because of the close relationship found between gender and MSCEIT scores, new studies are needed to describe the test's functioning in samples in which the proportion of men to women is more balanced or, if applicable, in samples that are predominantly men. Finally, a similar process should be completed for the age variable because, as the MSCEIT authors (Mayer et al., 2002, 2003) noted, EI is a type of intelligence that changes and develops with age. The samples used in our study were predominantly young, and thus these results would have to be replicated with older population samples to check their evolution throughout the human life cycle.

In summary, the factor structure and the psychometric properties of scores on the Spanish version of MSCEIT are similar to those of the original English version and support its use for assessing EI abilities in the Spanish population.

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