Convergent, Discriminant, and Incremental Validity of Competing Measures of Emotional Intelligence

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This study investigated the convergent, discriminant, and incremental validity of one ability test of emotional intelligence (EI)—the Mayer-Salovey-Caruso-Emotional Intelligence Test (MSCEIT)—and two self-report measures of EI—the Emotional Quotient Inventory (EQ-i) and the self-report EI test (SREIT). The MSCEIT showed minimal relations to the EQ-i and SREIT, whereas the latter two measures were moderately interrelated. Among EI measures, the MSCEIT was discriminable from well-studied personality and well-being measures, whereas the EQ-i and SREIT shared considerable variance with these measures. After personality and verbal intelligence were held constant, the MSCEIT was predictive of social deviance, the EQ-i was predictive of alcohol use, and the SREIT was inversely related to academic achievement. In general, results showed that ability EI and self-report EI are weakly related and yield different measurements of the same person.

Keywords: *emotional intelligence; personality; behavior; emotions; validity*

Research on emotional intelligence (EI) has expanded over the last decade and today there are a variety of tests to assess it. The three best-known tests are the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) (Mayer, Salovey, & Caruso, 2002a), the Emotional Quotient Inventory (EQ-I) (Bar-On, 1997a), and Schutte et al.'s (1998) self-report EI test (SREIT). There is a controversy, however, about what these tests actually measure, what they predict, and whether the tests are distinguishable from other abilities and personality attributes (Hedlund & Sternberg, 2000; McCrae, 2000; Mayer, Salovey, & Caruso, 2000).

Consider theories of EI. Mayer et al.'s (2000) original performance-based model of EI pertains to an individual's capacity to process and reason about emotions. These researchers distinguish their ability model from other "mixed" models of EI. They assert that the term EI has become "unmoored" from both emotion and intelligence because so-called mixed models combine mental abilities (e.g., ability to perceive emotion) with self-reported qualities such as optimism and well-being that are clearly distinct from their mental ability approach (Mayer et al., 2000; Roberts, Zeidner, & Matthews, 2002; Salovey, Mayer, Caruso, & Lopes, 2001).

Each approach to measuring EI can influence the validity of the construct. For example, in intelligence research, performance scales are standard because they are based on the capacity to solve mental tasks (Carroll, 1993). Self-report scales of intelligence, on the other hand, are based on people's endorsements of descriptive statements about themselves. If a person's self-concept is accurate, then self-report data serve as an accurate measure. However, most people are inaccurate reporters of their own abilities. Correlations between ability and self-report measures of intelligence, for instance, are generally low (r = .00 to .35) (Paulhus, Lysy, & Yik, 1998). Therefore, with respect to EI, it is likely that ability and self-report models will yield different representations of the same person.

In the present study, one ability-based and two self-report tests of EI are employed. The MSCEIT is designed to measure EI as a mental ability. In this conception, EI is

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the capacity to reason in regard to emotions and the capacity to use emotions to assist cognition (Mayer & Salovey, 1997). The EQ-i and SREIT are both mixed-model approaches to EI that are assessed with self-report inventories. The EQ-i measures an "array of noncognitive capabilities, competencies, and skills that influence one's ability to succeed in coping with environmental demands and pressures" (Bar-On, 1997b, p. 14). The SREIT is a brief self-report scale that is based on Schutte et al.'s (1998) understanding of Salovey and Mayer's (1990) original model of EI, which broadly defined EI as an ability. There also exist EI scales that are designed for organizational settings (e.g., Boyatzsis, Goleman, & Rhee, 2000). These tests, which usually require informant reports, were not employed here.

To date, there are no studies comparing the MSCEIT, EQ-i, and SREIT. Do the three tests assess the same or different things? Are the tests distinguishable from verbal intelligence and measures of personality and well-being? Do the tests predict important behavioral criteria beyond what can be predicted by well-studied traits? After briefly describing the three EI tests, the present article addresses the questions just raised.

BACKGROUND

Research on ability EI started with academic psychologists in the early 1990s (Mayer, DiPaolo, & Salovey 1990; Salovey & Mayer, 1990). By mid-decade, the topic was popularized by Goleman (1995), who made new and extraordinary claims about the importance of EI, including that it is "as powerful and at times more powerful than IQ" (p. 34). Independent reviews of Goleman's (1995, 1998) popular writings have shown that his claims are unsubstantiated (Epstein, 1998; Hedlund & Sternberg, 2000; Mayer et al., 2000; Roberts et al., 2002). Presently, there are three full-scale tests of EI in the scholarly literature. The MSCEIT, EQ-i, and SREIT are three such tests for which preliminary empirical data are now available. Here, we describe these tests and their general characteristics and then discuss what each test appears to predict.

MSCEIT

Salovey and Mayer (1990) first defined EI 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). In that same year, they also provided the first demonstration of how the construct may be measured (Mayer et al., 1990). These researchers acknowledge that their initial conception of EI was partly a mixed model because it incorporated aspects of personality that might accompany emotional intelligence (Mayer et al., 2000, p. 402).

Mayer and Salovey (1993) gradually refined their definition of EI and argued that it was a real intelligence. They then offered a revised, more focused definition of EI as the ability to (a) perceive emotion, (b) integrate emotion to facilitate thought, (c) understand emotions, and (d) regulate emotions to promote personal growth (Mayer & Salovey, 1997). The MSCEIT was designed to measure these four abilities.

The MSCEIT measures perception of emotion by having people rate how much of a particular emotion is being expressed in either a picture of a face expressing a basic emotion or in a picture of a design or landscape. Emotional facilitation of thought is measured by asking people to describe emotional sensations and their parallels to other sensory modalities and by having people assimilate predetermined mood into their thought processes concerning a fictional character. Understanding emotions is measured by asking people how emotions blend to form more complex emotions and how emotional reactions change over time. Finally, the MSCEIT measures emotion management by having test-takers choose effective ways to manage private emotions and the emotions of others in hypothetical situations.

The MSCEIT has a factor structure congruent with the four-part model of EI and it is both reliable and content valid. The authors assert that the MSCEIT meets several standard criteria for a new intelligence: It is operationalized as a set of abilities; it is objective in that answers on the test are either right or wrong as determined by consensus or expert scoring; its scores correlate with existing intelligences while also showing unique variance; and scores increase with age (Mayer, Caruso, & Salovey, 1999; Mayer et al., 2002; Mayer & Geher, 1996).

EQ-i

The EQ-i (Bar-On, 1997a) is a self-report test of EI that evolved out of the author's question, "Why do some people have better psychological well-being than others? And, why are some people able to succeed in life over others?" (Bar-On, 1997b, p. 1). In the EQ-i manual, Bar-On (1997b) broadly defines EI as addressing

> the emotional, personal, social, and survival dimensions of intelligence, which are often more important for daily functioning than the more traditional cognitive aspects of intelligence. Emotional intelligence is concerned with understanding oneself and others, relating to people, and adapting to and coping with the immediate surroundings to be more successful in dealing with environmental demands. . . . In a way, to measure emotional intelligence is to measure one's "common sense" and ability to get along in the world. (p. 1)

The EQ-i provides information on five composite factors that are composed of 15 subscales, including (a) intrapersonal EQ, composed of emotional self-awareness, assertiveness, self-regard, self-actualization, and independence; (b) interpersonal EQ, composed of empathy, relationship skills, and social responsibility; (c) adaptability, composed of problem solving, reality testing, and flexibility; (d) stress management, composed of stress tolerance and impulse control; and (e) general mood, composed of happiness and optimism. Bar-On (2000), however, recently made a revision to his scale; he now views the general mood factor as a facilitator of EI rather than a part of it. Thus, total EQ-i scores are now computed by only summing the first four scales. The comparability of the two scoring methods has not been reported.

Bar-On (1997b) has written that exploratory and confirmatory factor analytic studies indicate that a 15-factor solution provides a good fit to the EQ-i. The subscales also have fairly high internal consistency. The reliability of the total EQ-i, however, has not been reported. Given the diverse factors that comprise the EQ-i, it is important to know if the scales represent a unidimensional or multidimensional construct.

SREIT

The SREIT is a brief self-report measure of EI that was developed by Schutte et al. (1998). These authors wrote a pool of 62 self-report items that were primarily based on their reading of Salovey and Mayer's (1990) early model of EI, which pertained to the ability to monitor and discriminate emotions and to use emotions to guide one's thinking and actions. For example, some items on the SREIT measure a person's self-perceived ability to monitor private feelings or the feelings of others.

Factor analysis of the initial 62 items resulted in the single-factor, 33-item SREIT, which has good internal consistency and test-retest reliability. Petrides and Furnham (2000), however, have criticized the psychometric properties of the SREIT. These researchers claim that the scale does not appropriately map onto Salovey and Mayer's (1990) model of EI and that the scale is not unidimensional. They prefer the results of their exploratory factor analysis, which divided the SREIT into four provisional factors (optimism and mood regulation, appraisal of emotions, social skills, and utilization of emotions). Petrides and Furnham have not provided data on the reliability or validity of these subscales.

Comparative Performance of the MSCEIT, EQ-i, and SREIT

What do we know about these three EI tests? Remarkably, their intercorrelations have not been reported. However, we do know something about each test alone. For example, the MSCEIT and its predecessor test, the Multi-Factor Emotional Intelligence Scale (MEIS), have been correlated with verbal intelligence, the Big Five, and self-reported empathy (Brackett, 2001; Ciarrochi, Chan, & Caputi, 2000; Mayer et al., 1999; Salovey et al., 2001). These preliminary studies show that MSCEIT and MEIS only correlate moderately with these constructs (rs < .40).

The MSCEIT and MEIS also have been related to a number of life space criteria, which ask about the world outside and surrounding the individual, such as daily activities and owned possessions (Brackett, 2001; also see Mayer, Carlsmith, & Chabot, 1998). Higher EI has been associated with higher levels of attending to health and appearance, positive interactions with friends and family, and owning objects that are reminders of their loved ones. Lower EI has been associated with higher reported use of drugs and alcohol, more deviant behavior, and owning large numbers of self-help books (Brackett, 2001; Formica, 1998; Mayer et al., 1999; Trinidad & Johnson, 2001). Self-reported parental warmth and secure attachment style also positively correlated with EI (Mayer et al., 1999). Finally, EI has been linked to informant reports of positive interpersonal relations. For example, school children with higher EI were rated as less aggressive by their peers and more prosocial by their teachers, and leaders of an insurance company's customer claims team with higher EI were rated as more effective by their managers than those with lower EI (Rice, 1999; Rubin, 1999).

Most of the information on the validity of the EQ-i appears as data in the technical manual (Bar-On, 1997b). These reports and some recent published studies have shown that the EQ-i correlates strongly with a number of personality measures, including Neuroticism on the Big Five, anxiety on the 16PF, depression with the BDI, and alexythymia (Dawda & Hart, 2000; Newsome, Day, & Catano, 2000; Parker, Taylor, & Bagby, 2001). The EQ-i also has discriminated between certain groups, such as successful and unsuccessful Air Force recruiters (Handley, 1997, cited in Bar-On, 1997b) and academically successful and unsuccessful students (Swart, 1996, cited in Bar-On, 1997b). The positive correlation with academic performance, however, has not been replicated (Newsome et al., 2000). Finally, the EQ-i appears unrelated to fluid intelligence (Bar-On, 1997b; Derksen, Kramer, & Katzko, 2002).

The SREIT correlates moderately to strongly with a number of personality constructs, including alexithymia, optimism, impulse control, and openness to experience (Schutte et al., 1998). In Schutte et al.'s original study, the SREIT predicted end of the year college GPA and discriminated between groups expected to be higher and lower in EI. Specifically, women scored higher than men and therapists scored higher than both psychotherapy

patients and prisoners. In more recent studies, the scale significantly correlated with measures that assess interpersonal relations, including empathic perspective taking, social skills, marital satisfaction, and supervisor ratings of student counselors who worked at mental health agencies (Malouff & Schutte, 1998; Schutte et al., 2001).

There is concern that EQ-i and SREIT, similar to earlier self-report EI tests, share large amounts of variance with existing personality scales (Davies, Stankov, & Roberts, 1998). For example, the EQ-i substantially overlaps with measures of anxiety ($r = -.70$) and the SCL-90 ($r = .85$), which is a general indicator of social and emotional functioning (Bar-On, 1997b, 2000). The SREIT correlates very highly with alexithymia ($r = -.65$), self-reported mood repair ($r = .68$), and a marital satisfaction scale ($r = .75$). These findings have led some researchers to believe that the EQ-i and SREIT may be best characterized as types of personality inventories and not as measures of EI (Hedlund & Sternberg, 2000; Mayer et al., 2000; McCrae, 2000). In fact, McCrae (2000) has hypothesized that these mixed conceptions of EI may simply measure the evaluatively positive poles of the Big Five (i.e., low scores for Neuroticism and high scores for Extraversion, Openness, Agreeableness, and Conscientiousness). Mayer and Cobb (2000, p. 177) also believe that mixed conceptions have "an all things bright and beautiful" quality to them, which makes them suspicious as descriptors of an emotionally intelligent person.

INTRODUCTION TO THE PRESENT STUDY

Preliminary work on EI raises important questions concerning the convergent, discriminant, and incremental validity of the MSCEIT, EQ-i, and SREIT. This study addresses these questions by first comparing the three tests to one another and then to well-studied measures of personality, well-being, and verbal intelligence. We predict that ability (MSCEIT) and self-reported (EQ-i and SREIT) tests will yield different measurements of the same person because of their divergent definitions of EI and distinct measurement approaches. Because the MSCEIT is a well-defined ability model of EI in contrast to the EQ-i and SREIT, which are both mixed-conceptions of EI, we also predict that the MSCEIT will be mostly independent of existing personality constructs and that the EQ-i and SREIT will share considerable variance with these measures.

Each EI test author, researchers in the field, and popular writers on EI have predicted that EI is related to a number of behavioral criteria, including academic performance and lower levels of violence and self-destructive behaviors (Bar-On, 1997b; Brackett, 2001; Formica, 1998; Goleman, 1995, 1998; Mayer et al., 1999; Mayer, Salovey, & Caruso, 2002b; Schutte et al., 1998). In this study, two measures of academic performance (high school rank and college GPA) and four scales requiring individuals to report on cigarette smoking activity, alcohol use, drug use, and deviant behavior are used as the criteria. This will allow us to assess the comparative performance of each EI measure with respect to criteria they are purported to predict. We expect that all three EI measures will correlate with the criteria. However, once personality and well-being are controlled, we predict that the EQ-i and SREIT will lose predictive value due to their shared variance with these existing measures.

METHODS

Participants

Participants were 207 predominantly Caucasian American (97%) college students (130 women, 77 men). The mean age for women was 18.93 ($SD = 1.51$) and for men was 19.51 ($SD = 1.17$). Each participant received 2 hours of course credit in undergraduate psychology courses for their involvement in the study. Due to incomplete questionnaires and the exclusion of extreme outliers on the measures, most of the data reported here are based on responses ranging from 188 to 202 participants. Analyses with high school rank and college GPA include 140 and 164 participants, respectively, due to the availability of data from the university registrar. Informed consent was obtained from each participant.

Measures of Emotional Intelligence

Mayer, Salovey, and Caruso Emotional Intelligence Test (MSCEIT). Emotional intelligence ability was measured with the MSCEIT Version 2.0 (Mayer et al., 2002a). The MSCEIT is a 141-item test that measures how well people perform tasks and solve emotional problems on eight tasks, which are divided into four classes or branches of abilities, including (a) perceiving emotions, (b) facilitating thought, (c) understanding emotions, and (d) managing emotions. Correct answers are evaluated in terms of agreement with a general (or expert) consensus, which closely converge (Mayer et al., 2002b). Analysis of the data by the test publisher provides five scores, including one for each branch and one for total EI. As reported in the technical manual, split-half reliability coefficients for the four branches range from $r = .80$ to .91, and for the entire test, $r = .91$.

Bar-On Emotional Intelligence Inventory (EQ-i). The EQ-i (Bar-On, 1997a) is a 133-item self-report measure of emotional intelligence. Respondents answer questions using a 5-point Likert-type scale (1 = *very seldom or not true of me*; 5 = *very often true of me*). Scores are provided by the test publisher and are calculated with reference to North American norms for the age group. Reported scores include total EQ-i and scores from the test's five

composite scales: intrapersonal EQ, interpersonal EQ, adaptability, stress management, and general mood. Bar-On (2000) has recently changed his model and now considers the fifth factor, general mood, as a facilitator of EI and not part of it. Therefore, the total EQ-i score used here is based on the sum of the first four scales. Reliability coefficients for the 15 subscales that comprise the factor scores range from $\alpha = .69$ to .86 across 10 studies (Bar-On, 1997b).[1]

Self-Report Emotional Intelligence Test (SREIT). The SREIT (Schutte et al., 1998) is a self-report test of EI that is based on Salovey and Mayer's (1990) original work on EI. Participants respond to 33 self-report items such as "I know why my emotions change," using a 5-point scale, on which 1 represents *strongly disagree* and a 5 represents *strongly agree*. The reliability of the scale in the present study was high ($\alpha = .93$).

Measures of Personality and Well Being

Personality. Personality traits were assessed with the 240-item NEO-PI-R (Costa & McCrae, 1992), which measures five global dimensions of personality: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. Each factor is a composite of 6 primary (facet) scales. Participants completed the scale using a 1 (*strongly disagree*) to 5 (*strongly agree*) response format. The reliability and validity of the measure has been established for college samples and is provided in the technical manual (Costa & McCrae, 1992).

Psychological Well-Being. Ryff (1989) developed a theoretically based self-report inventory designed to measure six dimensions of psychological well-being (PWB). The six dimensions are self-acceptance, environmental mastery, purpose in life, positive relations with others, personal growth, and autonomy. To accommodate computer scoring, each dimension was operationalized with a 1 (*strongly disagree*) to 5 (*strongly agree*) response format instead of the recommended six-item response format. The reliabilities of the six scales (αs = .80 to .88) and composite PWB score ($\alpha = .94$) were high.

Subjective well-being. Subjective well-being (SWB) was measured with the Satisfaction with Life Scale (SWLS) (Diener, 1984). This five-item scale assesses a person's general satisfaction with life. Participants responded using a 1 (*strongly disagree*) to 7 (*strongly agree*) response format. The scale has been widely used in college samples and the reliability and validity of the measure is established (Pavot & Diener, 1993).

Criterion Measures

External life space criteria. Four life space scales, which provide data about people's daily activities, were employed as the criteria. These scales measured daily smoking behavior (e.g., packs of cigarettes owned, number of cigarettes smoked per day), illegal drug use (e.g., amount of marijuana owned, times used illegal drugs in the last month), alcohol consumption (e.g., bottles of beer and hard liquor owned, times in the last month fell asleep because of intoxication), and social deviance (e.g., number of physical fights, times vandalized something) (Brackett, 2001). Life space scales, similar to bio-data scales (Mael, 1991), differ from traditional self-report scales that inquire about a person's internal sentiments (e.g., "Do you enjoy smoking?") because they measure discrete, observable, and potentially verifiable behaviors (e.g., "How many cigarettes did you smoke yesterday?"). Reliabilities of the four scales, which had between 5 and 9 items, ranged from $\alpha = .62$ to .91.

Academic ability. Participants signed an additional informed consent form that permitted the researchers to access their academic records. We obtained two indices for academic performance: high school rank and college GPA. Verbal SAT scores also were obtained as a proxy measure of verbal intelligence.

Procedure

Participants completed the self-administered materials in one testing session, which lasted about 1 1/2 to 2 hours. Participants first completed the informed consent forms. They then received a short demographics form, which was followed by the ability and self-report tests of EI, and then the personality, well-being, and life space scales. Upon completion, participants were given a debriefing statement.

RESULTS

This section is divided into four parts. First, preliminary analyses were conducted within items on each scale. Second, EI measures were compared to one another, to verbal intelligence, and to well-studied measures of personality and well-being. Multivariate analyses were then used to further understand the interrelations among the EI and personality scales. Finally, the EI tests were related to academic performance and the external life space criteria.

Preliminary analyses on each scale and its items. Before performing our central analyses, we first tried to replicate Petrides and Furnham's (2000) four-factor solution of the SREIT. Our factor analysis resulted in only one interpretable factor pertaining to the perception or appraisal of emotion. Therefore, we conducted all analyses with the 33-item SREIT as recommended by Schutte et al. (1998) given that no other meaningful factors were extractable.

Because we employed Bar-On's (2000) revised EQ-i scoring and the norms and most of the validity data are

based on the original scoring of the EQ-i, we computed the correlation between the two scores. The correlation was almost perfect, $r(191) = .98$, $p < .001$. Thus, the elimination of the general mood factor from the original EQ-i composite score has relatively no effect on the total score.

We then assessed whether gender differences existed on any of the EI scales. Significant gender differences were only found on the MSCEIT, with women (M = 105.13, SD = 11.09) scoring higher than men (M = 95.17, SD = 13.43), $t(200) = -5.69$, $p < .001$. These gender differences are consistent with previous research (Brackett, 2001; Mayer et al., 1999). In contrast to Schutte et al.'s (1998) findings, we did not obtain significant gender differences on the SREIT: men (M = 3.71, SD = .51) and women (M = 3.75, SD = .39). Parallel to Bar-On's (1997b) findings, no gender differences existed on the EQ-i: men (M = 93.26, SD = 11.10) and women (M = 92.37, SD = 11.53).

Finally, we assessed the test-retest reliability of the MSCEIT by having 60 (18 men, 42 women) participants return 3 weeks after initial testing to retake the MSCEIT. The test-retest reliability was very high, $r(59) = .86$, $p < .001$. The EQ-i and SREIT have already demonstrated adequate test-retest reliability (r = .73 and .78, respectively) (Bar-On, 1997b; Schutte et al., 1998).

Relations Among Measures of EI, Personality, Well-Being, and Verbal SAT Scores

Table 1 shows the zero-order correlations among the measures of EI, personality, well-being, and verbal SAT scores. As expected, the MSCEIT was most distinct among EI measures (rs = .21, .18, with the EQ-i and SREIT, respectively). The SREIT and EQ-i, however, were moderately interrelated (r = .43). The MSCEIT was also most distinct among EI measures with respect to personality and well-being. The MSCEIT only modestly correlated with openness, agreeableness, psychological well-being (PWB), and verbal SAT scores (rs = .25 to .32). These findings corroborate earlier findings (Brackett, 2001; Salovey et al., 2001). Similar to previous research, the EQ-i and SREIT had strong associations with the personality measures (Bar-On, 1997b; Dawda & Hart, 2000; Newsome et al., 2000; Schutte et al., 1998). The SREIT correlated with four of the Big Five factors and very highly with PWB (r = .69) and the EQ-i correlated significantly with each factor on the Big Five, and Neuroticism in particular (r = –.57).

Next, we correlated the personality and well-being scales, which were all highly interrelated. For example, all of the Big Five factors correlated with PWB (rs = –.50 to .48). Only Neuroticism, Extraversion, and Conscientiousness correlated with SWB (rs = –.43 to .36). PWB and SWB also correlated with one another (r = .41). The interrelation among the personality and well-being scales is consistent with previous research (Emmons & Diener, 1985; McCrae & Costa, 1991; Schmutte & Ryff, 1997).

To obtain a more detailed understanding of the relations between the MSCEIT and EQ-i, we correlated the subscales on the tests. As shown in Table 2, the highest correlation was between the MSCEIT regulation of emotion scale and the EQ-i interpersonal EQ scale (r = .40). We then went a step further and computed partial correlations among the EI tests, separately controlling for the Big Five and PWB because the EI measures shared considerable variance with the these measures, which may have inflated the coefficients in Tables 1 and 2. As shown in Table 3, when controlling for the Big Five or PWB, the MSCEIT became mostly independent of both self-report EI inventories. When both the Big Five and PWB were controlled, all of the relations between the MSCEIT and self-report measures became nonsignificant. The SREIT and EQ-i, however, remained correlated when the Big Five was controlled. When PWB was controlled, the relations between the SREIT and the EQ-i became nonsignificant. Results indicate that the covariation between the EQ-i and SREIT is probably due to each scale's shared variance with PWB, whereas the covariation between the MSCEIT and EQ-i can be attributed, in part, to each scale's shared variance with the Big Five or PWB.

Discriminant Validity Using Multivariate Statistics

To gain a more comprehensive perspective on the discriminant validity of the three EI tests, multiple regression analyses were performed using the Big Five and PWB scales as predictor variables and the three EI tests as the outcome measures. Figure 1 represents these results, which were all statistically significant ($p < .001$).

The MSCEIT was most distinct among EI measures (Rs < .38). With respect to the Big Five, only Agreeableness and Openness to Experience significantly contributed to the model; for PWB, only the personal growth subscale significantly contributed to the model. In contrast, the EQ-i and SREIT both shared considerable variance with the Big Five and PWB. With respect to the Big Five, Extraversion, Openness to Experience, and Agreeableness were predictive of the SREIT (R = .52), and for PWB, five of the six scales significantly contributed to the model (R = .70). The EQ-i also shared substantial variance with four of the six PWB scales (R = .58) but shared most of its variance with the Big Five (R = .75). As predicted by McCrae (2000), all five factors significantly contributed to prediction of the EQ-i. These results provide further support that that the MSCEIT is mostly separable from personality and well-being, whereas the EQ-i and SREIT are not easily distinguished from these measures.

TABLE 1: Means, Standard Deviations, and Intercorrelations Among Measures of Emotional Intelligence, Personality and Well Being, and Verbal SAT Scores

	MSCEIT	*SREIT*	*EQ-i*	*N*	*E*	*O*	*A*	*C*	*PWB*	*SWB*	*VSAT*
Measures of emotional IQ											
MSCEIT	1.00										
SREIT	**.18****	1.00									
EQ-i	**.21****	**.43*****	1.00								
Big Five											
Neuroticism	–.08	**–.19****	**–.57*****	1.00							
Extraversion	.11	**.32*****	**.37*****	**–.27*****	1.00						
Openness	**.25*****	**.43*****	**.16***	.00	**.23*****	1.00					
Agreeableness	**.28*****	.09	**.27*****	–.09	.05	**.19****	1.00				
Conscientiousness	.03	**.25*****	**.48*****	**–.29*****	**.30*****	–.03	**.18****	1.00			
Measures of well-being											
Psychological well-being	**.28*****	**.69*****	**.54*****	**–.50*****	**.48*****	**.33*****	**.21****	**.40*****	1.00		
Subjective well-being	–.05	**.22*****	**.35*****	**–.43*****	**.34*****	.11	.11	**.36*****	**.41*****	1.00	
Verbal SAT	**.32*****	.05	–.03	–.04	**–.20****	**.26*****	.07	.08	.01	–.06	1.00
M	101.44	3.74	90.87	2.57	3.33	3.32	3.18	3.03	3.67	5.14	543.20
SD	12.91	.44	13.81	.56	.53	.53	.51	.58	.45	1.19	71.41

NOTE: $N = 188$ to 202. N = Neuroticism, E = Extraversion, O = Openness to Experience, A = Agreeableness, C = Conscientiousness, MSCEIT = Mayer-Salovey-Caruso-Emotional Intelligence Test, SREIT = self-report EI test, EQ-I = Emotional Quotient Inventory, PWB = psychological well-being, SWB = subjective well-being, VSAT = verbal Scholastic Aptitude Test (SAT) scores, IQ = intelligence quotient. Only significant correlations are shown in boldface.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

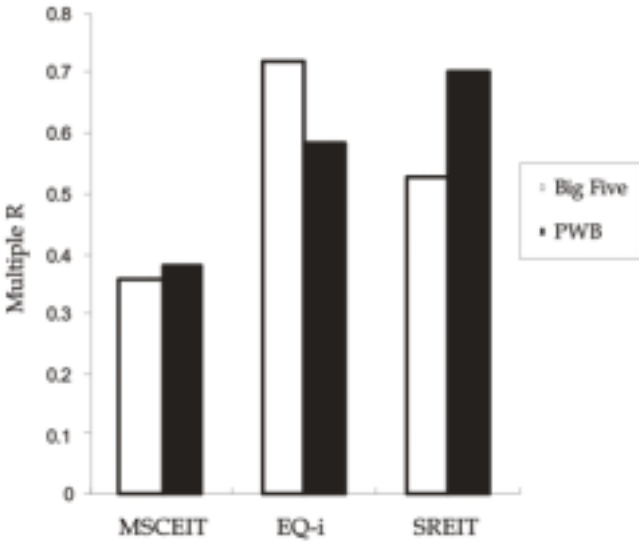

Figure 1 Multiple *R*s for Big Five traits versus psychological well-being scales regressed on total scores for the MSCEIT, EQ-i, and SREIT.
NOTE: MSCEIT = Mayer-Salovey-Caruso-Emotional Intelligence Test, SREIT = self-report EI test, EQ-I = Emotional Quotient Inventory, PWB = psychological well-being.

We then factor analyzed all of the personality, well-being, and EI tests, along with verbal SAT scores, to gain a second perspective on the relations among the measures. The results (principal axis followed by oblique rotation) are presented in Table 4. The eigenvalues for the first five factors were 7.2, 2.7, 1.9, 1.8, and 1.2, suggesting either a three- or four-factor solution. We decided on the three-factor solution because the loadings were clear and interpretable (± .35) and the solution accounted for a reasonable amount of variance (44%). As can be seen, Factor 1 was composed of the five EQ-i scales, Neuroticism (reverse-scored), Conscientiousness, and SWB. Factor 2 was composed of the four MSCEIT scales, along with verbal SAT scores and Agreeableness. Factor 3 was composed of the six PWB scales, the SREIT, Extraversion, and Openness to Experience. These results support our prior results and further demonstrate that among the EI measures, the EQ-i is highly related to personality and the SREIT is highly related to well-being. The MSCEIT, although slightly correlated with Agreeableness and verbal SAT scores, created its own factor. The MSCEIT factor was uncorrelated with factors 2 and 3, which were moderately correlated ($r = .50$) with one another.

Predictive and Incremental Validity

A limited number of behavioral life space criteria were employed based on their theoretical importance to EI. Table 5 shows the zero-order correlations among all measures with the life space criteria (drug use, alcohol use, cigarette smoking, social deviance) and scales of academic achievement (high school rank and college GPA). Both the MSCEIT and EQ-i correlated with some of the criteria. The SREIT was unrelated to any of the criteria. There were no significant gender differences in any of these correlations.

TABLE 2: Means, Standard Deviations, and Intercorrelations Among Subscales of Measures of Emotional Intelligence

	MSCEIT					*SREIT*	*EQ-i*					
	Total	*P*	*I*	*U*	*R*	*Total*	*Total*	*Intra*	*Inter*	*AD*	*SM*	*GM*
MSCEIT	1.00											
Perception (P)	**.79*****	1.00										
Integration (I)	**.75*****	**.48*****	1.00									
Understanding (U)	**.68*****	**.35*****	**.37*****	1.00								
Regulation (R)	**.65*****	**.31*****	**.36*****	**.27*****	1.00							
SREIT	**.18****	.06	**.15***	.12	**.22****	1.00						
EQ-i	**.21****	.07	**.17***	.11	**.28*****	**.43*****	1.00					
Intrapersonal (Intra)	.07	–.05	.11	.06	.13	**.43*****	**.90*****	1.00				
Interpersonal (Inter)	**.28*****	**.20****	**.15***	.06	**.40*****	**.37*****	**.68*****	**.49*****	1.00			
Adaptability (AD)	**.16***	.07	.14	.09	**.18****	**.33*****	**.81*****	**.64*****	**.40*****	1.00		
Self-management (SM)	**.15***	.02	.14	.14		**.17***	**.22****	**.69*****	**.45*****	**.32*****	**.62*****	1.00
General mood (GM)	.08	–.04	.11	.01	**.19****	**.36*****	**.83*****	**.75*****	**.53*****	**.57*****	**.50*****	1.00
M	101.44	103.52	101.53	100.70	101.20	3.74	90.87	92.72	96.17	88.94	92.98	92.81
SD	12.91	15.04	12.95	12.68	12.53	.44	13.81	15.30	14.66	13.30	14.75	16.27

NOTE: *N* = 188 to 202. MSCEIT = Mayer-Salovey-Caruso-Emotional Intelligence Test, SREIT = self-report EI test, EQ-I = Emotional Quotient Inventory. Only significant correlations are shown in boldface.
*$p < .05$. **$p < .01$. ***$p < .001$.

TABLE 3: Partial Correlations Among Measures of Emotional Intelligence Controlling for Big Five and Psychological Well-Being

	Controlling for Big Five							*Controlling for Psychological Well-Being*						
	SREIT	*EQ-i*						*SREIT*	*EQ-i*					
	Total	*Total*	*Intra*	*Inter*	*AD*	*SM*	*GM*	*Total*	*Total*	*Intra*	*Inter*	*AD*	*SM*	*GM*
MSCEIT	.08	.14	.04	.14	.13	.09	.00	–.01	.14	.02	**.19***	.10	.10	.00
Perception	.05	.08	.00	.12	.12	.00	–.04	–.02	.03	–.08	.12	.05	.00	–.07
Integration	.09	.12	.06	.09	.10	.09	.03	.02	.12	.08	.10	.08	.09	.03
Understanding	.02	.06	.08	.03	.06	.09	–.07	.02	.07	.03	.02	.05	.10	–.06
Regulation	.07	**.19***	.00	**.18***	.15	.14	.12	.00	**.20****	.07	**.30*****	.10	.12	.14
SREIT	1.00	**.31*****	**.27****	**.27****	**.24****	.15	**.22****	1.00	.09	.06	.19	.08	–.03	.02

NOTE: *N* = 191 to 202. Intra = intrapersonal, Inter = interpersonal, AD = adaptability, SM = self-management, GM = general mood, MSCEIT = Mayer-Salovey-Caruso-Emotional Intelligence Test, SREIT = self-report EI test, EQ-I = Emotional Quotient Inventory. Only significant correlations are shown in boldface.
*$p < .05$. **$p < .01$. ***$p < .001$.

In order of strength of association (highest to lowest), the top three predictors of drug use were Conscientiousness, the EQ-i, and SWB. Alcohol use was predictable by the EQ-i and Agreeableness. Cigarette smoking was predictable by Conscientiousness and SWB. The top predictors of social deviance were Agreeableness, the MSCEIT, and the EQ-i. With respect to academic achievement, high school rank was predictable by verbal SAT scores, Agreeableness, and the MSCEIT. First semester college GPA was predictable by Conscientiousness, verbal SAT scores, PWB, and the MSCEIT.

Because our central concern was the incremental validity of the EI tests, we computed partial correlations between the EI tests and the criteria controlling for the Big Five and verbal SAT. The Big Five was held constant because it covaried with the EQ-i and the MSCEIT. Verbal SAT scores also were controlled because they covaried with the MSCEIT. As shown in Table 6, only three partial correlations were significant. Contrary to Schutte et al.'s (1998) finding, the SREIT was inversely related to academic achievement. The EQ-i remained negatively correlated with alcohol use and the MSCEIT remained negatively correlated with social deviance.

DISCUSSION

Mayer and colleagues (Mayer et al., 2000; Mayer & Salovey, 1997; Salovey & Mayer, 1990) have consistently claimed that emotions pertain to signals about relationships and intelligence pertains to abstract reasoning. They argue that the correct definition of EI involves the ability to reason with emotions and of emotions to enhance reasoning. They further contend that broader definitions of EI are probably improper because when the term EI is used to include an array of attributes (Bar-On, 1997b; Goleman, 1995, 1998; Schutte et al., 1998) it

TABLE 4: Three-Factor Solution of Measures of Personality, Well-Being, Emotional Intelligence, and Verbal SATs using Principal Axis Factoring With Oblique Rotation (pattern matrix)

Scale	*I*	*II*	*III*
EQ-i: Self-management	.800		
EQ-i: Adaptability	.753		
EQ-i: General mood	.730		
Big Five: Neuroticism	–.719		
EQ-i: Intrapersonal	.667		
Subjective well-being	.443		
Big Five: Conscientiousness	.439		
EQ-i: Interpersonal	.346		
MSCEIT: Perception		.601	
MSCEIT: Regulation		.570	
MSCEIT: Integration		.524	
MSCEIT: Understanding		.447	
Verbal SAT		.430	
Big Five: Agreeableness		.402	
PWB: Personal growth			.740
SREIT			.723
PWB: Positive relations			.695
PWB: Self-acceptance			.693
PWB: Purpose in life			.619
PWB: Environmental mastery			.594
Big Five: Extraversion			.498
Big Five: Openness to experience			.405
PWB: Autonomy			.348

NOTE: Only factor loadings greater than ± .35 are included. MSCEIT = Mayer-Salovey-Caruso-Emotional Intelligence Test, SREIT = self-report EI test, EQ-I = Emotional Quotient Inventory, PWB = psychological well-being, SAT = Scholastic Aptitude Test.

becomes unclear what EI actually is and the construct begins to emulate existing measures.

If one adheres to Mayer and Salovey's (1997) mental ability model of EI, this study showed that MSCEIT is the measure of choice; it was discriminable from well-studied measures of personality and well-being and it showed some evidence that it predicts important life criteria. If, on the other hand, one defines EI in terms of a mixed array of "desirable" personality characteristics, then the EQ-i and SREIT are both good choices. The drawback to these latter measures is that they are quite similar to already-existing measures of personality and well-being.

Convergent and Discriminant Validity

For the most part, ability and self-report EI tests were weakly related. The lack of convergence between the measures was probably due in part to the distinct ways the constructs are defined. Many items on the EQ-i and SREIT, for instance, pertain to personality attributes such as optimism and emotional stability, which are unrelated to the four abilities assessed by the MSCEIT. The low correlations between ability and self-report measures also may be due to their different measurement approaches (i.e., performance based vs. self-report). It is well known that self-report and ability scales only modestly correlate because people are notoriously bad at assessing their own capacities (e.g., Paulhus et al., 1998).

As predicted, this study showed that MSCEIT was mostly distinguishable from well-being scales and the Big Five, whereas the EQ-i and SREIT were less separable from these constructs. Because EI ability is specifically defined as the ability to perceive, integrate, understand, and regulate emotions (Mayer & Salovey, 1997), it is unlikely to emulate existing personality measures. Indeed, the description of the four-branch model of EI is different from anything described by the Big Five. Although the Big Five explain large amounts of variance in personality, there are many traits and abilities such as masculinity/femininity or religiosity that are not covered by the Big Five (Paunonen & Jackson, 2000; Saucier & Goldberg, 1998). EI ability is one aspect of personality that is likely to fall outside the factor space of the Big Five. There is no reason to believe that people higher in EI are more extraverted or open to experience than their less emotionally intelligent counterparts.

The EQ-i and SREIT, on the other hand, were less separable from well-being constructs and the Big Five. This may be due to the similar semantic content between these self-report tests and the other existing self-report measures. Although Bar-On (2000, p. 364) stresses that the EQ-i was not developed to measure personality traits, in the present study, the EQ-i was highly correlated with the Big Five ($R = .75$). Indeed, our regression analyses showed that all five factors of the Big Five uniquely contributed to the prediction of the EQ-i at significant levels. This finding was in keeping with McCrae's (2000) prediction that the Big Five covers most of what is measured by mixed conceptions of EI, particularly when the Big Five is scored in an "ideal" way (i.e., low Neuroticism and high Extraversion, Agreeableness, Openness, and Conscientiousness). A comparable story could be told for the SREIT, which overlapped highly with Ryff's (1989) PWB scales ($R = .70$).

Incremental Validity

Most personality psychologists would agree that for a new construct to be welcomed into the field, it must explain variance that is not accounted for by well-established constructs. For that reason, we were less interested in the zero-order correlations between the EI tests and criteria because of each tests' shared variance with existing measures that were themselves correlated with criteria. Furthermore, the self-report EI tests had so much in common with personality variables that the zero-order correlations may have just been a case of reinventing the wheel.

TABLE 5: Zero-Order Correlations Among Measures of Personality, Well-Being, and Verbal SAT With External Criteria

Measures of Emotional IQ	*Drug Use*	*Alcohol Use*	*Cigarette Smoking*	*Social Deviance*	*High School Rank*	*College GPA*
MSCEIT	–.05	–.06	–.02	**–.27*** **	**.21** **	**.16***
EQ-i	**–.24*** **	**–.20** **	–.13	**–.21** **	.04	.10
SREIT	–.04	–.05	.01	–.07	–.02	.06
Big Five						
Neuroticism	.09	.07	.03	.00	.07	–.03
Extraversion	**–.15***	.10	–.06	–.07	.05	**.15***
Openness	.04	–.03	.04	–.07	.15	.12
Agreeableness	–.11	**–.15***	–.06	**–.39*** **	**.24*** **	.06
Conscientiousness	**–.31*** **	–.11	**–.19** **	**–.20** **	**.19***	**.33*** **
Measures of well-being						
Psychological well-being	–.13	–.06	–.03	**–.16***	.06	**.19** **
Subjective well-being	**–.20** **	.01	**–.17***	–.07	.01	**.16***
Verbal SAT	**.17***	–.09	–.03	–.08	**.39*** **	**.27*** **

NOTE: N = 188 to 202. For high school rank, N = 140, and for college grade point average (GPA), N = 164. MSCEIT = Mayer-Salovey-Caruso-Emotional Intelligence Test, SREIT = self-report EI test, EQ-I = Emotional Quotient Inventory. Only significant correlations are shown in boldface.
*p < .05. **p < .01. ***p < .001.

TABLE 6: Partial Correlations Between Measures of Emotional Intelligence and External Criteria Controlling for Big Five and Verbal SAT Scores

	Drug Use	*Alcohol Use*	*Cigarette Smoking*	*Social Deviance*	*High School Rank*	*College GPA*
Measures of emotional IQ						
MSCEIT	–.07	–.01	.02	**–.20** **	.04	.05
EQ-i	–.12	**–.19***	–.08	–.06	–.12	–.08
SREIT	.05	–.05	.04	–.05	**–.16***	–.10

NOTE: N = 173 to 183, missing data for verbal Scholastic Aptitude Test. For high school rank, N = 140, and for college grade point average (GPA), N = 164. MSCEIT = Mayer-Salovey-Caruso-Emotional Intelligence Test, SREIT = self-report EI test, EQ-I = Emotional Quotient Inventory. Only significant correlations are shown in boldface.
*p < .05. **p < .01.

The MSCEIT and EQ-i showed some evidence of incremental validity, whereas the SREIT did not. With respect to the MSCEIT, after personality and verbal SAT scores were controlled, lower scores remained predictive of social deviance. This finding replicates a pattern of negative correlations between ability EI and deviant behavior (Brackett & Mayer, 2002; Formica, 1998; Rubin, 1999). With respect to the EQ-i, lower scores were predictive of higher alcohol consumption. The SREIT did not correlate with any of the criteria in expected ways. Furthermore, this study challenged the importance of self-reported EI in the prediction of academic performance. In particular, the SREIT, contrary to previous findings (Schutte et al., 1998), had a negative partial correlation with academic performance.

It is plain that none of the correlations with the limited criteria employed here were high in absolute terms. Although predictions with other criteria may be higher, a realistic expectation is that the best new variables ought to increase predictive accuracy in important but modest ways. Of note, correlations in the .20 to .30 range with real-life criteria can have important implications (Abelson, 1985; Meyer et al., 2001). Consider the case of a researcher who wishes to include as many individuals as possible that are at-risk for deviant behavior in a 6-month longitudinal study. Budgetary considerations allow for the selection of 100 participants out of an initial pool of 200. Pretesting with the MSCEIT, and selection of individuals scoring below the average, would provide the researcher with an additional 10 participants (i.e., 60 vs. 50 with no pretesting) who are above-average in risk for behaving in a deviant fashion.[2] Thus, a test that correlates .20 with a criterion of interest can facilitate selection in consequential ways.

It is likely that more extensive criteria will yield additional interesting predictions, some stronger and some less strong than the above. The criterion and incremental validity of these tests needs to be developed over multiple studies with multiple criteria and diverse samples. The criteria employed here told us something about each measure of EI. The predictive validity findings here, however, are better interpreted in the context of more extensive studies and more comprehensive reviews of evidence that are available for the MSCEIT (Brackett & Mayer, 2002; Mayer et al., 2002a) and the EQ-i and SREIT (e.g., Bar-On, 2000; Schutte et al., 2001).

Conclusions

There now exist two general models of EI: a mental ability model and a mixed model. In regard to mixed-models, most of the attributes measured by the EQ-i and SREIT substantially overlap with existing measures, which suggests that these scales have a breadth of coverage that is not all that different from well-studied personality and well-being scales. Mixed models are also somewhat misleading. Such models suggest that there is a new, integrated, single psychological entity called EI that combines diverse traits such as common sense, well-being, persistence, and good interpersonal skills. Furthermore, each of the Big Five scales individually predicts measures such as the EQ-i, which suggests that these mixed models are truly composed of distinct, somewhat uncorrelated, attributes. On the other hand, findings with the MSCEIT suggest that EI as a mental ability exists as a distinct, clearly defined construct that has evidence of incremental validity.

We assert that broad definitions of EI that do not refer exclusively to the terms "emotion" and "intelligence" are probably improper uses of the term. Although the traits that are theoretically covered by mixed models such as motivation, optimism, and self-esteem—and the traits that they empirically correlate with, such as Extraversion, Agreeableness, and Openness—are important and predictive of real-life criteria, they are better addressed directly and as distinct from EI. Keeping EI restricted to an ability model makes it possible to analyze the degree to which EI specifically contributes to a person's behavior.

NOTES

1. Bar-On (1997b) does not report reliabilities for the five composite factors. Because the EQ-i is computer scored by the test, publisher reliability for the measure in the present study was not available.

2. Calculations for this example are based on Rosenthal and Rubin's (1982) Binomial Effect Size Display (BESD). This example, however, is just an approximation because the BESD assumes normality for both variables. For this example, the assumption was met for the predictor but not the criterion.

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