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Trait Emotional Intelligence: Psychometric Investigation with Reference to Established Trait Taxonomies

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Abstract

This paper sets out the theoretical foundation of emotional intelligence (EI) as a constellation of traits and self-perceived abilities. The discriminant validity of ***trait EI*** *is explored in two studies. In study 1 (N = 227), the psychometric properties of the BarOn Emotional Quotient inventory were scrutinized through confirmatory factor analysis and the measure was found to be unifactorial. When the EQ-i was examined concurrently with the Eysenck Personality Profiler, a clear trait EI factor emerged in Eysenckian factor space. In study 2 (N = 166), a modified version of the EQ-i was examined concurrently with the NEO PI-R and a truncated trait EI factor was isolated within the Five-Factor Model. Results are discussed with explicit reference to established personality models and it is concluded that trait EI can be conceptualized as a distinct composite construct at the primary level of hierarchical trait structures. Copyright © 2001 John Wiley & Sons, Ltd.*

INTRODUCTION

The concept of emotional intelligence (EI) has recently received ample attention both in the scientific (Davies, Stankov and Roberts, 1998; Mayer and Salovey, 1997; Mehrabian, 2000; Newsome, Day and Catano, 2000; Parker, Taylor and Bagby, 2001; Petrides and Furnham, 2000a; Salovey and Mayer, 1990) and in the popular literature (Cooper and Sawaf, 1997; Goleman, 1995; Hein, 1997; Steiner, 1997; Wessinger, 1998). An embryonic form of EI can be traced back to Gardner (1983), but in the present context the term first appeared in an unpublished dissertation (Payne, 1986) and thereafter in the work of Salovey and Mayer, who were the first to propose a systematic theoretical account of the construct (Mayer, DiPaolo and Salovey, 1990; Salovey and Mayer, 1990).[1] The original model of Salovey and Mayer included variables that traditionally belonged in areas outside intelligence such as flexibility and motivation. Mayer and Salovey (1997) proposed a

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[1]For bibliographic purposes, it may be interesting to note that 'emotional intelligence' as a term also appeared in Greenspan (1989) in a psychoanalytic context that bore a distant resemblance to the present use of the term as well as in a German paper on developmental psychotherapy (Leuner, 1966).

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revised model that redefined EI in cognitive–emotional terms. This model consisted solely of abilities, such as those to perceive, appraise, and express emotions. In the interim, a range of popular writers, notably Goleman (1995), had presented their own accounts of the concept that extended over a wider domain and encompassed many personality variables such as impulsiveness, assertiveness, and optimism.

Theoretical advances were soon followed by attempts to devise measures to assess the new construct (Bar-On, 1997; Mayer, Caruso and Salovey, 1999; Schutte *et al.*, 1998; Tapia, 2001). The process of test construction, however, did not fully consider the fundamental psychometric distinction between measures of typical and maximum performance (Cronbach, 1949; Hofstee, in press). Consequently, some measures of the construct were based on self-report (e.g. Schutte *et al.*, 1998) whereas others attempted to develop items with correct and incorrect responses (Mayer *et al.*, 1999). This is problematic inasmuch as different measurement approaches will almost certainly produce different results even if the model being operationalized is one and the same. To take the case in point, a self-report measure of the model of Mayer and Salovey (1997) will have different properties and will produce different results from a maximum-performance measure simply because the former will be assessing behavioural tendencies and self-perceived abilities whereas the latter will be assessing actual abilities.

It should be clear that a fundamental distinction concerning the measurement of a construct would have important theoretical implications. Any such distinction, then, should be clearly reflected in the label of the construct. In an attempt to emphasize the importance of measurement in the operationalization of EI, we proposed a differentiation between *trait EI* and *ability EI* (formerly referred to as 'information-processing EI'; Petrides and Furnham, 2000b). The former encompasses behavioural dispositions and self-perceived abilities and is measured through self-report, whereas the latter concerns actual abilities and ought to be measured with maximum-performance rather than self-report tests. Because trait EI relates to behavioural tendencies and self-perceived abilities, its investigation should be conducted primarily within a personality framework. In contrast, ability EI should be studied primarily with respect to psychometric intelligence. Given that intelligence and personality are essentially independent domains (e.g. Eysenck, 1994; McCrae, 1994; Zeidner, 1995) one would expect trait EI to be related to personality, but not to ability factors.[2] On the other hand, ability EI should certainly be related to cognitive ability (especially g), but it should also correlate with those personality dimensions that have a strong affective core (especially Extraversion and Neuroticism; see Tellegen, 1985; Watson, 2000; Watson and Clark, 1997). In other words, it would be reasonable to expect a construct that concerns individual differences in the ability to understand, process, and utilize affect-laden information to be associated with personality dimensions that reflect individual differences in positive and negative affectivity.

Emphasizing the distinction between trait and ability EI is conducive to the organization of the burgeoning EI literature. Contrast, for example, the following conclusions: '. . . the orthogonality of IQ and the major emotion variables argue for the unique contributions of emotional intelligence and trait affect to interview success (Fox and Spector, 2000, p. 203). 'Overall emotional intelligence, g_{ei}, correlated with verbal intelligence at a low-to-moderate level, as predicted' (Mayer *et al.*, 1999, p. 293). Is this a simple inconsistency, or could the two statements be referring to distinct constructs?

[2]Hofstee (in press) presents an original and integrative account of 'intelligences' measured through self-report and other cognate constructs, which he views as facets of 'stylistic intellect' and places in the domain of personality. Furnham (in press) presents a comprehensive review of studies on self-estimated intelligence, including EI and Gardner's (1983) multiple intelligences.

At first glance, the proposed labels for the two types of EI seem to have certain limitations. For example, there are theorists who would view intelligence as a trait and virtually everyone would agree that it is an ability. Following the Eysenckian view (e.g. Eysenck and Eysenck, 1985), we regard traits as *dispositions* and distinguish them from abilities. In light of this distinction, the term 'trait' becomes particularly useful as a descriptor of the construct we will consider in this paper because it emphasizes both its strong relationship to the basic dimensions of personality as well as the fact that it is not a cognitive ability. In contrast, the term 'ability' emphasizes that the second type of EI belongs in the domain of cognition. However, these two labels leave us with an oxymoron and a redundancy, respectively, because intelligence is an ability and not a trait. In order to avoid these semantic inconsistencies, we propose two alternative labels for these two fundamentally different constructs, i.e. 'emotional self-efficacy' for the former and 'cognitive–emotional ability' for the latter. Nevertheless, we believe it important that the present paper be explicitly linked to the extant literature on EI, which is why we will retain the term 'EI' in the labels of the two constructs.

Why would we want to study EI as a trait rather than a cognitive ability? It should be noted that the two constructs are not mutually exclusive and may therefore co-exist. In principle, there is no reason why the operationalization of the former should preclude that of the latter and vice versa. Nevertheless, attempts to measure EI as a cognitive ability must resolve a difficult problem, i.e. determining objectively correct responses to test items. The fact that it is particularly difficult to apply truly veridical criteria in scoring EI tasks (Davies *et al.*, 1998; Roberts, Zeidner and Matthews, in press) prompted many researchers to investigate the construct as a constellation of dispositions and self-perceived abilities rather than as a class of cognitive–emotional abilities. Thus, at the time of writing, most EI research papers in peer reviewed journals concerned aspects of what we have defined as 'trait EI' (Bar-On, Brown, Kirkcaldy and Thome, 2000; Dawda and Hart, 2000; Martinez-Pons, 1997; Petrides and Furnham, 2000a; Salovey, Mayer, Goldman, Turvey and Palfai, 1995; Schutte *et al.*, 1998; Tapia, 2001). Clearly, then, the present paper does not propose a completely novel approach to EI, but rather tries to systematize and evaluate an approach that largely exists already.

Extant empirical evidence shows that trait EI is likely to be implicated in a variety of behaviours and subjective judgments. For example, it has been shown that the construct predicts goal orientation (Martinez-Pons, 1997), mood recovery (Salovey *et al.*, 1995), and self-reported affect intensity and depression (Dawda and Hart, 2000). Furthermore, various emotion-related traits and self-perceptions have been repeatedly shown to affect a wide range of psychological and behavioural variables (Beyer, 1998; Beyer and Bowden, 1997; Katz and Campbell, 1994; King and Emmons, 1990, 1991; Taylor and Armor, 1996; Taylor and Brown, 1988). In short, the available empirical evidence suggests that trait EI warrants further investigation.

The sampling domain of trait EI

Trait EI encompasses various dispositions from the personality domain such as empathy and assertiveness (Goleman, 1995) as well as elements of social intelligence (Thorndike, 1920), personal intelligence (Gardner, 1983), and ability EI (Mayer and Salovey, 1997), the latter three in the form of *self-perceived* abilities. For example, an ability EI scale designed to measure, say, 'emotion perception' would comprise items with correct and incorrect responses whilst the respective trait EI scale would consist of typical self-report

Table 1. The sampling domain of trait EI

Adaptability	Emotion regulation	Social competence
Assertiveness	Impulsiveness (low)	Stress management
Emotion appraisal (self and others)	Relationship skills	Trait empathy
Emotion expression	Self-esteem	Trait happiness
Emotion management (others)	Self-motivation	Trait optimism

items such as 'I know what others are feeling just by looking at them'. The various conceptualizations of trait EI have sampled from the above areas to different degrees. However, as Ciarrochi, Chan and Caputi (2000) pointed out, the different 'definitions' of EI generally tend to be complementary rather than contradictory.

Based on a content analysis of the salient literature on EI, we identified a number of facets encompassed in various operationalizations of the construct including those of Bar-On (1997), Goleman (1995) and Salovey and Mayer (1990). These facets are presented in Table 1.

It cannot be expected that there will be complete consensus as regards the appropriateness of the facets that have been included in Table 1. Asking what precisely should be part of a construct is like asking what sports should be in the Olympics; neither question can be answered objectively. Consequently, it is possible that some researchers may feel that certain changes need to be made to the above domain. Nevertheless, Table 1 can be used as a guide for the development of comprehensive trait EI inventories. It must also be noted that the facets in this table should be expected to blend through relatively high correlations and therefore they may not be perceived as factors in a statistical sense.

Although many trait EI facets have been investigated before, either separately or in various permutations (Gohm and Clore, 2000), at present there do not exist any inventories to measure the construct comprehensively. For this reason, in the present paper we will employ a trait EI measure that covers the construct's domain relatively well, albeit not fully (cf. Tables 1 and 2). The empirical aim of the paper is to examine the psychometric properties of the Emotional Quotient inventory (EQ-i; Bar-On, 1997) both in isolation and with reference to two established trait taxonomies.

STUDY 1

The first aim of this study is to scrutinize the factorial structure of the BarOn Emotional Quotient inventory (EQ-i; Bar-On, 1997) via confirmatory factor analysis (CFA). The EQ-i is based on Bar-On's (1997, p. 14) view of EI as 'an array of noncognitive capabilities, competencies, and skills that influence one's ability to succeed in coping with environmental demands and pressures'. Although the author freely uses terms such as *ability* and *intelligence* throughout the technical manual, it is obvious, not least from the items and labels of the scales, that the questionnaire concerns dispositions and self-perceived abilities. Therefore, it should be clear that this inventory attempts to tap aspects of trait EI.

The second and more important aim of study 1 is to locate trait EI in Eysenckian factor space. This psychometric technique is designed to shed light on new constructs or new measures of extant constructs (Kline, 1993). We have theoretically placed trait EI in the domain of personality and it is therefore important to investigate *how* the construct belongs in this domain. If it breaks up and its constituent scales are subsumed under the three

superfactors, it can be concluded that trait EI can be conceptualized as a mixture of established traits. If, on the other hand, a distinct trait EI factor emerges, then we can infer that there is an integrative force behind the scales, quite different from Psychoticism (P), Extraversion (E), and Neuroticism (N). The latter result is essentially a demonstration of the construct's discriminant validity with respect to the three superfactors.

In addition to elucidating the theoretical nature of a construct, factor location studies can provide important information concerning incremental validity. Investigations of incremental validity are normally conducted through regression analysis and require the use of external variables as criteria. This is somewhat problematic because different criteria are likely to lead to different conclusions as regards the incremental validity of a construct. In contrast, factor location studies can be conducted without the use of external criteria, i.e. only on the construct under consideration and the variables over which one seeks to demonstrate incremental validity. Thus, if a distinct trait EI factor can be identified within the Eysenckian personality model, it is very likely that the construct will exhibit incremental validity over the Eysenckian dimensions at least with respect to certain external criteria.

Method

Participants

Two hundred and twenty-seven (125 males and 102 females) predominantly white employees from a large transport company based in New Zealand participated in the study. The mean age for the sample was 37.9 years (SD = 6.3 years).

Measures

BarOn EQ-i (Bar-On, 1997). This inventory comprises 133 items, 15 scales, and five second-order factors or *composites* loading on a third-order factor, which was labeled total (full-scale) trait EI. Items are responded to on a five-point Likert scale ranging from 'not true of me' to 'true of me'. Table 2 presents the EQ-i scales and composites, along with brief descriptions and characteristic items.

The 15 scales consist of unequal numbers of items ranging from seven to nine. Some of the items, notably within the *Intrapersonal* and *Interpersonal* composites, have similar semantic content.[3] The inventory also includes a 16-item 'validity' scale, which has not been entered in the analyses that follow. Finally, 13 items appear to have been duplicated and assigned to two scales rather than a single scale. In this paper, these items were allocated to whichever scale had the fewer items.

In terms of validity, Bar-On (1997) reports studies showing that total EQ-i scores differentiate between professional and unemployed groups, successful and unsuccessful U.S. Air Force recruiters, and clinical and normative samples in Argentina, Israel, South Africa, and the US. Independent studies have found that the EQ-i differentiates between students with and without learning disabilities (Reiff, Hatzes, Bramel and Gibbon, 2001) and predicts self-reported depression and affect intensity (Dawda and Hart, 2000).

Eysenck Personality Profiler (EPP; Eysenck, Barrett, Wilson and Jackson, 1992). The EPP encompasses 420 items measuring 21 scales and the three Eysenckian superfactors

[3]Examples of such items include 'It's fairly easy to express my feelings' ('emotion self-awareness')—'I'm unable to express my ideas to others' ('assertiveness'), 'I lack self-confidence' ('self-actualization')—'I really don't know what I'm good at' ('self-regard'), 'I care what happens to other people' ('empathy')—'I like helping people' ('social responsibility'), 'I avoid hurting other people's feelings' ('empathy')—'I'm sensitive to the feelings of others' ('social responsibility').

Table 2. Definitions and characteristic items for the 15 EQ-i scales

Composites	Primary scale	Brief description	Characteristic item
Intrapersonal	*Intra1:* Emotional Self-Awarenesss	Self-perceived ability to recognize, be aware and differentiate between feelings.	I'm 'in touch' with my emotions.
	Intra2: Assertivenesss	Disposition to express feelings, beliefs, and thoughts and defend one's rights.	When I'm angry with others I can tell them about it.
	Intra3: Self-Regard	Disposition to respect and accept oneself as basically good.	Looking at both my good and bad points, I feel good about myself.
	Intra4: Self-Actualization	Drive to realize one's potential capacities.	I try to make my life as meaningful as I can.
	Intra5: Independence	Self-perceived ability to be self-directed and self-controlled in one's thinking and actions and to be free of emotional dependency.	I tend to cling to others. (R)
Interpersonal	*Inter1:* Empathy	Self-perceived ability to be aware of, understand and appreciate the feelings of others.	I'm good at understanding the way other people feel.
	Inter2: Interpersonal Relationship	Self-perceived ability to establish mutually satisfying relationships characterized by intimacy and by giving and receiving affection.	I'm unable to show affection. (R)
	Inter3: Social Responsibility	Self-perceived ability to demonstrate oneself as a cooperative, contributing, and constructive member of one's group.	I like helping people.
Adaptability	*Ada1:* Problem Solving	Self-perceived ability to identify and define problems as well as to generate effective solutions.	In handling situations that arise, I try to think of as many approaches as I can.
	Ada2: Reality Testing	Self-perceived ability to assess the correspondence between what is experienced and what objectively exists.	I can easily pull out of daydreams and tune into the reality of the immediate situation.
	Ada3: Flexibility	Self-perceived ability to adjust one's emotions, thoughts, and behavior to changing situations and conditions.	It's easy for me to adjust to new conditions.
Stress Management	*SM1:* Stress Tolerance	Self-perceived ability to withstand stressful situations.	I can handle stress without getting too nervous.
	SM2: Impulse Control	Self-perceived ability to resist or delay an impulse, drive or temptation to act.	It is a problem controlling my anger. (R)
General Mood	*GM1:* Happiness	Disposition to feel satisfied with one's life, to enjoy oneself and others, and to have fun.	It's hard for me to enjoy life. (R)
	GM2: Optimism	Disposition to look at the brighter side of life and to maintain a positive attitude, even in the face of adversity.	I generally hope for the best.

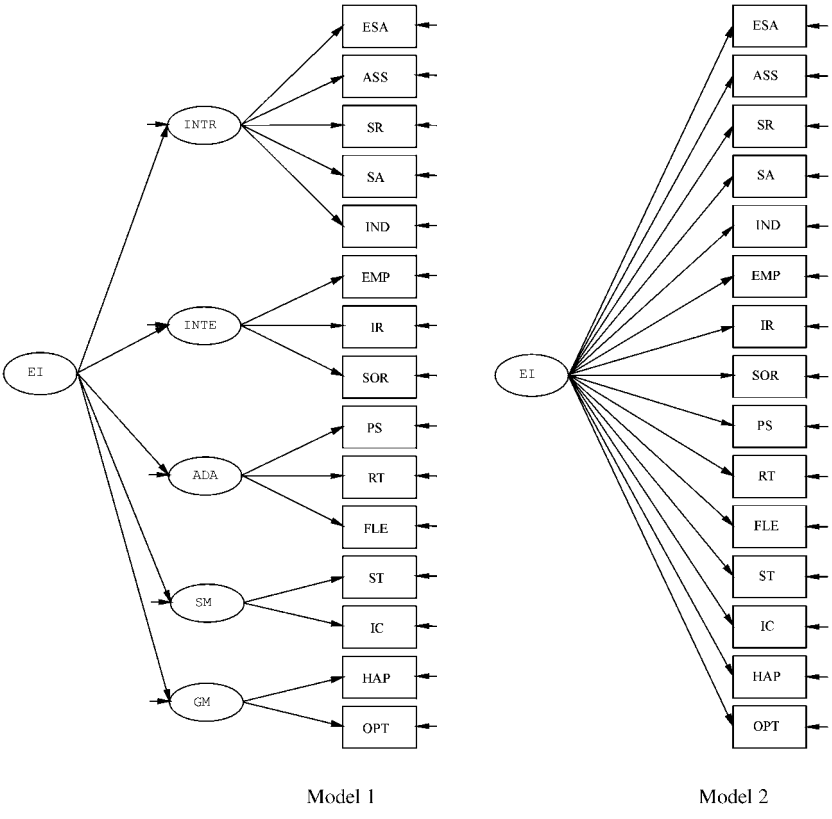

Figure 1. Conceptual diagrams for the two EQ-i models. Latent variables: EI = trait EI; INTR = intrapersonal composite; INTE = interpersonal composite; ADA = adaptability composite; SM = stress management; GM = general mood. Scales: ESA = emotional self-awareness; ASS = assertiveness; SR = self-regard; SA = self-actualization; IND = independence; EMP = empathy; IR = interpersonal relationship; SOR = social responsibility; PS = problem solving; RT = reality testing; FLE = flexibility; ST = stress tolerance; IC = impulse control; HAP = happiness; OPT = optimism. The *modified* models include correlated uniquenesses between ESA and ASS, and EMP and SOR.

(P–E–N). There is also a 20-item dissimulation scale that will not be examined here, as it is not part of the P–E–N system. The inventory is based on a trichotomous response scale (yes/can't decide/no) and is usually administered by personal computer. The EPP has been psychometrically investigated (Costa and McCrae, 1995; Eysenck *et al.*, 1992; Jackson, Furnham, Forde and Cotter, 2000; Muris, Schmidt, Merckelbach and Rassin, 2000) and has been used in many studies of personality (Furnham, Forde and Cotter, 1998a, 1998b).[4]

Procedure

All participants completed the questionnaire as part of an assessment and development centre and received individual feedback on their results. The CFA was conducted with LISREL 8.3 (Jöreskog and Sörbom, 1993) and the EFA was conducted with the PsWin programs (Barrett, 1996).

[4]Item-level data on the EPP were not available for this study and therefore the reliabilities of the EPP scales could not be estimated. Jackson *et al.* (2000, p. 227) present such estimates based on their data set and also reproduce estimates from Eysenck *et al.* (1992) and Costa and McCrae (1995). Overall, the alphas of the EPP scales were satisfactory and relatively stable across the three studies.

CFA models

A second-order confirmatory factor analysis with maximum likelihood estimation was performed to test the 15–5–1 *a priori* structure of the EQ-i (model 1). Due to evidence of high correlations between the five second-order factors (Bar-On, 1997; Dawda and Hart, 2000) an alternative, nested model (model 2) with 15 scales and one first-order factor (total trait EI) was also tested. Model 2 was derived by fixing the disturbances of the five second-order factors in model 1 at zero. Figure 1 presents the conceptual diagrams for the two models. Correlated uniquenesses were anticipated due to the inclusion of similarly worded items in the questionnaire. Such items share much of their specific variance (Cooper, 1998), which causes uniquenesses to correlate (Byrne, 1998).

The analyses were conducted on the covariance matrix. All variables exhibited some degree of negative skewness, but none was severely skewed. 'Happiness', 'social responsibility', and 'optimism' had the three largest absolute skew ($-1.57, -1.26, -1.09$) and kurtosis (4.03, 2.69, 3.34) indices. There are no firmly established upper limits for skew and kurtosis absolute values, but, as a rule of thumb, skew indices greater than |3| and kurtosis indices greater than |20| would indicate extreme non-normality (Kline, 1998). As regards model fit, non-normality tends to lead to an overestimation of χ^2 values and a modest underestimation of fit indices such as the CFI (West, Finch and Curran, 1995).

In order to assess model fit we relied on the comparative fit index (CFI; Bentler, 1990), the standardized root-mean-square residual (SRMR; Bentler, 1990; Jöreskog and Sörbom, 1981), and the root-mean-square error of approximation (RMSEA; Jöreskog and Sörbom, 1993; Steiger and Lind, 1980), all of which have been recommended by Hu and Bentler (1999). The cutoff values used as *guides* in this study follow the recommendations of Byrne (1998): >0.90 for the CFI, <0.05 for the SRMR, and <0.10 for the RMSEA.

Results

The descriptive statistics, number of items, and internal consistencies for the 15 EQ-i scales are presented in Table 3, where they have been grouped under the relevant composites according to the *a priori* structure of the questionnaire. On this sample, the internal reliabilities of the scales, especially that of 'empathy', were generally lower than those reported in the test's technical manual (Bar-On, 1997), partly on account of the deletion of the 13 duplicated items (see the 'Method' section). It can be seen in Table 3 that the largest discrepancies between the reliabilities based on this data set and those based on Bar-On's (1997) North American samples concern scales from which duplicated items have been deleted. The internal consistency for the total scale was 0.93. The intercorrelations between the EQ-i scales are presented in Table 4.

Confirmatory factor analysis

Model 1 resulted in a reasonable fit to the data: $\chi^2_{(85)} = 251.94$, CFI $= 0.91$, SRMR $= 0.06$, RMSEA $= 0.09$. As would be expected, the additional restrictions led to a somewhat lower fit for model 2: $\chi^2_{(90)} = 316.66$, CFI $= 0.88$, SRMR $= 0.06$, RMSEA $= 0.11$. Both models were modified by allowing the residuals between 'emotional self-awareness' and 'assertiveness', and 'empathy' and 'interpersonal relationship', to covary. In freeing the covariances between those residuals, we were guided primarily by the methodological issue of overlapping item content (see footnote 3) rather than the absolute sizes of the modification indices, which have been shown to be problematic (MacCallum, 1986;

Table 3. Descriptive statistics, number of items, and coefficients of reliability for the 15 EQ-i scales

Scale	Mean[a]	SD	Number of items[b]	Cronbach's alpha[c]	Cronbach's alpha[d]
Intrapersonal composite					
Emotional Self-Awareness	4.20	0.52	8	0.78	0.79
Assertiveness	3.95	0.55	7	0.75	0.74
Self-Regard	4.50	0.44	8 (1)	0.75	0.87
Self-Actualization	4.55	0.38	9	0.72	0.76
Independence	4.02	0.50	7	0.69	0.77
Interpersonal composite					
Empathy	4.34	0.40	7 (1)	0.54	0.76
Interpersonal Relationship	4.43	0.38	8 (3)	0.62	0.79
Social Responsibility	4.54	0.41	7 (3)	0.64	0.87
Adaptability composite					
Problem Solving	4.25	0.46	8	0.78	0.80
Reality Testing	4.25	0.43	8 (2)	0.68	0.76
Flexibility	3.96	0.52	8	0.71	0.75
Stress Management composite					
Stress Tolerance	4.13	0.49	8 (1)	0.79	0.80
Impulse Control	4.14	0.45	9	0.71	0.79
General Mood composite					
Happiness	4.61	0.38	8 (1)	0.72	0.79
Optimism	4.34	0.44	7 (1)	0.67	0.80

[a]Raw scale scores have been averaged over the number of items in each scale.
[b]The numbers in the parentheses indicate how many duplicated items were dropped from the scale.
[c]Present study ($N = 227$).
[d]Average alpha based on three North American samples (total $N = 6396$) presented in Bar-On (1997).

MacCallum, Roznowski and Necowitz, 1992). Nevertheless, these indices were consulted in order to decide which errors within the Interpersonal and Intrapersonal composites should be freed.

Following the modifications, the fit indices for model 1 were: $\chi^2_{(83)} = 224.89$, CFI = 0.92, SRMR = 0.05, RMSEA = 0.09. Model 2 had a marginally lower fit: $\chi^2_{(88)} = 259.47$, CFI = 0.91, SRMR = 0.06, RMSEA = 0.10. The parameter estimates for the two models are reported in Table 5.

The additional restrictions imposed on model 2 inevitably led to a decrease in overall model fit. Since model 2 is nested under model 1, the χ^2 difference test ($\Delta\chi^2$) was used to assess the statistical significance of fit attenuation. In this case, $\Delta\chi^2_{(5)} = 34.58$, $p < 0.01$. Despite this, it can be seen in Table 5 that the loadings of the second-order factors on total trait EI were very high and the corresponding uniquenesses very low, with the possible exception of those pertaining to the Interpersonal composite. These values call into question the discriminant validity of the composites and the theoretical plausibility of model 1 as a whole. In addition, it should be noted that the five-factor solution extracted factors with eigenvalues as low as 0.62. Therefore, despite the significance of the sample-sensitive $\Delta\chi^2$ test, model 2 will be preferred on statistical and parsimony grounds.

Factor location analysis

In all, 35 variables were entered in the analysis, i.e. the 15 EQ-i scales along with 20 EPP scales. The 'practical' scale from Psychoticism was left out as it has been repeatedly

Table 4. Intercorrelations between the EQ-i scales for studies 1 and 2

	ESA	ASS	SR	SA	IND	EMP	IR	SOR	PS	RT	FLE	ST	IC	HAP	OPT	EM
ESA	–	0.556**	0.532**	0.356**	0.536**	0.197*	0.503**	0.131	0.232**	0.442**	0.290**	0.292**	0.086	0.420**	0.414**	0.166*
ASS	0.641	–	0.572**	0.487**	0.700**	0.200**	0.474**	0.082	0.374**	0.454**	0.404**	0.377**	−0.026	0.424**	0.444**	0.469*
SR	0.464	0.510	–	0.564	0.504	0.211**	0.552**	0.148	0.249**	0.479**	0.420**	0.473**	−0.006	0.699**	0.660**	0.155*
SA	0.548	0.528	0.610	–	0.529	0.320**	0.488**	0.214**	0.291**	0.383**	0.384**	0.431**	0.025	0.590**	0.513**	0.308**
IND	0.403	0.568	0.526	0.575	–	0.111	0.271**	−0.029	0.291**	0.423**	0.510**	0.464**	0.027	0.386**	0.424**	0.578**
EMP	0.369	0.275	0.225	0.400	0.212	–	0.621**	0.630**	0.272**	0.178*	0.201**	0.232**	0.228**	0.309**	0.437**	0.374**
IR	0.523	0.511	0.412	0.571	0.428	0.501	–	0.504**	0.326**	0.438**	0.402**	0.384**	0.224**	0.639**	0.670**	0.603**
SOR	0.461	0.414	0.328	0.509	0.357	0.559	0.546	–	0.232**	0.234**	−0.014	0.165*	0.450**	0.264**	0.315**	0.253**
PS	0.471	0.535	0.515	0.559	0.517	0.377	0.387	0.415	–	0.351**	0.244**	0.329**	0.248**	0.173*	0.253**	0.609**
RT	0.511	0.598	0.517	0.500	0.505	0.348	0.444	0.504	0.540	–	0.275**	0.431**	0.292**	0.537**	0.420**	0.591**
FLE	0.430	0.474	0.481	0.511	0.500	0.253	0.369	0.376	0.453	0.554	–	0.502**	0.070	0.372**	0.473**	0.689**
ST	0.471	0.614	0.589	0.588	0.605	0.354	0.483	0.452	0.597	0.658	0.585	–	0.218**	0.508**	0.657**	0.516**
IC	0.332	0.379	0.338	0.303	0.315	0.243	0.264	0.378	0.458	0.539	0.381	0.457	–	0.103	0.110	0.606**
HAP	0.408	0.411	0.593	0.600	0.445	0.404	0.577	0.550	0.383	0.525	0.370	0.556	0.329	–	0.699	0.432**
OPT	0.499	0.573	0.595	0.658	0.557	0.387	0.507	0.475	0.526	0.546	0.395	0.655	0.337	0.628	–	0.537**

Note: Correlations below the diagonal are for study 1 ($N = 220$). All values were significant at $p < 0.01$. Correlations above the diagonal are for study 2 ($N = 166$). *$p < 0.05$, **$p < 0.01$. Scale abbreviations as in Figure 1. EM = Emotion Mastery (scale added in study 2).

Table 5. Standardized parameter estimates for EQ-i models 1 and 2

	Model 1							Model 2	
	INTR	INTE	ADA	SM	GM	Uniq		Trait EI	Uniq
Scales							Scales		
ESA[a]	**0.65**	0.0	0.0	0.0	0.0	0.57	ESA[b]	**0.65**	0.58
ASS[a]	**0.73**	0.0	0.0	0.0	0.0	0.46	ASS[b]	**0.73**	0.47
SR	**0.73**	0.0	0.0	0.0	0.0	0.46	SR	**0.72**	0.48
SA	**0.79**	0.0	0.0	0.0	0.0	0.38	SA	**0.78**	0.39
IND	**0.71**	0.0	0.0	0.0	0.0	0.49	IND	**0.70**	0.51
EMP[c]	0.0	**0.60**	0.0	0.0	0.0	0.65	EMP[d]	**0.47**	0.78
IR	0.0	**0.78**	0.0	0.0	0.0	0.38	IR	**0.66**	0.57
SOR[c]	0.0	**0.72**	0.0	0.0	0.0	0.49	SOR[d]	**0.62**	0.62
PS	0.0	0.0	**0.72**	0.0	0.0	0.49	PS	**0.70**	0.51
RT	0.0	0.0	**0.78**	0.0	0.0	0.40	RT	**0.75**	0.43
FLE	0.0	0.0	**0.67**	0.0	0.0	0.56	FLE	**0.64**	0.59
ST	0.0	0.0	0.0	**0.86**	0.0	0.26	ST	**0.82**	0.33
IC	0.0	0.0	0.0	**0.53**	0.0	0.72	IC	**0.52**	0.73
HAP	0.0	0.0	0.0	0.0	**0.75**	0.44	HAP	**0.71**	0.50
OPT	0.0	0.0	0.0	0.0	**0.84**	0.30	OPT	**0.78**	0.39

	Trait EI	Uniq
Composites		
INTR	0.99	0.03
INTE	0.82	0.34
ADA	0.97	0.06
SM	0.96	0.08
GM	0.93	0.14

Note: Scale and composite abbreviations as in Figure 1. Uniq = Uniqueness. All parameter estimates were significant beyond the 0.05 level. Correlations between uniquenesses were [a]0.16, [b]0.17, [c]0.13, [d]0.27.

shown that it does not fit within the P–E–N scheme (Costa and McCrae, 1995; Eysenck *et al.*, 1992; Jackson *et al.*, 2000; Muris *et al.*, 2000).

A principal axis exploratory factor analysis (EFA) was performed to investigate the nature of the trait EI factor and its location in Eysenckian factor space. Based on the theoretical aims of this study and the scree test, four factors accounting for 53.9% of the total variance were extracted. The eigenvalues for the four factors were 9.97, 3.42, 2.06, and 1.33. The factors were rotated via the direct OBLIMIN algorithm. The Delta parameter was swept from -10.5 to 0.0 in steps of 0.5 and maximum simple structure was attained at Delta $= -4.5$ with a total hyperplane count (Cattell, 1952) of 51. Table 6 presents the factor pattern matrix for this solution.

It can be seen in Table 6 that the trait EI factor and the three Eysenckian superfactors have emerged with remarkable clarity. As regards the EPP scales, 'aggressive' and 'obsessive' loaded more strongly on Extraversion and Psychoticism, respectively, than on their keyed superfactors. Eysenck *et al.* (1992) and Jackson *et al.* (2000) have also detected this anomaly. Costa and McCrae (1995) reported similar findings for these scales, although on their sample 'obsessive' had an even more complex pattern of loadings. The correlations between trait EI and the three Eysenckian superfactors were -0.31, 0.29 and -0.14 with N, E and P, respectively. The correlations between the three superfactors were low, as expected ($r_{NE} = 0.02$, $r_{NP} = 0.15$, and $r_{EP} = 0.06$).

Table 6. Factor pattern matrix for the EQ-i and EPP scales

Scale	Trait EI	N	E	P
EQ-i				
Emotional Self-Awareness	**0.500**	0.079	− 0.260	0.193
Assertiveness	**0.538**	0.168	− 0.304	0.013
Self-Regard	**0.540**	0.290	− 0.169	− 0.106
Self-Actualization	**0.698**	0.058	− 0.207	− 0.025
Independence	**0.592**	0.123	− 0.194	− 0.155
Empathy	**0.506**	− 0.185	− 0.090	0.316
Interpersonal Relationship	**0.554**	− 0.052	− 0.281	0.232
Social Responsibility	**0.651**	− 0.123	− 0.003	**0.413**
Problem Solving	**0.590**	0.124	− 0.115	0.050
Reality Testing	**0.678**	0.268	0.083	0.070
Flexibility	**0.533**	0.132	− 0.162	− 0.059
Stress Tolerance	**0.681**	0.296	− 0.086	− 0.099
Impulse Control	**0.469**	0.327	0.260	0.163
Happiness	**0.726**	0.002	− 0.008	0.007
Optimism	**0.701**	0.096	− 0.150	− 0.065
EPP Neuroticism				
Inferior	0.158	**0.711**	− 0.248	0.023
Unhappy	0.082	**0.698**	− 0.204	0.135
Anxious	0.121	**0.761**	− 0.100	− 0.003
Dependent	0.083	**0.695**	− 0.091	0.035
Hypochondriac	0.047	**0.590**	0.079	0.064
Guilty	− 0.024	**0.723**	− 0.057	0.176
Obsessive	0.094	**0.365**	**0.444**	− 0.233
EPP Extraversion				
Active	− 0.094	− 0.042	**0.526**	0.105
Sociable	− 0.059	− 0.137	**0.491**	− 0.060
Expressive	− 0.006	0.276	**0.466**	0.206
Assertive	− 0.057	− 0.240	**0.592**	0.157
Ambitious	− 0.109	− 0.087	**0.672**	− 0.056
Dogmatic	0.080	0.312	0.347	0.202
Aggressive	0.036	0.300	0.078	**0.550**
EPP Psychoticism				
Risk-Taking	− 0.133	0.064	0.038	**0.577**
Impulsive	0.024	0.303	0.275	**0.429**
Irresponsible	0.074	0.236	− 0.287	0.332
Manipulative	0.167	0.086	− 0.066	**0.373**
Sensation-Seeking	− 0.060	− 0.026	0.212	**0.602**
Tough-Minded	− 0.057	− 0.276	− 0.128	**0.538**

Note: Loadings greater than |0.35| are in boldface. E = Extraversion; N = Neuroticism; P = Psychoticism.

Discussion

The first aim of study 1 was to explore the factorial structure of the EQ-i and propose a credible model to account for the intercorrelations of the 15 scales it comprises. From the results of this study, it appears that the second-order factors of the EQ-i (composites) constitute a redundant layer in the structure. Instead, a single-factor model with the 15 variables as indicators of one broad latent variable (full-scale trait EI) provides an adequate approximation to the data. Dawda and Hart (2000) also recommended against the use of the five composites on evidence of very high zero-order correlations. From the perspective of basic personality research there is very little to be gained by treating

the five composites as distinct when they are so highly correlated. However, it is possible that the composites may be useful from a practitioner's perspective (Baron, 1996; but also see Barrett, Kline, Paltiel and Eysenck, 1996).

The removal of the 13 duplicated items had a negative impact on the reliability of some scales, notably 'empathy', and the questionnaire could perhaps benefit from the inclusion of additional items. More importantly, the inventory should be amended in order to cover more extensively the sampling domain of trait EI. As it currently stands, the EQ-i neglects important parts of the construct's domain, for example, emotion expression, emotion regulation, and self-motivation, which are included in several salient conceptualizations of EI (e.g. Goleman, 1995; Salovey and Mayer, 1990).

The fact that the 15 EQ-i scales did not 'disintegrate' in the presence of the three superfactors provides strong empirical evidence for the existence of a coherent and distinguishable trait EI factor. However, this factor is not orthogonal to P–E–N and therefore trait EI cannot be conceived of as a new personality dimension. In the Eysenckian personality structure, then, trait EI is a lower-order composite construct that occupies space largely delimited by Extraversion and Neuroticism. In view of the emotional core of these two dimensions (Tellegen, 1985; Watson, 2000; Watson and Clark, 1997), it should be clear that the position of trait EI in the Eysenckian model of personality is theoretically meaningful.

The isolation of a trait EI factor in Eysenckian factor space constitutes evidence of discriminant validity. In turn, this suggests that the construct is very likely to exhibit incremental validity *vis-à-vis* the Eysenckian dimensions, at least with respect to certain external criteria. The sampling domain of the construct can be used as a guide for the selection of appropriate criteria to include in investigations of criterion and incremental validity. For example, given that trait EI is a personality construct, one should not expect it strongly to correlate with measures of psychometric intelligence, since traits and cognitive abilities are generally orthogonal (Eysenck, 1994; Zeidner, 1995). On the other hand, because trait EI encompasses facets like emotion appraisal, emotion regulation, and adaptability it should be expected to relate and predict constructs like satisfaction with life, depression, and coping styles (Petrides, Furnham and Frederickson, submitted for publication).

The association between trait EI and Psychoticism was lower than might have been expected, given that individuals with high scores on this dimension are likely to be unfriendly, unemotional, antisocial, and 'lacking in feelings' (Eysenck and Eysenck, 1976; Richendoller and Weaver, 1994). It is possible that the weak relationship is simply an artifact of the poor psychometric properties of the Psychoticism factor in the EPP. Also to be noted is the absence of any displacements among the EQ-i scales or strong secondary loadings from the EPP scales on the trait EI factor. To the extent that trait EI encompasses variables from the personality domain, it would not be surprising if a number of its facets were subsumed under the Eysenckian factors or if certain EPP facets showed relatively strong secondary or even primary loadings on the trait EI factor.

Trait EI is meaningfully placed within the Eysenckian personality model. The hypothetico-deductive derivation (Eysenck, 1997) and universality (Barrett, Petrides, Eysenck and Eysenck, 1998) of this model render it appealing as an explanatory framework. However, there is a number of personality theorists who believe that five rather than three dimensions are required to describe personality characteristics (Costa and McCrae, 1992a; Digman, 1990; Goldberg and Saucier, 1995; John and Robins, 1994). It is therefore important to investigate trait EI with reference to a Big Five trait taxonomy.

STUDY 2

There are various operationalizations and labels for the Big Five personality dimensions (John and Srivastava, 1999). The present study is based on the Five-Factor Model (FFM) of Costa and McCrae, operationalized by the NEO PI-R (Costa and McCrae, 1992b). In addition to Extraversion and Neuroticism, the FFM encompasses the dimensions of Conscientiousness, Agreeableness and Openness-to-Experience (Openness). It should be noted that the complexity of the empirical status of a construct is likely to vary as a function of the scope of the trait taxonomy against which it is assessed. In general, broader taxonomies are likely to lead to greater complexity because they encompass more dimensions.

The NEO PI-R operationalization of Conscientiousness seems to be particularly relevant to trait EI, as it comprises facets such as 'self-discipline', 'achievement-striving', and 'competence' (for facet descriptions see Costa and McCrae, 1992b, 1998; Costa, McCrae and Dye, 1991), which are conceptually related to trait EI in general and to certain EQ-i scales in particular (e.g. 'self-actualization' and 'problem solving'). Dawda and Hart (2000) found a correlation of about 0.4 between the EQ-i and the Conscientiousness factor in the NEO FFI. Agreeableness is also relevant to trait EI, as it primarily concerns interpersonal behavior (Costa *et al.*, 1991). In general, the theoretical connections between trait EI and Agreeableness are similar to those between trait EI and Psychoticism since several facets of the FFM dimension (e.g. 'altruism', 'compliance', and 'tender-mindedness') can be traced at the negative pole of the Eysenckian dimension. If the weak association between trait EI and Psychoticism in study 1 was indeed due to the non-robust nature of the P factor in the EPP, then the relationship between trait EI and Agreeableness should be substantial, given that the NEO PI-R factor is psychometrically strong. Finally, the relationship between trait EI and Openness is more difficult to hypothesize, partly on account of conflicting findings in the literature. Thus, Schutte *et al.* (1998) reported a zero-order correlation of about 0.5 between their measure of trait EI and Openness whereas the corresponding correlation in Dawda and Hart (2000) was close to zero. In part, this discrepancy can be attributed to the fact that the two studies employed measures that assessed different parts of the construct's domain, which again highlights the pressing need for consistency in the area.

The location of trait EI in FFM space will be more complicated than the corresponding analysis with the EPP. The NEO PI-R has nine sub-scales and two factors more than the EPP and its structure is certainly more robust. In addition, as noted above, there are grounds to expect associations between trait EI and at least two of the FFM dimensions that are not fully represented in the Eysenckian model. The test concerning discriminant validity would again entail isolating a trait EI factor defined by several of the EQ-i scales in the joint factor analysis.

Method

Participants

One hundred and sixty-six individuals participated in the study (54 males and 110 females, two unreported) of whom 85 were first-year psychology undergraduates and the rest mainly postgraduates from a wide variety of disciplines. The mean age for the sample was 22.17 (SD = 4.27).

Measures

Bar-On EQ-i (Bar-On, 1997). This is the inventory examined in study 1 with the addition of a 15-item scale intended to cover some aspects of the construct's domain that the EQ-i does not. The new scale sampled from the areas of emotion identification and regulation and was labeled 'emotion mastery'.

NEO PI-R (Costa and McCrae, 1992b). This well established questionnaire comprises 240 items measuring six facets for each of the five basic personality dimensions, *viz.*, Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. Participants responded on a five-point Likert scale.

Procedure

The 85 undergraduate students were tested in class whereas the rest of the participants were given the questionnaires to complete in their own time. Where possible, participants were debriefed. The CFA was conducted with LISREL 8.3 (Jöreskog and Sörbom, 1993) and the EFA was conducted with the PsWin programs (Barrett, 1996).

Results

The reliabilities for the EQ-i and the NEO PI-R scales are presented in Table 7. The alphas for the EQ-i scales were notably higher than in study 1 and very close to those reported by Bar-On (1997). The alphas for the NEO PI-R scales were satisfactory with a third below 0.70. With the exception of the values for 'impulsiveness' and 'excitement-seeking', all other alphas were either higher or very similar to those reported by Costa and McCrae (1992b).

A CFA was performed to test the adequacy of the model endorsed in study 1. The results indicated a poor fit: $\chi^2_{(88)} = 405.81$, CFI = 0.75, SRMR = 0.10, RMSEA = 0.15. A subsequent EFA with OBLIMIN rotation revealed a strong first factor (38.97% of the total variance) defined by twelve EQ-i scales and a weaker second factor (10.35% of the total variance) defined by three EQ-i scales ('empathy', 'social responsibity', and 'impulse control'). The correlation between the two factors was 0.30.

Factor location analysis

A joint factor analysis with the 16 EQ-i scales (including 'emotion mastery') and the 30 NEO PI-R facets was performed to examine whether a trait EI factor could be recovered in FFM space. Upon examination of the scree test and in conjunction with the theoretical aims of the study, six factors accounting for 64.5% of the total variance were extracted through principal axis analysis.[5] The eigenvalues for the six factors were 12.12, 6.23, 4.41, 3.09, 2.34, and 1.50. The factors were rotated via the direct OBLIMIN algorithm. The Delta parameter was swept from −10.5 to 0.0 in steps of 0.5 and three virtually equivalent solutions (with respect to the hyperplane count criterion) were identified (S1, S2, and S3). S1 was identified at Delta = 0, had a hyperplane count of 116, and four displaced NEO PI-R scales (an index of factorial distortion); S2 was identified at Delta = −0.5, had a hyperplane count of 112, and three displaced NEO PI-R scales; last, S3 was identified at Delta = −1, had a hyperplane count of 112, and two displaced NEO PI-R scales. A trait EI factor emerged in S2 and S3, but not in S1, where the majority of the EQ-i scales blended

[5]Because of the possibility of a second factor in the EQ-i, a seven-factor solution was also extracted and rotated via OBLIMIN. With respect to trait EI, the seven-factor solution was very similar to that presented in Table 7. The additional factor was loaded by scales from Neuroticism (2), Agreeableness (1), Conscientiousness (1), and trait EI (1).

into NEO PI-R Neuroticism. Despite the somewhat higher hyperplane count, S1 was anomalous as it contained a 'blank' factor, i.e., a factor consisting solely of secondary loadings. S2 and S3 were highly similar, thus indicating that the trait EI factor can be recovered across a range of Deltas. The factor pattern matrix for S2 is presented in Table 7. The expected complexity of the present solution was manifested mainly in the form of scale-shifting, with half of the EQ-i scales having higher loadings on the personality factors than on trait EI.

The factor intercorrelation matrix is presented in Table 8, where it can be seen that trait EI correlated negatively with Neuroticism (− 0.29) and positively with Extraversion and Conscientiousness (0.30 and 0.35 respectively), while it was weakly correlated with Openness (0.13) and effectively independent of Agreeableness (− 0.01). The correlations of trait EI with Extraversion, Neuroticism, and Conscientiousness confirm that the construct is not orthogonal to the major personality dimensions.

Table 7. Factor pattern matrix for the EQ-i and NEO PI-R scales

Scale and reliability	Trait EI	A	C[a]	O	N	E
EQ-i (0.90)						
Assertiveness (0.80)	**0.786**			0.146		
Emotional Self-Awareness (0.78)	**0.657**					
Independence (0.74)	**0.647**	− 0.233	0.105	0.267	− 0.180	− 0.117
Emotion Mastery (0.75)	**0.609**				**− 0.369**	
Self-Regard (0.88)	**0.591**		0.108		− 0.168	0.249
Optimism (0.70)	**0.440**	0.226			− 0.279	**0.400**
Reality Testing (0.73)	**0.438**	0.194	0.315	− 0.279	− 0.208	
Happiness (0.80)	**0.433**	0.176		− 0.104	− 0.244	**0.415**
Interpersonal Relationship (0.81)	**0.482**	**0.518**				**0.400**
Self-Actualization (0.72)	0.324		**0.392**	0.201		0.325
Empathy (0.64)	0.257	**0.656**		0.176	0.163	0.146
Social Responsibility (0.69)	0.148	**0.825**	0.102			
Impulse Control (0.77)		**0.523**	0.183		− 0.338	− 0.291
Problem Solving (0.73)	0.301	0.175	**0.383**	0.194		− 0.214
Stress Tolerance (0.80)	0.247			0.125	**− 0.654**	
Flexibility (0.77)	0.249			**0.367**	**− 0.368**	0.111
NEO Agreeableness (0.83)						
Straightforwardness (0.70)		**0.734**				− 0.248
Altruism (0.74)	0.104	**0.733**				0.288
Compliance (0.67)	− 0.299	**0.666**			− 0.298	− 0.113
Modesty (0.79)	− 0.191	**0.629**	− 0.196			− 0.156
Tender-Mindedness (0.57)	− 0.126	**0.621**		0.194		0.126
Trust (0.81)		**0.574**			− 0.276	0.323
NEO Conscientiousness (0.81)						
Achievement Striving (0.76)		− 0.235	**0.780**			0.289
Self-Discipline (0.73)			**0.704**	− 0.158	− 0.214	
Order (0.68)		− 0.158	**0.581**			− 0.266
Competence (0.68)	0.232		**0.579**	0.125	− 0.171	0.143
Dutifulness (0.63)		0.340	**0.578**			
Deliberation (0.74)		0.225	**0.542**			− 0.333

Continues

Table 7. Continued

Scale and reliability	Trait EI	A	C[a]	O	N	E
NEO Openness (0.81)						
Ideas (0.83)		− 0.100	0.203	**0.749**		− 0.145
Aesthetics (0.77)				**0.743**		
Fantasy (0.70)			− 0.144	**0.675**	0.125	
Values (0.70)				**0.576**	− 0.180	
Feelings (0.72)		0.317		**0.575**	0.270	0.260
Actions (0.57)	− 0.254			**0.545**	− **0.427**	0.118
NEO Neuroticism (0.83)						
Anxiety (0.79)	− 0.323				**0.667**	− 0.121
Vulnerability (0.77)	− **0.455**		− 0.110	− 0.111	**0.551**	
Depression (0.80)	− **0.408**		− 0.138	0.107	**0.548**	− 0.168
Angry Hostility (0.72)	0.120	− **0.588**			**0.570**	
Self-Consciousness (0.62)	− 0.302	0.217	− 0.127		**0.506**	
Impulsiveness (0.55)	0.128		− **0.379**	0.117	**0.357**	0.298
NEO Extraversion (0.80)						
Activity (0.65)		− 0.227	0.298			**0.623**
Positive Emotions (0.76)		0.241		0.110	− 0.278	**0.623**
Gregariousness (0.77)		0.246	− 0.104			**0.567**
Excitement-Seeking (0.56)		− 0.129	− 0.151	0.279		**0.553**
Assertiveness (0.80)	0.329	− 0.213	0.118		− 0.145	**0.412**
Warmth (0.79)		**0.636**		0.176	0.163	0.146

Note: Loadings greater than |0.35| are in boldface. Loadings less than |0.10| are suppressed. A = Agreeableness; C = Conscientiousness; O = Openness; N = Neuroticism; E = Extraversion. [a]This factor was reflected.

Table 8. Factor intercorrelations for study 2

Factor	1	2	3	4	5	6
1. Trait EI	–					
2. Agreeableness	− 0.010	–				
3. Conscientiousness	0.352	0.059	–			
4. Openness	0.131	0.060	0.036	–		
5. Neuroticism	− 0.292	− 0.130	− 0.212	0.045	–	
6. Extraversion	0.299	0.071	0.044	0.186	− 0.119	–

Discussion

As expected, the location of a trait EI factor in FFM space was more complicated than the location within the Eysenckian P–E–N system. Nevertheless, the results supported the conceptualization of trait EI as a distinguishable, lower-order construct within the FFM. The additional scale ('emotion mastery'), incorporated in the EQ-i to expand the inventory's coverage of the trait EI domain, showed a satisfactory internal reliability and loaded on the trait EI factor. Before further discussing the results of the factor location analysis, it is perhaps necessary to touch on some issues pertaining to the internal structure of the EQ-i, especially in view of the results of the CFA in this study.

It should be noted that it is uncommon for lengthy personality inventories to meet the stringent criteria of CFA, for reasons explained by McCrae, Zonderman, Bond, Costa and Paunonen (1996) and Church and Burke (1994). Furthermore, correlation matrices based on qualitatively different subject pools may differ considerably, thereby affecting the

internal structure of a measurement instrument. For example, the intercorrelations of the EQ-i scales were higher on the assessment-centre sample in Study 1 than on the student sample in this study (see Table 4). While such differences will almost certainly affect the results of a CFA, their impact is likely to be much less important in an EFA context. Thus, the present EFA confirmed the presence of a strong factor in the EQ-i, but also revealed a weaker correlated second factor loaded by 'empathy', 'social responsibity', and 'impulse control'. This is likely an artefact of the semantic similarities between the items in the foregoing scales, especially in the former two. In the present context, the important fact is that the trait EI factor was isolated in FFM space both in the six- as well as in the seven-factor solution.

These findings suggest that trait EI can be conceptualized as a distinguishable, lower-order composite construct within the FFM. As expected, due to the greater number of dimensions in the FFM, the empirical status of trait EI was more complex than in the Eysenckian model. Thus, half of the EQ-i scales in this analysis shifted under the five personality factors. This accords well with the conceptualization of trait EI because, as noted, the construct encompasses many variables that are more or less represented in extant trait taxonomies (see Table 1). In joint factor analyses investigating trait EI inventories with respect to broad and robustly measured personality taxonomies, it is likely that some scales of the former will share more variance with certain personality factors than with the trait EI factor.

Having noted this, we might ask why we did not observe the same pattern of results with the EPP, where the EQ-i scales loaded the trait EI factor *en bloc*. The principal reason is that the NEO PI-R comprises nine scales and two dimensions more than the EPP. Indeed, a cursory look at Table 7 shows that the displaced EQ-i scales have mainly shifted under dimensions that are not entirely represented in the Eysenckian model, *viz.*, Agreeableness and, to a lesser extent, Conscientiousness. A second reason is that the EPP factors, especially Psychoticism, are less robust than the factors in the NEO PI-R. Given that there is little disagreement about the association between Agreeableness and Psychoticism (Costa and McCrae, 1995; Eysenck, 1992), the weak relationship between trait EI and the Eysenckian dimension would have to be attributed to the imperfect measurement of the latter in the EPP.

Finally, a fine distinction should be drawn between trait EI as a *statistical factor* and trait EI as a *construct*. For example, the former is virtually uncorrelated with Agreeableness whilst the latter relates to it by way of encompassing variables that clearly fall in this dimension's domain (e.g. 'empathy'). The factor and the construct are likely to diverge in joint factor analyses, with the degree and pattern of divergence contingent on the model that has been employed as a reference framework.

The results of this study support the view that, despite their usefulness, nested models of personality in which each construct at each level of the hierarchy is connected to only one factor above it are simplistic (Paunonen, 1998; Saucier, 1992). In accordance with study 1, the present findings showed that trait EI is a distinguishable, lower-order, composite, personality construct. While it is a positive fact that the empirical status of trait EI does not change dramatically across the two taxonomies, it must be stressed that the trait EI factor in this study was isolated with considerable difficulty and only within a specific range of Delta parameters. This degree of discriminant validity is somewhat limited, but still sufficient for the construct to predict a series of external criteria incrementally over the Big Five (Petrides *et al.*, submitted for publication). Nevertheless, it is important that new trait EI measures be developed such that they cover the construct's domain

comprehensively while maximising its discriminant validity *vis-à-vis* the major dimensions of personality.

GENERAL DISCUSSION

An important issue is whether further exploration of the construct, including the development of new measures, is warranted. Is it worthwhile to press ahead with the investigation of trait EI? In view of the existing empirical evidence, it would be difficult to argue that the construct is not useful inasmuch as it has already been shown to differentiate between groups of people such as students with and without learning difficulties (Reiff *et al.*, 2001), care workers and police officers (Bar-On *et al.*, 2000), and prison inmates and controls (Bar-On, 1997). Various trait EI measures have also been found to relate meaningfully to constructs such as mood recovery (Salovey *et al.*, 1995), life satisfaction (Martinez-Pons, 1997), and depression and affect intensity (Dawda and Hart, 2000).

Although EI continues to receive a lot of attention in the literature and promising findings such as those mentioned above are slowly accumulating, few studies have examined the construct with explicit reference to the main personality and ability dimensions. An especially relevant investigation in the context of this paper is that by Davies *et al.* (1998), who attempted to locate measures of both trait and ability EI in personality and ability factor space. Davies *et al.* concluded that the former are indistinguishable from established trait dimensions, whereas the latter tend to have low reliabilities and considerable problems with defining objectively correct responses (see also Roberts *et al.*, in press).

Because the conclusion of Davies *et al.* (1998) about self-report measures of EI appears to be inconsistent with the results of the present two studies, it is important that we discuss it in some detail. In revealing partly independent trait EI factors in Eysenckian space (factors 4 and 5), the findings of the first study of Davies *et al.* are very much in line with those presented herein. Their third study is largely irrelevant to the present investigation, as it was designed to assess measures of ability EI. Thus, the only study in the paper of Davies *et al.* showing any discrepancy with the present findings is study 2, in which trait EI measures were subsumed under Big Five dimensions (Neuroticism, Extraversion, and Agreeableness) and verbal ability.[6] In that study, however, the six trait EI measures used were vastly outnumbered by the ten cognitive ability and the 26 personality and mood scales that were entered with them in the factor analysis. They were therefore subsumed mainly under Neuroticism, Extraversion, and Agreeableness while their communalities remained rather moderate. In short, a conservative interpretation of the investigation by Davies *et al.* suggests that their results are inconclusive as to whether trait EI can be distinguished from personality dimensions, but definitive in showing that it is associated with them.

It should be noted that a fundamental premise of the investigation by Davies *et al.* (1998) was that if EI, regardless of whether it is measured by self-report or

[6]As Davies *et al.* (1998) note, the nature of the link between the self-report EI measures and the ability factor in their second study could well be semantic rather than substantive. In general, trait EI measures tend to be independent of cognitive ability (Bar-On, 1997; Fox and Spector, 2000; Newsome *et al.*, 2000). However, it is important to establish the extent to which the (somewhat erratic) association between ability EI and psychometric intelligence can be attributed to semantic causes.

maximum-performance measures, were to qualify as an ability, then it would have to be shown to be relatively independent of personality and clearly related to psychometric intelligence. The fact that largely the opposite turned out to be the case for self-report measures fully supports the need to distinguish between trait and ability EI. Furthermore, it maintains the position that the former should be investigated primarily with reference to personality dimensions and the latter primarily with reference to cognitive ability dimensions.

Future research and conclusions

An important task for future investigations is to develop trait EI measures that cover the construct's sampling domain more extensively than the EQ-i. From a certain viewpoint, it would also be important to investigate the extent to which the discriminant validity of the construct translates into incremental predictive power over the basic traits. Implicit in the demonstration of discriminant validity is the presence of incremental variance, however, the circumstances and extent to which this variance might be useful, remain to be determined. It is intended that the theoretical domain of trait EI, as was set out in the introduction, can be used to guide future investigations of incremental validity.

Given that we are dealing with a lower-order construct, whose domain is likely to slightly vary in these early stages of operationalization, it is recommended that research be conducted on the higher-order level of trait EI, i.e., with a full-scale trait EI score. This is because higher-order factors are both more invariant and more likely to be replicated than primary factors. Consequently, the impact of small changes in the sampling domain of trait EI (or that of any other construct) will be far less disruptive to the higher-order factor than to the primary scales or sub-factors it comprises. Moreover, the full-scale score will be more easily amenable to complex analyses and experimental investigations.

In conclusion, the evidence from the two studies in the present paper converged to show that trait EI is a composite construct that belongs to the lower-order stratum of established personality taxonomies. It is important that this finding be replicated with more comprehensive measures of trait EI. More importantly, future investigations must attempt to build a nomological network for the construct, along the lines proposed by Cronbach and Meehl (1955). In any case, future research will have to heed the distinction between trait and ability EI. Failure to do so can only lead to uninterrupted disturbance in the area of 'emotional intelligence'.

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REFERENCES

Bar-On R. 1997. *BarOn Emotional Quotient Inventory: Technical Manual.* Multi-Health: Toronto.

Bar-On R, Brown JM, Kirkcaldy BD, Thome EP. 2000. Emotional expression and implications for occupational stress: an application of the Emotional Quotient Inventory (EQ-i). *Personality and Individual Differences* **28**: 1107–1118.

Baron H. 1996. An evaluation of some psychometric parameters: a response to Barrett, Kline, Paltiel & Eysenck. *Journal of Occupational and Organizational Psychology* **69**: 21–23.

Barrett PT. 1996. *The PsWin programs.* Available free at http://www.liv.ac.uk/∼pbarrett/programs.htm

Barrett PT, Kline P, Paltiel L, Eysenck HJ. 1996. An evaluation of the psychometric properties of the concept 5.2 Occupational Personality Questionnaire. *Journal of Occupational and Organizational Psychology* **69**: 1–19.

Barrett PT, Petrides KV, Eysenck SBG, Eysenck HJ. 1998. The Eysenck Personality Questionnaire: an examination of the factorial similarity of P, E, N and L across 34 countries. *Personality and Individual Differences* **25**: 805–819.

Bentler PM. 1990. Comparative fix indexes in structural models. *Psychological Bulletin* **107**: 238–246.

Beyer S. 1998. Gender differences in self-perception and negative recall biases. *Sex Roles* **38**: 103–133.

Beyer S, Bowden EM. 1997. Gender differences in self-perceptions: convergent evidence from three measures of accuracy and bias. *Personality and Social Psychology Bulletin* **23**: 157–172.

Byrne BM. 1998. *Structural Equation Modeling with LISREL, PRELIS and SIMPLIS: Basic concepts, applications and programming.* Erlbaum: Mahwah, NJ.

Cattell RB. 1952. *Factor analysis.* Harper: New York.

Church AT, Burke PJ. 1994. Exploratory and confirmatory tests of the Big Five and Tellegen's three- and four-dimensional models. *Journal of Personality and Social Psychology* **66**: 93–114.

Ciarrochi JV, Chan AYC, Caputi P. 2000. A critical evaluation of the emotional intelligence construct. *Personality and Individual Differences* **28**: 539–561.

Cooper C. 1998. *Individual Differences.* Arnold: London.

Cooper RK, Sawaf A. 1997. *Executive EQ: Emotional intelligence in leadership and organizations.* Grosset Putnum: New York.

Costa PT Jr, McCrae RR. 1992a. Four ways five factors are basic. *Personality and Individual Differences* **13**: 653–665.

Costa PT Jr, McCrae RR. 1992b. *The Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor inventory (NEO-FFI) Professional Manual.* Psychological Assessment Resources: Odessa, FL.

Costa PT Jr, McCrae RR. 1995. Primary traits of the Eysenck P–E–N system: three and five-factor solutions. *Journal of Personality and Social Psychology* **69**: 308–317.

Costa PT Jr, McCrae RR. 1998. Six approaches to the explication of facet-level traits: examples from conscientiousness. *European Journal of Personality* **12**: 117–134.

Costa PT Jr, McCrae RR, Dye DA. 1991. Facet scales for agreeableness and conscientiousness—A revision of the NEO Personality Inventory. *Personality and Individual Differences* **12**: 887–898.

Cronbach LJ. 1949. *Essentials of Psychological Testing.* Harper and Row: New York.

Cronbach LJ, Meelh PE. 1955. Construct validity in psychological tests. *Psychological Bulletin* **52**: 281–302.

Davies M, Stankov L, Roberts RD. 1998. Emotional intelligence: in search of an elusive construct. *Journal of Personality and Social Psychology* **75**: 989–1015.

Dawda D, Hart SD. 2000. Assessing emotional intelligence: reliability and validity of the Bar-On Emotional Quotient-Inventory (EQ-i) in university students. *Personality and Individual Differences* **28**: 797–812.

Digman JM. 1990. Personality structure: emergence of the five-factor model. *Annual Review of Psychology* **41**: 417–440.

Eysenck HJ. 1992. Four ways five factors are not basic. *Personality and Individual Differences* **13**: 667–673.

Eysenck HJ. 1994. Personality and intelligence: psychometric and experimental approaches. In *Personality and Intelligence*, Sternberg RJ, Ruzgis P (eds). Cambridge University Press: New York; 3–31.

Eysenck HJ. 1997. Personality and experimental psychology: the unification of psychology and the possibility of a paradigm. *Journal of Personality and Social Psychology* **73**: 1224–1237.

Eysenck HJ, Barrett PT, Wilson GD, Jackson CJ. 1992. Primary trait measurement of the 21 components of the P–E–N system. *European Journal of Psychological Assessment* **8**: 109–117.

Eysenck HJ, Eysenck MW. 1985. *Personality and Individual Differences: A Natural Science Approach.* Plenum: New York.

Eysenck HJ, Eysenck SBG. 1976. *Psychoticism as a dimension of personality.* Hodder and Stoughton: London.

Fox S, Spector PE. 2000. Relations of emotional intelligence, practical intelligence, general intelligence, and trait affectivity with interview outcomes: it's not all just 'G'. *Journal of Organizational Behavior* **21**: 203–220.

Furnham A. in press. Self-estimates of intelligence: culture and gender differences in self and other estimates of both general (g) and multiple intelligences. *Personality and Individual Differences*.

Furnham A, Forde L, Cotter T. 1998a. Personality and intelligence. *Personality and Individual Differences* **24**: 187–192.

Furnham A, Forde L, Cotter T. 1998b. Personality scores and test taking style. *Personality and Individual Differences* **24**: 19–23.

Gardner H. 1983. *Frames of Mind: The Theory of Multiple Intelligences.* Basic: New York.

Gohm CL, Clore GL. 2000. Individual differences in emotional experience: mapping available scales to processes. *Personality and Social Psychology Bulletin* **26**: 679–697.

Goldberg LR, Saucier G. 1995. So what do you propose we use instead? A reply to Block. *Psychological Bulletin* **117**: 221–225.

Goleman D. 1995. *Emotional Intelligence: Why it can Matter More than IQ.* Bloomsbury: London.

Greenspan SI. 1989. Emotional intelligence. In *Learning and Education: Psychoanalytic Perspectives*, Field K, Cohler BJ, Wool G (eds). Madison, CT; International Universities Press: 209–243.

Hein S. 1997. *EQ for Everybody: A Practical Guide to Emotional Intelligence.* Grainsville: Alligater.

Hofstee WKB. in press. Intelligence and personality: do they mix? In *Intelligence and Personality: Bridging the Gap in Theory and Measurement*, Collis J, Messick S (eds). Mahwah, NJ: Erlbaum.

Hu LT, Bentler PM. 1999. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling* **6**: 1–55.

Jackson CJ, Furnham A, Forde L, Cotter T. 2000. The structure of the Eysenck Personality Profiler. *British Journal of Psychology* **91**: 223–239.

John OP, Robins RW. 1994. Traits and types, dynamics and development: no doors should be closed in the study of personality. *Psychological Inquiry* **5**: 137–142.

John OP, Srivastava S. 1999. The big five trait taxonomy: history, measurement and theoretical perspectives. In *Handbook of Personality: Theory and Research*, 2nd edn, Pervin LA, John OP (eds). Guildford: New York; 102–138.

Jöreskog KG, Sörbom, D. 1981. *LISREL VI User's Guide* 3rd edn. Scientific Software: Mooresville, IN.

Jöreskog KG, Sörbom D. 1993. *LISREL 8 User's Reference Guide.* Scientific Software International: Chicago.

Katz IM, Campbell JD. 1994. Ambivalence over emotional expression and well-being: nomothetic and idiographic tests of the stress-buffering hypothesis. *Journal of Personality and Social Psychology* **67**: 513–524.

King LA, Emmons RA. 1990. Conflict over emotional expression: psychological and physical correlates. *Journal of Personality and Social Psychology* **58**: 864–877.

King LA, Emmons RA. 1991. Psychological, physical, and interpersonal correlates of emotional expressiveness, conflict, and control. *European Journal of Personality* **5**: 131–150.

Kline P. 1993. *The Handbook of Psychological Testing.* Routledge: London.

Kline RB. 1998. *Principles and Practice of Structural Equation Modeling.* Guilford: New York.

Leuner B. 1966. Emotionale intelligenz und emanzipation [Emotional intelligence and emancipation]. *Praxis der Kinderpsychologie und Kinderpsychiatry* **15**: 196–203.

MacCallum R. 1986. Specification searches in covariance structure modeling. *Psychological Bulletin* **100**: 107–120.

MacCallum R, Roznowski M, Necowitz LB. 1992. Model modifications in covariance structure analysis: the problem of capitalization on chance. *Psychological Bulletin* **111**: 490–504.

Martinez-Pons M. 1997. The relation of emotional intelligence with selected areas of personal functioning. *Imagination, Cognition and Personality* **17**: 3–13.

Mayer JD, Caruso DR, Salovey P. 1999. Emotional intelligence meets traditional standards for an intelligence. *Intelligence* **27**: 267–298.

Mayer JD, DiPaolo M, Salovey P. 1990. Perceiving affective content in ambiguous visual stimuli: a component of emotional intelligence. *Journal of Personality Assessment* **54**: 772–781.
Mayer JD, Salovey P. 1997. What is emotional intelligence? In *Emotional Development and Emotional Intelligence: Educational Implications*, 2nd edn, Salovey P, Sluyter D (eds). Basic: New York; 3–31.
McCrae RR. 1994. Openness to experience as a basic dimension of personality. *Imagination, Cognition and Personality* **13**: 39–55.
McCrae RR, Zonderman AB, Bond MH, Costa PT Jr, Paunonen SV. 1996. Evaluating replicability of factors in the revised NEO personality inventory: confirmatory factor analysis versus procrustes rotation. *Journal of Personality and Social Psychology* **70**: 552–566.
Mehrabian A. 2000. Beyond IQ: broad-based measurement of individual success potential or 'emotional intelligence'. *Genetic Social and General Psychology Monographs* **126**: 133–239.
Muris P, Schmidt H, Merckelbach H, Rassin E. 2000. Reliability, factor structure and validity of the Dutch Eysenck Personality Profiler. *Personality and Individual Differences* **29**: 857–868.
Newsome S, Day AL, Catano VM. 2000. Assessing the predictive validity of emotional intelligence. *Personality and Individual Differences* **29**: 1005–1016.
Parker JDA, Taylor GJ, Bagby RM. 2001. The relationship between emotional intelligence and alexithymia. *Personality and Individual Differences* **30**: 107–115.
Paunonen SV. 1998. Hierarchical organization of personality and prediction of behavior. *Journal of Personality and Social Psychology* **74**: 538–556.
Payne WL. 1986. *A Study of Emotion: Developing Emotional Intelligence; Self-Integration; Relating to Fear, Pain and Desire.*
Petrides KV, Furnham A. 2000a. Gender differences in measured and self-estimated trait emotional intelligence. *Sex Roles* **42**: 449–461.
Petrides KV, Furnham A. 2000b. On the dimensional structure of emotional intelligence. *Personality and Individual Differences* **29**: 313–320.
Petrides KV, Furnham A, Frederickson N. Emotional intelligence: the case for self-report measures. (submitted).
Reiff HB, Hatzes NM, Bramel MH, Gibbon T. 2001. The relation of LD and gender with emotional intelligence in college students. *Journal of Learning Disabilities* **34**: 66–78.
Richendoller NR, Weaver JB. 1994. Exploring the links between personality and empathic response style. *Personality and Individual Differences* **17**: 303–311.
Roberts RD, Zeidner M, Matthews G. in press. Does emotional intelligence meet traditional standards for an intelligence? Some new data and conclusions. *Emotion.*
Salovey P, Mayer JD. 1990. Emotional intelligence. *Imagination, Cognition and Personality* **9**: 185–211.
Salovey P, Mayer JD, Goldman S, Turvey C, Palfai T. 1995. Emotional attention, clarity, and repair: exploring emotional intelligence using the Trait Meta-Mood scale. In *Emotion, Disclosure, and Health*, Pennebaker JW (ed.). American Psychological Association: Washington, DC; 125–154.
Saucier G. 1992. Benchmarks: integrating affective and interpersonal circles with the Big-Five personality factors. *Journal of Personality and Social Psychology* **62**: 1025–1035.
Schutte NS, Malouff JM, Hall LE, Haggerty DJ, Cooper JT, Golden CJ, Dornheim L. 1998. Development and validation of a measure of emotional intelligence. *Personality and Individual Differences* **25**: 167–177.
Steiger JH, Lind JC. 1980. Statistically based tests for the number of common factors. Iowa City, IA.
Steiner C. 1997. *Achieving Emotional Literacy.* Bloomsbury: London.
Tapia M. 2001. Measuring emotional intelligence. *Psychological Reports* **88**: 353–364.
Taylor SE, Armor DA. 1996. Positive illusions and coping with adversity. *Journal of Personality* **64**: 873–898.
Taylor SE, Brown JD. 1988. Illusion and well-being: a social psychological perspective on mental health. *Psychological Bulletin* **103**: 193–210.
Tellegen A. 1985. Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report. In *Anxiety and the Anxiety Disorders*, Tuma AH, Maser JD (eds). Erlbaum: Hillsdale, NJ; 681–706.
Thorndike EL. 1920. Intelligence and its uses. *Harper's Magazine* **140**: 227–235.
Watson D. 2000. *Mood and Temperament.* Guilford: New York.

Watson D, Clark LA. 1997. Extraversion and its positive emotional core. In *Handbook of Personality Psychology*, Hogan R, Johnson J, Briggs S (eds). Academic: San Diego, CA; 767–793.

Wessinger H. 1998. *Emotional Intelligence at Work.* Jossey-Bass: San Francisco.

West SG, Finch JF, Curran PJ. 1995. Structural equation models with nonnormal variables: problems and remedies. In *Structural Equation Modeling: Concepts, Issues and Applications*, Hoyle RD (ed.). Sage: Thousand Oaks, CA; 56–75.

Zeidner M. 1995. Personality trait correlates of intelligence. In *International Handbook of Personality and Intelligence*, Saklfoske DH, Zeidner M (eds). Plenum: New York; 299–319.

