Multistudy Report

Incremental Validity of the Trait Emotional Intelligence Questionnaire-Adolescent Short Form (TEIQue-ASF)

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Abstract. This study examined the incremental validity of the adolescent short form of the Trait Emotional Questionnaire (TEIQue-ASF) in two European secondary-school samples. The TEIQue-ASF was administered as a predictor of socioemotional or academic achievement criteria, along with measures of coping strategies or cognitive ability, respectively. In Dutch high school students (N = 282), the TEIQue-ASF explained variance in all socioemotional criteria, controlling for coping strategies and demographics. In a sample of British preadolescents, the measure showed incremental contributions to academic achievement in the core areas (English, math, and science) of the English curriculum, controlling for cognitive ability subscales and gender (N = 357–491). Implications for the validity and applied utility of the TEIQue-ASF are discussed.

Keywords: Trait Emotional Intelligence Questionnaire, short form, incremental validity, adolescents, trait emotional self-efficacy

Research interest in the field of emotional intelligence (EI) has exploded in recent years with scores of empirical studies and a growing number of meta-analyses on various topics (e.g., Joseph, Jin, Newman, & O'Boyle, 2014; Malouff, Schutte, & Thorsteinsson, 2014; Martins, Ramalho, & Morin, 2010; Perera & DiGiacomo, 2013). Trait emotional intelligence (trait EI) refers to a constellation of emotional self-perceptions located at the lower levels of personality hierarchies (Petrides, Pita, & Kokkinaki, 2007) and is assessed using typical-performance measures. The construct is distinct from ability EI, which seeks to integrate emotion-related abilities and should be assessed using maximum-performance measures (Petrides & Furnham, 2001). The weak associations between typical- and maximum-performance EI measures illustrate this distinction (e.g., Derksen, Kramer, & Katzko, 2002; Ferrando et al., 2010; Petrides, Frederickson, & Furnham, 2004; Warwick & Nettelbeck, 2004). Furthermore, trait EI provides an interpretive framework for the majority of EI measures, which assess typical performance, even though many of them were originally conceptualized as measuring emotion-related abilities. The term "EI" has been retained, however, in order to relate the construct to the broader EI literature, from which it derives.

Several trait EI measures have been developed (Siegling, Saklofske, & Petrides, 2014) and an impressive line of research has demonstrated their predictive and incremental validity. For example, a recent review of the literature found that the Trait Emotional Intelligence Questionnaire (Petrides, 2009) explained additional criterion variance over broad personality factors (i.e., Big Five or Giant Three) and other emotion-related constructs (e.g., alexithymia, social desirability, and exposure to stress) in 78% of the analyses (N > 100; Andrei, Siegling, Aloe, Baldaro, & Petrides, 2015). In contrast, relatively few trait EI measures have been developed specifically for children or adolescents. The Emotional Quotient Inventory: Youth Version (Bar-On & Parker, 2000) and the Trait Emotional Intelligence Questionnaire Adolescent and Child forms (Petrides, Sangareau, Furnham, & Frederickson, 2006) are the only two established measures, although another measure was developed recently (Billings, Downey, Lomas,

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Lloyd, & Stough, 2014). Generally, these measures have been subject to considerably less validation research than their respective adult counterparts. Following a brief review of published studies, the present paper further examines the incremental validity of the Trait Emotional Intelligence Questionnaire-Adolescent Short Form (TEIQue-ASF) over other relevant predictors of socioemotional and educational criteria.

Criterion and Incremental Validity of the TEIQue-ASF

To date, the adolescent form of the TEIQue has been subject to relatively little psychometric research compared to its adult counterpart. Nonetheless, since it consists of similar items to the adult version, rephrased into age-appropriate language, construct validity can, to some extent, be extrapolated from evidence gathered with the adult version. Notably, the adult TEIQue was found to converge strongly with two similar self-report measures (r = .73 and .77; Gardner & Qualter, 2010). Most studies involving the adolescent form have used the 30-item TEIQue-ASF, which has shown good internal reliability in adolescents (α = .83; Mikolajczak, Petrides, & Hurry, 2009) and preadolescents (α = .84; Petrides et al., 2006).

The type of criteria a construct should explain are those that, in theory, are directly influenced by it. For example, proximate outcomes of trait EI are likely to have a pronounced emotional emphasis and revolve around how people manage everyday challenges or function in social situations (e.g., situational frustration, response to stress, or positive and negative affect). Moreover, the value of a construct (or a measure) is considerably enhanced if it can predict broader, long-lasting life outcomes and not just behaviors or mental states of a temporary, psychological nature. Examples of such outcomes are academic and career success, career selection, relationship and family stability, mental health, and even reproductive success. These broader outcomes are influenced, to various extents, by a multitude of psychological constructs, without necessarily being directly related to any of them.

However, predictive and criterion validity are not sufficient for measures of a relatively new construct, such as trait EI. Beyond the ability to explain or predict variance, it is essential for a construct and its measures to explain unique or incremental criterion variance not accounted for by conceptually related and established constructs. Cognate constructs of trait EI include higher-order personality factors and other narrower trait-like factors akin to trait EI (Petrides, Pérez-González, & Furnham, 2007).

A prime example of a narrower set of related constructs are coping strategies. In general, coping refers to how people respond to stressful or negative situations and has implications for a range of psychological outcomes, predominantly mental health (Endler & Parker, 1994; Greenaway et al., 2015). Coping strategies are trait-like attributes that partly overlap with trait EI, both conceptually and empirically. For example, trait EI correlates positively with adaptive and negatively with maladaptive coping strategies (Mavroveli, Petrides, Rieffe, & Bakker, 2007). Evidence also exists that trait EI maximizes the beneficial effects of the former while minimizing the adverse effects of the latter (Davis & Humphrey, 2012a). Moreover, some have conceptualized coping strategies as proximate outcomes of trait EI and found to statistically mediate its effects on maladaptive behavior (Davis & Humphrey, 2012a; Mikolajczak et al., 2009). Regardless of whether trait EI is an antecedent or an overlapping construct situated at the same ontological level, it should demonstrate incremental validity over conceptually and empirically related constructs, such as coping strategies.

There exist general consensus and good evidence that trait EI is at most weakly related to cognitive ability (Derksen et al., 2002; Saklofske, Austin, & Minski, 2003; Van der Zee, Thijs, & Schakel, 2002). In fact, some research suggests that cognitive ability and trait EI interact in predicting academic performance, with trait EI showing stronger effects for students at the lower end of cognitive ability (Petrides et al., 2004). Still, to be considered useful, trait EI should explain incremental variance in directly relevant, emotion-laden criteria above cognitive ability. At the same time, any incremental contributions to outcomes primarily linked to cognitive ability would speak to the validity and value of trait EI and its measures. An example of such a criterion is academic achievement, which is a relatively broad and important outcome. The relationship between trait EI and academic achievement has been discussed elsewhere (Ferrando et al., 2010; Petrides et al., 2004).

Evidence for the incremental validity of the English TEIQue-ASF has been reported in three studies on British preadolescents and adolescents. In these samples, the measure accounted for variance in the following criteria: self-reported disruptive behavior and depression when controlling for demographics, the Big Five personality traits, and general cognitive ability (Davis & Humphrey, 2012b); four of five aspects of psychopathology after controlling for gender, an adult trait EI measure (Schutte et al.'s, 1998, Assessing Emotions Scale), and measures of emotional ability (emotion perception, emotion management, using emotions, and facial expression recognition; Williams, Daley, Burnside, & Hammond-Rowley, 2010); and four socioemotional variables (peer-rated social behavior and inclusion, and self-reported adjustment/psychopathology) over the baseline levels of these criteria and general cognitive ability (Frederickson, Petrides, & Simmonds, 2012).

Translations of the TEIQue-ASF were assessed for incremental validity in two studies of preadolescents. In these studies, TEIQue-ASF scores explained unique variance in somatic complaints, controlling for depression in a Dutch sample (Mavroveli et al., 2007), and in teacher-rated academic achievement, controlling for cognitive ability, personality, and self-concept in a Spanish sample (Ferrando et al., 2010). Overall, few studies have used the TEIQue-ASF to predict (a) socioemotional criteria, especially operationalized in ways other than self-report while

controlling for relevant predictors, and (b) objectively assessed performance criteria.

Present Study

The present study further investigates the incremental validity of the TEIQue-ASF over and above competing constructs. First, it was examined whether the TEIQue-ASF accounts for unique variance in socioemotional criteria (depression, somatic complaints, and peer-rated social competence) when controlling for a broad set of trait-like predictors (i.e., seven coping strategies), by reanalyzing data presented by Mavroveli et al. (2007). Coping strategies have only been used as criteria of TEIQue-ASF scores. Operationalized as relatively stable traits, however, coping strategies qualify as a particularly relevant set of competing predictors beyond which the TEIQue-ASF should demonstrate incremental validity, given their theoretical and empirical relationships with trait EI, and implications for psychological outcomes. Thus, trait EI as well as a subset of coping strategies may be expected to explain variance in the three criteria investigated in this study.

Second, using unpublished data on criteria assessed in Frederickson et al.'s (2012) sample, it was examined whether the TEIQue-ASF can explain unique variance in objective academic achievement criteria (end-of-year grade levels in three subjects) when controlling for cognitive ability. One advantage of using objective criteria in this study was the avoidance of the limitation of common-method variance. In both samples, demographic data (gender and either age or school grade) were also held constant. In Sample 2, the analyses were conducted separately for Grades 7 and 8, since the criterion variables (grade levels) were grade-dependent but same for all students, as described in the Measures Section.

Method

Participants and Procedure

Sample 1 consisted of preadolescents and adolescents (N = 282; 48.2% female), recruited from four Dutch state high schools. It had a mean age of 13.7 years (SD = 0.7, range = 12.0–15.7) and was described as ethnically and socially diverse (Mavroveli et al., 2007). Data from students with special needs, identified by their teachers, were excluded from the dataset by the researchers who conducted the original study. Since the exact same sample was used in the present study, there were no missing data. Measures were administered during class time.

Sample 2 comprised British preadolescents (46.8% female, age range = 11–13 years) from four secondary schools situated in South East England. The students were in Grades 7 or 8 and predominantly from White English (78.2%) or other White Western European (10.99%) backgrounds. A total of 1,140 students participated in the original study, but the number of students in the analyses reported ranged from 476 to 491 for seventh graders and from 357 to 469 for eighth graders. By using pairwise deletion for dealing with missing data on some variables, the effective sample size varied from analysis to analysis. Further details about the two samples can be found in previous publications (Frederickson et al., 2012; Mavroveli et al., 2007).

Measures

The TEIQue-ASF comprises 30 items, taken in pairs from each of the 15 facets of the full form. The items are responded to on a 7-point Likert scale (1 = *completely disagree*, 7 = *completely agree*). A Dutch translation (Mavroveli et al., 2007) was administered to Sample 1, whereas the original English form was administered to Sample 2. The internal consistency (McDonald's omega) of the TEIQue-ASF scores was .85 in both samples.

Sample 1

Utrecht Coping List for Adolescents (Bijstra, Jackson, & Bosma, 1994)

This measure consists of 47 items based on a 4-point Likert scale and assessing seven distinct coping strategies. The subscale names, numbers of items, and internal consistencies on this sample were as follows: confrontation (7 items, ω = .82), palliative coping (8 items, ω = .80), avoidant coping (8 items, ω = .77), seeking social support (6 items, ω = .88), depressive coping (7 items, ω = .71), showing emotions (3 items, ω = .78), and optimistic coping (5 items, ω = .81). Three "spare items" are not used in any of the subscales.

Children's Depression Inventory (Kovacs, 1985; Timbremont & Braet, 2001)

This Dutch scale consists of 28 items measuring cognitive and somatic symptoms of depression in children. Children answer the items on a 3-point Likert scale of increasing symptom severity. McDonald's omega on this sample was .87.

Somatic Complaints List (Rieffe, Meerum Terwogt, & Bosch, 2004)

This is a 10-item Dutch measure of the pain frequency experienced by adolescents and children. Responses are indicated on a 3-point Likert scale. McDonald's omega on this sample was .85.

Guess Who Peer Assessment (Coie & Dodge, 1988; Parkhurst & Asher, 1992)

Students were asked to identify classmates whose behavior reflects each of the following descriptors: cooperation,

disruption, aggression, and leadership. Proportions of a student's nominations by his or her classmates were computed for each description. An overall social-competence score was then calculated by subtracting the sum of pro-social nomination proportions (cooperation and leadership) from the sum of antisocial nomination proportions (aggression and disruption). Evidence for the descriptors' criterion and discriminant validity with social preference and impact was presented in Coie, Dodge, and Coppotelli (1983). Results presented by Frederickson and Furnham (1998) support the temporal stability of the descriptors in 9- to 12-year-olds over a 5-week period.

Sample 2

Cognitive Abilities Test (CAT; Lohman et al., 2001)

This test was administered to all participants at age 11 upon entering secondary education. Our focus was on the verbal, quantitative, and nonverbal subscales. The rationale for using subscales is that any one of them may not explain variance in a given criterion, thus weakening the composite's overall explanatory power while inflating that of TEIQue-ASF scores. Only total scale scores of the CAT were available and, thus, internal consistency could not be calculated. However, CAT scores are highly reliable in national samples (Strand, 2004).

National Curriculum Levels

Eight levels covering the ages 5–14 years describe pupils' progress at the end of the academic year, compared to their same-age peers across the country. Level 1 represents the progress of pupils at age five and Level 8 that of the most able pupils at age 14. Each level is divided into three sublevels: C ("has started to work at the level"), B ("working well within the level"), and A ("has reached the top of the level and is working towards the next level"). The levels in the core areas of the curriculum (English, math, and science) were used as criteria of academic achievement. For the analyses in this study, numerical point scores ranging from 1 (representing Level 1C) to 24 (representing Level 8A) were used.

Results

Sample 1

Histograms indicated that all variables except for depression approximated a normal distribution. Table 1 shows the levels of skewness and kurtosis for each variable. These confirmed the non-normality of depression, but also indicated a small degree of skew and a more pronounced degree of kurtosis for social competence. Concerning depression, the positive skew is not surprising, because

Table 1. Sample 1: Descriptive statistics and intercorrelations between study variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Depression	–												
2. Somatic complaints	.42***	–											
3. Social competence	−.21***	−.14*	–										
4. Age	.29***	.15*	−.18**	–									
5. Gender	.01	−.18**	−.25***	.03	–								
6. UCL-A confrontational	−.23***	−.19**	.02	−.22***	.03	–							
7. UCL-A palliative	.15*	−.05	−.04	−.12	−.03	.23***	–						
8. UCL-A avoidant	.18**	.04	−.07	−.02	.07	.02	.41***	–					
9. UCL-A social support	−.22***	−.08	.12*	−.10	−.19**	.25***	.16**	−.07	–				
10. UCL-A depressive	.45***	.45***	−.03	.08	−.08	−.15**	.18**	.19**	−.05	–			
11. UCL-A showing emotions	.20***	.16**	−.31***	.03	.09	−.06	.03	.01	.07	.18**	–		
12. UCL-A optimistic	−.11	−.15*	.17**	−.24***	−.02	.46***	.53***	.22***	.14*	.03	−.17**	–	
13. TEIQue-ASF	−.54***	−.39***	.20***	−.29***	.05	.43***	.002	−.12*	.22***	−.46***	−.20***	.20***	–
M	1.25	1.62	2.30	13.69	0.52	16.14	20.13	16.41	13.67	11.78	6.28	12.00	5.01
SD	0.20	0.33	6.52	0.70	0.50	3.48	3.70	3.58	3.67	2.69	1.78	2.75	0.60
Skewness	2.39	0.61	−1.13	0.18	−0.07	0.41	0.12	0.17	0.32	0.49	0.56	0.12	−0.17
Kurtosis	14.55	0.27	4.63	−0.44	−2.01	0.21	0.16	−0.11	−0.07	0.24	0.06	0.18	−0.49

Notes. $N = 282$. UCL-A = Utrecht Coping List for adolescents (Bijstra et al., 1994); TEIQue-ASF = Trait Emotional Intelligence Questionnaire-Adolescent Short Form (Petrides, 2009). $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 2. Sample 1: Hierarchical regression analyses predicting socioemotional criteria with demographics (Step 1), UCL-A coping strategies (Step 2), and the TEIQue-ASF (Step 3)

	Depression			Somatic complaints			Social competence		
Step 1: Age and gender	$F(2, 279) = 13.23$***, $\Delta R^2 = .087$***, $R^2_{Adj} = .08$			$F(2, 279) = 8.40$**, $\Delta R^2 = .057$***, $R^2_{Adj} = .05$			$F(2, 279) = 13.97$***, $\Delta R^2 = .091$***, $R^2_{Adj} = .08$		
Step 2: UCL-A coping strategies	$F(9, 272) = 16.40$***, $\Delta R^2 = .265$***, $R^2_{Adj} = .33$			$F(9, 272) = 11.50$***, $\Delta R^2 = .219$***, $R^2_{Adj} = .25$			$F(9, 272) = 8.12$***, $\Delta R^2 = .121$***, $R^2_{Adj} = .19$		
Step 3: TEIQue-ASF	$F(10, 271) = 19.24$***, $\Delta R^2 = .063$***, $R^2_{Adj} = .39$			$F(10, 271) = 11.22$***, $\Delta R^2 = .017$*, $R^2_{Adj} = .27$			$F(10, 271) = 8.12$***, $\Delta R^2 = .019$*, $R^2_{Adj} = .20$		
Step 3 predictors	β	Tolerance	VIF	β	Tolerance	VIF	β	Tolerance	VIF
Age	.17***	.87	1.15	.05	.87	1.15	−.12*	.87	1.15
Gender	.001**	.92	1.08	−.16**	.92	1.08	−.20***	.92	1.08
UCL-A confrontational	.02	.65	1.54	.02	.65	1.54	−.16*	.65	1.54
UCL-A palliative	.17**	.59	1.68	−.09	.59	1.68	−.15*	.59	1.68
UCL-A avoidant	.04	.79	1.27	.01	.79	1.27	−.03	.79	1.27
UCL-A social support	−.14**	.84	1.19	−.03	.84	1.19	.09	.84	1.19
UCL-A depressive	.23***	.74	1.36	.36***	.74	1.36	.09	.74	1.36
UCL-A showing emotions	.08	.88	1.14	.06	.88	1.14	−.24***	.88	1.14
UCL-A optimistic	−.08	.56	1.77	−.07	.56	1.77	.20**	.56	1.77
TEIQue-ASF	−.33***	.59	1.70	−.17*	.59	1.70	.18*	.59	1.70

Notes. $N = 282$. UCL-A = Utrecht Coping List for adolescents (Bijstra et al., 1994); TEIQue-ASF = Trait Emotional Intelligence Questionnaire-Adolescent Short Form (Petrides, 2009); VIF = Variance inflation factor. *$p < .05$. **$p < .01$. ***$p < .001$.

most children are presumably not depressed. Nonetheless, both skewness (0.71) and kurtosis (−0.17) were within an acceptable range when examining normality without two extreme outliers ($z > 3$) on the depression scale. Likewise, there were two outliers in social comparison ($z < -3$), whose removal brought skewness and kurtosis down to reasonable levels (−0.50 and 1.80, respectively). It was decided not to remove these cases from the analysis, given the fairly large sample size should compensate for any outlier effects.

Correlations between the variables were generally weak or moderate, with a maximum value of −.54 between the TEIQue-ASF and depression. Thus, the correlations indicated no issues with multicollinearity. Correlations between the TEIQue-ASF and the three criteria were all significant and in the expected direction. The coping strategies showed a mix of significant and nonsignificant associations with the criteria that were also in a logical direction. The TEIQue-ASF showed the expected pattern of positive associations with adaptive coping strategies and negative associations with maladaptive coping strategies. It was unrelated to palliative coping.

Regression analysis summaries for Sample 1 are shown in Table 2. Demographics (age and gender) were entered at Step 1, followed by coping strategies at Step 2, and the total TEIQue-ASF score at Step 3. In the interest of space and given the study aims, only beta weights at Step 3 are displayed. Collinearity statistics shown in Table 2 further alleviate any concerns for multicollinearity. Variance inflation factors were all between 1 and 2 and tolerance values were all greater than .55. Thus, none of these values were within a critical range. The numbers of coping strategies showing a significant beta weight were one for somatic complaints, three for depression, and four for social competence; criterion variance explained ranged from 12.1% (social competence) to 26.5% (depression) at Step 2. The TEIQue-ASF composite explained unique variance in all three socioemotional criteria in an expected direction. The additional criterion variance explained by the TEIQue-ASF ranged from 1.7% (somatic complaints) to 6.3% (depression).

Sample 2

Histograms approximated a normal distribution and statistics of skewness and kurtosis were all within an acceptable range (see Table 3). Correlations were mostly weak-to-moderate (see Table 3). The maximum correlation between the TEIQue-ASF and CAT subscales was .20 (Grade 8) and, therefore, multicollinearity was of little concern. The TEIQue-ASF showed significant, albeit weak, associations with academic achievement criteria as well as with the CAT subscales. In contrast, all three CAT subscales were moderately correlated with the criteria in both samples. Correlations between the TEIQue-ASF and CAT subscales were weak but consistently significant. All of these associations were positive.

Regression analysis summaries for seventh and eighth graders are shown in Tables 4 and 5, respectively. Once again, multicollinearity statistics gave no reason for concern. For the most part, incremental effects of the TEIQue-ASF were consistent across the two grades in

Table 3. Sample 2: Descriptive statistics and intercorrelations between study variables

Variable	*N*	*M*	*SD*	Skewness	Kurtosis	1	2	3	4	5	6	7
					Grade 7							
1. End-of-year English	554	28.70	5.13	−0.38	0.37	–						
2. End-of-year math	566	27.53	4.89	0.12	−0.85	.47***	–					
3. End-of-year science	569	28.63	4.08	−0.78	0.36	.52***	.45***	–				
4. Gender	672	1.49	0.50	0.24	−1.95	.21***	.06	.12**	–			
5. CAT verbal	651	94.99	11.88	−0.23	−0.08	.57***	.50***	.50***	.09*	–		
6. CAT quantitative	630	94.74	12.28	0.11	−0.79	.47***	.54***	.46***	−.04	.63***	–	
7. CAT nonverbal	636	97.95	13.21	0.18	−0.28	.41***	.48***	.47***	−.01	.60***	.70***	–
8. TEIQue-ASF	614	4.50	0.71	−0.03	0.44	.21***	.14**	.17***	.03	.19***	.15***	.12**
					Grade 8							
1. End-of-year English	421	30.64	4.64	−0.38	0.37	–						
2. End-of-year math	439	28.54	7.27	0.12	−0.85	.30***	–					
3. End-of-year science	437	29.13	5.41	−0.78	0.36	.54***	.25***	–				
4. Gender	468	1.44	0.50	0.24	−1.95	.16***	.03	−.02	–			
5. CAT verbal	430	96.61	13.04	−0.23	−0.08	.44***	.29***	.46***	−.04	–		
6. CAT quantitative	432	93.89	12.40	0.11	−0.79	.37***	.31***	.36***	−.11*	.65***	–	
7. CAT nonverbal	435	99.04	13.20	0.18	−0.28	.31***	.30***	.40***	−.05	.63***	.62***	–
8. TEIQue-ASF	413	4.41	0.72	−0.03	0.44	.29***	.14**	.21***	−.17***	.16**	.20***	.12*

Notes. CAT = Cognitive Abilities Test (Lohman et al., 2001); TEIQue-ASF = Trait Emotional Intelligence Questionnaire-Adolescent Short Form (Petrides, 2009). *$p < .05$. **$p < .01$. ***$p < .001$.

terms of significance (at $p < .05$). In Grade 7, TEIQue-ASF scores explained incremental variance over and above CAT subscales in end-of-year English and Science, but not in math, while in Grade 8 they explained incremental variance in all three subjects. The unique contribution of the TEIQue-ASF was 1.3% (English) and 0.6% (science) in Grade 7 and somewhat stronger in Grade 8 at 5.8% (English), 1.0% (math), and 2.2% (science).

Of the three CAT subscales, only nonverbal ability had consistent betas across the two grades in terms of significance. As can be expected, nonverbal ability was significant in the regression analyses for math and science, but nonsignificant in the analysis for English. Verbal ability was a significant predictor of English and science in both grades and of math in Grade 7 only. Quantitative ability explained unique variance in English and math, but not in science, in Grade 7, and in none of the criteria in Grade 8. Variance explained by CAT subscales ranged from 28.8% (science) to 34.5% (English) in Grade 7, and from 11.5% (math) to 22.4% (science) in Grade 8.

Discussion

This investigation focused on the incremental validity of the TEIQue-ASF. Specifically, it extended this important aspect of construct validity to (a) socioemotional criteria, controlling for a broad set of competing, trait-like attributes (i.e., coping strategies), and (b) objective achievement criteria (end-of-year grade levels), controlling for cognitive ability. Two samples were used, with the analyses concerning academic achievement (Sample 2) split by grade.

The results showed incremental contributions of the TEIQue-ASF to the variance of all three socioemotional criteria (depression, somatic complaints, and social competence) above and beyond coping strategies. Coping strategies have only been examined as criteria of the various TEIQue forms (Mavroveli et al., 2007). However, since they were operationalized as traits (i.e., based on items concerning respondents' general behavior and not to any particular time period), the present study categorized them as concurrent predictors in order to examine the incremental validity of the TEIQue-ASF. Coping strategies represent typical responses to stressful life events (Greenaway et al., 2015) that are highly relevant during the adolescence, given the socioemotional and developmental challenges ones faces during this formative developmental stage. In that sense, coping strategies may provide a more developmentally appropriate and, perhaps, meaningful proxy conceptualization of personality than, for instance, the Five-Factor Model.

The incremental contributions of the TEIQue-ASF to the variance in these socioemotional criteria are consistent with previous findings demonstrating the measure's unique contributions to self-reported disruptive behavior and depression, controlling for demographics, the Big Five personality traits, and academic achievement (Davis & Humphrey, 2012b). They also build on Frederickson et al.'s (2012) findings of incremental predictive effects on peer-rated social behavior, inclusion, and self-reported psychopathology over the baseline levels of these criteria and general cognitive ability. The present results thus provide further evidence for the incremental validity of the TEIQue-ASF in predicting socioemotional criteria. Even though the effect sizes were not particularly large, these results also extend the measure's relatively consistent

Table 4. Sample 2: Hierarchical regression analyses predicting academic achievement criteria of seventh graders with gender (Step 1), CAT subscales (Step 2), and the TEIQue-ASF (Step 3)

	End-of-year English			End-of-year maths			End-of-year science		
Step 1: gender	$F(1, 474) = 15.14$***, $\Delta R^2 = .031$***, $R^2_{Adj} = .03$			$F(1, 486) = .13$, $\Delta R^2 = .0003$, $R^2_{Adj} = -.002$			$F(1, 489) = 3.92$*, $\Delta R^2 = .008$, $R^2_{Adj} = .01$		
Step 2: CAT subscales	$F(4, 471) = 71.01$***, $\Delta R^2 = .345$***, $R^2_{Adj} = .37$			$F(4, 483) = 59.97$***, $\Delta R^2 = .332$***, $R^2_{Adj} = .33$			$F(4, 486) = 51.13$***, $\Delta R^2 = .288$***, $R^2_{Adj} = .29$		
Step 3: TEIQue-ASF	$F(5, 470) = 59.97$***, $\Delta R^2 = .013$***, $R^2_{Adj} = .38$			$F(5, 482) = 48.19$***, $\Delta R^2 = .001$, $R^2_{Adj} = .33$			$F(5, 485) = 41.98$***, $\Delta R^2 = .006$**, $R^2_{Adj} = .29$		
Step 3 predictors	β	Tolerance	VIF	β	Tolerance	VIF	β	Tolerance	VIF
Gender	.16***	.97	1.03	.02	.97	1.03	.07	.97	1.03
CAT verbal	.37***	.54	1.86	.21***	.55	1.83	.27***	.54	1.84
CAT quantitative	.23***	.41	2.45	.31***	.42	2.38	.12	.42	2.39
CAT nonverbal	.03	.47	2.15	.13*	.47	2.12	.21***	.47	2.14
TEIQue-ASF	.12**	.96	1.05	.04	.96	1.05	.08*	.96	1.04

Notes. CAT = Cognitive Abilities Test (Lohman et al., 2001); TEIQue-ASF = Trait Emotional Intelligence Questionnaire-Adolescent Short Form (Petrides, 2009); VIF = Variance inflation factor. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 5. Sample 2: Hierarchical regression analyses predicting academic achievement criteria of eighth graders with gender (Step 1), CAT subscales (Step 2), and the TEIQue-ASF (Step 3)

	End-of-year English			End-of-year maths			End-of-year science		
Step 1: gender	$F(1, 355) = 7.20$**, $\Delta R^2 = .020$**, $R^2_{Adj} = .02$			$F(1, 367) = 1.11$, $\Delta R^2 = .003$, $R^2_{Adj} = .0003$			$F(1, 367) = .20$, $\Delta R^2 = .001$, $R^2_{Adj} = -.002$		
Step 2: CAT subscales	$F(4, 352) = 25.95$***, $\Delta R^2 = .208$***, $R^2_{Adj} = .22$			$F(4, 364) = 12.16$***, $\Delta R^2 = .115$***, $R^2_{Adj} = .12$			$F(4, 364) = 26.29$***, $\Delta R^2 = .224$***, $R^2_{Adj} = .22$		
Step 3: TEIQue-ASF	$F(5, 351) = 28.11$***, $\Delta R^2 = .058$***, $R^2_{Adj} = .28$			$F(5, 363) = 65$***, $\Delta R^2 = .010$*, $R^2_{Adj} = .13$			$F(5, 363) = 23.74$***, $\Delta R^2 = .022$**, $R^2_{Adj} = .24$		
Step 3 predictors	β	Tolerance	VIF	β	Tolerance	VIF	β	Tolerance	VIF
Gender	.21***	.96	1.04	.10*	.96	1.04	.04	.96	1.04
CAT verbal	.33***	.54	1.85	.09	.52	1.93	.31***	.52	1.92
CAT quantitative	.10	.52	1.91	.10	.51	1.97	.04	.51	1.96
CAT nonverbal	.03	.55	1.81	.19**	.53	1.89	.16*	.53	1.88
TEIQue-ASF	.25***	.94	1.06	.10*	.94	1.07	.15**	.94	1.07

Notes. CAT = Cognitive Abilities Test (Lohman et al., 2001); TEIQue-ASF = Trait Emotional Intelligence Questionnaire-Adolescent Short Form (Petrides, 2009); VIF = Variance inflation factor. *$p < .05$. **$p < .01$. ***$p < .001$.

pattern of unique contributions to more objective criteria when controlling for a relevant and comprehensive set of trait-like attributes.

Above and beyond cognitive ability, the TEIQue-ASF also explained unique variance in academic achievement, represented here by British students' end-of-year grade levels in the core areas of the curriculum (English, science, and math). Only one of the six analyses conducted across the two grades (end-of-year math of seventh graders) did not reveal an incremental effect for the TEIQue-ASF. Although the effect sizes for the TEIQue-ASF were modest, these results build on previously observed unique contributions to teacher-rated academic performance after controlling for cognitive ability, personality, anxiety, and self-concept (Ferrando et al., 2010). In that study, the TEIQue-ASF emerged as the only significant predictor of academic achievement other than cognitive ability, despite the additional predictors. The current results show that the measure also explains unique variance in objective achievement indices, relative to cognitive ability.

Implications

Despite the small effect sizes for the TEIQue-ASF in this investigation, it is important to keep in mind that they were derived with the short form of the instrument, which is less powerful than the full form. Also, where academic achievement is concerned, a small effect size of trait EI can be expected, since trait EI is not theoretically the strongest predictor of achievement (Petrides et al., 2004). Other relatively broad criteria in which trait EI may play a stronger role include interpersonal outcomes (e.g., relationship stability and social loneliness) and intrapersonal outcomes

(e.g., mental disorders and substance dependence). From this point of view, the results are encouraging and speak to the value of the construct.

Another reason why the results reported here may underrepresent the true effects of trait EI is emerging evidence indicating that the TEIQue does not represent trait EI optimally (Siegling, Petrides, & Martskvishvili, 2014), even though it has demonstrated superior construct validity relative to other trait EI measures (Freudenthaler, Neubauer, Gabler, Scherl, & Rindermann, 2008; Gardner & Qualter, 2010; Martins et al., 2010). Some of the 15 facets represented by the TEIQue items seem to be redundant and to compromise the validity of the total composite (Siegling, Petrides, et al., 2014). Redundant facets occupy no unique variance of the construct and, therefore, are unable to account for incremental variance in construct-relevant outcomes. On the contrary, the effects of uniquely predictive and non-predictive facets average out when combined into a composite; correlations of this composite with relevant criteria will consequently be lower than those of a composite comprised of predictive facets only (Siegling, Petrides, et al., 2014; Smith, Fischer, & Fister, 2003). Although more psychometric research is needed to confirm these initial results of facet (item) redundancy, stronger incremental effects can be expected with a refined version of the TEIQue.

The results convincingly demonstrate that trait EI, and more specifically the TEIQue-ASF, can explain unique variance in construct- and developmentally relevant criteria in adolescents. In conjunction with previous findings, they support the application of trait EI measures in psychoeducational assessments and suggest that even short trait EI forms can have valuable utility in adolescent samples. From the perspective of prediction, the present demonstration of incremental validity is important because it is furnished by a short, convenient, and cost-effective measure. Short forms are often preferred where practical constraints in a research or applied context do not permit the use of the corresponding full forms. Given the enormous effort and resources that go into the prediction of academic performance at every level of education, the ability to improve prediction precision through straightforward means is highly desirable. From the perspective of explanation, our findings further highlight the importance of emotions in the educational process and the need to investigate in greater depth when and why emotion is associated with academic success (Valiente, Swanson, & Eisenberg, 2012).

Limitations and Future Directions

Given the overlap of trait EI with personality, the fact that personality was not assessed and controlled for may be viewed as a limitation. As discussed, the comprehensive set of coping strategies used as control variables in Sample 1 is perhaps a more developmentally meaningful proxy for personality, which may not be fully crystallized until adulthood (e.g., Roberts, Caspi, & Moffitt, 2001). Personality was certainly not unrepresented among the Sample 1 predictors. Though it would have been ideal to include a trait measure in Sample 2, the analysis was restricted to preexisting data and, therefore, it must be tentatively assumed that the TEIQue-ASF has incremental validity vis-à-vis both personality and cognitive ability, as previous research suggests (Ferrando et al., 2010). Especially the size of the measure's unique contributions to various criteria remains to be established, using objective achievement data of the kind analyzed in the present investigation.

References

Andrei, F., Siegling, A. B., Aloe, A. M., Baldaro, B., & Petrides, K. V. (2015). The incremental validity of the Trait Emotional Intelligence Questionnaire (TEIQue): A systematic review and meta-analysis. Manuscript under review.

Bar-On, R., & Parker, J. D. A. (2000). *Bar-On Emotional Quotient Inventory: Youth version (BarOn EQ-I:YV) technical manual*. Toronto, Canada: Multi-Health Systems.

Bijstra, J. O., Jackson, S., & Bosma, H. A. (1994). De Utrechtse Coping Lijst voor adolescenten [The Utrecht Coping List for adolescents]. *Kind En Adolescent, 15*, 67–74. doi: 10.1007/BF03060546

Billings, C. E. W., Downey, L. A., Lomas, J. E., Lloyd, J., & Stough, C. (2014). Emotional Intelligence and scholastic achievement in pre-adolescent children. *Personality and Individual Differences, 65*, 14–18. doi: 10.1016/j.paid.2014.01.017

Coie, J. D., & Dodge, K. A. (1988). Multiple sources of data on social behavior and social status in the school: A cross-age comparison. *Child Development, 59*, 815–829. doi: 10.2307/1130578

Coie, J. D., Dodge, K. A., & Coppotelli, H. (1983). "Dimensions and Types of Social Status: A Cross-Age Perspective": Correction. *Developmental Psychology, 19*, 224. doi: 10.1037/0012-1649.19.2.224

Davis, S. K., & Humphrey, N. (2012a). Emotional intelligence predicts adolescent mental health beyond personality and cognitive ability. *Personality and Individual Differences, 52*, 144–149. doi: 10.1016/j.paid.2011.09.016

Davis, S. K., & Humphrey, N. (2012b). The influence of emotional intelligence (EI) on coping and mental health in adolescence: Divergent roles for trait and ability EI. *Journal of Adolescence, 35*, 1369–1379. doi: 10.1016/j.adolescence.2012.05.007

Derksen, J., Kramer, I., & Katzko, M. (2002). Does a self-report measure for emotional intelligence assess something different than general intelligence? *Personality and Individual Differences, 32*, 4–6. doi: 10.1016/S0191-8869(01)00004-6

Endler, N. S., & Parker, J. D. A. (1994). Assessment of multidimensional coping: Task, emotion, and avoidance strategies. *Psychological Assessment, 6*, 50–60. doi: 10.1037/1040-3590.6.1.50

Ferrando, M., Prieto, M. D., Almeida, L. S., Ferrandiz, C., Bermejo, R., Lopez-Pina, J. A., … Fernandez, M.-C. C. (2010). Trait emotional intelligence and academic performance: Controlling for the effects of IQ, personality, and self-concept. *Journal of Psychoeducational Assessment, 29*, 150–159. doi: 10.1177/0734282910374707

Frederickson, N. L., & Furnham, A. F. (1998). Sociometric classification methods in school peer groups: A comparative investigation. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 39*, 921–933. doi: 10.1111/1469-7610.00392

Frederickson, N., Petrides, K. V., & Simmonds, E. (2012). Trait emotional intelligence as a predictor of socioemotional outcomes in early adolescence. *Personality and Individual Differences, 52*, 323–328. doi: 10.1016/j.paid.2011.10.034

Freudenthaler, H. H., Neubauer, A. C., Gabler, P., Scherl, W. G., & Rindermann, H. (2008). Testing and validating the Trait Emotional Intelligence Questionnaire (TEIQue) in a German-speaking sample. *Personality and Individual Differences, 45*, 673–678. doi: 10.1016/j.paid.2008.07.014

Gardner, K. J., & Qualter, P. (2010). Concurrent and incremental validity of three trait emotional intelligence measures. *Australian Journal of Psychology, 62*, 5–13. doi: 10.1080/00049530903312857

Greenaway, K. H., Louis, W. R., Parker, S. L., Kalokerinos, E. K., Smith, J. R., & Terry, D. J. (2015). Measures of coping for psychological well-being. In G. J. Boyle, D. H. Saklofske, & G. Matthews (Eds.), *Measures of personality and social psychological constructs* (pp. 322–351). London, US: Academic Press. doi: 10.1016/B978-0-12-386915-9.00012-7

Joseph, D., Jin, J., Newman, D., & O'Boyle, E. (2014). Why does self-reported emotional intelligence predict job performance? A meta-analytic investigation of mixed EI. *Journal of Applied Psychology, 100*, 298–342. Retrieved from http://psycnet.apa.org/psycinfo/2014-39897-001/

Kovacs, M. (1985). The Children's Depression Inventory (CDI). *Psychopharmacology Bulletin, 21*, 995–998.

Lohman, D. F., Thorndike, R. L., Hagen, E. P., Smith, P., Fernandes, C., & Strand, S. (2001). *Cognitive Abilities Test* (3rd ed.). Windsor, UK: NFER-Nelson.

Malouff, J. M., Schutte, N. S., & Thorsteinsson, E. B. (2014). Trait emotional intelligence and romantic relationship satisfaction: A meta-analysis. *The American Journal of Family Therapy, 42*, 53–66. doi: 10.1080/01926187.2012.748549

Martins, A., Ramalho, N., & Morin, E. (2010). A comprehensive meta-analysis of the relationship between emotional intelligence and health. *Personality and Individual Differences, 49*, 554–564. doi: 10.1016/j.paid.2010.05.029

Mavroveli, S., Petrides, K. V., Rieffe, C., & Bakker, F. (2007). Trait emotional intelligence, psychological well-being and peer-rated social competence in adolescence. *British Journal of Developmental Psychology, 25*, 263–275. doi: 10.1348/026151006X118577

Mikolajczak, M., Petrides, K. V., & Hurry, J. (2009). Adolescents choosing self-harm as an emotion regulation strategy: The protective role of trait emotional intelligence. *The British Journal of Clinical Psychology, 48*, 181–193. doi: 10.1348/014466508X386027

Parkhurst, J. T., & Asher, S. R. (1992). Peer rejection in middle school: Subgroup differences in behavior, loneliness, and interpersonal concerns. *Developmental Psychology, 28*, 231–241. doi: 10.1037/0012-1649.28.2.231

Perera, H. N., & DiGiacomo, M. (2013). The relationship of trait emotional intelligence with academic performance: A meta-analytic review. *Learning and Individual Differences, 28*, 20–33. doi: 10.1016/j.lindif.2013.08.002

Petrides, K. V. (2009). Psychometric properties of the trait emotional intelligence questionnaire (TEIQue). In C. Stough, D. H. Saklofske, & J. D. A. Parker (Eds.), *Assessing emotional intelligence: Theory, research, and applications* (pp. 85–101). New York, NY: Springer Science + Business Media. doi: 10.1007/978-0-387-88370-0

Petrides, K. V., Frederickson, N., & Furnham, A. (2004). The role of trait emotional intelligence in academic performance and deviant behavior at school. *Personality and Individual Differences, 36*, 277–293. doi: 10.1016/S0191-8869(03)00084-9

Petrides, K. V., & Furnham, A. (2001). Trait emotional intelligence: Psychometric investigation with reference to established trait taxonomies. *European Journal of Personality, 15*, 425–448. doi: 10.1002/per.416

Petrides, K. V., Pérez-González, J. C., & Furnham, A. (2007). On the criterion and incremental validity of trait emotional intelligence. *Cognition & Emotion, 21*, 26–55. doi: 10.1080/02699930601038912

Petrides, K. V., Pita, R., & Kokkinaki, F. (2007). The location of trait emotional intelligence in personality factor space. *British Journal of Psychology, 98*, 273–289. doi: 10.1348/000712606X120618

Petrides, K. V., Sangareau, Y., Furnham, A., & Frederickson, N. (2006). Trait emotional intelligence and children's peer relations at school. *Social Development, 15*, 537–547. doi: 10.1111/j.1467-9507.2006.00355.x

Rieffe, C., Meerum Terwogt, M., & Bosch, J. (2004). Emotional awareness and somatic complaints in children. *European Journal of Developmental Psychology, 1*, 31–47.

Roberts, B. W., Caspi, A., & Moffitt, T. E. (2001). The kids are alright: Growth and stability in personality development from adolescence to adulthood. *Journal of Personality and Social Psychology, 81*, 670–683. doi: 10.1037/0022-3514.81.4.670

Saklofske, D. H., Austin, E. J., & Minski, P. S. (2003). Factor structure and validity of a trait emotional intelligence measure. *Personality and Individual Differences, 34*, 707–721. doi: 10.1016/S0191-8869(02)00056-9

Schutte, N. S., Malouff, J. M., Hall, L. E., Haggerty, D. J., Cooper, J. T., Golden, C. J., & Dornheim, L. (1998). Development and validation of a measure of emotional intelligence. *Personality and Individual Differences, 25*, 167–177. doi: 10.1016/S0191-8869(98)00001-4

Siegling, A. B., Petrides, K. V., & Martskvishvili, K. (2014). An examination of a new psychometric method for optimizing multi-faceted assessment instruments in the context of trait emotional intelligence. *European Journal of Personality, 29*, 42–54. doi: 10.1002/per.1976

Siegling, A. B., Saklofske, D. H., & Petrides, K. V. (2014). Measures of ability and trait emotional intelligence. In G. J. Boyle, D. H. Saklofske, & G. Matthews (Eds.), *Measures of personality and social psychological constructs* (1st ed., pp. 381–414). Oxford, UK: Academic Press.

Smith, G. T., Fischer, S., & Fister, S. M. (2003). Incremental validity principles in test construction. *Psychological Assessment, 15*, 467–477. doi: 10.1037/1040-3590.15.4.467

Strand, S. (2004). Consistency in reasoning test scores over time. *The British Journal of Educational Psychology, 74*, 617–631. doi: 10.1348/0007099042376445

Timbremont, B., & Braet, C. (2001). Psychometrische evaluatie van de Nederlandstalige Children's Depression Inventory [Psychometric assessment of the Dutch version of the Children's Depression Inventory]. *Gedragstherapie, 34*, 229–242.

Valiente, C., Swanson, J., & Eisenberg, N. (2012). Linking students' emotions and academic achievement: When and why emotions matter. *Child Development Perspectives, 6*, 129–135. doi: 10.1111/j.1750-8606.2011.00192.x

Van der Zee, K., Thijs, M., & Schakel, L. (2002). The relationship of emotional intelligence with academic intelligence and the Big Five. *European Journal of Personality, 16*, 103–125. doi: 10.1002/per.434

Warwick, J., & Nettelbeck, T. (2004). Emotional intelligence is…? *Personality and Individual Differences, 37*, 1091–1100. doi: 10.1016/j.paid.2003.12.003

Williams, C., Daley, D., Burnside, E., & Hammond-Rowley, S. (2010). Can trait Emotional Intelligence and objective measures of emotional ability predict psychopathology across the transition to secondary school? *Personality and Individual Differences, 48*, 161–165. doi: 10.1016/j.paid.2009.09.014

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