Can emotional and social abilities predict differences in attainment at secondary school?

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Abstract

Trait Emotional Intelligence (EI) covers a wide range of skills and personality dispositions such as confidence, optimism, adaptability, motivation, peer relations and coping with stress. In recent years the case has been made that emotional and social abilities can be more influential than conventional intelligence for all kinds of personal, career and school success. This study sought to explore the relationship between trait EI and GCSE science performance in a sample of approximately 2000 British students aged 14 to 16. Students were from 31 schools that included both state and independent establishments. The hypothesis was that trait EI would account for better performance at GCSE over and above the level attributable to prior attainment at Key Stage 3.

Trait EI was measured with the Trait Emotional Intelligence Questionnaire: a 153 item, likert-type, self-report instrument that yields a global trait EI score as well as scores for 15 subscales organized into four factors. Participants completed the questionnaire prior to the June 2007 examination session and their responses were matched to their Key Stage 3 and GCSE results. Attainment in different GCSE science subjects was modelled through separate regression analyses.

Results showed that some aspects of trait EI significantly predicted attainment in GCSE sciences over and above the contribution made by Key Stage 3 attainment. The majority of the questionnaire subscales significantly predicted attainment in the Applied Science Double Award after controlling for Key Stage 3 scores. Self-motivation and low impulsivity were significant predictors of attainment in all of the science subjects here after controlling for Key Stage 3 scores. Global trait EI scores significantly predicted progress from Key Stage 3 in the Applied Science Double Award and in Biology and Chemistry but not in Physics.

Introduction

One piece of evidence that is used by awarding bodies when setting pass marks for school examinations in England is the prior attainment of the candidates. It is not unreasonable to expect that examination results will improve if the prior attainment of the candidates improves from that of the previous year. However, prior attainment is not the only determinant of examination performance. This can be illustrated by considering what happened when vocational GCSEs (GCSE(v)) were introduced in England.

These examinations were introduced to give a more practical alternative than the academic GCSE examinations. It was hoped that this would improve the motivation of these students. When the first results were released concern was expressed that the grades tended to be lower than expected given candidates' attainment at age 11. A thorough analysis revealed that the candidates also made less progress than expected from National Tests at age 14. However, there was no evidence that the pupils' results in GCSE(v)s tended to be any lower than in their other GCSE subjects (that is, they also made less progress than expected in their non-vocational GCSEs). It was thought that a possible reason for this was that the GCSE(v) candidates tended to be less motivated (Vidal Rodeiro and Bell, 2007).

The objective of this study was therefore to investigate whether relationships exist between the affective domain and progress in school. After reviewing the affective literature it was decided that an investigation into emotional intelligence might provide an insight into the reasons for differential progress in schools. This involves attributes such as motivation, stress management and self-control: factors which could conceivably influence school performance in addition to ability. This study was designed to investigate the following research questions:

(1) Do the entries of different OCR science specifications (i.e. the sets of candidates taking the examinations) vary in their emotional intelligence?

(2) Is this variation not simply explained by prior attainment?

(3) Is progress on the different science specifications associated with candidates' levels of emotional intelligence?

If the answers to all of these questions are yes, then it would suggest that care needs to be taken when using prior attainment to predict performance in the processes of setting and maintaining examination standards. It would also suggest that, if attempts to develop the emotional intelligence of schoolchildren prove to be successful, then these would be worthwhile.

National Curriculum subjects such as PSE/PSHE and Citizenship target pupils' social, emotional and behavioural skills. Many primary and secondary schools are currently using new curriculum materials for actively developing their pupils' social, emotional and behavioural skills (DfES, 2005, 2007). An example of this is the 'Social and Emotional Aspects of Learning' program (SEAL) which is a comprehensive approach to promoting the social and emotional skills that underpin effective learning, positive behaviour, regular attendance, staff effectiveness and the emotional health and well-being of all who learn and work in schools. It is argued that the social and emotional aspects of learning, such as self-awareness, managing feelings, motivation, empathy, and social skills, are key areas that can and need to be developed in children so that they can learn effectively. Research has suggested that motivation, along with abilities and other personality traits, is important in predicting academic school performance (*e.g.* Abouserie, 1995; Gumora and Arsenio, 2002; Lam and Kirby 2002; Humphrey *et al.*, 2007).

This study uses a questionnaire that measures trait emotional intelligence. Goleman (1996) popularized the term 'emotional intelligence' and argued that emotional and social abilities can be more influential than conventional intelligence for all kinds of personal, career and school success. The definitions of emotional intelligence are varied and researchers are constantly amending definitions of the construct (Dulewicz and Higgs, 2000). In this research, the Petrides and Furnham (2000) model is used. This proposes a conceptual distinction between the ability-based model and the trait-based model of emotional intelligence. Their trait emotional intelligence (or 'trait emotional self-efficacy') is defined as:

> "*a constellation of behavioral dispositions and self-perceptions concerning one's ability to recognize, process, and utilize emotion-laden information*".

> Petrides and Furnham (2000)

Trait emotional intelligence (trait EI) is regarded by these authors as a dimension of personality rather than a form of intelligence due to its relationship with certain personality traits and its lack of a relationship with non-verbal reasoning ability (Petrides and Furnham, 2000; Petrides, Frederickson and Furnham, 2004).

This study explored the relationships between trait EI and academic performance in a sample of British students. It investigated whether trait EI accounts for better performance in examinations at age 16 over and above the level predicted by prior attainment at age 14.

Method

The questionnaire was administered in the period immediately before the GCSE examinations were to be taken. Unfortunately this might have been the reason why the response rate was relatively low (many schools turned down the opportunity to take part). The final sample comprised 1977 students in 31 schools who were taking OCR[1] GCSE science exams in June 2007. All participants were in Year 10 or Year 11 of school. It should be noted that the study was designed to compare the different science specifications and is restricted to OCR science examinations. This means that the resulting sample was not intended to be representative of the whole population. In particular, the proportion of candidates entered for separate sciences and attending independent schools is higher than in the whole population.

Trait EI was measured with the Trait Emotional Intelligence Questionnaire (TEIQue v. 1.50): a likert-type, self-report instrument devised and developed by Petrides (2001) and Petrides and Furnham (2003). As a self-report instrument, the TEIQue measures people's perceptions of their own abilities.

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[1] Oxford, Cambridge and RSA Examinations

The version of the questionnaire used in this research has 153 items and yields a global score as well as scores for each of 15 subscales organized into four factors. Table 1 lists the 15 trait EI subscales along with a brief description of each of them.

Table 1: Emotional intelligence subscales

Subscale	High scorers perceive themselves as…
Adaptability	…flexible and willing to adapt to new conditions.
Assertiveness	…forthright, frank, and willing to stand up for their rights.
Emotion perception	…clear about their own and other people's feelings.
Emotion expression	…capable of communicating their feelings to others.
Emotion management	…capable of influencing other people's feelings.
Emotion regulation	…capable of controlling their emotions.
Impulsiveness (low)	…reflective and less likely to give in to their urges.
Relationships	…capable of having fulfilling personal relationships.
Self-esteem	…successful and self-confident.
Self-motivation	…driven and unlikely to give up in the face of adversity.
Social awareness	…accomplished networkers with excellent social skills.
Stress management	…capable of withstanding pressure and regulating stress.
Empathy	…capable of taking someone else's perspective.
Happiness	…cheerful and satisfied with their lives.
Optimism	…confident and likely to "look on the bright side" of life.

The TEIQue also provides scores on four factors:

- Wellbeing: a combined score of optimism, happiness and self-esteem.
- Self-control: a combined score of emotion regulation, impulsiveness and stress management.
- Emotionality: a combined score of empathy, emotion perception, emotion expression and relationships.
- Sociability: a combined score of emotion management, assertiveness and social awareness.

All TEIQue scores (subscales, factors and global) vary between 1 and 7 with a theoretical average of 3.5. Higher scores on the TEIQue indicate higher levels of trait emotional intelligence. Descriptive statistics providing the mean values and the standard deviations of each of the TEIQue subscales in this sample are given in Table 2.

The examination most commonly taken at the end of Key Stage 4 is the General Certificate of Secondary Education (GCSE). There are eight grades: A*, A, B, C, D, E, F and G. Students who fail to reach grade G are recorded as U (unclassified). Students were invited to participate in this study if they were entered for an examination in at least one of the following OCR science subjects: Applied Science Double Award, Biology, Physics, Chemistry, Science: Double Award, Science: Twenty First Century Science Suite and Science: Gateway Science Suite. The last two specifications are modular and the candidates in this study were all in Year 10. Unfortunately, the response rate for Science Double Award was too low to allow meaningful analysis. This paper therefore concentrates on the remaining four specifications: Applied Science Double Award (vocational) and the three separate sciences.

The separate sciences (Biology, Chemistry and Physics) were usually taken by the same candidates: only a small number here did not take all three subjects. Nobody taking the vocational science subject took any of the separate science subjects. Many of the pupils in the sample were tested at age 14 (Key Stage 3) and were awarded attainment levels ranging from 1 to 8. These tests cover English, Mathematics and Science. The total of the levels is used as the prior attainment variable in this study. Around 30% of the sample did not take Key Stage 3 tests (students at independent schools are not required to). Of the separate sciences candidates with Key Stage 3 scores, around a third were female and around two thirds were male (for all three subjects).

Table 2: Means and standard deviations of the TEIQue subscales

Variable	Mean	Standard Deviation	Minimum	Maximum
Self-esteem	4.47	1.04	1.00	7.00
Emotion expression	4.45	1.04	1.00	7.00
Self-motivation	4.31	0.84	1.20	6.90
Emotion regulation	3.93	0.85	1.08	7.00
Happiness	5.22	1.20	1.00	7.00
Empathy	4.63	0.85	1.33	7.00
Social awareness	4.65	0.83	1.00	7.00
Impulsivity (low)	3.94	0.94	1.00	7.00
Emotion perception	4.57	0.79	1.40	7.00
Stress management	4.16	0.96	1.10	7.00
Emotion management	4.66	0.84	1.00	7.00
Optimism	4.94	1.03	1.00	7.00
Relationships	5.17	0.84	1.44	7.00
Adaptability	4.17	0.75	1.56	6.78
Assertiveness	4.61	0.93	1.00	7.00
Wellbeing	4.88	0.96	1.46	7.00
Self-control	4.01	0.75	1.24	6.56
Emotionality	4.71	0.66	1.66	6.75
Sociability	4.64	0.73	1.04	6.85
trait EI	4.53	0.57	2.29	6.59

Results

The aim of the survey was to investigate the relationships between EI and particular OCR specifications. The initial study design meant that more centres were asked to take part from some specification types than others e.g. the three separate sciences are much more likely to be taken in independent and grammar schools. The lower than hoped for participation rate by schools led to a distribution of school types that restricted the practicable analyses at the school level. In addition, it became clear in exploratory data analysis that the single girls-only grammar school had particularly low values on some of the EI factors. This school had an OFSTED inspection two months after the questionnaire was completed. This report noted that the school was recovering from difficulties which were not specified. However, there was a quote from a pupil attending the school that the atmosphere was improving day by day.

**Table 3: The distribution of school types taking part in the study**

School Type	Boarding	Boys	Girls	Mixed	Grand Total
Comprehensive	No		4	14	18
Grammar	No	2	1		3
Independent	No		2	1	3
Independent	Yes	1		2	3
Independent Total		1	2	3	6
Secondary Modern	No		2	2	4
Grand Total		3	9	19	31

The distribution of schools severely restricted the analysis that could be done at the school level because of the small number of schools in each cell. Gender differences in trait EI and in each of its subscales and factors were tested via independent samples t-tests. Except for the emotion expression, impulsivity and emotion perception subscales, there were significant differences in the mean scores by gender, usually with boys scoring higher than girls. However, given the self-selected nature of the data set, it should not be inferred that this is true of the population in general.

Table 4: Comparison of mean EI scores and Key Stage 3 performance for Applied Science GCSE(v) and the separate sciences entry

Subscale	Mean Applied Science	Mean Separate Sciences	t-value	df	p
Self-esteem	4.50	4.74	-3.27	723	0.00
Emotion expression	4.46	4.48	-0.32	723	0.75
Self-motivation	4.27	4.50	-3.80	723	0.00
Emotion regulation	3.94	4.33	-6.52	723	0.00
Happiness	5.07	5.44	-4.21	723	0.00
Empathy	4.56	4.89	-5.56	723	0.00
Social awareness	4.55	4.89	-5.52	723	0.00
Impulsivity (low)	3.94	4.21	-3.97	723	0.00
Emotion perception	4.55	4.73	-3.15	723	0.00
Stress management	4.08	4.53	-6.39	723	0.00
Emotion management	4.45	4.95	-8.16	723	0.00
Optimism	4.93	5.05	-1.59	723	0.11
Relationships	5.13	5.30	-2.88	723	0.00
Adaptability	4.13	4.35	-3.95	723	0.00
Assertiveness	4.51	4.89	-5.72	723	0.00
Wellbeing	4.83	5.08	-3.45	723	0.00
Self-control	3.99	4.36	-6.84	723	0.00
Emotionality	4.67	4.85	-3.66	723	0.00
Sociability	4.51	4.91	-7.64	723	0.00
Trait EI	4.47	4.75	-6.67	723	0.00
Total Key Stage score	14.92	20.89	-40.06	574	0.00

When scores on the trait EI subscales were compared for the Applied Science GCSE(v) and the separate sciences entries (Table 4), it was found (for all subscales except emotion expression and optimism) that the mean score for the Applied Science GCSE(v) entry was significantly lower than that for the separate sciences. In addition, the performance of the separate sciences entry at Key Stage 3 was considerably higher. The entry of the vocational GCSE tends to be composed of much lower performers at Key Stage 3 than the entry for the separate sciences (as illustrated in the box plots in Figure 1). This has the implication that the relationships between attainment and the trait EI scales for the vocational science and for the separate sciences will apply to different parts of the attainment range. If there is any non-linearity in the relationships between attainment and the trait EI scales then different results may be expected between the vocational science subject and the separate science subjects.
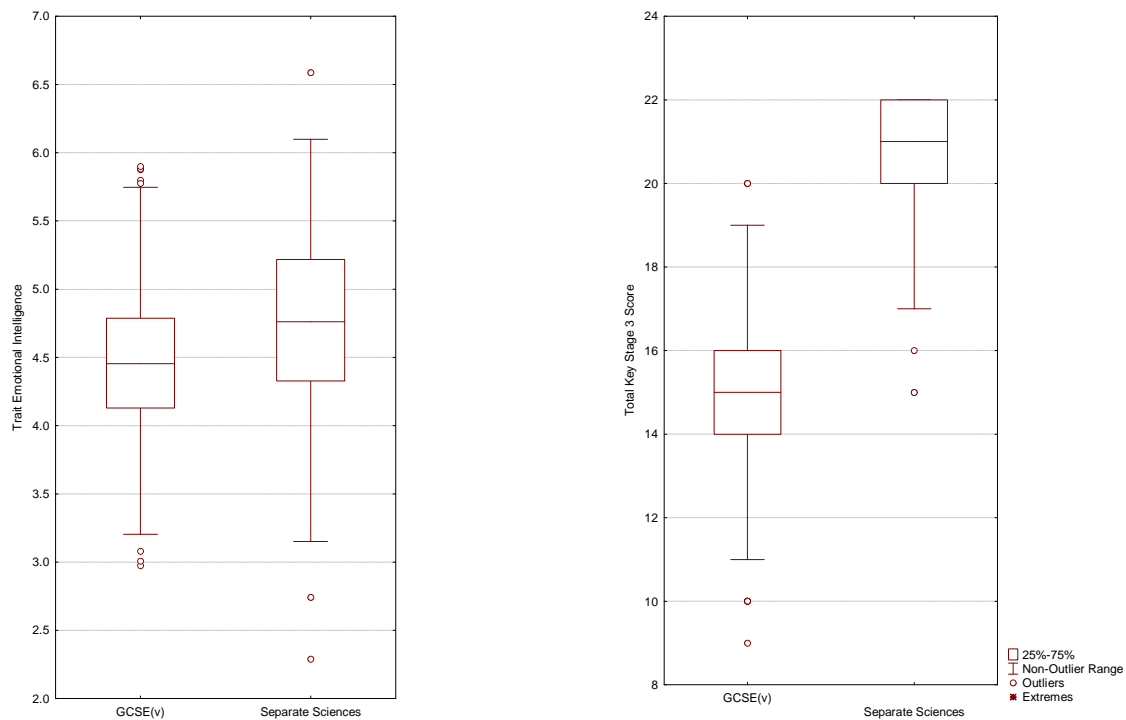
(a) Trait Emotional Intelligence   (b) Total Key Stage 3 Score

Figure 1: Box plots of measures by science entries

GCSE(v) Double Award in Applied Science

There were 283 students in the survey who sat a GCSE(v) Double Award in Applied Science and had a Key Stage 3 score. The grades obtained ranged from AA to GG with CC being the modal grade. This set of students was quite different to the set taking the separate sciences. For example, only around 3% of these students obtained at least a grade AA (compared with 75% of students in the sample obtaining at least a grade A in Biology). This is to be expected given the difference in prior attainment at Key Stage 3.

In Table 5 the parameters for the independent variables are given for GCSE(v) Applied Science. Each EI subscale was modelled separately. The estimates represent the log of the odds ratio of attaining a particular GCSE grade. All significant effects are highlighted in bold type (an estimate is statistically significant if it equals twice or more the value of the standard error). A positive significant gender effect indicates that, for given values of the EI subscale in the model and a given Key Stage 3 score, the probability of obtaining any given grade is higher for females than for males. This was the case for the self-motivation, emotion regulation and stress management subscales, the self-control factor and the global EI score.

A positive significant EI subscale effect indicates that, for a given Key Stage 3 score, the probability of obtaining any given grade significantly increases with increasing scores on that subscale. It can be seen in Table 5 that most of the EI subscales had a positive relationship with the probability of obtaining a given grade in this subject when Key Stage 3 performance was controlled for. The exceptions were the emotion expression, emotion management and assertiveness subscales and the sociability factor.

Figure 2 illustrates that a male candidate with a total Key Stage 3 score of 16 and an overall trait EI score of 3 would have a probability of obtaining a grade CC of 0.42. If that same candidate's trait EI score was 6 then the probability would be 0.92. A more modest difference in trait EI from 3 to 4 would increase the probability of obtaining a grade CC from 0.42 to 0.63. If this is a causal relationship, where changes in an individual's trait EI changes their probability of success in examinations (given that one of the subscales is self-motivation this is plausible), then the performance of school children could be improved substantially by devising strategies for even modest improvements in their emotional intelligence.

Table 5: Proportional odds regression parameter for gender, total Key Stage 3 score and the emotional intelligence subscales for GCSE(v) Applied Science

Subscale	Gender (=F)		EI subscale		Total KS3 score	
	Estimate	Std Err	Estimate	Std Err	Estimate	Std Err
Self-esteem	0.22	0.12	**0.29**	**0.12**	**0.49**	**0.06**
Emotion expression	0.18	0.12	0.06	0.12	**0.47**	**0.06**
Self-motivation	**0.24**	**0.12**	0.59	0.16	0.48	0.06
Emotion regulation	**0.27**	**0.12**	0.47	0.15	0.47	0.06
Happiness	0.19	0.12	**0.24**	**0.09**	**0.46**	**0.06**
Empathy	0.15	0.12	**0.40**	**0.15**	**0.46**	**0.06**
Social awareness	0.20	0.12	**0.30**	**0.15**	**0.48**	**0.06**
Impulsivity (low)	0.20	0.12	**0.69**	**0.14**	**0.51**	**0.06**
Emotion perception	0.17	0.12	**0.53**	**0.16**	**0.48**	**0.06**
Stress management	**0.28**	**0.12**	0.43	0.12	0.47	0.06
Emotion management	0.19	0.12	-0.06	0.14	**0.47**	**0.06**
Optimism	0.22	0.12	**0.30**	**0.12**	**0.48**	**0.06**
Relationships	0.12	0.12	**0.50**	**0.15**	**0.49**	**0.06**
Adaptability	0.22	0.12	**0.29**	**0.12**	**0.47**	**0.06**
Assertiveness	0.19	0.12	0.15	0.14	**0.47**	**0.06**
Wellbeing	0.22	0.12	**0.35**	**0.13**	**0.49**	**0.06**
Self-control	**0.30**	**0.12**	0.81	0.17	0.48	0.06
Emotionality	0.14	0.12	**0.65**	**0.20**	**0.47**	**0.06**
Sociability	0.19	0.12	0.18	0.18	**0.47**	**0.06**
Trait EI	**0.23**	**0.12**	0.93	0.23	0.48	0.06

(Full details of all the models can be obtained from the authors)
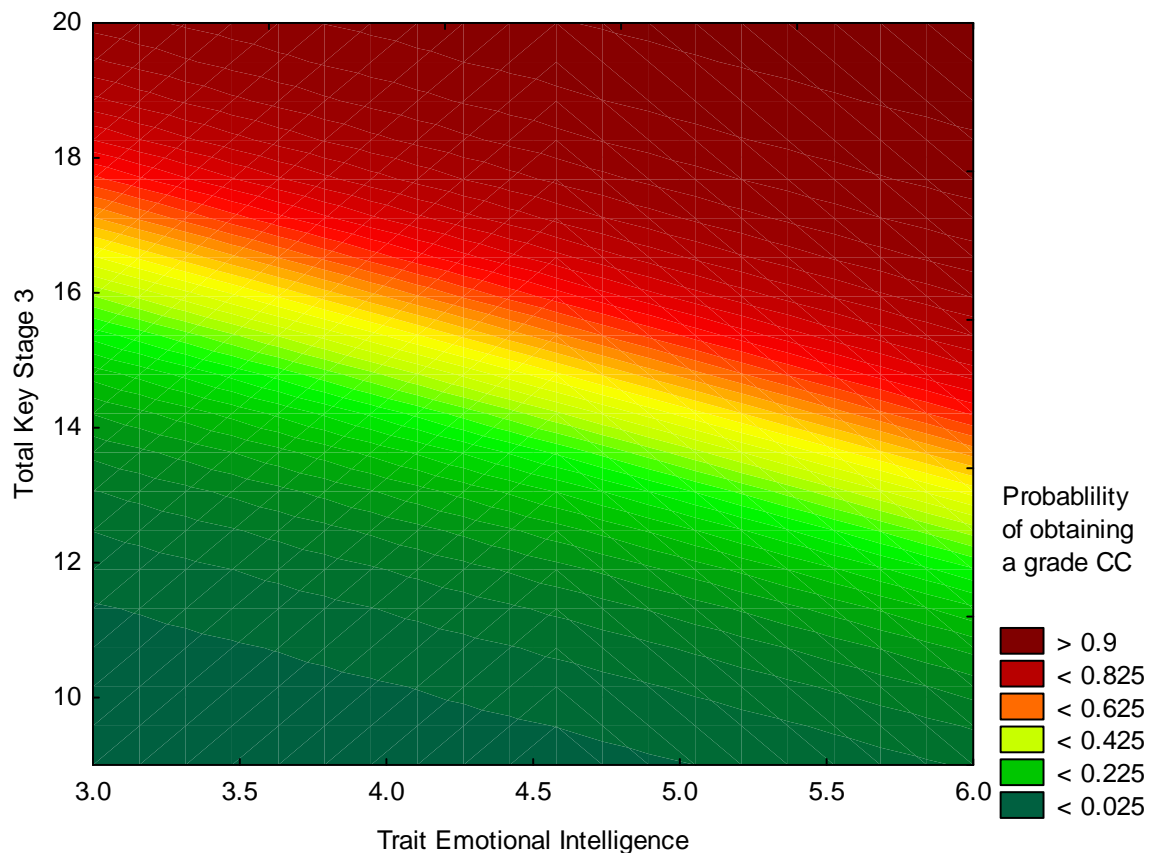

Figure 2: Predicted probability of a male candidate obtaining a grade CC in GCSE(v) Double Award in Applied Science

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GCSE Biology

There were 244 students in the sample who took the Biology GCSE and had a total Key Stage 3 score. The grades obtained were A* to D with A being the modal grade (such a small grade range is to be expected since the separate sciences are usually taken by relatively high achievers). In Table 6 the parameters for the independent variables are given for GCSE Biology. For most of the subscales the gender effect was positive and significant. The exceptions were the emotion expression, empathy, emotion management and relationships subscales. The self esteem, self motivation, happiness, empathy, impulsivity, relationships and adaptability subscales, the wellbeing and self-control factors and the global score were all significant predictors of attainment in Biology when controlling for Key Stage 3 attainment. Prior attainment was a much more powerful predictor than was the case for Applied Science but it should be noted that the two sets of data differ considerably in their prior attainment scores and that the relationships therefore refer to different parts of the attainment range.

Table 6: Proportional odds regression parameter for gender, total Key Stage 3 score and the emotional intelligence subscales for GCSE Biology

Subscale	Gender (=F)		EI subscale		Total KS3 score	
	Estimate	Std Err	Estimate	Std Err	Estimate	Std Err
Self-esteem	**0.50**	**0.16**	**0.39**	**0.13**	**0.81**	**0.11**
Emotion expression	0.25	0.14	-0.10	0.11	**0.83**	**0.11**
Self-motivation	**0.39**	**0.14**	**0.61**	**0.14**	**0.80**	**0.11**
Emotion regulation	**0.35**	**0.15**	0.25	0.16	**0.79**	**0.11**
Happiness	**0.39**	**0.15**	**0.34**	**0.10**	**0.84**	**0.11**
Empathy	0.22	0.14	**0.37**	**0.15**	**0.81**	**0.11**
Social awareness	**0.30**	**0.14**	0.17	0.13	**0.82**	**0.11**
Impulsivity (low)	**0.30**	**0.14**	**0.64**	**0.13**	**0.77**	**0.10**
Emotion perception	**0.30**	**0.14**	0.13	0.14	**0.82**	**0.11**
Stress management	**0.28**	**0.14**	0.05	0.13	**0.81**	**0.11**
Emotion management	0.26	0.14	-0.09	0.14	**0.82**	**0.11**
Optimism	**0.34**	**0.15**	0.19	0.11	**0.82**	**0.11**
Relationships	0.23	0.14	**0.54**	**0.15**	**0.81**	**0.11**
Adaptability	**0.50**	**0.16**	**0.39**	**0.13**	**0.81**	**0.11**
Assertiveness	**0.28**	**0.14**	0.06	0.12	**0.82**	**0.11**
Wellbeing	**0.43**	**0.15**	**0.38**	**0.13**	**0.83**	**0.11**
Self-control	**0.38**	**0.15**	**0.49**	**0.17**	**0.77**	**0.10**
Emotionality	**0.28**	**0.14**	0.29	0.17	**0.81**	**0.11**
Sociability	**0.28**	**0.14**	0.07	0.15	**0.82**	**0.11**
Trait EI	**0.39**	**0.15**	**0.59**	**0.20**	**0.80**	**0.11**

GCSE Chemistry

For GCSE Chemistry there were 241 candidates with valid Key Stage 3 scores. Again the grades ranged from A* to D. However, in this case the modal grade was A*. Table 7 gives the parameters for the independent variables for GCSE Chemistry. For the self-esteem and adaptability subscales, and for the wellbeing factor, there was a gender effect in favour of females. The following subscales and factors were related to improved performance in Chemistry when controlling for Key Stage 3 attainment: self-esteem, self motivation, happiness, impulsivity, optimism, adaptability, wellbeing, self-control and the global score. Key Stage 3 performance was a strong predictor of performance in this subject.

Table 7: Proportional odds regression parameter for gender, total Key Stage 3 score and the emotional intelligence subscales for GCSE Chemistry

Subscale	Gender (=F)		EI subscale		Total KS3 score	
	Estimate	Std Err	Estimate	Std Err	Estimate	Std Err
Self-esteem	**0.40**	**0.16**	**0.47**	**0.13**	**0.99**	**0.12**
Emotion expression	0.08	0.14	-0.13	0.12	**1.00**	**0.12**
Self-motivation	0.22	0.14	**0.53**	**0.14**	**0.97**	**0.11**
Emotion regulation	0.24	0.15	0.33	0.17	**0.97**	**0.12**
Happiness	0.22	0.15	**0.27**	**0.10**	**1.00**	**0.12**
Empathy	0.11	0.14	0.08	0.15	**0.99**	**0.12**
Social awareness	0.15	0.14	0.13	0.13	**0.99**	**0.12**
Impulsivity (low)	0.13	0.14	**0.58**	**0.14**	**0.95**	**0.11**
Emotion perception	0.13	0.14	0.04	0.14	**0.99**	**0.12**
Stress management	0.15	0.15	0.09	0.13	**0.98**	**0.12**
Emotion management	0.11	0.14	-0.04	0.15	**0.99**	**0.12**
Optimism	0.21	0.15	**0.22**	**0.11**	**1.00**	**0.12**
Relationships	0.11	0.14	0.21	0.15	**0.98**	**0.12**
Adaptability	**0.40**	**0.16**	**0.47**	**0.13**	**0.99**	**0.12**
Assertiveness	0.15	0.14	0.19	0.12	**0.99**	**0.12**
Wellbeing	**0.30**	**0.15**	**0.38**	**0.13**	**1.00**	**0.12**
Self-control	0.24	0.15	**0.52**	**0.18**	**0.95**	**0.11**
Emotionality	0.12	0.14	0.04	0.18	**0.99**	**0.12**
Sociability	0.15	0.14	0.15	0.15	**0.99**	**0.12**
Trait EI	0.25	0.15	**0.57**	**0.21**	0.98	0.12

GCSE Physics

GCSE Physics had the fewest candidates in the sample with a valid Key Stage 3 score. Data from 225 candidates were analysed. The grades ranged from A* to E with A* being the modal grade. Table 8 gives the parameters for the independent variables for GCSE Physics. For all subscales here the effect of female gender was negative (although not significantly so for self-esteem, emotion regulation and adaptability). Only two of the EI subscales had a significant relationship with GCSE performance after controlling for Key Stage 3 attainment (self-motivation and low impulsivity). For a candidate with a Key Stage 3 score of 21 an increase on the self-motivation scale from 4 to 5 would increase their probability of getting an A* grade from 0.5 to 0.58. Of all the science subjects here, Key Stage 3 scores had the strongest influence on Physics performance.

Table 8: Proportional odds regression parameter for gender, total Key Stage 3 score and the emotional intelligence subscales for GCSE Physics

Subscale	Gender (=F)		EI subscale		Total KS3 score	
	Estimate	Std Err	Estimate	Std Err	Estimate	Std Err
Self-esteem	-0.34	0.18	0.17	0.15	**1.02**	**0.12**
Emotion expression	**-0.48**	**0.16**	-0.11	0.14	**1.03**	**0.12**
Self-motivation	**-0.38**	**0.16**	**0.32**	**0.15**	**1.02**	**0.12**
Emotion regulation	-0.32	0.17	0.33	0.19	**1.01**	**0.12**
Happiness	**-0.38**	**0.16**	0.15	0.12	**1.03**	**0.12**
Empathy	**-0.44**	**0.16**	-0.11	0.19	**1.03**	**0.12**
Social awareness	**-0.46**	**0.16**	-0.07	0.17	**1.03**	**0.12**
Impulsivity (low)	**-0.42**	**0.16**	**0.48**	**0.17**	**1.01**	**0.12**
Emotion perception	**-0.46**	**0.16**	-0.05	0.18	**1.03**	**0.12**
Stress management	**-0.45**	**0.16**	-0.01	0.16	**1.03**	**0.13**
Emotion management	**-0.50**	**0.16**	-0.23	0.18	**1.01**	**0.12**
Optimism	**-0.43**	**0.17**	0.03	0.13	**1.03**	**0.12**
Relationships	**-0.46**	**0.16**	0.27	0.18	**1.02**	**0.12**
Adaptability	-0.34	0.18	0.17	0.15	**1.02**	**0.12**
Assertiveness	**-0.45**	**0.16**	-0.02	0.15	**1.03**	**0.12**
Wellbeing	**-0.38**	**0.17**	0.15	0.15	**1.03**	**0.12**
Self-control	**-0.35**	**0.16**	0.38	0.21	**1.00**	**0.12**
Emotionality	**-0.45**	**0.16**	-0.02	0.22	**1.03**	**0.12**
Sociabiliy	**-0.48**	**0.16**	-0.13	0.19	**1.02**	**0.12**
Trait EI	**-0.38**	**0.17**	0.24	0.25	**1.02**	**0.12**

Conclusions

Emotional intelligence currently attracts a great deal of interest, both in academia and within the general public. In education, it has been claimed that people with high scores on a trait EI measure perform better at school (*e.g.* Thi Lam and Kirby, 2002; Petrides, Frederickson and Furnham, 2004; Zins *et al.*, 2004). The present study provides support for the role of trait EI in students' performance and progress at secondary school.

Factors such as ability are not the only predictors of educational attainment. According to this study, and also according to previous research (Cassidy and Lynn, 1991; Vidal Rodeiro and Bell, 2007), it is the combination of ability, individual characteristics, home background, the type of school attended and social, behavioural and emotional aspects that is important.

The results show that some aspects of trait emotional intelligence significantly contributed to attainment in GCSE sciences over and above the contribution made by prior ability (Key Stage 3 scores). Self-motivation and low impulsivity were significant positive predictors of progress from Key Stage 3 in all four science subjects here. On the other hand, the emotion expression, emotion management and assertiveness subscales, and the sociability factor, were not significant predictors of progress in any of them. These findings corroborate those of Petrides, Frederickson and Furnham (2004), who found that EI moderated the relationship between cognitive ability and performance. Similarly, Gumora and Arsenio (2002) found that

some aspects of EI contributed to performance at school over and above the contribution made by cognition-related abilities.

In this research the relationships between trait EI and performance in four different science subjects at GCSE were studied. Some GCSE subjects appear to require more consideration of affect-related issues (e.g. English Literature, Art, Drama, etc.) and therefore trait EI may be found to be a better predictor of performance in some subjects than in others. Petrides, Frederickson and Furnham (2004) found a differential influence of trait EI on Mathematics, English and Science attainment. A future intention with this research is to match all the GCSE results of the participants to their trait EI scores in order to investigate the relationships between trait EI and performance in a wide range of GCSE subjects.

The results of this study show that trait EI was differentially implicated in academic progress across the various GCSE science subjects considered and influenced progress from Key Stage 3 in some more than in others. Trait EI scores had the greatest effect on attainment in the Applied Science Double Award and the least effect on attainmment in Physics. The predictiveness of Key Stage 3 attainment was lowest for the Applied Science Double Award and highest for Physics. There are large differences in the prior attainment of the entries for these examinations and this hints at a possibly non-linear relationship between trait EI and progress over the range of prior attainment. That is, trait EI may have a larger effect where prior attainment is lower and a smaller effect where prior attainment is higher.

Schools and students were self-selected for this study and this might be a limitation since it is possible that the more able and/or confident students would have been more likely to complete the questionnaire. Also, schools that were more involved in the promotion of EI ideas might have been more likely to take part. Finally, the present study was limited by being restricted to students taking science subjects. Further research on the long-term stability of trait EI may also be of interest.

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