Emotional intelligence in medicine: a systematic review through the context of the ACGME competencies

Sonal Arora, Hutan Ashrafian, Rachel Davis, Thanos Athanasiou, Ara Darzi & Nick Sevdalis

OBJECTIVES Emotional intelligence (EI) involves the perception, processing, regulation and management of emotions. This article aims to systematically review the evidence for EI in medicine through the context of the Accreditation Council for Graduate Medical Education (ACGME) competencies.

METHODS MEDLINE, EMBASE, PsycINFO, the Cochrane Database of Systematic Reviews and the Cochrane Central Register of Controlled Trials were searched for English-language articles published between January 1980 and March 2009. The grey literature was also searched and experts in the field contacted for additional studies. Two independent reviewers selected articles which reported empirical research studies about clinicians or medical students. Conceptual articles and opinion pieces and commentaries were excluded. Information about the measure used to assess EI, the study parameter or domain, and the educational or clinical outcome (with specific relation to the ACGME competencies) was extracted.

RESULTS The literature search identified 485 citations. An abstract review led to the retrieval of 24 articles for full-text assessment, of which 16 articles were included in the final review. Eleven studies focused on postgraduates, four on undergraduates and one on medical school applicants. Six out of seven studies found women to have higher EI than men. Higher EI was reported to positively contribute to the doctor–patient relationship (three studies), increased empathy (five studies), teamwork and communication skills (six studies), and stress management, organisational commitment and leadership (three studies).

CONCLUSIONS Measures of EI correlate with many of the competencies that modern medical curricula seek to deliver. Further research is required to determine whether training can improve EI and thus augment educational and clinical outcomes.

*Medical Education 2010: **44**: 749–764*
doi:10.1111/j.1365-2923.2010.03709.x

Department of Biosurgery and Surgical Technology, Imperial College London, London, UK

Correspondence: Sonal Arora, Department of Biosurgery and Surgical Technology, Imperial College London, 10th Floor, QEQM, St Mary's Hospital, South Wharf Road, London W2 1NY, UK.
Tel: 00 44 207 886 7651; Fax: 00 44 207 886 6309;
E-mail: Sonal.Arora06@imperial.ac.uk

INTRODUCTION

Medical education aims to cultivate doctors with a broad range of skills which will ultimately enable them to provide patient care that is clinically sound and emotionally responsive.[1,2] In order to improve and streamline this endeavour, there has been an increased drive to define and assess the core characteristics of professional competence.[3] Subsequently, the Accreditation Council for Graduate Medical Education (ACGME) in the USA has defined six core competencies that constitute the hallmarks of graduate medical education: Patient Care; Professionalism; Systems-based Practice; Interpersonal and Communication Skills; Medical Knowledge, and Practice-based Learning and Improvement. Each competency can be measured and mapped to clinical indicators of outcome and performance. Understanding of the underlying attributes of these competencies is required to foster educational strategies that will promote their development and thus improve patient care.[4]

Many of the skills that contribute towards these competencies are thought to be underpinned by emotional intelligence (EI).[5] Emotional intelligence is an individual characteristic that reflects the 'ability to monitor one's own and others' emotions, to discriminate among them, and to use this information to guide one's thinking and actions'.[6] It is thought to capture how people manage their own and other people's emotions.[7] Emotional intelligence is a psychological 'construct': it has been developed conceptually to represent a characteristic in which individuals differ (much like motor skill, intelligence and neuroticism). The construct has been subsequently used in empirical research to show how best to measure EI and, more importantly, whether EI matters in professional and educational contexts, including clinical practice and education. Although the field has grown rapidly over the past 15 years, there is currently heated debate regarding the nature of EI and how best to measure it. Although summarising the entire field is beyond the scope of this current review, it is important to outline the state of the debate. This is instrumental in situating our work amongst the current state of the art in the conceptual development of EI, as well as in the empirical evidence base that supports it. Our exposition is based on a recent theoretical analysis of EI by Cherniss.[8] It is also informed by a critical review of the literature from a medical viewpoint by Lewis *et al.*[9]

A first point to consider in this matter is: what is EI? Various definitions, conceptualisations and measures exist in the psychological and other literatures, such that the non-expert reader is often at a loss to grasp the underlying construct. Such confusions are present in relation to whether EI actually exists (i.e. a validity issue) and, if it does, whether it is a unitary or a multi-dimensional construct, whether it can be modified and, therefore, whether training in EI makes sense, and whether EI should be viewed as the static 'property' of an individual or in a more context-dependent, 'dynamic' manner.[9] On the minimal assumption that EI exists (in some form), there is further debate in the psychological literature on whether EI is an ability or a personality trait. Early conceptualisations of EI referred to it as an ability – hence the usage of the term 'intelligence'. Some researchers have defined it as a type of social intelligence;[10] others have maintained that it is a mental ability, much like cognitive ability, that reflects the efficacy of affective information processing,[11] and yet others have treated it as encompassing various social and emotional competencies.[12] Within the framework of EI as an ability, EI captures individuals' ability to understand and process affective information. This framework has been challenged recently by researchers who maintain that EI is a personality trait rather than a form of intelligence.[13] Within this framework of EI as a trait, EI captures personality facets and dispositions related to emotions.

This distinction between, and the ensuing debate on, the conceptualisations of EI as an ability and EI as a trait are important because they have determined the approaches taken to EI measurement and assessment.[8] If EI is an ability, there ought to be objective tests that capture that ability. If, however, EI is a personality trait, then objective assessment of it is by definition impossible. Some ability EI theorists have assessed EI via self-report questionnaires, such as Bar-On's Emotional Quotient Inventory (EQ-i).[10] (Bar-On's conceptualisation of EI clearly illustrates the confusion we referred to earlier. In Bar-On's model, it is not clear whether EI is treated as an ability or as a personality trait.[10] Lewis *et al.* capture this confusion nicely by describing this model of EI as including 'an array of skills, abilities and personality traits, clustered together under four of five organising domains'.[9] As we argue later in this paper, an ability conceptualisation of EI paired with a self-report measure of the construct is inherently problematic because it does not allow for maximal performance in terms of objective scoring.)

Although it is widely used, the EQ-i is problematic because an ability cannot, by definition, be captured solely by self-report (i.e. there is no objective metric). In addition, EQ-i scores do not correlate well with other measures of cognitive ability. To overcome some of these problems, the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT) attempts to capture emotional ability objectively.[11] The MSCEIT uses expert and consensus scoring to assess participants' performance. Neither approach, however, is without problems because individual differences in the way people perceive emotional information cannot be easily deemed 'erroneous' by either an expert judge or a panel of judges. Moreover, the test has been criticised as being a knowledge test, rather than an ability test. Furthermore, the MSCEIT does not correlate well with the EQ-i. With regard to the popularised Goleman model, there is also the Emotional Competence Inventory, a tool based upon self-report and 360-degree assessment.[15] However, evidence on the reliability and validity of this tool is limited[16] and questions arise as to whether it truly measures what it purports to measure (i.e. EI.)[9] Finally, from the perspective of personality, Petrides' Trait Emotional Intelligence Questionnaire (TEIQue) captures EI via subjective self-report.[13] Although the TEIQue has good psychometric properties, it potentially suffers from its sole reliance on self-report (no objective metrics are available).

These conceptual disagreements and methodological disparities notwithstanding, outside health care, EI has been linked to academic success, increased productivity and job satisfaction.[17] Within medicine, EI is thought to be equally important, especially in view of the careful management of emotions required in daily patient care and practice. In particular, EI-related abilities or personal dispositions are considered to be key to sound doctor–patient and team-working relationships.[18,19] For example, good emotional understanding may involve listening to a tired and frustrated colleague's angry tirade without taking it personally, or trying to focus on what is best for the patient rather than on 'who is right'. Emotional intelligence might be equally important in professionalism and systems-based practice. For example, admitting that an error has been made and being open about it to a patient or a patient's family involves significant management of one's own feelings, as well as of the emotional response of the patient and his or her family, and one's colleagues.

As medical education strives to produce doctors with these characteristics, it is timely that educators consider the emotional aspects of competence and reflect on how these actually influence outcomes. Here, we report a systematic review of the literature with the primary aim of determining the relationship of EI to the ACGME competencies with a specific focus upon educational and clinical outcomes.

METHODS

Data sources

The databases of MEDLINE (1950–March 2009), EMBASE (1980–March 2009), PsycINFO (1987–2009), the Cochrane Database of Systematic Reviews and the Cochrane Central Register of Controlled Trials were searched. Terms used included each of the following keywords: 'medi*', 'surg*', 'clinic*', 'physician$' and 'health care'. These were combined with the term 'emotional intelligence'. We did not specify the term 'education' at this stage as we wanted to pick up all studies that related to EI and medicine. This increased the sensitivity of our search, allowing us to focus upon the relevant articles later. In addition, we hand-searched the reference lists of all retrieved articles for further papers as well as conference proceedings from relevant meetings. We also contacted experts in the field for unpublished studies. We limited our results to English-language studies conducted upon humans, published between the years 1980 and 2009.

Study selection and inclusion and exclusion criteria

Two authors (SA, HA) independently reviewed the abstracts of all articles identified by our search criteria (n = 485) for potential inclusion in the review. Any disagreements were resolved by consensus. The two authors initially disagreed about whether to include or exclude five of the 485 abstracts. The full text for these five abstracts was retrieved for discussion and decisions were made jointly with a third author (NS). All five of these abstracts were excluded as they did not specify any clinicians in the sample. In order to achieve the same degree of specificity as sensitivity, a standardised set of inclusion criteria was formulated. These inclusion criteria required papers to be empirical data articles related to health care only (specifically to clinicians or medical students). Articles focusing exclusively upon patients, nurses or members of other professions were excluded. We also excluded reviews, general opinion pieces, commentaries and letters. After applying these criteria, duplicates were removed, leaving the remaining articles to be retrieved for full-text review. Two authors (SA, HA) independently examined each of

these articles for inclusion. This protocol identified the articles to be included in the final review.

Data abstraction

Data extraction from each article was conducted by two authors; disagreements were resolved by consensus. A standardised abstraction form was utilised, which included information on the following: study population and specialty; study design; aspect of EI; measure of EI, and outcome measure. The heterogeneity of obtained study designs ruled out a formal meta-analysis. Instead, two authors (SA, HA) categorised the studies according to the themes that emerged from the literature (by consensus). These were then matched to one or more of the relevant ACGME competencies. Definitions from the ACGME and information obtained through the abstraction criteria were used in order to match the two constructs.

Assessment of study quality

We developed our own assessment of study quality for the purpose of this review. This is because no single 'hierarchy' of the quality of evidence exists which is applicable across all research methodologies and topics[20] and most of the checklists currently available have been developed for assessing randomised controlled trials (e.g. the Jadad scale[21]). Moreover, most quality assessment scales[22] do not pertain specifically to studies of a descriptive nature (like those in our review). Our assessment criteria for quantitative studies in this review were based upon existing, generally acceptable guidelines and recommendations (e.g. MOOSE[23] [*m*eta-analysis *o*f *o*bservational *s*tudies in *e*pidemiology] Guidelines, the QUOROM Statement[24] and the Consort Statement checklist[25]). For the qualitative studies in the review, our quality assessment was developed using the Consolidated Criteria for Reporting Qualitative Research (COREC) checklist as a framework.[26]

Scoring items in the assessment scales

In accordance with the Cochrane Collaboration's recommendations,[27] we evaluated the quality of the studies by assessing on a 3-point ordinal scale the extent to which the items on the quality checklist were met by each of the papers. Each criterion or item was definitely met, partially met or definitely not met. Table S1 provides comprehensive information on how the quality scoring was completed. It is important to note that the aim of performing the quality check was not to exclude papers on the basis of 'low' quality scores; rather, it was to provide an idea of the quality of the empirical data currently available.

RESULTS

We retrieved 485 citations from the systematic search strategy. After application of our inclusion criteria, 38 abstracts remained. Excellent agreement between the two raters who reviewed each article for inclusion was obtained ($\kappa = 0.74$). The removal of 14 duplicates led to the retrieval of 24 full-text articles for assessment. Of these, 16 articles were subsequently identified for final inclusion in the review (Fig. 1).

Quality assessment

Table 1 displays the quality assessment scores for included papers. Once again, there was an excellent level of agreement between the two raters using the quality assessment scale ($\kappa = 0.80$). None of the quantitative studies ($n = 14$) 'definitely met' all quality assessment criteria. However, nine of the papers met six out of 10 criteria and all the papers met at least four out of 10 criteria (more detailed methodological evaluations are available in

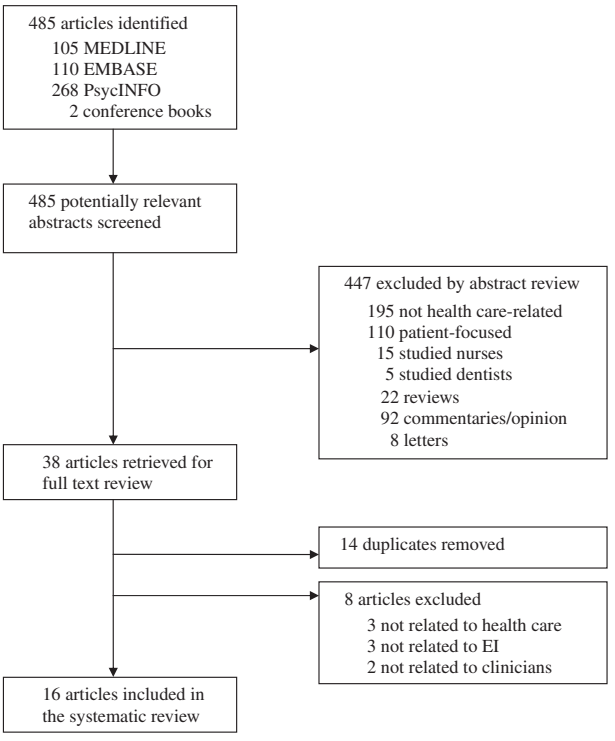

Figure 1 Flow of articles through the study. EI = emotional intelligence

Table 1 Characteristics of studies

Source (Author/year)	Study design, methodology	Population, sample size, setting	Quality assessment score: number of criteria the paper 'definitely met'
Austin *et al.* (2007)[32]	Cross-sectional survey; EI questionnaire	273 medical students (85 male, 188 female), UK	5/10
Austin *et al.* (2005)[31]	Cross-sectional survey; EI questionnaire	156 medical students (51 male, 103 female, no data for two students), UK	4/10
Stratton *et al.* (2008)[30]	Longitudinal cohort survey study; EI questionnaire	64 medical students (35 male, 29 female) at Year 1 then again at Year 3, USA	6/10
Stratton *et al.* (2005)[1]	OSCE-styled task and cross-sectional survey; EI questionnaire	165 third-year medical students (male = 92, female = 73), USA	6/10
McCallin & Bamford (2007)[29]	Cross-sectional interviews	44 health professionals from seven disciplines in two hospitals, New Zealand	Unable to assess*
Carrothers *et al.* (2000)[33]	Cross-sectional survey; EI questionnaire	147 medical school applicants	4/10
Weng (2008)[37]	Cross-sectional survey; EI questionnaire	39 doctors from 11 specialties	6/10
Weng *et al.* (2008)[38]	Cross-sectional survey; EI questionnaire	39 doctors	6/10
Talarico *et al.* (2008)[35]	Cross-sectional survey; EI questionnaire	Anaesthesiology residents (n = 26), postgraduate years 2–4, USA	6/10
Wagner *et al.* (2002)[36]	Cross-sectional survey; EI questionnaire	14 faculty and 16 residents (18 male, 12 female), USA	6/10
Humphreys *et al.* (2005)[51]	Cross-sectional survey; EI questionnaire	105 direct care workers (78 nurses, 27 other medical staff) 88% female, 12% male	5/10
Amundson (2005)[47]	Cross-sectional survey; EI questionnaire	85 health care and human service professionals comprising 20 interdisciplinary teams; 75% women	6/10
Skinner & Spurgeon (2005)[57]	Cross-sectional survey; EI questionnaire	96 health managers, Western Australia	6/10
Taylor *et al.* (2008)[28]	Cross-sectional interviews	25 doctor-leaders (aspiring leaders [n = 10] and established leaders [n = 15])	10/14
Oginska-Bulik[44]	Cross-sectional survey; EI questionnaire	330 human service professionals: 42.4% male, 57.6% female; doctors (n = 70), nurses (n = 70), teachers (n = 60), probation officers (n = 60), managers (n = 70)	5/10
Jensen *et al.* (2008)[34]	Cross-sectional survey; EI questionnaire	General surgical residents (n = 74): 51 male, 23 female	6/10

* Unable to assess because of very limited information on research methodology and results
EI = emotional intelligence; OSCE = objective structured clinical examination

Table S1). Only one (of a total of $n = 2$) qualitative study could be assessed on the basis of quality.[28] This paper met 10 of 14 assessment criteria. The other paper[29] focused on a discussion of the authors' interpretation of findings and gave very limited information on the study's methodology or results; for this reason this paper was excluded from quality analysis.

Study characteristics

Table 1 shows the characteristics of the included studies. Regarding study design and methodology, the vast majority of reviewed studies were survey-based, employing self-report EI questionnaires ($n = 14$). Most of these studies were cross-sectional and only one[30] was longitudinal. Other methodological approaches included the use of objective structured clinical examination (OSCE)-style tasks and correlation of performance with EI scores in one study[1] and interview methodology in two studies.[28,29] Study populations included medical undergraduates (four of 16 studies)[1,30–32] and medical school applicants.[33] The remaining 11 studies focused upon postgraduates: six examined solely clinicians, including surgical[34] and anaesthesiology[35] residents, as well as doctors from various specialties.[28,36–38] The five remaining postgraduate studies included other members of the multidisciplinary team (as well as doctors).[29,44,47,51,57]

How EI was measured

As we highlighted in the Introduction, if we are to understand and apply EI, we must first be able to measure it in a robust, comprehensive manner. Our review revealed that this is not the case at present in medicine, thereby replicating the pattern of disagreement around EI found outside medicine.[8] Table 2 demonstrates the range of measures used at both the undergraduate and postgraduate levels. It shows there were significant variations in the choice of tool used to assess EI across the reviewed studies. Of the 14 studies employing EI questionnaires, three[34–36] used the Bar-On EQ-i,[10] two[31,32] used a revised version of Schutte *et al.*'s questionnaire,[39] two[1,30] used the Trait Meta Mood Scale,[40] and two[37,38] used the Wong and Law Emotional Intelligence Scale (WLEIS).[41] Many other tools were used in only one study each. Although there is some evidence on reliability and validity, there remains much controversy regarding the measurement instruments used in these studies, which must be borne in mind when interpreting results. For example, the Schutte Self-report Emotional Intelligence Test[39] (used by two studies) does have a high internal consistency reliability ($r = 0.90$),[42] but may lack discriminant validity and appears to be unrelated to general intelligence.[43]

The more popular Bar-On EQ-i[10] also has uncertain content validity as it reports personality traits that are not widely considered to be abilities and omits certain elements of EI, such as emotion perception and understanding.[8] It does, however, display excellent reliability (internal consistency) of 0.97 and correlates well with other self-report measures.[10] In the studies reported within this review, all the tools utilised were based on participants' self-reporting of facets of their own EI. This raises its own issues, including that of reliance on people's subjective judgements of their own abilities (with particular application to the EQ-i); in fact it could be argued that the poorer someone's emotional understanding is, the more likely it is that his subjective judgement of himself will be inaccurate.

Effect of gender on EI

Of the four studies investigating medical students, three found that females had higher EI than males.[30–32] A study by Carrothers *et al.*[33] of applicants to medical schools also found that their female population scored higher on EI. Similarly, Oginska-Bulik[44] studied human service professionals and found that women had significantly higher EI, although Wagner *et al.*[36] found this effect in clinicians on only one subscale of EI, namely, stress management.

Effect of age and experience on EI

One study in the undergraduate literature[30] compared the EI of medical students in their third year with that in their first year and found it to be significantly decreased in the latter years. Within the clinician population, two studies[37,38] found a positive correlation between EI and age or experience, thus suggesting that EI increases as one progresses through one's career. By contrast, Wagner *et al.*[36] found no differences in EI scores between faculty members and more junior doctors. Finally, in a study of surgical residents,[34] neither resident age nor level of training correlated with EI.

The doctor–patient relationship and EI

The doctor–patient relationship represents an inherent part of the Patient Care, Professionalism, Systems-based Practice, and Interpersonal and Communication Skills competencies outlined by the

ACGME. Given the emphasis that EI places upon recognising and managing emotions, this may help to explain why some doctors are more able to provide better patient-centred care.[45] Within this review, three studies of postgraduates examined the components of this relationship with EI.[36–38] Two studies by Weng *et al.*[37,38] found that doctors' EI positively correlated with patients' trust, which in turn correlated with better patient follow-up, better doctor–patient relationships and increased satisfaction with both the doctor and hospital. Wagner *et al.*[36] compared doctors who achieved 100% patient satisfaction with those who achieved < 100% satisfaction and found a significant difference only

Table 2 Findings of studies in undergraduate and postgraduate samples

Source (Author/year)	Domain measured	Instrument used	Summary of findings
Undergraduate studies on EI			
Austin *et al.* (2007)[45]	EI	41-item EI scale (modified Schutte *et al.*'s measure)	F score higher than M for EI (t[268] = 3.23, p = 0.001) and empathy (t[263] = 2.43, p = 0.016)
	Empathy	Jefferson Scale of Physician Empathy	Communication skills correlates with total EI (r = 0.20, p = 0.05)
	Exam performance		Peer rating of student contribution to group work correlates with total EI (r = 0.23, p = 0.03)
			No significant association between EI or empathy and end-of-year marks
Austin *et al.* (2005)[44]	EI	41-item EI scale	F score higher than M for EI
	Empathy	Jefferson Scale of Physician Empathy	EI correlates with empathy (r = 0.35, p < 0.001) and student attitudes about talking with families/communication (r = 0.51, p < 0.001)
	Exam performance		EI correlates with exam performance on health and society module (r = 0.22, p < 0.007)
			No association between EI and exam performance in biomedical science
Carrothers *et al.* (2000)[33]	EI	EI instrument (34 points)	F higher than M for EI in total (mean 189.23 versus 176.52) and all subscales of EI
		Maturity	
		Compassion	
		Morality	EI correlates with interview assessment (r = 0.761) but not ACT (r = 0.084) and GPA (r = 0.138)
		Sociability	
		Calm disposition	
	Knowledge and analytical skills	ACT (entrance exam)	M higher than F for ACT (mean 31.53 versus 30.58)
			No p-values reported
	Personal and interpersonal skills	Traditional interviews	F higher than M for interview assessment (mean 22.88 versus 21.33) and GPA (mean 3.92 versus 3.89)

Table 2 (Continued)

Source (Author/year)	Domain measured	Instrument used	Summary of findings
Stratton *et al.* (2008)[30]	EI Attention to feelings Mood repair Clarity of feelings	TMMS: 30-item EI scale (range 1–5)	F score higher than M for attention to feelings at Year 1 (mean 4.28 versus 4.00; $p < 0.01$)
		Davis IRI (range 1–5)	At Year 1, F score higher for empathic concern (mean 4.39 versus 4.14; $p < 0.05$) and personal distress (2.05 versus 1.72; $p < 0.05$)
	Empathy Perspective taking Empathic concern Personal distress		At Year 3, F score higher for empathic concern (4.19 versus 3.78; $p < 0.001$)
			Comparing Years 3 and 1, decreased attention to feelings (3.97 versus 4.12; $p < 0.05$), mood repair (3.90 versus 4.19; $p < 0.001$), empathic concern (3.97 versus 4.25; $p < 0.001$) and increased personal distress (2.13 versus 1.87; $p < 0.01$)
Stratton *et al.* (2005)[1]	EI Attention to feelings Mood repair Clarity of feelings	TMMS: 30-item EI scale Davis IRI (range 1–5) OSCE (marked by patients)	F score higher than M on empathic concern dimension of IRI (mean 27.9 versus 26.6; $p < 0.05$) and for communication skills (99.3% versus 98.3%; $p < 0.05$)
	Empathy Perspective taking Empathic concern Personal distress	Communication and examination skills	Communication skills positively correlated with attention to feelings of TMMS ($p = 0.011$) and perspective taking of IRI ($p = 0.027$) and em pathic concern of IRI ($p = 0.005$)
			Physical exam skills negatively correlated with perspective taking ($p = 0.006$) and empathic concern ($p = 0.035$) of IRI
Postgraduate studies on EI			
Amundson (2005)[47]	Group emotional competence	Group emotional intelligence questionnaire	Significant correlation between group emotional competence and member-rated effectiveness ($r = 0.839$, $p < 0.001$)
	Team effectiveness (rated by members and supervisors)	Team effectiveness scales	Group emotional competence significantly predicted team effectiveness ($p < 0.001$)
			Group interaction predicted creating affirmative environment ($r = 0.856$, $p < 0.733$)

Table 2 (Continued)

Source (Author/year)	Domain measured	Instrument used	Summary of findings
Humphreys *et al.* (2005)[51]	EI	Self-report surveys	EI and coping ability significantly correlated ($r = 0.319$, $p < 0.01$)
	Emotional coping ability		EI and organisational commitment significantly correlated ($r = 0.303$, $p < 0.01$)
	Organisational commitment		Emotional coping ability and organisational commitment significantly correlated ($r = 0.209$, $p < 0.05$)
Jensen *et al.* (2008)[34]	EI	Bar-On EQ-i Intrapersonal Interpersonal Stress management Adaptability General mood 20-item survey	Surgical residents scored highly on self-rated and validated measures of EI Resident training level did not correlate with EQ-i ($r[2] < 0.07$, $p > 0.26$) Resident age level did not correlate with EQ-i ($r[2] = 0.07$) EQ-i levels in residents were higher than the national norms
McCallin & Bamford (2007)[29]	EI Team-working	Grounded theory approach	Team members need EI to work effectively with colleagues, patients and families EI less valued than knowledge, skills and expertise in teamwork Low level of EI in individuals and the team leads to poor teamwork, increased anxiety, poorer job satisfaction Team effectiveness and safety improved when colleagues were emotionally able
Oginska-Bulik (2005)[44]	EI	Emotional Intelligence Questionnaire, Polish adaption	Significantly higher EI in F than M (125.18 ± 14.37 versus 121.41 ± 15.95)
	Stress at work		
	General health	Subjective Work Evaluation Questionnaire	Significant negative relationship between EI and perceived stress in the workplace. ($r = -0.23$, $p < 0.001$)
		General Health Questionnaire, Polish adaption	EI negatively correlated with depression ($r = -0.28$, $p < 0.001$)

Table 2 (Continued)

Source (Author/year)	Domain measured	Instrument used	Summary of findings
Skinner & Spurgeon (2005)[57]	Empathy	Empathy scale Empathic concern Perspective taking Personal distress Empathic matching	All four empathy scales had significant correlations with transformational leadership (EC $r = 0.3$, $p < 0.01$, EM $r = 0.31$, $p < 0.01$, PT $r = 0.33$, $p < 0.01$, PD $r = -0.26$, $p < 0.01$) No relationship of empathy to transactional behaviour and negatively associated with *laissez-faire*
	Leadership behaviour	Multi-factor leadership questionnaire	'Empathy appears to be a major influencing factor in leadership effectiveness'
Talarico *et al.* (2008)[35]	EI	Bar-on EQ-i (125)	Assertiveness subscale of EI negatively correlates with ABA essential attributes ($r = -0.40$, $p < 0.05$)
	Six ACGME competencies	ACGME competencies and ABA essential attributes questionnaire	EI did not correlate with any of the resident competencies (authors state this is reflects an insufficient sample size)
Taylor *et al.* (2008)[28]	EI Leadership	Qualitative interview	> 70% cited EI that they admired in leaders 40–58% cited EI as an important skill to acquire for leadership
Wagner *et al.* (2002)[36]	EI	Bar-On EQ-i Intrapersonal Interpersonal	No differences in EQ-i scores between faculty members and doctors F higher than M on only one subscale of EI – stress (mean 104.24 versus 94,17; $p < 0.016$)
	Patient satisfaction	Adaptability Stress management General mood (happiness) 11-item patient satisfaction survey completed by 232 patients	Comparison of doctors with 100% patient satisfaction and < 100% satisfaction showed difference in only 'happiness' subscale of EI (mean 107.45 versus 97.47; $p < 0.01$)
Weng *et al.* (2008)[38]	Doctor EI	16-item EI ability measure from WLEIS (2002, scored 1–5) Self-emotion appraisal Other emotion appraisal Use of emotion Regulation of emotion	Nurses' ratings of doctors' EI positively correlated with doctor age ($r = 0.482$, $p < 0.05$) and experience ($r = 0.403$, $p < 0.05$) suggesting EI increases with age and experience
	Patient trust DPR	11-item trust scale on patient survey	Patient trust correlates with doctors' use of emotion subscale of EI, as assessed by nurses($r = 0.358$, $p < 0.05$)

Table 2 (Continued)

Source (Author/year)	Domain measured	Instrument used	Summary of findings
	Patient satisfaction	9 item PDR questionnaire, 2 item questionnaires	As assessed by patients, Patient trust correlates with PDR ($r = 0.752$, $p < 0.01$), doctor satisfaction ($r = 0.647$, $p < 0.01$), hospital satisfaction ($r = 0.752$, $p < 0.01$) and patient follow-up ($r = 0.132$, $p < 0.001$)
Weng (2008)[37]	Doctor EI	16-item EI ability measure from WLEIS as above (scored 1–5)	Doctor age correlates with regulation of emotion subscale of EI ($r = 0.328$, $p < 0.05$)
	Patient trust	11-item trust scale on patient survey (rated by patients and nurses)	Patient trust correlates with doctors' use of emotion subscale of EI ($r = 0.358$, $p < 0.05$), other emotional appraisal ($r = 0.286$, $p < 0.05$) and regulation of emotion ($r = 0.270$, $p < 0.05$) as rated by nurses
	DPR	9-item questionnaire, rated by patients, doctors and nurses	Patient trust correlates with higher patient follow-up ($r = 0.527$, $p < 0.01$), DPR ($r = 0.773$, $p < 0.01$) and satisfaction with doctor ($r = 0.647$, $p < 0.01$) as rated by patients
	Patient satisfaction	Questionnaire	

EI = emotional intelligence; F = female; M = male; GPA = grade point average; DPR = doctor–patient relationship; EQ-i = Emotional Quotient Inventory; TMMS = Trait Meta Mood Scale; IRI = Davis Interpersonal Reactivity Index; ACT = American College Test; ABA = American Board of Anesthesiology; ACGME = Accreditation Council for Graduate Medical Education; WLEIS = Wong and Law Emotional Intelligence Scale

in the 'happiness' subscale of EI. This lack of findings in other subscales could be attributed to the small sample size of 30, particularly as the study was powered to detect only large effects.[36] In addition, there was a wide disparity in the sample population (i.e. the doctors included ranged in age from 26 to 52 years).[36] In line with other evidence stating that expert clinicians have a greater appreciation of the sensitive nature of the doctor–patient relationship[46] and therefore are more likely to generate higher rates of patient satisfaction, the inclusion of senior doctors in this sample may have acted as a potential confounder.

Empathy and EI

Empathy is an inherent component of several of the ACGME competencies. Being compassionate underpins good Patient Care, Professionalism, and Interpersonal and Communication Skills. Accurately 'reading' and managing emotions is a crucial process in being aware of the feelings of others. Not surprisingly, therefore, empathy is regarded as an inherent facet of EI.[31] Four studies examined EI or empathy in medical students[1,30–32] and another investigated the same qualities in health care managers.[32] Women were found to score more highly than men in empathy[1,30,32] and overall EI.[1,30,32] However, only one study directly compared EI and empathy skills[18] and found that the two significantly correlated.[31] It is important to note that in both this study and another by Austin *et al.*,[32] students within the sample were self-selected. This could introduce bias through the self-selection for inclusion of those who are more able. Furthermore, the results were based upon

self-report questionnaires, which, although they reported adequate reliabilities, did not allow for the detailed exploration of the subject area that might have been achieved with parallel interviews.

The role of EI in teamwork, communication and interpersonal skills

Teamwork and communication are an essential component of Systems-based Practice. Moreover, Interpersonal and Communication Skills constitute a specific ACGME competency themselves and are postulated to be directly related to EI.[18] All four studies that examined EI in conjunction with the communication and interpersonal skills of undergraduates[1,31–33] found significant positive correlations between the two domains. These included communication skills in a medical school entrance interview,[33] students' attitudes to 'talking with families'[31] and communication skills as assessed by patients in an OSCE setting.[1] Two studies examined EI and teamwork in the postgraduate literature.[29,47] McCallin and Bamford[29] interviewed 44 health professionals and found that high levels of EI were associated with better team behaviour and performance. However, this study especially lacks methodological detail; no information on sampling strategy, the interview questions or the reliability of the 'grounded theory' analysis used was provided.[29] As only one person analysed the interview transcripts, the findings could be based solely upon that person's own subjective interpretation. Member-checking or the use of another coder might have overcome this limitation. Amundson's study of health care teams[47] also showed significant correlations between group EI and team effectiveness. However, this study included non-clinicians, which makes it difficult to extrapolate findings to a purely clinical population.

EI and academic performance

Emotional intelligence training may improve clinical diagnostic and prognostic abilities as well as the doctor–patient relationship.[48] It is therefore possible that EI is implicated in the ACGME competency of Medical Knowledge. Evidence from outside health care suggests that higher EI is potentially associated with various facets of academic performance, most notably those involving emotions and emotional processing.[49] All three studies within this review that investigated the association of EI with performance in medical examinations were conducted in undergraduates.[31–33] One found no association between EI and end-of-year marks of medical students.[32] However, another study by Austin *et al.*[31] in first-year students found a positive and significant relationship between EI and examination performance on a specific course component (a health and society module), but not on the biomedical sciences module. Carrothers *et al.*[33] also found that the EI scores of medical school applicants correlated positively with the interview assessment designed to test interpersonal skills. This is an important study as it was amongst the first to report the use of EI within the selection process, albeit on a pilot basis.[33] However, the lack of longitudinal data prevents the drawing of conclusions on whether the findings remained stable during medical school and beyond.

The role of EI in workplace stress, leadership and organisational commitment

In addition to EI in individuals, there is also the concept of the 'emotionally intelligent organisation',[45] which pertains to the emotional culture or climate of the workplace. In this respect, EI relates to the competencies of Practice-based Learning and Improvement, and Systems-based Practice. For example, accurately regulating one's emotional response may be important in mitigating the impact of stress and burnout.[50] In a study of front-line care workers, EI significantly correlated with both coping ability and organisational commitment.[51] Another study by Oginska-Bulik[44] demonstrated a significant negative relationship between EI and depression, as well as stress in the workplace. Both these studies, however, relied upon self-report and included non-clinicians, which raises questions about the generalisability of their results to a purely clinical population.

DISCUSSION

To our knowledge, this is the first systematic review of the evidence on EI in relation to modern doctor training. With specific reference to the ACGME competencies, the review revealed a plethora of potential applications of EI to medical education. These range from the more direct link between EI and Interpersonal and Communication Skills to indirect applications, such as links between EI and Practice-based Learning and Improvement. The evidence base showed that higher EI is positively associated with more compassionate and empathetic patient care (Patient Care), higher-scoring assessments of knowledge (Medical Knowledge), and effective coping with organisational pressures and leadership (Practice-based Learning and Improve-

ment, and Systems-based Practice). Furthermore, EI also contributed to improved teamwork and doctor–patient communication (Interpersonal and Communication Skills, and Professionalism).

These findings are exciting and novel. However, they should be evaluated in the context of the limitations of the existing evidence. Firstly, we were surprised to find that the evidence base is rather slim: the present review covered material published in 16 peer-reviewed reports. Of these, three articles contained a sample population that was not limited to doctors (e.g. including managers), thus making it difficult to draw firm conclusions from these results. It is interesting that there is much more talk than robust empirical work around EI: opinion pieces calling for more research on EI and its implications for doctors' skills and competencies far outnumber relevant research reports. A first conclusion that emerges from this review is that further, systematic empirical research on EI is needed to address this limitation.

A second, related limitation of the evidence base concerns the proliferation of EI measures in the published reports, with a corresponding lack of standardisation. The present review identified nine different EI assessment tools used in 14 studies. Although EI-related research in the context of health care is novel and standardisation potentially risks stifling innovative research approaches, the anarchy in tool usage is in fact a greater risk. From a slightly different perspective, we think it is rather interesting that the development of the EI evidence base in medicine has closely followed that in the non-medical fields. These unresolved disagreements on the nature of the underlying construct have led to multiple, often conflicting, approaches to EI assessment, which is exactly what we found in medicine. Psychometric robustness tends to be mixed for the tools used. Like the EQ-i[10] (the problems of which were discussed earlier), evidence on the validity of Schutte's scale[39] is mixed (and the versions used in the studies we found were modified[42,43]), and the WLEIS[41] has not been used enough in the literature to draw firm conclusions.

A final limitation of the evidence base concerns the fact that although the ACGME-based competencies provide a useful framework in which to situate the educational and clinical outcomes, it should be noted that many EI-related behaviours did not fall neatly under a single competency, but were more widely applicable across the competencies. Although it might perhaps be naïve to expect complex competencies to cluster neatly around equally complex facets of clinicians' personality or ability set, we believe that the lack of standardisation in the assessment of EI addressed earlier is a likely contributor to this pattern. Without agreed definitions and measures, the medical education community will find it hard to link individuals' characteristics with competency development and achievement, which emphasises the need for greater clarity in the research approach.

These limitations notwithstanding, the present review shows that EI measures relate to a wide range of competencies that modern medical training curricula seek to deliver. The pervasive link between EI and doctor competence carries significant implications for medical training. A first, immediate implication would be to educate doctors in EI-related skills to better achieve their required competencies, which echoes calls in the literature for training in the psychosocial aspects of care.[52] Moreover, the EI components provide an evidence-based classification of the type of non-technical skills that medical training has traditionally found hard to address and incorporate into the standard curriculum.[46] Importantly, the EI theory and tools also offer a vocabulary for the provision of systematic feedback to trainees, which might enable them to make the most of learning opportunities and interaction with their senior peers.

Further work should seek to achieve higher levels of conceptual and methodological clarity regarding EI definition and assessment.[45] It is important to note that 'a particular theoretical model of EI can be measured in more than one way';[8] thus seeking a 'one-size-fits-all' approach may not be the most suitable way of dealing with the issue. This is not a call for methodological anarchy. Rather, we recommend that a clear choice of a conceptual framework of EI be made, followed by careful selection of a relevant tool that assesses EI as defined within the framework of choice. This will render the medical education literature much more consistent. It will also allow for the build-up of an evidence base such that the efficacy of different tools and theoretical approaches can be compared systematically in the future, with the ultimate aim of assessing their validity. With regard to EI as a 'trait', tools that have appeared more recently in the literature, particularly the TEIQue,[13] should receive more attention. The TEIQue has good psychometric properties,[13] correlates with non-technical skills,[54] is sensitive in capturing training effects on EI[55] and, finally, has shown adaptability

across countries and cultures.[56] Of all the ability measures, the MSCEIT appears to have the greatest degree of content validity as it conforms most closely to the basic definition of EI.[8] Furthermore, its test–retest and internal consistency reliabilities are sufficiently high (0.75–0.86).[42] Future application of this tool to a clinical population alongside other measures of EI and personality would help to establish its concurrent and discriminant validity within medicine. Careful choice of EI assessment tools and their consistent application across specialties will allow for the construction of a more robust evidence base on the role of EI in medicine.

With appropriately clear, theory-driven tool selection, further work should also seek to clarify the role of EI in all stages of medical training, including its predictive validity. More empirical work is also required to determine the correlation of EI with clinical and academic performance. This would pave the way for a coherent approach to its integration in the medical curricula. Finally, further research would involve extending study designs to include additional longitudinal studies. A conspicuous lack of these to date has meant that medical educators have been unable to assess the impact of clinical training on EI skills. Such studies are required in health care to determine whether EI really matters and, if so, how best to improve trainees' EI, their competencies as doctors and, subsequently, patient care, which is, of course, the ultimate aim of medical education.

CONCLUSIONS

Emotional intelligence correlates with many of the core competencies that modern medical curricula seek to deliver. The potential application of EI as a pedagogical tool into medical education offers a new approach to improving both educational and clinical outcomes.

Contributors: SA contributed to the conception and design of the study, the acquisition, analysis and interpretation of data, and the drafting of the manuscript. HA contributed to the acquisition, analysis and interpretation of data, and the drafting of the manuscript. RD, TA and AD contributed to the analysis and interpretation of data and the drafting of the manuscript. NS contributed to the conception and design of the study and the drafting of the manuscript. All authors participated in the critical revision of the manuscript and approved the final paper for submission. SA and NS had full access to all data and act as guarantors.
Acknowledgements: none.
Funding: this review was supported by the BUPA Foundation, the National Institute of Health Research (NIHR) and the Economic and Social Research Council Centre for Economic Learning and Social Evolution (ESRC ELSE), UK.
Conflicts of interest: none.
Ethical approval: this study was approved by the Local Ethics Committee of St Mary's Hospital, London. The work was carried out in accordance with the Declaration of Helsinki, including, but not limited to there being no potential harm to participants; the anonymity of participants is guaranteed and the informed consent of participants was obtained.

REFERENCES

1 Stratton TD, Elam CL, Murphy-Spencer AE, Quinlivan SL. Emotional intelligence and clinical skills: preliminary results from a comprehensive clinical performance examination. *Acad Med* 2005;**80** (Suppl):34–7.
2 Arora S, Sevdalis N. Systems approach to daily clinical care. *Int J Surg* 2010;**8**:164–6.
3 Epstein RM, Hundert EM. Defining and assessing professional competence. *JAMA* 2002;**287**:226–35.
4 Prystowsky JB, Bordage G, Feinglass JM. Patient outcomes for segmental colon resection according to surgeon's training, certification, and experience. *Surgery* 2002;**132**:663–70; discussion 670–2.
5 Stewart M. Towards a global definition of patient-centred care. *BMJ* 2001;**322**:444–5.
6 Mayer JD, Salovey P. What is emotional intelligence? In: Salovey P, Sluyter DJ, eds. *Emotional Development and Emotional Intelligence: Educational Implications*. New York, NY: Basic Books 1997;3–31.
7 Petrides KV, Furnham A. The role of trait emotional intelligence in a gender-specific model of organisational variables. *J Appl Soc Psychol* 2006;**36**:552–69.
8 Cherniss C. Emotional intelligence: towards clarification of a concept. *Ind Organ Psychol* 2010 (in press).
9 Lewis NJ, Rees CE, Hudson JN, Bleakley A. Emotional intelligence in medical education: measuring the unmeasurable? *Adv Health Sci Educ Theory Pract* 2005;**10**:339–55.
10 Bar-On R. The Bar-On Emotional Quotient Inventory (EQ-i): rationale, description, and summary of psychometric properties. In: Geher G, ed. *The Measurement of Emotional Intelligence: Common Ground and Controversy*. Hauppage, NY: Nova Science Publishers 2004;115–45.
11 Mayer JD, Caruso DR, Salovey P. Emotional intelligence meets traditional standards for an intelligence. *Intelligence* 1999;**27**:267–98.
12 Boyatzis RE, Sala F. Assessing emotional intelligence competencies. In: Geher G, ed. *The Measurement of Emotional Intelligence: Common Ground and Controversy*. Hauppage, NY: Nova Science Publishers 2004; 147–80.

13 Petrides KV, Pita R, Kokkinaki F. The location of trait emotional intelligence in personality factor space. *Br J Psychol* 2007;**98**:273–89.
14 Goleman D *Emotional intelligence: why it can matter more than IQ.* London: Bloomsbury; 1995.
15 Conte JM. A review and critique of emotional intelligence measures. *J Organ Behav* 2005;**26**:433–40.
16 Weinberger LA. Emotional intelligence: its connection to HRD theory and practice. *Hum Res Dev* 2002;**1**:215–43.
17 Van Rooy DL, Viswesvaran C. Emotional intelligence: a meta-analytic investigation of predictive validity and nomological net. *J Vocat Behav* 2004;**65**:71–95.
18 Grewal D, Davidson HA. Emotional intelligence and graduate medical education. *JAMA* 2008;**300**:1200–2.
19 Levinson W, Roter DL, Mullooly JP, Dull VT, Frankel RM. Physician–patient communication. The relationship with malpractice claims among primary care physicians and surgeons. *JAMA* 1997;**277**:553–9.
20 Mays N, Pope C, Popay J. Systematically reviewing qualitative and quantitative evidence to inform management and policy-making in the health field. *J Health Serv Res Policy* 2005;**10** (Suppl 1):6–20.
21 Jadad AR, Cook DJ, Jones A, *et al.* Methodology and reports of systematic reviews and meta-analyses: a comparison of Cochrane reviews with articles published in paper-based journals. *JAMA* 1998;**280**:278–80.
22 Moja LP, Telaro E, D'Amico R, Moschetti I, Coe L, Liberati A. Assessment of methodological quality of primary studies by systematic reviews: results of the metaquality cross-sectional study. *BMJ* 2005;**330**:1053.
23 Stroup DF, Berlin JA, Morton SC, *et al.* Meta-analysis of observational studies in epidemiology: a proposal for reporting. *Meta-analysis Of Observational Studies in Epidemiology (MOOSE) group. JAMA* 2000;**283**:2008–12.
24 Moher D, Cook DJ, Eastwood S, Olkin I, Rennie D, Stroup DF. Improving the quality of reports of meta-analyses of randomised controlled trials: the QUOROM statement. *QUOROM Group. Br J Surg* 2000;**87**:1448–54.
25 http://www.consort-statement.org/
26 Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007;**19**:349–57.
27 Higgins J, Green S. Cochrane Handbook for Systematic Reviews of Interventions Version 5.0.1. Cochrane Collaboration 2008.
28 Taylor CA, Taylor JC, Stoller JK. Exploring leadership competencies in established and aspiring physician leaders: an interview-based study. *J Gen Int Med* 2008;**23**:748–54.
29 McCallin A, Bamford A. Interdisciplinary teamwork: is the influence of emotional intelligence fully appreciated? *J Nurs Manag* 2007;**15**:386–91.
30 Stratton TD, Saunders JA, Elam CL. Changes in medical students' emotional intelligence: an exploratory study. *Teach Learn Med* 2008;**20**:279–84.
31 Austin EJ, Evans P, Goldwater P, Potter V. A preliminary study of emotional intelligence, empathy and exam performance in first year medical students. *Pers Individ Dif* 2005;**39**:1395–405.
32 Austin EJ, Evans P, Magnus B, O'Hanlon K. A preliminary study of empathy, emotional intelligence and examination performance in MBChB students. *Med Educ* 2007;**41**:684–9.
33 Carrothers RM, Gregory SW Jr, Gallagher TJ. Measuring emotional intelligence of medical school applicants. *Acad Med* 2000;**75**:456–63.
34 Jensen AR, Wright AS, Lance AR, O'Brien KC, Pratt CD, Anastasakis DJ, Pellegrini CA, Horvath KD. The emotional intelligence of surgical residents: a descriptive study. *Am J Surg* 2008;**195**:5–10.
35 Talarico JF, Metro DG, Patel RM, Carney P, Wetmore AL. Emotional intelligence and its correlation to performance as a resident: a preliminary study. *J Clin Anesth* 2008;**20**:84–9.
36 Wagner PJ, Moseley GC, Grant MM, Gore JR, Owens C. Physicians' emotional intelligence and patient satisfaction. *Fam Med* 2002;**34**:750–4.
37 Weng HC. Does the physician's emotional intelligence matter? Impacts of the physician's emotional intelligence on trust, patient–physician relationship, and satisfaction. *Health Care Manage Rev* 2008;**33**:280–8.
38 Weng HC, Chen HC, Chen HJ, Lu K, Hung SY. Doctors' emotional intelligence and the patient–doctor relationship. *Med Educ* 2008;**42**:703–11.
39 Schutte NS, Malouff JM, Hall LE, *et al.* Development and validation of a measure of emotional intelligence. *Pers Ind Dif* 1998;**25**:167–77.
40 Salovey P, Mayer JD, Goldman SL, Turvey C, Palfai TP. Emotional attention, clarity, and repair: exploring emotional intelligence using the trait meta-mood scale. in: Pennebaker JW, ed. *Emotion, Disclosure, and Health APA.* Washington, DC: 1995;125–54
41 Wong CS, Wong PM, Law KS. Evidence on the practical utility of Wong's emotional intelligence scale in Hong Kong and Mainland China. *Asia Pac J Manag* 2007;**24**:43–60.
42 Conte JM, Dean MA. Can emotional intelligence be measured? In: Murphy KR, ed. *A Critique of Emotional Intelligence: What Are the Problems and How Can They Be Fixed?* Mahwah, NJ: Lawrence Erlbaum Associates 2006;59–77.
43 Saklofske DH, Austin EJ, Minski PS. Factor structure and validity of a trait emotional intelligence measure. *Pers Individ Dif* 2003;**34**:707–21.
44 Oginska-Bulik N. Emotional intelligence in the workplace: exploring its effects on occupational stress and health outcomes in human service workers. *Int J Occup Med Environ Health* 2005;**18**:167–75.
45 Birks YF, Watt IS. Emotional intelligence and patient-centred care. *J R Soc Med* 2007;**100**:368–74.
46 Arora S, Sevdalis N, Suliman I, Athanasiou T, Kneebone R, Darzi A. What makes a competent surgeon? Experts' and trainees' perceptions of the roles of a surgeon. *Am J Surg* 2009;**198**:726–32.

47 Amundson SJ. The impact of relational norms on the effectiveness of health and human service teams. *Health Care Manage* 2005;**24**:216–24.
48 Pagnini F, Manzoni GM, Castelnuovo G. Emotional intelligence training and evaluation in physicians. *JAMA* 2009;**301**:600; author reply 601.
49 Petrides KV, Frederickson N, Furnham A. The role of trait emotional intelligence in academic performance and deviant behaviour at school. *Pers Individ Dif* 2004;**36**:277–93.
50 Arora S, Sevdalis N, Nestel D, Tierney T, Woloshynowych M, Kneebone R. Managing intraoperative stress: what do surgeons want from a crisis training programme? *Am J Surg* 2009;**197**:537–43.
51 Humphreys J, Brunsen B, Davis D. Emotional structure and commitment: implications for health care management. *J Health Organ Manag* 2005;**19**: 120–9.
52 Kroenke K. Unburdening the difficult clinical encounter. *Arch Intern Med* 2009;**169**:333–4.
53 Petrides KV, Sevdalis N. Emotional intelligence and nursing: comment on Bulmer-Smith, Profetto-McGrath, and Cummings (2009). *Int J Nurs Stud* 2009;**47**:526–8.
54 Sevdalis N, Petrides KV, Harvey N. Trait emotional intelligence and decision-related emotions. *Pers Individ Dif* 2007;**42**:1347–58.
55 Nelis D, Quoidbach J, Mikolajczak M, Hansenne M. Increasing emotional intelligence: (how) is it possible? *Pers Individ Dif* 2009;**47**:36–41.
56 Petrides KV. *Technical manual for the Trait Emotional Intelligence Questionnaires (TEIQue)*. London: London Psychometric Laboratory 2009.
57 Skinner C, Spurgeon P. Valuing empathy and emotional intelligence in health leadership: a study of empathy, leadership behaviour and outcome effectiveness. *Health Serv Manage Res* 2005;**18**:1–12.

SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article.

Table S1. Assessment of the quality of papers in the systematic review.

Please note: Wiley-Blackwell are not responsible for the content or functionality of any supporting materials supplied by the authors. Any queries (other than for missing material) should be directed to the corresponding author for the article.

Received 26 August 2009; editorial comments to authors 13 October 2009, 23 December 2009; accepted for publication 3 March 2010