

What impact do structured educational sessions to increase emotional intelligence have on medical students?

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Abstract

Background: Emotional Intelligence (EI) has been defined as “a type of social intelligence that involves the ability to monitor one’s own and other’s emotions, to discriminate among them, and to use this information to guide one’s own thinking and actions” (Salovey and Mayer, 1990). It can be speculated that EI is related directly to the competency of interpersonal and communication skills, and is important in the assessment and training of medical undergraduates.

Aim: This review aimed to determine the impact of structured educational interventions on the emotional intelligence of medical students

Methods: We systematically searched 14 electronic databases and hand searched high yield journals. We looked at changes in emotional intelligence and related behaviour of medical students, assessed using Kirkpatrick’s hierarchy, provided they could be related directly to the content of the educational intervention.

Results: A total of 1947 articles were reviewed, of which 14 articles met the inclusion criteria.

Conclusions: The use of simulated patients is beneficial in improving EI when introduced in interventions later rather than earlier in students’ undergraduate medical education.

Regardless of duration of intervention, interventions have the best effects when delivered: 1) over a short space of time; 2) to students later in their undergraduate education and; 3) to female students. This should be taken into account when designing and delivering interventions. Emphasising the importance of empathetic qualities, such as empathetic communication style should be made explicit during teaching.

Practice points

1. The use of simulated patients is beneficial in improving emotional intelligence when introduced in interventions later in the course rather than earlier (i.e. in final year students rather than first year students)
2. Regardless of duration of intervention, interventions have the best effects when delivered over a short space of time, i.e. less than a month.
3. Interventions have the most positive effect when given to students later in their undergraduate education, for example in their final or penultimate years
4. Emphasising the importance of empathetic qualities, such as empathetic communication style generally improves EI, therefore these qualities should be made explicit during teaching.
5. Interventions generally have the most positive effect on females rather than males, which should be taken into account when designing and delivering interventions.

Executive Summary

Background and context: Emotional Intelligence (EI) is a type of social intelligence. It consists of the ability to manage your own and other's emotions in your day to day life, and to use this information to inform your thinking and behaviour. It is a characteristic, similar to other constructs such as reasoning, thinking and conscientiousness, which can be used to differentiate between individuals. Research within medical education has suggested looking at doctors' EI to assess their levels of emotional competence when interacting with patients. Other research found a relationship between the EI of medical students, and patient satisfaction scores after their Objective Structured Clinical Examinations (OSCEs). It can be speculated that EI is related directly to interpersonal and communication skills, and is important in the assessment and training of medical undergraduates. It is therefore important to assess if EI can be improved by targeted, structured educational interventions, as medical students who have high EI may be better at responding to expressions of emotional distress by patients than those with lower EI. We investigated this problem using a systematic review. The aim of the review was to focus on if medical students may be taught to improve their EI, using Best Evidence Medical Education (BEME) guidelines.

Review Methodology: An educational intervention was defined as a structured process intended to improve medical students' emotional intelligence or emotional development. Due to the large amount of literature relating to this subject, some inclusion criteria were devised as a means of narrowing the focus of the review. The inclusion criteria were that the participants must be medical students, that the outcomes measured in studies must be related to their EI or emotional development, that the studies must not be general review articles or editorials, and that the studies must report interventions with content that is documentable and repeatable, and run over a defined time period. 14 relevant health and educational

databases were searched electronically, using multiple search terms to ensure that all relevant material was captured. High yield journals and reference lists of included papers were hand searched. 2419 studies were retrieved, producing 1947 once de-duplicated. The abstract of each study was obtained, and looked at for relevance by 2 members of the team. Full-text papers were obtained for 36 studies, of which 14 studies were identified as fulfilling all inclusion criteria and were suitable for inclusion in review. Due to the variety in outcome measures reported, the studies were grouped by outcome according to Kirkpatrick's 1967 model of hierarchical outcomes at four levels. In order to assess the quality of the studies, a categorical method of assessment was used to incorporate both study design and quality of results. No study was excluded based solely on quality score, although this was considered in the analysis of studies. Relevant information was extracted from each paper by a member of the review team, using a tailored coding sheet.

Implications for practice: Following this systematic review, several conclusions for practice were found. Overall, educational interventions to improve EI in medical students have a small, positive effect on attitudes and knowledge. The use of simulated patients is beneficial in improving EI when introduced in interventions later rather than earlier in students' undergraduate medical education. Regardless of duration of intervention, interventions have the best effects when delivered: 1) over a short space of time; 2) to students later in their undergraduate education and; 3) to female students. This should be taken into account when designing and delivering interventions. Emphasising the importance of empathetic qualities, such as empathetic communication style should be made explicit during teaching.

Introduction

What is emotional intelligence?

In addition to research into psychometric intelligence, interest in assessing and measuring non-cognitive, socially competent behaviour (Moss and Hunt, 1927) has been ongoing since the early 20th century. The term social intelligence was used to describe the skill of understanding and managing other people to facilitate social interaction processes (Thorndike, 1920, Hunt, 1928). This concept received limited support and research interest until 1990, when it was re-named emotional intelligence (EI) by Mayer and Salovey (Salovey and Mayer, 1990). They defined EI as “a type of social intelligence that involves the ability to monitor one’s own and other’s emotions, to discriminate among them, and to use this information to guide one’s own thinking and actions” (Salovey and Mayer, 1990). In 1997, this definition was further developed by Mayer et al as “the ability to perceive emotion, integrate emotion to facilitate thought, understand emotions, and to regulate emotions to promote personal growth”. Davies et al. (Davies and Stankov, 1998) argued that EI was an abstract concept, and proposed that EI refers to four salient constructs: appraisal and expression of emotion in oneself; appraisal and recognition of emotion in others; regulation of emotion in oneself; and the use of emotion to facilitate performance. Law et al. (Law et al., 2004) further clarified the concept of EI by defining EI as an attribute separate from the Big Five personality dimensions (Costa and McCrae, 1985) of openness, conscientiousness, extraversion, agreeableness and neuroticism. He went on to say that EI is a feature of intelligence, loosely proportional to general mental abilities, which increases with age and past experiences, due to its developmental nature (Law et al., 2004).

Description of main models of EI:

EI was conceptualised by Mayer and Salovey (Salovey and Mayer, 1990) as comprising three major components:

1. The appraisal and expression of emotion in oneself and others.
2. The regulation of emotion in the self and others.
3. The utilization of emotion.

The first component encompasses the skills to perceive and correctly identify particular emotions expressed either verbally and/ or non-verbally, and to provide socially adaptive responses to others emotions e.g. empathy. The second aspect refers to moods which are usually thought of as being less strong than emotions, although longer lasting. The capacity to 'lift' one's own mood or others is clearly positive in many circumstances, and the third component relates to employing emotions to achieve goals i.e. using 'controlled aggression' in sporting endeavours.

Three main models of EI have now been proposed (Spielberger, 2004): the ability model, the mixed model and the trait model. The ability model, by Salovey and Mayer (Salovey and Mayer, 1990), defines EI as a set of 4 distinct yet related abilities: perceiving emotions, using emotions, understanding emotions and managing emotions. Mixed models include those proposed by Goleman (Goleman, 1998) and Bar-On (1997). Goleman's model (Goleman, 1998) views EI as a wide array of competencies and skills that drive managerial performance with five dimensions that are categorised into two areas i.e. personal competence (self-awareness, self-regulation, motivation) and social competence (empathy and social skills). The Bar-On model (Bar-On, 1997) also has five dimensions: intrapersonal, interpersonal, stress management, adaptability, and general mood which encompass mental abilities and a

wide range of personal qualities, such as optimism, independence and happiness. Finally, the trait model (Petrides et al., 2007) proposes that trait EI is “a constellation of emotion-related self-perceptions located at the lower end of personality”, and this model comprises 15 facets that range from adaptability to emotions and traits such as optimism. These models are summarised in Table 1, below.

Table 1: Summary of the main models of EI

<p>Mayer and Salovey: Four-branch Model of EI</p>	<ul style="list-style-type: none"> • Perception of emotion (Branch 1) • Use of emotion to facilitate thinking (Branch 2) • Understanding of emotion (Branch 3) • Management of emotion (Branch 4)
<p>Goleman’s Five Dimensional Model of EI</p>	<ul style="list-style-type: none"> • Self-awareness (Emotional Awareness, Accurate Self-Assessment, Self-Confidence) • Self-regulation (Self-Control, Trustworthiness, Conscientiousness, Adaptability, Innovation) • Motivation (Achievement Drive, Commitment, Initiative, Optimism) • Empathy (Understanding Others, Developing Others, Service Orientation, Leveraging Diversity, Political Awareness) • Social Skills (Influence, Communication, Conflict Management, Leadership, Change Catalyst, Building Bonds, Collaboration and Cooperation, Team Capabilities)
<p>Bar-On’s EQ-i</p>	<ul style="list-style-type: none"> • Intrapersonal (Self-Regard, Emotional Self-Awareness,

Model of EI	<p>Assertiveness, Independence, Self-Actualization)</p> <ul style="list-style-type: none"> • Interpersonal (Empathy, Social Responsibility, Interpersonal Relationship) • Stress Management (Stress Tolerance, Impulse Control) • Adaptability (Reality-Testing, Flexibility, Problem-Solving) • General Mood (Optimism, Happiness)
Petrides' Trait Model of EI	<ul style="list-style-type: none"> • Adaptability • Assertiveness • Emotion perception (self and others), expression, management (others) and regulation • Impulsiveness (low) • Relationships • Self-esteem and self-motivation • Social awareness • Stress management <p>Trait empathy, happiness and optimism</p>

Measurement of Emotional Intelligence

The conceptualisation of EI results in implications for quantifying levels of EI, and measures of EI generally fall into two categories- put simply, these are those requiring respondents to answer questions about problem solving ability (the trait and mixed model approach), and actually solve problems (the ability model approach). If EI can be classed as an ability, as advocated by Mayer et al. (Mayer and Salovey, 1997), and seen in that respect to be similar to general intelligence, then accurate and reliable measurement should be possible. Mayer et

al. (Mayer et al., 2002) propose EI to be measured using the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT), an ability based measure of EI, measuring abilities to perceive, facilitate, understand and manage emotions in oneself and others, such as recognition of emotion in faces. When scored, the MSCEIT produces fifteen main scores: the total EI score (or Quotient, EIQ), two Area scores, four Branch scores and eight Task scores. In order for meaningful data interpretation, the participants' raw scores are converted by the test publishers, based on either expert or consensus scoring of items. Evidence for the scale's validity has been obtained through examinations of its correlation with related scales and with outcomes theoretically linked to EI (Mayer et al., 2002), yet the MSCEIT has been criticised for being a knowledge test, rather than a true test of ability.

It has been suggested, by Zeidner et al. (Zeidner et al., 2008), that ability based tests of emotional intelligence (such as the MSCEIT, particularly the Branch of Understanding Emotion) measure emotional knowledge, which in turn is related to crystallised intelligence (Ciarrochi et al., 2000).

The scales linked to the other models in Table 1 are self-report scales measuring dispositional tendencies, so are more similar to personality scales. Bar-On and Goleman's model are both mixed models of EI, thereby adding to the uncertainty of measurement, as both conceptualise EI as a mixture of traits and abilities. Bar-On proposes measurement of EI using the Bar-On Emotional Quotient Inventory (or EQ-i) (Bar-On, 1997), a 133 item self-report measure with a five-point Likert response scale, with EI defined as "an array of non-cognitive capabilities, competencies and skills that influence one's ability to succeed in coping with environmental demands and pressures". By its very definition, a mixed model of EI, cannot be measured with a self-report measure, as traits cannot be measured objectively by self-report alone. Similarly, objective measurement of EI would not be possible if EI is conceptualised as a trait, as proposed by Petrides et al. (Petrides et al., 2007). The validity of emotional

intelligence measures is well summarised by Zeidner et al. (Zeidner et al., 2008), that states that self-report measures, such as the Bar-On EQ-i, have shown to correlate little to none with traditional measures of intelligence (Davies et al., 1998), and correlate strongly with several personality traits (Matthews et al., 2002). From this, it can be speculated that trait and mixed models have questionable discriminant validity (Zeidner et al., 2008). There is also a low correlation between different measures of EI, generally ranging from between 0.20 to 0.30; Perez et al. (Pérez et al., 2005) propose that trait EI instruments instead measure emotional self-efficacy, whereas ability measures measure cognitive-emotional ability.

Each model of EI proposes its own measurement method, thus creating difficulty in comparing results from one model to results from another. However, whilst there are four definite, separate models of EI, there are some common components across the two mixed models and the trait model. For instance, the areas of personal competence in the Goleman model map onto the intrapersonal, stress management and adaptability dimensions of Bar-On's model, and various facets of the Petrides model e.g. impulsiveness, self-esteem etc. Similarly, empathy is mentioned in each model (being conceptualised as trait empathy by Petrides et al. (Petrides et al., 2007), as is the importance of emotional awareness (labelled emotional self-awareness by Bar-On, and emotion perception (self and others) by Petrides et al. (Petrides et al., 2007). Adaptability is also named in each model, falling under the heading of Self-Regulation in Goleman et al.'s model. In addition, stress management is named by both Bar-On and Petrides et al. Table 1 shows in detail the facets of each model, along with a brief expansion of these facets. Using the definition that EI is “a type of social intelligence that involves the ability to monitor one's own and other's emotions, to discriminate among them, and to use this information to guide one's own thinking and actions” (Salovey and

Mayer, 1990), it is apparent that many aspects of behaviour map onto this construct e.g. empathy and responsiveness towards patients' views in consultations. It is therefore important not to limit outcome measures when considering studies that may look at EI in differing ways.

It is important to conceptualise what is being discussed in this review when 'emotional intelligence' is referred to, as there are various different definitions, models and measurement methods of EI (as discussed previously) which can lead to confusion as to the underlying principles.

Emotional intelligence, put plainly, is a type of social intelligence. It consists of the ability to manage your own and other's emotions in your day to day life, and to use this information to inform your thinking and behaviour. It is a characteristic, similar to other constructs such as reasoning, thinking and conscientiousness, which can be used to differentiate between individuals.

In this review, EI is defined as the characteristics that best equip an individual for successful social and personal interactions, and EI is considered to contain several components which we feel are necessary aspects of this. These include: empathy (broadly be defined as the capability to share another's emotions and feelings); mindfulness (broadly defined as an awareness of one's body functions, feelings and consciousness); empathetic communication style (the ability communicate appropriate reactions to others' emotions and feelings); compassion (defined as awareness of the suffering of others, and a desire to relieve it); and sensitivity (defined as the ability to react appropriately to the emotions or situations of other people).

EI within medical education

Historically, to maximise the objectivity of treatment, doctors have been traditionally advised to maintain a professional distance from their patients. The nature of doctors' work is such that they work in a fluctuating, unpredictable climate, with collaboration and team working regularly required to solve diverse problems.

However, there exists a recent shift towards recognition of the importance of emotional intelligence within medical education (Lewis et al., 2005), particularly as an attribute in fostering the patient-doctor relationship. One facet of this relationship, effective patient-provider communication (PPC), can be conceptualised as an interaction whereby a doctor allows medical consultations to be patient led. This allows for patient autonomy, a concept which may lead to more effective treatment adherence and better outcomes for patient.

Heralded throughout medical education research, this 'patient centred approach' has been identified as a central value in medical communication. Multiple studies of practicing doctors have investigated and identified the factors associated with effective communication (Maguire and Pitceathly, 2002). For example, Giron et al. (Giron et al., 1998) found that doctors' ability to listen and ask psychosocially relevant questions is associated with identification of the patients' emotional problems, independent of the age, gender and experience of the doctor in question.

The General Medical Council (2009) sets out effective communication with patients and colleagues as a key outcome for graduates in Tomorrow's Doctors. In addition, doctors' interpersonal communication skills have been identified as one of six areas of professional competence for doctors by the Accreditation Council for Graduate Medical Education (AACME) in the USA, with EI included as an assessment item under moral/affective dimension (Epstein and Hundert, 2002). The importance of effective communication for

practicing physicians has been identified in other national codes such as CANMED in Canada (which groups communication under one of the seven groups of competencies for practicing physicians (2005)) and the Australian Medical Council (AMC).

It is apparent throughout the literature that predictors of effective patient-doctor relationships are well researched, yet little research has assessed the association between EI and the patient-doctor relationship. Research by Wagner et al. (Wagner et al., 2002) and Weng et al. (Weng et al., 2008) found weak links between doctors' EI and patient outcomes. Wagner et al. (2002) found only one subscale of EI related to higher patient education, the 'happiness' subscale of the Bar-On EQ-i whereas Weng et al. (Weng et al., 2008) found that doctors' self-rated EI was not correlated with any variables related to patient trust by patients. More research is needed to assess this relationship, both in undergraduate and postgraduate medical professionals.

Guidelines about essential skills for medical graduates have been created by the medical regulatory bodies, such as the GMC, the AACM, the AMC and CANMEDS. These guidelines encompass intrapersonal, interpersonal and professional skills and attributes. As a result, patient-centred skills are gaining increasing recognition as important aspects of medical education curricula (Brown and Bylund, 2008, 2009). Recently, literature has begun to assess the importance of developing EI in medical students prior to graduation (McMullen, 2003). However, there exists a debate in the literature as to the impact of EI training in medical students. Kasman et al. (Kasman et al., 2003) have argued that it is important to gain a fuller understanding of patients' emotional situations before the improvement of emotional 'competencies'.

It has been indicated that training in communication skills leads to a decrease in anxiety by students regarding communication with patients, although anxiety still remains when faced with patients who are crying or in emotional distress (Hajek et al., 2000). It is therefore important to consider how communication skills training, in particular the role of emotional intelligence and empathy training, is translated and applied by medical students. Austin et al. (Austin et al., 2005) found that medical students who had higher emotional intelligence reported more positive feelings about a communication skills exercise, and other studies have reported similar findings.

Re-conceptualisation of EI as the “sensitive and intelligent problem-solving activities emerging from deliberate, structured group learning” (Lewis et al., 2005) may therefore make it more relevant to undergraduate and postgraduate medical education.

Research within medical education has suggested using EI as a means of assessing levels of professional competence within the affective/moral dimension (Epstein and Hundert, 2002). Stratton et al. (Stratton et al., 2005) found that facets of EI were related to simulated patient satisfaction scores in Objective Structured Clinical Examinations (OSCEs), indicating the importance of evaluating EI training within medical education research.

There exists a large body of literature pertaining to interventions to improve EI in medical students, despite research indicating that effective training in the ability to manage emotions is difficult within undergraduate medical education (Sade et al., 1985).

Previous work into the teaching of interviewing skills (Evans et al., 1989) indicates that some skills are easily taught, whilst other skills, based on higher level understanding, are not.

‘Structural’ interviewing skills (such as use of wide ranging questions and clear

communication) appear to be easily ascertained, whilst skills such as the use of empathy in responding to distressed patients do not.

Using this framework, it can be speculated that EI related directly to the competency of interpersonal and communication skills is important in the assessment and training of medical undergraduates and practicing healthcare professionals. Initially, these skills may seem a reflection of personality, yet accurate management and reading of emotions is necessary to learn and demonstrate these skills properly.

Researchers have begun to assess the importance of interpersonal EI (such as empathy) in patient encounters, with increasing recognition of the importance of intrapersonal EI, particularly when dealing with stress. EI, as a construct, can easily be mapped onto Hilton and Slotnick's (Hilton and Slotnick, 2005) six domains of professionalism, with intrapersonal skills reflecting the personal, or intrinsic, attributes of professionals, and interpersonal skills reflecting the co-operative attributes of professionals. The benefit, therefore, of recruiting emotionally intelligent individuals to undertake undergraduate training is apparent.

However, medical schools receive large amounts of applicants each year, all with uniformly high academic achievements. With each medical student in the UK currently costing approximately £200000 to train (Brown and Bylund, 2008), it is essential that selection methods are robust and reflect the skills and attributes laid out by regulatory bodies. In the USA, assessment of EI has been integrated as part of the selection process in some medical schools, in an attempt to consider competency in interpersonal skills (Carrothers et al., 2000, Elam, 2000). Despite the use of EI as a selection measure, at present little research has been conducted on medical students' EI. There is a growing need to thoroughly understand the role

of EI in being an effective physician, in order to ensure that the admissions process selects the right type of student.

The use of EI within a medical setting was questioned by Lewis et al. (Lewis et al., 2005), with concerns being raised about the construct validity and psychometric properties of scales. From the research, the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) (Mayer et al., 2002), an ability based assessment of EI, has been suggested as a consistent and preferred measure of EI (Spector, 2005), that has a strong internal validity (Daus and Ashkanasy, 2005).

It is evident that more research is needed to assess the role of EI, if any, within the medical school selection process.

A systematic review has already been undertaken evaluating emotion skills training in medical students (Sattersfield and Hughes, 2007), and this review builds on this work by assessing outcomes of studies at several levels. This has been done in line with Best Evidence Medical Education guidelines, and used Kirkpatrick's 1967 model of hierarchical outcomes to assess the effectiveness of educational interventions.

This systematic review therefore aimed to assess the impact of educational sessions to improve EI in medical students, and aimed to give a theoretical background to the study of behavioural change with regards to facets of EI. The present selection process is based on cognitive ability alone, therefore it is be valuable to consider methods of improving emotional intelligence in medical students and their effectiveness, particularly given the research suggesting the importance of EI in medicine.

Objectives

The objective of this review was to inform medical and healthcare professionals, trainers, educationalists and educational researchers of the impact of structured training sessions to improve emotional intelligence medical students. To evaluate this, we looked at changes in the emotional development of medical students. Please see below for a more detailed summary of outcome measures considered.

Review Question

Following in-group discussion, and feedback from the BEME steering committee, we addressed the following review question:

What impact do structured educational sessions to increase emotional intelligence have on medical students?

In addition, we also explored the following questions:

- What are the effects of individual features of emotional intelligence training courses on the behaviour of medical students?
- What features characterise the emotional intelligence educational interventions?
- What are the methodological strengths and weaknesses of the reported studies?
- What are the implications of this review for service delivery, the teacher or trainer, the medical education researcher and for ongoing research in this area?

The review followed similar methodology to that used in a previously completed BEME systematic review by some members of the group (Cherry et al., 2010).

Review Methodology

Group Formation

A Topic Review Group (TRG) was formed comprising members of the Centre for Excellence in Evidence Based Learning and Teaching (CEEBLT) at the University of Liverpool, the Division of Clinical Psychology at the University of Liverpool and Mersey Deanery NHS North West. This collaboration was selected to maximise expertise in both educational research methodology and practising clinical experience. The TRG consisted of one practising clinician, and three research active members of University staff.

Pilot Process

In order to prepare for the BEME systematic review, a pilot process was undertaken. This was intended to determine the scope of the review, size of background literature, to refine the review question and to determine if adaptation of the BEME Coding Sheet (www.bemecollaboration.org/) would be suitable for use in the review.

Preliminary literature search

A scoping literature search was carried out to determine the size of background literature pertaining to the review topic and to develop a potential, encompassing search strategy for use in the final electronic literature searches.

This search was undertaken in July 2009, across Medline. Medline was chosen as it was expected that Medline would have the largest body of literature relating to emotional intelligence and the most relevant publications. Ovid Medline was used to determine MeSH

search terms, and subject headings of relevant articles were examined to further develop the search strategy.

A total of 2012 articles were retrieved as a result of this search, of which the first 200 were screened for eligibility by the lead reviewer. It was apparent that the search strategy needed refinement, and as a result a new search strategy was established and piloted. The new strategy incorporated key phrases and additional subject headings found by examination of relevant studies, and when piloted yielded 1947 studies. This strategy is summarised on the BEME website (www.bemecollaboration.org/), and forms the basis of the search used in the final review search. Following this search, two reviewers from the project reviewed the titles and abstracts of the first 200 of the 1947 articles identified by the search. This enabled confirmation that the lead reviewer had an appropriate balance of sensitivity and specificity for relevant evidence which could not be improved by second-screening, and that this researcher alone was able to select articles for further consideration from the main search.

Preliminary pilot of coding sheet

Members of the TRG met to discuss the suitability of the BEME Coding Sheet by piloting it on a number of studies fulfilling the inclusion criteria for review. It became apparent that there was enormous diversity in reporting style and details, and it therefore would not be appropriate at this stage to produce a simple categorical tool to extract data. A more comprehensive sheet was required, with more flexibility to report data as presented. A second coding sheet was devised with free-text reporting boxes for this purpose. This is provided on the BEME website (www.bemecollaboration.org/).

The following inclusion and exclusion criteria were used:

Types of intervention

An educational intervention to improve emotional intelligence was, for the purpose of this review, defined as a structured educational process intended to increase, improve or enhance the performance of the recipients with regards to the assessment of competence in perceived improvements in health or well being of their future patients. Interventions considered for this review included, but were not limited to: courses; lectures; simulations; small group learning session(s); e-learning, curriculum-based learning; shadowing / mentoring; workshops and learning through educational material such as media, posters, handouts and other paper material.

Interventions must have been both structured and educational in their nature to be included in this review.

Types of participants

This review focuses on the delivery of educational interventions relating to the emotional intelligence of medical students. Participants were any students undertaking undergraduate medical training.

It was deemed likely that the effectiveness of educational interventions targeting doctors would be different to those targeting solely medical students. Given that the differing programmes to target medical students were already diverse in their delivery, it was agreed by the TRG that adding another comparator would complicate the report. All studies that did not focus on medical students were therefore excluded. Where studies had focused both on educational interventions delivered to doctors and medical students, only the results of the

medical student intervention were reported and considered. If results were not reported separately from that of the doctors, the study was excluded.

Study design

Comparative (cross-sectional research, before and after studies, time series studies, non-randomised trials, randomised controlled trials, group randomised trials, case control trials and cohort studies) research designs were considered for inclusion. General review articles and editorials were not considered but their reference lists were scanned to check all relevant materials are included.

Comparators

Studies with comparators were considered for inclusion in the review, including but not limited to use of a control group (e.g. students not receiving interventions), a differing educational intervention and use of differing student groups.

Table 2: Inclusion Criteria

Inclusion criteria	
Study design	<ul style="list-style-type: none"> • All study designs considered. • Studies conducted and published from 1990 onwards included.
Population	<ul style="list-style-type: none"> • Undergraduate medical students OR • Contained medical students in addition to other participants, for which results were recorded separately.
Educational Intervention	<ul style="list-style-type: none"> • Content documentable and repeatable. • Interventions run over defined time period. • Interventions designed to change EI or measures such as empathy, communication,

	compassion, mindfulness and sensitivity.
Comparator	<ul style="list-style-type: none"> Any, including but not limited to use of a control group, a differing educational intervention and use of differing student groups.
Outcome Measures	<ul style="list-style-type: none"> At least one outcome measure of EI. Measured using Kirkpatrick's hierarchy (Kirkpatrick, 1967)

Table 3: Exclusion Criteria

Exclusion criteria	
Study design	<ul style="list-style-type: none"> Reviews and systematic reviews. Studies published before 1990, or in which the study period was prior to 1990.
Population	<ul style="list-style-type: none"> All studies not focusing solely on medical students, including studies using doctors as sole participants. Studies where results of inclusion medical student groups could not be distinguished from exclusion healthcare professional groups.
Educational Intervention	<ul style="list-style-type: none"> Interventions not educational in content.
Comparator	<ul style="list-style-type: none"> No exclusion criteria applied.
Outcome Measures	<ul style="list-style-type: none"> No recorded outcome measure of EI

Outcome measures of study

For the purpose of the review we chose to define EI as the characteristics that best equip an individual for successful social and personal interactions. These include empathy, mindfulness, empathetic communication style, compassion and sensitivity when interacting with simulated or real patients. Throughout this review, these outcome measures were referred to under the umbrella term of 'emotional intelligence' Models of EI propose additional components, such as adaptability and self-management (Bar-On, 1997), which we agree are important components of successful interactions. However, for the purpose of this

review we chose to define EI and expand this definition only to include qualities directly related to emotional management and interaction, which can be clearly conceptualised in the literature.

The outcome measures were informed by our pilot review. Initially, only the term “emotional intelligence” was considered, but this narrowed the scope of the review too greatly, and it was felt that expanding the term ‘emotional intelligence’ would provide a more complex and in-depth overview of the effectiveness of interventions to improve EI in medical students. It is possible that such an additive view may lead to difficulty in interpretation of study findings, but due to the scarcity of published literature on interventions to specifically improve emotional intelligence, a narrower focus would yield little data. The literature demonstrates fluidity to the definition and measurement of emotional intelligence, therefore using a more expansive search in this review means that findings may still be informative, even if definitions of EI change.

For the purpose of this review, we chose not to limit our findings to one model, and therefore definition and method of measurement, of EI. This was important, particularly as EI was first conceptualised only in 1990, and the definition of EI is regularly being modified as new models and research becomes published. Both self-report measures of outcomes, such as EI scales, and observed change in outcome measures were considered.

Assessment of outcome measures

These will be based on modified Kirkpatrick's 1967 model of hierarchical outcomes at four levels, as illustrated in Table 4. Additional predetermined or secondary outcome measures were also accepted and recorded. Kirkpatrick's hierarchy has been selected to provide a more comprehensive evaluation, in order to inform this review's development. This model has been used by other BEME review groups (Issenberg et al., 2005) and, once modified, fits the outcome measures of the review.

Level 1: Reaction

This covers learner's views on the delivery and content of the educational intervention. This may take the form of verbal or written feedback immediately after the delivery of the intervention, and includes learner's views on presentation, organisation, content, teaching methods, time-tabling, materials used and quality of teaching.

Level 2a: Modification of attitudes and perceptions

This relates to any changes in reciprocal attitudes or perceptions between participant groups. This includes any changes in perceptions or attitudes by participants towards the value and/or use of the taught approach to caring for patients, and their condition, circumstances, care and treatment.

Level 2b: Acquisition of knowledge and skills

For knowledge, this relates to the acquisition of concepts, procedures and principles of emotional intelligence as a direct result of the delivery of the educational intervention.

For skills, this relates to the acquisition of thinking/problem-solving, psychomotor and social skills linked to emotional intelligence as a direct result of the delivery of the educational intervention.

Table 4

*Kirkpatrick's
Hierarchy(Kirkpatrick, 1967)*

Level 3: Behavioural change

This relates to the transfer of emotional intelligence to the workplace, such as support for change in behaviour in the workplace, or willingness of learners to apply knowledge and skills about emotional intelligence, obtained as a direct result of the delivery of the educational intervention, to their practice style.

Level 4a: Change in organisational practice

This relates to wider changes in the organisation/delivery of care, attributable to the delivery of an education intervention. These changes may be financial or organisational.

Level 4b: Benefits to patients / clients, families and communities

This relates to any improvements in the health and well being of patients as a direct result of the delivery of an educational intervention. Where possible, objectively measured or self reported outcomes will be used. These outcomes will be determined by the literature found.

Table 4

*Kirkpatrick's
Hierarchy(Kirkpatrick, 1967)*

Search Strategy

A comprehensive search was conducted to determine the body of literature pertaining to the review question across all sources relevant to healthcare education and best practise in an undergraduate and clinical context. This search was divided into two sections - an electronic search of relevant health and educational databases, and augmentation of this search using various methods. These will be summarised in detail below.

Searching of literature base

A comprehensive electronic search was carried out in November 2009.

In total, 14 electronic databases were searched. These were chosen to span clinical and educational databases, and are listed on the BEME website (www.bemecollaboration.org/), along with the individual search strategies used for each. The initial, piloted strategy pertains to Medline, and was adapted for each database to reflect minor modifications specific to their vocabulary or search terms. Natural language terms were derived for those databases that did not recognise MeSH search headings, such as the National Research Register and Web of Science, and were based on synonyms of a combination of three relevant components: EI, medical students and educational interventions.

Medline records were substituted for duplicated records from other databases when identified due to their standardisation and level of detail. A total of 2419 studies were retrieved, producing 1947 studies once de-duplicated. Only original research findings were included in the search - editorials and essays were excluded.

A two-stage process was employed to retrieve relevant articles. The lead reviewer (GC) and one other member of the review team initially screened all titles and abstracts, and eliminated all studies not relating to educational interventions to improve EI. Any discrepancies were

discussed with another member of the review team, and a decision was reached. This resulted in 36 studies for which full text was obtained for all, 1.8% of the initial cohort.

A subsequent hand search of high yield journals was carried out (see the BEME website (www.bemecollaboration.org/) for full list of journals hand searched), followed by a search of reference lists of all full-text studies, and hand search of the researcher's own files. This yielded a subsequent 11 studies, and cross-checking with the results of the electronic searching confirmed receipt of these studies in the initial electronic cohort.

These 36 full-text studies were independently reviewed by two members of the review team, seeking consensus from a third member when opinion as to suitability was divided. From this, 15 studies were identified as fulfilling all inclusion criteria and therefore suitable for inclusion in the review.

It cannot be said for certain that all relevant, high quality published material was obtained through the combination of electronic searching and hand searching of journals selected as the most likely robust publishers of related material. However, knowledge within the field of emotional intelligence, together with continued monitoring of evidence bases has led us to conclude that this review will encompass as much published material as possible to answer the review question based on the best available evidence, using systematic processes.

Quality assessment

Each full-text paper was read and quality assessed. We used a quality assessment checklist to supplement the coding sheet. A categorical method of assessment was used to incorporate both study design and quality of results.

This method of assessment yielded a quality assessment score for each paper from between 2 and 9. No study was excluded from the review based solely on quality assessment score. The tool used is summarised on the BEME website (www.bemecollaboration.org/).

Coding

Each full text paper was coded by a member of the review team. A random sample of 20% of studies was doubly coded to ensure that appropriate, consistent and matching data were collected. Data collected were entered into Microsoft Excel.

Review analysis

Description of studies

Fourteen studies met the criteria for inclusion in this review. Included studies are summarised in tables 5 and 6. Of these studies, five were conducted in the USA (Henry-Tillman et al., 2008, Knight et al., 1992, Shapiro et al., 2004, Shapiro et al., 2005), four were conducted in Australia (Evans et al., 1993, Farnill et al., 1997, Moorhead and Winefield, 1991, Winefield and Chur-Hanswn, 2000), two were conducted in the UK (Fletcher et al., 2009, Lancaster et al., 2002), and one each in Canada (Craig, 1992), Sweden (Holm and Aspegren, 1999), Spain (Fernandez-Olano et al., 2008) and Turkey (Harlak et al., 2008).

Five studies used first year medical students as participants (Craig, 1992, Harlak et al., 2008, Henry-Tillman et al., 2008, Shapiro et al., 2004, Winefield and Chur-Hanswn, 2000), four used fourth year medical students (Evans et al., 1993, Knight et al., 1992, Lancaster et al., 2002, Moorhead and Winefield, 1991), two studies used second year medical students (Farnill et al., 1997, Fernandez-Olano et al., 2008), one study used third and fourth year medical students (Shapiro et al., 2005), and one each used third year medical students (Fletcher et al., 2009) and students in a mixture of years (Holm and Aspegren, 1999).

For the purpose of the review we chose to define EI as the characteristics that best equip an individual for successful social and personal interactions. These include empathy (broadly defined as the capability to share another's emotions and feelings); mindfulness (broadly defined as an awareness of one's body functions, feelings and consciousness); empathetic communication style (the ability communicate appropriate reactions to others' emotions and feelings); compassion (defined as awareness of the suffering of others, and a desire to relieve it); and sensitivity (defined as the ability to react appropriately to the emotions or situations of other people). Throughout this review, these outcome measures were referred to under the umbrella term of 'emotional intelligence'.

Assessment of outcome measures was based on Kirkpatrick's modified 1967 model of hierarchical outcomes. This model evaluates the impact of an educational intervention using four levels: Level 1 (Reaction of the learner to the delivery and content of the educational intervention); Level 2a (Modification of attitudes and perceptions as a result of the intervention) and Level 2b (Acquisition of knowledge and skills as a result of the intervention); Level 3 (Behavioural change); Level 4a (Change in organisational practice) and Level 4b (Benefits to patients / clients, families and communities). Studies reporting only Kirkpatrick level 1 (reaction to intervention) were excluded (see the BEME website (www.bemecollaboration.org/) for excluded studies). As participants were students, no assessment considered change in organisational practice or benefits to patients / clients, families and communities (level 4).

Studies using level 2a as an outcome measure

Thirteen of the fourteen studies (Craig, 1992, Evans et al., 1993, Farnill et al., 1997, Fernandez-Olano et al., 2008, Fletcher et al., 2009, Harlak et al., 2008, Henry-Tillman et al., 2008, Knight et al., 1992, Lancaster et al., 2002, Moorhead and Winefield, 1991, Shapiro et al., 2004, Shapiro et al., 2005, Winefield and Chur-Hanswn, 2000) measured a change in medical students' attitudes with regards to EI (level 2a). Of these, four used in-house questionnaires to measure change in self-reported EI, and the remainder used validated questionnaires together with either focus groups, written evaluations with debriefing sessions or nominal group technique- free text questions or focus groups. The characteristics and results of these studies are summarised in Table 2.

The combined results of these level 2a studies suggest that interventions that aim to improve attitudes around EI/empathy seem to benefit females more than males, as five of the thirteen studies report that females increased significantly more than males (Fernandez-Olano et al., 2008, Harlak et al., 2008, Holm and Aspegren, 1999, Shapiro et al., 2004, Winefield and Chur-Hanswn, 2000). Interventions that are introduced later in the course appear to have a more beneficial effect than those introduced with early year students. Similarly, the use of simulated patients appears to be more beneficial to later rather than early year students. Several interventions emphasised empathetic behaviour, particularly when communicating, and these interventions appeared to have a positive effect on attitude change.

Studies using level 3 as an outcome

Three studies measured observation of behavioural change in medical students' EI (level 3), and all used coding tools to rate EI from videotaped simulated scenarios. The characteristics and results of these studies are described in Table 2.

The combined results of these level 3 studies indicate that there may be a decline in EI/empathy over the course of undergraduate medical education. Interventions such as those

reported above may not be effective in improving and sustaining EI over the course.

Interpreting the results of these interventions is difficult, as they are not clearly defined.

However, interventions seem to be most effective when targeted at students in later years, indicating that they may have more of an effect on more mature students. However, it is not clear if they are consistently effective.

Outcome measures

Table 5- Description of included studies

Author	Focus of intervention	Main outcome measure	Intervention duration/frequency	Main findings	Other notes	Quality score
Craig 1992	Effective communication and empathy	In-house checklist of videotaped interviews	30 hours, freq. not stated	Both groups demonstrated a significant decline in empathy scores in third and fourth year (p=0.001) from first year.	Compared intervention group with control group longitudinally	6
Evans 1993	Effective communication and empathy	History-taking rating scale (Evans et al., 1989)- rating of videoed OSCEs	Not stated	No statistically significant difference in empathy scores between participants who had received communication skills training and those who had not. Cohort 1 (no training): 2.7/4, Cohort 2 (training) 2.6/4. p=0.471	Compared Cohort 1 (no training) with Cohort 2 (communication skills training)	7
Farnill 1997	Psychosocial interviewing techniques, with empathy outcomes:	i) Volunteers completed questionnaire (not standard). Ii) Students completed evaluation of own performance questionnaire (not standard). Iii) Videotaped interviews rated by psychologist experienced in comm. skill teaching (not standardised). "empathetic responding to content and	7 months- 16 sessions of 1 hour	Students were significantly more competent in their second interview than in their first (based on video ratings, p<0.01), Scale assessing facilitation of emotional expression showed no improvement (rated by video tape analysis) although students rated themselves are more competent than pre-intervention (pre intervention rating 2.7/5, post intervention rating 3.7/5). No real change in volunteers' ratings of empathetic responding (2.8/5 pre, 3.0/5		7

		feeling"		post).		
Fernandez Olano 2008	Empathy	Jefferson Scale of Physician Empathy	25 hours- 5 days of 5 hour sessions	Experimental group significantly increased in empathy ($p < 0.02$), from 120.5 (9.1) to 124.5 (7.58). Control group also significantly increased ($p < 0.02$), from 118.4 (3.1) to 119.9 (3.7) but ended with lower mean than experimental group. Data taken from students only.		6
Fletcher 2009	Emotional intelligence	Bar-On EQ-i	7 months- once monthly for 4 hours	Statistically significant difference between groups post intervention but not at baseline. Intervention group scored significantly higher on EQ-i post intervention.		5
Harlak 2008	Empathy and communication skills	Communication Skills Attitudes Scale (CSAS) and Empathic Tendencies Scale (ETS)	1 academic year (30 hours)- freq. not stated	In pre test, 49% had positive attitudes towards communication skills (CS) learning (grouped as PAG, and remainder as NAG), and 59% had higher empathic tendencies (grouped as HEG, and remainder as LEG). Post intervention, PAG had significantly decreased attitudes towards empathy, but no change in NAG. In HEG, empathy scores did not change significantly, but empathic tendency in LEG significantly increased. Females had higher mean scores than males in CSAS and ETS pre and post tests.		7

Henry Tillman 2002	Empathy	Small group reflection. 13 item survey measuring knowledge of empathic communication techniques administered pre and post intervention	13 afternoons	Focus group results: "most said yes when asked if they had developed empathy for the patient". No statistically significant differences in pre and post test of empathy (but reportedly due to high levels at pre test)		7
Holm 1999	Empathy	Affect Reading Scale	Not stated	Hospital factors accounted for significant proportion of variance. Students in 6th term had significantly higher score than students in the 1st term. In 8th term scores differed between hospitals. PBL hospital had no difference in scores between 8th term and 6th term students, but traditional teaching hospital 8th term students had significantly lower scores than 6th term students.	Different hospital placements compared in 8th term. Compared students from different years	5
Knight 1992	Awareness, sensitivity and clinical skills in dealing with the terminally ill	In-house questionnaire	16 hours- 4 half days	Statistically significant increases pre to post intervention in 8 of the 9 items concerning hospice concepts. Changes in attitudes positively in 4 of the 7 items concerning hospice rotation. Statistically significant changes in 5 of the 7 items concerning palliative care.		7
Lancaster 2002	Empathy	Nominal group technique-free text responses to questions, focus group, axial coding of responses	4 weeks- 13 seminars of 2 hours, plus trips to theatre and museums and individual tutorials	Reported that they had increased empathy for patients, increased interpersonal skills, reduced presumption towards patients, empathy for other medical professionals	No detail about numbers of participants or baseline measures	8

Moorhead 1991	Improving counselling, interpersonal and history taking skills	Empathy Rating Scale (ERS)	1 week (3 hours, then 1.5 hours, then 10 hours)	No statistically significant increase in individual empathy scores from pre to post test (average scores 12.6 and 12.8 respectively)		7
Shapiro 2004	Empathy and attitudes	Empathy Construct Rating Scale (ECRS), Balanced Emotional Empathy Scale (BEES), 9-item attitude towards humanities measure. Focus groups with 3 main questions.	8 sessions of 1 hour	Qualitative comments indicated students had changed behaviour with regards to looking at patient situations Identical groups at baseline. Female students, Asian students and student planning to enter primary care showed significantly more empathy post intervention (BEES). Statistically significant pre to post intervention increases on attitudes towards humanities scale and BEES	Students either received immediate participation in intervention or were wait-listed, forming 2 groups for comparison	8
Shapiro 2005	Empathy	In-house questionnaire	Not stated	Third of students completing RASH notes increased the likelihood that they would express empathy for the patient. COLD condition- 80% reported that the reading increased some dimension of empathy for the patient. Breast cancer poem- 30% reported that poem increased their empathy for patient moderately, and 60% reported it increased their empathy a great deal. Students reading 3 station specific poems rated the poems' ability to increase empathy significantly higher than their helpfulness in influencing treatment.	Compared poems and readings.	7

Winefield 2000	Effective communication and empathy	10 item empathy scale by Danish and Hauer	2 1.5 hour workshops, a week apart then 1 hour interview	Pre intervention empathy score 9.97 (2.7). Post intervention empathy score 14.44 (6.77). Significant improvement in empathy scores ($p < 0.001$). Females scored significantly higher than males post intervention (15.95 6.69 vs. 12.86 6.79, $p < 0.05$). Neither sex improved more than the other. 36.5% improved, 33.3% improved a little and 30.2% did not improve at all or decreased.	Assessment was part of summative OSCE	8
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Table 6- included studies continued

Author	Location	Participant group	Mean age	Number (final n/start n)	Intervention duration/frequency
Craig 1992	Canada	First year medical students	-	26/31- 15 intervention, 11 control	30 hours, freq. not stated
Evans 1993	Australia	Fourth year medical students (first clinical year)- two cohorts studied	Cohort 1: 21.9, Cohort 2: 22.3	Cohort 1: 49/54 Cohort 2: 45/52	Not stated
Farnill 1997	Australia	Second year medical students	21.1 (18-33)	60	7 months- 16 sessions of 1 hour
Fernandez Olano 2008	Spain	second year medical students (plus residents)		137, 82 experimental, 55 control	25 hours- 5 days of 5 hour sessions
Fletcher 2009	UK	Third year medical students	21.1 (2.0) - intervention group. 24.4 (2.4)- control group	70 , 25 intervention, 36 control	7 months- once monthly for 4 hours
Harlak 2008	Turkey	First year medical students		59/70	1 academic year (30 hours)- freq. not stated
Henry Tillman 2002	USA	First year medical students	-	87	13 afternoons
Holm 1999	Sweden	Medical students, in first, sixth and eighth term	-	240/286,	Not stated
Knight 1992	USA	Fourth year medical students		65/76	16 hours- 4 half days
Lancaster 2002	UK	Fourth year medical students	-	Not stated	4 weeks- 13 seminars of 2 hours, plus trips to theatre and museums and individual tutorials
Moorhead 1991	Australia	Fourth year medical students	-	63	1 week (3 hours, then 1.5 hours, then 10 hours)
Shapiro 2004	USA	First year medical students	23.4 (1.9)	22/92	8 sessions of 1 hour
Shapiro 2005	USA	Third and fourth year medical		72/88	Not stated

		students			
Winefield 2000	Australia	First year medical students	18.8 (1.9)	107/115	2 1.5 hour workshops, a week apart then 1 hour interview

Review discussion

Summary of findings:

Fourteen studies were selected for inclusion in this review, a surprisingly low number given the extensive research interest in the measurement and assessment of both professionalism and emotional intelligence, including both interpersonal and intrapersonal dimensions of EI (McMullen, 2003). The literature demonstrates fluidity to the definition and measurement of emotional intelligence, therefore using a more expansive search in this review meant that relevant papers were captured and findings are informative, even if definitions of EI change. Great diversity was found in reporting styles and outcomes used, and despite the patient-centred approach to medicine being widely accepted as central to efficient communication (De Haes, 2006), eight of the fourteen included studies aimed to improve EI using no reported patient contact, with mixed results. Overall, educational interventions to improve EI in medical students were found to have a small, positive effect on attitudes and knowledge. However, most studies considered Kirkpatrick level 2a, which may not be applicable to real-life practice, and as such self-report measures may overestimate the impact of the intervention.

Only three studies considered changes in medical students' behaviour (level 3) as a result of structured EI training courses (Craig, 1992, Evans et al., 1993, Holm and Aspegren, 1999), and very little information as to the replicable details of the interventions were provided. No transferrable and detailed descriptions were provided as to the use of, for example, printed educational materials, demonstrations, small group teaching, lectures or online elements of each intervention. It is therefore not possible from the small number of studies evaluating behavioural change in medical students, and the sparsity of information reported to assess the

effects of individual features of emotional intelligence training courses on behavioural change.

Overall, inconsistencies were evident in methodological reporting and quality, in the 14 studies included in this review. None of the studies reviewed provided an appropriate framework for defining, measuring or understanding emotional intelligence within their work. This resulted in the inclusion in this review of a wide range of EI proxy measures, thus illustrates the problems caused by the broad definition of EI and related constructs within medical education. Many definitions of EI have been proposed, including those by Mayer et al., Goleman, Bar-On and Petrides. It has been suggested by Lewis et al. (Lewis et al., 2005) that some facets of what is currently defined as “EI” may be relevant to medical education due to the nature of doctors’ work; often problems are ill-structured, require collaborative attention and team working, and occur in an uncertain landscape. If EI can be reframed as the “sensitive and intelligent problem-solving activities emerging from deliberate, structured group learning” (Lewis et al., 2005), then it is not difficult to see the relevance of EI to both undergraduate and postgraduate medical education. However, this may mean that the term EI means something different than that postulated by Mayer and Salovey in 1990, and modified in 2000. Further work is needed to achieve clarity amongst researchers as to the true definition of EI and how it should be measured.

No study used the same outcome measure as any other, illustrating the heterogeneity in assessment measures available. It is therefore possible that some, if not all, outcome measures selected by the authors of included studies may not be accurately mapping onto dimensions of EI, but instead may be measuring manifestations of stress or anxiety of students. Research has indicated that many students experience stress associated with academic pressure and

adjustment to a new environment which may manifest as depression or anxiety, leading to mental distress and negative impact on cognitive functioning and effective learning (Saipanish, 2003). First year medical students have been shown to experience high levels of anxiety and depression, which may influence the sensitivity of measures of EI to fluctuating circumstances. In this review, no study considered the mediating effects of well-being on EI measurement, a confound which could potentially alter results. It is therefore essential that, in order to for accurate measurement of EI, tools must be sensitive, generalisable and validated, to allow for adequate determination of baseline attitudes, motivation, EI, measures of well-being and other confounding factors. Further research should also consider the mediating effects of high EI on susceptibility to stress, anxiety and depression, if any.

In order for EI to be a type of intelligence, it must meet three criteria, one of which being that it must develop with age and experience, a concept shown by Mayer et al. (Mayer et al., 1999). Goleman (Goleman, 1995) also hypothesised that EI can be learned, and improves with age, as do Salovey and Mayer, alongside suggesting that emotional knowledge and skills can be enhanced and learned with time. In contrast to these findings, the only study to assess empathy longitudinally ((Craig, 1992); 3 year follow up) showed a decline in empathy over time, post-intervention. The results of this analysis also show no difference in the outcomes of the educational interventions with regards to the age of the participants or their year of medical school. Importantly, of the fourteen studies included in this review, only five studies (Evans et al., 1993, Fernandez-Olano et al., 2008, Fletcher et al., 2009, Holm and Aspegren, 1999, Shapiro et al., 2004) used a control group to assess the effects of the intervention used. As EI has been found to increase with age, the inclusion of control groups may help to establish the effectiveness of interventions. It is possible that any reported change in EI from pre- to post-intervention may simply be due to the time elapsed between measurement points,

and not due to the success (or otherwise) of an intervention. Having a matched group of participants who do not receive the intervention would control for any potential increases in EI, not due to the success of the intervention, over time.

Studies also reported variations in the number of participants studied. Due to the diversity of the study settings, dissimilarity in participant numbers is to be expected, but percentage completion rates vary from 24% (Shapiro et al., 2004) to 93% (Winefield and Chur-Hanswn, 2000), with participant numbers also varying greatly, from 240 (Holm and Aspegren, 1999) to 15 (Craig, 1992). Method of selection also varies, from self-selecting students to randomised groups. Self-selecting students may have different characteristics than students chosen randomly to participate. Given the nature of EI, it is possible that self-selecting students may be more motivated to respond, more assertive, and generally may score higher on the intrapersonal dimension of EI than those who may not respond to requests for participants. This may lead to a polarization of responses, thus jeopardising the generalisability of findings.

In addition to the above limitations, no study considered the input of students in determining content or delivery of the educational interventions. No study considered attitudes or personal values of medical students as a basis for the development of the intervention, tailored for that particular student group, a pre-requisite for some interventions to be successful (Burgers et al., 2002, Grol et al., 1998). In a similar vein, no study assessed motivation of medical students as a contributing factor to the success of the educational interventions, regardless of the format of the education or the emphasis, such as communication skills. It has been hypothesised that motivation alone may have a substantial effect on the success of educational interventions when the topic is of low interest (Foy, 2002). Differences in motivation between participants may affect results, although this may be difficult to identify.

In addition, considerations of how emotional intelligence and empathy training may be translated and applied by medical students were not reported.

Implications for future research design

Difficulties in between-study comparisons have been apparent when performing this review. In order to alleviate this problem and allow for future reviews to investigate and clarify factors relating to the effectiveness of delivery of education within healthcare, several implications for research must be taken from these findings.

Adequate group sizes are needed, with groups being large enough to measure the relatively small effects of each educational component with adequate specificity and accuracy.

Reporting and performing of both allocation of concealment and adequate blinding must be implicit to allow for comparisons both within group and across studies. Sensitive, generalisable and validated measures are needed to allow for adequate determination of baseline knowledge, attitudes, motivation and behaviour of healthcare workers, and for comparisons post-intervention. Before and after measurements are required, with sufficient follow-up periods to ensure longitudinal stability in results. More within-study comparisons of conflicting modes of educational delivery are needed, in future research.

Researchers need to reach a consensus as to one measure of EI, rather than the generality of surveying the diverse range that this study attempted to investigate. That is not to say that one model would suit every situation, nor that EI should be only be conceptualised and measured using a rigid framework. Rather, the approach to measuring EI should be rooted in a theoretical framework, focus on the needs of the researcher and the desired outcomes, yet provide comparable, valid and reliable data that can be accurately compared to others' findings.

These limitations and implications should be taken into account when interpreting the findings of this review.

Conclusions and future research

This review's findings suggest that self-reported emotional intelligence can be improved in medical students through structured education sessions, although this improvement may not translate into behavioural change. However, improvements reported were small, and therefore further research must not make the assumption that interventions can improve emotional intelligence. More research in this area is necessary to assess if emotional intelligence can indeed be improved through structured teaching sessions. Taking this review's limitations into consideration, the findings of this work have several implications for further research in the area, as well as for current undergraduate medical education.

As mentioned previously, research has identified the importance of interpersonal EI (such as empathy) in patient encounters, with increasing recognition of the importance of intrapersonal EI, particularly when dealing with stress (Slaski and Cartwright, 2002). EI has been suggested as a means of assessing levels of professional competence within the affective/moral dimension (Epstein and Hundert, 2002). EI, as a construct, can easily be mapped onto Hilton and Slotnick's (Hilton and Slotnick, 2005) six domains of professionalism, with intrapersonal skills reflecting the personal, or intrinsic, attributes of professionals, and interpersonal skills reflecting the co-operative attributes of professionals. The benefit, therefore, of recruiting individuals with high EI to undertake undergraduate training is apparent.

Medical schools receive large amounts of applicants each year, all with uniformly high academic achievements (Brown and Bylund, 2008). With each medical student in the UK currently costing approximately £200,000 to train (Brown and Bylund, 2008), it is essential that selection methods are robust and reflect the skills and attributes laid out by regulatory bodies. In the USA, assessment of EI has been integrated as part of the selection process in some medical schools, in an attempt to consider competency in interpersonal skills (Carrothers et al., 2000, Elam, 2000). Despite the use of EI as a selection measure, this review found little research conducted on improving medical students' EI. Research at present into improving the emotional development of medical students has mainly focused on structured training to increase empathy, with mixed results. Only one study focused specifically on improving medical students' emotional intelligence (Fletcher et al., 2009), with a small increase reported.

If the present selection process, based on cognitive ability alone, is sufficient, then it would be valuable to consider both medical students' entry-level EI, and to see if EI can be improved through structured training sessions, particularly given research suggesting the importance of EI in medicine (Lewis et al., 2005). Medical students and doctors differ from the general population in that they are required to continually engage with relationships (patient-doctor, colleague, peers) as part of their profession, for which EI is important (Epstein and Hundert, 2002).

Despite EI increasing with age, it may be difficult to expect to produce highly emotionally intelligent doctors without establishing a method of admissions to reflect this criterion.

In addition, Objective Structured Clinical Examinations (OSCEs) are the current method of assessing clinical skill performance in undergraduate medical students, as they allow for the

assessment of students without endangering patients' health. Stratton et al (2005) found that facets of EI were related to simulated patient satisfaction scores in OSCEs, indicating the importance of evaluating EI, and its links with communication skills, within medical education research.

This therefore raises the question: could a 5 minute mock-OSCE, whereby a prospective student interviews a simulated patient and the quality of their communication is rated, sit alongside the traditional entry-level interview as a means of assessing EI, empathy and communication skills of applicants prior to selection? This approach has already been adopted by St George's Medical School (London, UK) for the academic year 2009/2010, as well as being widely used in Canada since 2001 (Rosenfield et al., 2006), and takes the form of Multiple Mini Interviews (MMI). MMI consists of eight different tasks, each lasting five minutes, and assesses skills such as empathy, academic achievement and communication skills. Research has indicated the MMI to be more reliable, and have better predictive power, than traditional interviews (Rosenfield et al., 2006), but, being a relatively new concept, more time is needed before the effects of this selection process can be seen on medical practice.

What is evident, however, is that little research has been conducted on improving the EI of medical students during undergraduate medical education. This makes synthesis of the effects of interventions on EI difficult. In addition, no research that the authors are aware of has looked at the effects of EI interventions on examination performance, which would make for valuable further research.

Future research should aim to assess the relationship between EI and objective, behavioural outcomes, transferrable to the clinical setting, with the goal of establishing a theoretic, observable link between EI and clinical behaviour. It can be hypothesised that EI is related directly to the competency of interpersonal and communication skills; medical students who

are considered to have high EI abilities may be more sensitive to identifying and responding to expressions of psychosocial distress when communicating with patients. It would therefore be beneficial to evaluate the effectiveness of interventions to improve EI on the clinical performance of medical students, for example in communication skills OSCEs. This review provides an initial examination of the effectiveness of interventions to improve emotional intelligence in medical students.

EI is important for medical students' wellbeing and their clinical and professional performance, as we wish them to be clinically engaged and offer clinical leadership in their future role as a doctor. Therefore the impact of EI on increasing self awareness and improving their levels of resilience, influence, adaptability and decisiveness is paramount in their wellbeing as well as their performance as potential clinical leaders. If these aspects can be improved, then there are clear implications not only for the students, but for the patient and the clinical environment. Evidence from the BMA Board of Medical Education (2004) indicates that up to eighty percent of patient complaints to disciplinary bodies are attributed to a breakdown of communication between doctors and patients.

Research has demonstrated a relationship between effective patient-provider communication and better treatment outcomes for patients (Stewart, 1995, Rost et al., 1989, Hickson et al., 1994, Levinson et al., 1997, Stewart et al., 1999, Kaplan et al., 1989, Roter and Hall, 1993, Street, 2001). Cohen et al. (Cohen et al., 2005) argue that problems with communication for the doctor manifest in a variety of ways, such as anxiety and stress. If established relationships can be found between EI and communication skills, then this therefore will have an impact not only on patient care, but on the well being of the doctor. If further links can be shown between EI and communication skills, and the interventions needed to improve students' EI whilst they are undergraduates, it will add to the evidence suggesting that the EI

of applicants be considered alongside their cognitive abilities when successfully selecting tomorrow's doctors.

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