

## BEME GUIDE

# What impact do structured educational sessions to increase emotional intelligence have on medical students? BEME Guide No. 17

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## Abstract

**Background:** Emotional intelligence (EI) is a type of social intelligence that involves monitoring, discriminating between and using emotions to guide thinking and actions. EI is related to 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 EI of medical students.

**Methods:** We systematically searched 14 electronic databases and hand searched high yield journals. We looked at changes in EI and related behaviour of medical students, assessed using Kirkpatrick's hierarchy, provided they could be directly related 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 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

In addition to research into psychometric intelligence, interest in assessing and measuring non-cognitive, socially competent behaviour (Moss & Hunt 1927) has been ongoing since the early twentieth 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 & 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 & Mayer 1990). Using this definition, 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.

EI was conceptualised as comprising three major components (Salovey & Mayer 1990):

- (1) The appraisal and expression of emotion in oneself and others.
- (2) The regulation of emotion in the self and others.
- (3) The utilisation of emotion.

## Practice points

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

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

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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.

There are now four definite, separate models of EI (Salovey & Mayer 1990; Bar-On 1997; Goleman 1998; Petrides et al. 2007), with some common components. 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), as is the importance of emotional awareness (labelled emotional self-awareness by Bar-On and emotion perception (self and others)) by Petrides. Adaptability is also named in each model, falling under the heading of Self-Regulation in Goleman's model. In addition, stress management is named by both Bar-On and Petrides.

There exists a recent shift towards recognition of the importance of EI 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, 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 (De Haes 2006). Multiple studies of practicing doctors have investigated and identified the factors associated with effective communication (Maguire & Pitceathly 2002). For example, 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 in the USA, with EI included as an assessment item under moral/affective dimension (Epstein & 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, Frank 2005) and the Australian Medical Council.

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. (2002) and Weng et al. (2008) found weak links between doctors' EI and patient outcomes. Wagner found only one subscale of EI related to higher patient education, the 'happiness' subscale of the Bar-On EQ-i whereas Weng 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. 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. (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 2000). It is therefore important to consider how communication skills training, in particular the role of EI and empathy training, is translated and applied by medical students. 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).

A systematic review has already been undertaken evaluating emotion skills training in medical students (Sattersfield & Hughes 2007), and this review builds on this study 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 (Kirkpatrick 1967).

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 EI in medical students and their effectiveness, particularly given the research suggesting the importance of EI in medicine.

**Review question:** What impact do structured educational sessions to increase EI have on medical students?

## Review methodology

Following a pilot process, 16 electronic clinical and educational databases were searched and can be found at [www.bemecollaboration.org](http://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 EI and education. Medline records were substituted for duplicated records from other databases when identified due to their standardisation and level of detail. A subsequent hand search of high yield journals was carried out (see [www.bemecollaboration.org](http://www.bemecollaboration.org) for full list of journals

**Table 1.** Inclusion criteria.

	Inclusion criteria	Exclusion criteria
Study design	<ul style="list-style-type: none"> <li>All study designs considered</li> <li>Studies conducted and published from 1990 onwards included</li> </ul>	<ul style="list-style-type: none"> <li>Reviews and systematic reviews</li> <li>Studies published before 1990, or in which the study period was prior to 1990</li> </ul>
Population	<ul style="list-style-type: none"> <li>Undergraduate medical students or</li> <li>Contained medical students in addition to other participants, for which results were recorded separately</li> </ul>	<ul style="list-style-type: none"> <li>All studies not focusing solely on medical students, including studies using doctors as sole participants</li> <li>Studies where results of inclusion medical student groups could not be distinguished from exclusion healthcare professional groups</li> </ul>
Educational intervention	<ul style="list-style-type: none"> <li>Content documentable and repeatable</li> <li>Interventions run over defined time period</li> <li>Interventions designed to change EI or measures such as empathy, communication, compassion, mindfulness and sensitivity</li> </ul>	<ul style="list-style-type: none"> <li>Interventions not educational in content</li> </ul>
Comparator	<ul style="list-style-type: none"> <li>Any, including but not limited to use of a control group, a differing educational intervention and use of differing student groups</li> </ul>	<ul style="list-style-type: none"> <li>No exclusion criteria applied</li> </ul>
Outcome measures	<ul style="list-style-type: none"> <li>At least one outcome measure of EI</li> <li>Measured using Kirkpatrick's hierarchy (Kirkpatrick 1967)</li> </ul>	<ul style="list-style-type: none"> <li>No recorded outcome measure of EI</li> </ul>

hand searched), followed by a search of reference lists of all full-text studies, and hand search of the researcher's own files.

The database search identified 2419 articles (1947 after duplication), with the hand search yielding a subsequent eight studies. Cross-checking with the results of the electronic searching confirmed receipt of these studies in the initial electronic cohort. Abstracts were evaluated for relevance by two members of the review team (Gemma Cherry and Nigel Shaw), and full text of 36 relevant papers was obtained. These papers formed 1.8% of the initial cohort and were independently reviewed by two members of the review team (Gemma Cherry and Nigel Shaw), seeking consensus from a third member (Ian Fletcher) when opinion as to suitability was divided. From this, 15 studies were identified as fulfilling all inclusion criteria (Table 1) and therefore suitable for inclusion in the review.

Each full-text paper was coded and quality assessed using a categorical method of assessment to incorporate both study design and quality of results. This method of assessment yielded a quality assessment score for each paper 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/](http://www.bemecollaboration.org/)).

## Review analysis

### 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 (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 to 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 'EI'.

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/](http://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).

Included studies are summarised in Table 2. The majority of studies were conducted in the USA (5/14). Five studies used first year medical students as participants, four used fourth year medical students, two used second year medical students and one each used third and fourth year medical students, third year medical students and students in a mixture of years. Only one study looked at EI as an outcome measure, with most studies (12/14) using empathy as an outcome measure.

*Studies using level 2a as an outcome measure.* A total of 13 of the 14 studies (Moorhead & Winefield 1991; Craig 1992; Knight et al. 1992; Evans et al. 1993; Farnill et al. 1997; Winefield & Chur-Hanswn 2000; Lancaster et al. 2002; Shapiro et al. 2004; Shapiro et al. 2005; Fernandez-Olano et al. 2008; Harlak et al. 2008; Henry-Tillman et al. 2008; Fletcher et al.

**Table 2.** Description of included studies.

Author	Kirkpatrick level	Participant group	Focus of intervention	Main outcome measure	Intervention duration/frequency	Main findings	Quality score
Craig (1992)	2b 3	First year medical students	Effective communication and empathy	In-house checklist of videotaped interviews	30 h, frequency not stated	Both groups demonstrated a significant decline in empathy scores in third and fourth year ( $p = 0.001$ ) from first year	6
Evans et al. (1993)	3	Fourth year medical students (first clinical year) – two cohorts studied	Effective communication and empathy	History-taking rating scale (Evans et al. 1989) – rating of videotaped 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, $p = 0.471$	7
Farnill et al. (1997)	2a 3	Second year medical students	Psychosocial interviewing techniques, with empathy outcomes	(1) Volunteers completed questionnaire (not standard) (2) Students completed evaluation of own performance questionnaire (not standard). (3) Videotaped interviews rated by psychologist experienced in communication skill teaching (not standardised)	7 months – 16 sessions of 1 h	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 videotape analysis) although students rated themselves as more competent than pre-intervention (pre-intervention rating 2.7/5, post-intervention rating 3.7/5). No real change in volunteers' ratings of empathic responding (2.8/5 pre, 3.0/5 post)	7
Fernandez Olano et al. (2008)	2a	Second year medical students (plus residents)	Empathy	Jefferson Scale of Physician Empathy	25 h – 5 days of 5 h 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 et al. (2009)	2a	Third year medical students	EI	Bar-On EQ-i	7 months – once monthly for 4 h	Statistically significant difference between groups post-intervention, but not at baseline. Intervention group scored significantly higher on EQ-i post-intervention	5
Hariak et al. (2008)	2a	First year medical students	Empathy and communication skills	Communication Skills Attitudes Scale (CSAS) and Empathic Tendencies Scale (ETS)	1 academic year (30 h) – frequency not stated	In pre-test, 49% had positive attitudes towards communication skills learning (grouped as positive attitude group, PAG, and remainder as negative attitude group, NAG), and 59% had higher empathic tendencies (grouped as high empathy group, HEG, and remainder as low empathy group, 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 et al. (2002)	2a	First year medical students	Empathy	Small group reflection. A 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 and Aspegren (1999)	2a	Medical students, in first, sixth and eighth term	Empathy	Affect Reading Scale	Not stated	Hospital factors accounted for significant proportion of variance. Students in sixth term had significantly higher score than students in the first term. In eighth term, scores differed between hospitals. PBL hospital had no difference in scores between eighth and sixth terms students, but traditional teaching hospital eighth term students had significantly lower scores than sixth term students	5
Knight et al. (1992)	2a	Fourth year medical students	Awareness, sensitivity and clinical skills in dealing with the terminally ill	In-house questionnaire	16 h – 4 half days	Statistically significant increases pre- to post-intervention in eight of the nine items concerning hospice concepts. Changes in attitudes positively in four of the seven items concerning hospice rotation. Statistically significant changes in five of the seven items concerning palliative care	7
Lancaster et al. (2002)	2a	Fourth year medical students	Empathy	Nominal group technique – free text responses to questions, focus group, axial coding of responses	4 weeks – 13 seminars of 2h, 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	8
Moorhead and Winefield (1991)	2a	Fourth year medical students	Improving counselling, interpersonal and history taking skills	Empathy Rating Scale	1 week (3h, then 1.5h, then 10h)	No statistically significant increase in individual empathy scores from pre- to post-test (average scores 12.6 and 12.8, respectively)	7
Shapiro et al. (2004)	2a	First year medical students	Empathy and attitudes	Empathy Construct Rating Scale, Balanced Emotional Empathy Scale (BEES), nine-item attitude towards humanities measure. Focus groups with three main questions	Eight sessions of 1 h	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	8

(continued)

**Table 2.** Continued.

Author	Kirkpatrick level	Participant group	Focus of intervention	Main outcome measure	Intervention duration/frequency	Main findings	Quality score
Shapiro et al. (2005)	2a	Third and fourth year medical students	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 three station specific poems rated the poems' ability to increase empathy significantly higher than their helpfulness in influencing treatment	7
Winefield and Chur-Hanswn (2000)	2a	First year medical students	Effective communication and empathy	10-item empathy scale by Danish and Hauer	2 1.5h workshops, a week apart then 1 h 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	8

2009) 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 5 of the 13 studies report that females increased significantly more than males (Holm & Aspegren 1999; Winefield & Chur-Hanswn 2000; Shapiro et al. 2004; Fernandez-Olano et al. 2008; Harlak et al. 2008). 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.

## Discussion

In this study, 14 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 EI, including both interpersonal and intrapersonal dimensions of EI (McMullen 2003). The literature demonstrates fluidity to the definition and measurement of EI, 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), 8 of the 14 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 & Aspegren 1999), and very little information as to the replicable details of the interventions were provided. No transferable 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 EI 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 EI within their work. This resulted in the inclusion in this review of a wide range of EI proxy measures, thus illustrating 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. (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 among 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. (1999). 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 15 studies included in this review, only 5 studies (Evans et al. 1993; Holm & Aspegren 1999; Shapiro et al. 2004; Fernandez-Olano et al. 2008; Fletcher et al. 2009) 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 & Chur-Hanswn 2000), with participant numbers also varying greatly, from 240 (Holm & 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 polarisation 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 (Grol et al. 1998; Burgers et al. 2002). 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 EI and empathy

training may be translated and applied by medical students were not reported.

## Conclusions and future research

This review's findings suggest that self-reported EI can be improved in medical students through structured education sessions. The findings of this study have several implications for further research in the area, as well as for current undergraduate medical education.

Future research should aim to assess the relationship between EI and objective, behavioural outcomes, transferable to the clinical setting, with the goal of establishing a theoretical, 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 Objective Structured Clinical Examinations (OSCEs). This review provides an initial examination of the effectiveness of interventions to improve EI in medical students.

EI is important for medical students' well-being 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 well-being 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.

**Declaration of interest:** The authors report no declarations of interest.

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interests relate to postgraduate teaching and learning in medicine, use of postgraduate portfolios and assessment tools and educational interventions which maintain clinical skills.

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