REVIEW

Changes in wellbeing and professional values among medical undergraduate students: a narrative review of the literature

Jochanan Benbassat

Abstract *Background* Educators are concerned by the high prevalence of emotional distress among medical students, and by the alleged decline in their humanitarian values. *Objective* To re-examine these concerns by reviewing studies of medical students' wellbeing and development. *Method* Narrative review of the literature. *Main findings* (a) Medical students' emotional distress increases during their undergraduate training. However, although higher than in the general population, the prevalence of distress among medical students is similar to that among other university students. (b) Medical students' distress is independently related to endogenous factors (personality traits and life events) and to their perception of the medical learning environment. (c) Medical students do not display a measurable increase in moral reasoning, empathy and tolerance of uncertainty. (d) Students' wellbeing, moral development, reflectivity and tolerance of uncertainty have been shown to be interrelated, and associated with clinical performance. *Conclusions* The findings of this review endorse the concerns about the wellbeing and development of undergraduate medical students. The design of the reviewed studies does not permit inferences about causality. Yet, these findings are consistent with the hypothesis that medical training causes emotional distress that delays students' development and affects their clinical performance.

Keywords Medical students · Tolerance of uncertainty · Empathy · Emotional intelligence · Moral development · Personal epistemology

Introduction

Surveys have indicated that, as students progress through medical school, they experience increasing emotional distress (see Dyrbye et al. 2005 for review), while their attitudes to

J. Benbassat (✉)
Smokler Center for Health Policy Research, Myers-JDC-Brookdale Institute, PO Box 3886,
91037 Jerusalem, Israel
e-mail: benbassat@jdc.org.il

social issues, and perceptions of their learning environment deteriorate (Schwartz and Loten 2004). These observations, as well as recurring instances of students' misconduct, have raised concerns that some features of the medical learning environment foster distress and undesirable values and, thereby, impede the development of medical professionalism (Glass 2006).

Medical professionalism is an all-inclusive term for desirable physician's attitudes, behaviors and personality traits. These attributes have been variously identified as integrity, tolerance of uncertainty, empathy and responsiveness to societal needs (Swick 2000); accountability, altruism, honor and respect (Blackall et al. 2007); and compassion, communication, and team collaboration (Hill-Sakurai et al. 2008). During the last decades, medical schools have made an effort to promote the development of professional values by including the behavioral and the social sciences into their curricula (Benbassat et al. 2003), and by attempting to select applicants, who are likely to relate with patients and to engage in ethical decision making (Benbassat and Baumal 2007). The implicit assumption of this effort is that a combination of appropriate admission policies, teaching of the behavioral sciences, and exposure to clinical role models will promote students' professional development.

The objective of the present review of the literature is to explore whether medical students develop professionally during their undergraduate training. I focused on students' emotional distress, as well as on their moral reasoning, empathy and tolerance of uncertainty, because the development of these attributes among undergraduate medical and other university students has been the subject of cross-sectional and longitudinal studies.

Methods

I searched Old and New Medline through PaperChase (Horowitz and Bleich 1981) for studies of emotional distress (since 2000), and of moral reasoning, empathy, personal epistemology and tolerance of uncertainty (since 1970). I combined the terms [(Students, medical) OR (education, medical) OR (education, medical, undergraduate)] with each of the following: (a) (burnout, professional) OR (stress, psychological) OR (adjustment disorders) OR (affective disorders) OR (depressive disorders) OR depression OR anxiety] (714 hits); (b) [Moral OR Ethics OR (Social Responsibility)] (1,501 hits); (c) [empathy OR (emotional intelligence) OR caring OR compassion] (591 hits); and (d) [(Professionalism OR professional competence) OR (tolerance AND uncertainty) OR (epistemology OR cognition)] (1,740 hits).

The full papers of the titles and abstracts that I considered relevant were retrieved, reviewed and synthesized. There is no agreed framework for synthesizing diverse forms of evidence across research methodologies and topics (Mays et al. 2005), and most available checklists for assessing quality (e.g., Jadad et al. 1998) are designed for reports of randomised controlled trials. Therefore, I restricted the assessment of the quality of the retrieved studies to their design (retrospective, cross-sectional or prospective) and employed instruments (validated or not).

The limitations of these methods are twofold. First, most probably, the employed key terms for the literature search did not capture all relevant publications on the topic of professionalism and student development. Therefore, this review should be viewed as narrative, rather than systematic. Second, even though I made an effort to be objective in reviewing the selected studies, my conclusions may have been affected by my perceptions

of the learning environment and role models during my own undergraduate and residency training in the 1950s and 1960s in Jerusalem.

Students' wellbeing and development during undergraduate training

Emotional distress

Studies of medical students' emotional distress have used self-administered validated measures of stress, anxiety, depression and burnout. Burnout is a psychometric measure of professional distress that includes the dimensions "negative perceptions of self and of accomplishment", "emotional exhaustion" and "depersonalization" (i.e., treating patients as inanimate objects) (Maslach 2003). These studies have indicated that, first, students' distress is independently related to endogenous factors (personality traits and life events) and to students' perceptions of their learning environment (Dyrbye et al. 2009); second, the emotional state of entering medical school students resembles that of the general population (Smith et al. 2007); and third, the prevalence of distress increases during undergraduate training.

In the USA, both crossectional (Goebert et al. 2009; Schwenk et al. 2010; Santen et al. 2010) and longitudinal (Levine et al. 2006; Compton et al. 2008) studies have indicated an increasing prevalence of distress among medical students. The prevalence of moderate and severe *depression* was 5–6 % at matriculation and 11–12 % in second year of medical school (Levine et al. 2006); 13 % in the first year, 22 % in the third year (at entry to the clinical wards), and 9 % in the fourth year (Schwenk et al. 2010); third year students exhibited more stress and depressive feelings than first-year students, with fourth year students reporting intermediate stress levels (Compton et al. 2008). The prevalence of *suicidal ideation* during the previous 12 months increased from 1 to 8 % in the first year, to 9–13 % in the fourth year (Compton et al. 2008; Dyrbye et al. 2008; Goebert et al. 2009; Schwenk et al. 2010). A moderate or high degree of *burnout* was seen in 21 % of first year students, 41 % in the second year, 43 % in the third year, and 31 % of fourth year students (Santen et al. 2010).

An increasing prevalence of distress has been also observed among medical students in Israel (Bonne et al. 2003), Norway (Kjeldstadli et al. 2006), Finland (Niemi and Vainiomaki 2006), Brazil (Paro et al. 2010), India (Sidana et al. 2012), and Turkey (Aktekin et al. 2001). However, but for one study (Aktekin et al. 2001), all comparative studies have indicated that the prevalence of anxiety, depression, suicidal ideation, stress, sleep deprivation, or alcohol abuse among medical students was similar to that reported among other university students (Bunevicius et al. 2008; Khawaja and Duncanson 2008; Alexandrino-Silva et al. 2009; Curran et al. 2009; Murphy et al. 2009; Honney et al. 2010; Samaranayake and Fernando 2011).

Although similar to that among other university students, the prevalence of distress among medical students is a source of concern. Medical schools should address students' distress as a priority not only in order to improve students' wellbeing, but also because emotional distress has been reported to be associated with reduced empathy (Thomas et al. 2007), professionalism (Brazeau et al. 2010), societal responsibility (Dyrbye et al. 2010), and with self-reported suboptimal patient care (Shanafelt et al. 2002) and professional misconduct (Vengoechea et al. 2008; Dyrbye et al. 2010).

Moral development

Moral development refers to changes in defining what is right and wrong. Most studies of moral development have used the Defining Issues Test (DIT) of moral reasoning that is based on a subject's responses to hypothetical dilemmas (Rest 1994). The test draws from Kohlberg's theory (Kohlberg 1984) that discerns among three levels of moral reasoning. The pre-conventional level is observed in children, who define "right" as avoidance of punishment. The conventional level characterizes adolescents, who define actions as right if approved by significant others—parents or teachers—or if consistent with societal norms. The post-conventional ("principled") level is characterized by the adoption of moral principles that are seen as having validity apart from societal norms.

The application of the DIT on medical students has suggested an arrest in the development of moral reasoning. But for two studies (Sheehan et al. 1981; Baldwin et al. 1991), all cross-sectional (Husted 1978; Self et al. 1989; Morton et al. 1996; Self and Baldwin 1998; Akabayashi et al. 2004; Hren et al. 2011) and longitudinal (Self et al. 1993; Lind 2000; Patenaude et al. 2003; Helkama et al. 2003; Hren et al. 2011; Chalmers et al. 2011) studies have failed to detect any gains in moral reasoning during medical training, with students demonstrating a predominantly conventional level of reasoning.

Less frequently used measures of moral development are tests of ethical sensitivity (ability to identify ethical issues in clinical vignettes), and of attitudes to social issues and to ethical dilemmas. Cross-sectional studies have indicated an increase in ethical sensitivity during the first years of medical training in Japanese (Akabayashi et al. 2004) and Canadian (Hebert et al. 1990, 1992) students, followed by a decline in more senior students. Longitudinal studies have found a decline in attitudes to social issues (Woloschuk et al. 2004; Schwartz and Loten 2004), and to providing care for the medically indigent (Crandall et al. 1993, 2007) as students progressed through their undergraduate program.

Several studies have also indicated an erosion of students' ethical principles. In the UK, students' responses to scenarios describing a fictitious academic misconduct (e.g., falsifying patient information) indicated that more first year students regarded the misconduct as wrong than did senior students (Rennie and Rudland 2003). In France, students' analyses of ethical problems they had witnessed indicated that their ability to identify ethical dilemmas in terms of fundamental principles and professional responsibility declined (Barrier et al. 2005). In the US, a survey at four schools found that 28 % of preclinical students, but as many as 65 % of clinical students believed that accepting gifts from pharmaceutical companies was appropriate (Fitz et al. 2007).

The arrest of medical students' moral reasoning is in sharp contrast with the findings in college students. A review of 172 studies of college students found dramatic gains in moral reasoning, even after controlling for entering levels of moral reasoning and for age (King and Mayhew 2002). On the other hand, studies of the moral reasoning of other university students have yielded inconsistent results (Bebeau 2002). While moral reasoning scores increased during training of physiotherapy (Geddes et al. 2009), and pharmacy (Gallagher 2011) students, there was no change in the moral reasoning of students of veterinary medicine (Self et al. 1996), dentistry (Chaves 2000), and computing (Holland 2011).

The arrest in medical students' moral reasoning scores is a source of concern because of evidence for their association with behavior, clinical performance and reflectivity. Medical students who kept their promise to have a repeated follow-up test had higher moral reasoning scores on the first test than those who did not keep this promise (Givner and Hynes 1983). Moral reasoning scores of pediatric house officers correlated with the ratings of their peer-assessed clinical performance (Sheehan et al. 1980). Moral reasoning scores of

nursing students correlated with clinical performance, as assessed by a validated Clinical Evaluation Tool (Krichbaum et al., 1994). Orthopedic surgeons with fewer than 0.20 malpractice claims per year had higher moral reasoning scores than those with higher than 0.40 claims per year (Baldwin et al. 1996). Finally, medical students' moral reasoning has been reported to be associated with their scores on a validated reflection-in-learning measure (Chalmers et al. 2011).

Empathy/emotional intelligence

Empathy has been variously identified with putting oneself *cognitively* into another person's psychological perspective (Deutsch and Madle 1975), with an *affective* response to another person's plight (Eisenberg and Strayer 1987), with compassion (Glick 1993) and with "respect for the personhood of another" (Levasseur and Vance 1993). Emotional intelligence has been defined as awareness, understanding and management of emotions in self and others (Satterfield and Hughes 2007). The diverse definitions of empathy explain the difficulties in measuring it. Empathy has been assessed by pencil-and-paper tests, peer ratings, patient ratings, and observed behavior. Pencil-and-paper test scores have been reported to correlate with patients' ratings by some (Glaser et al. 2007), but not other (Hornblow et al. 1977) authors, and with peer ratings, but not with observed behavior (Jarski et al. 1985). The study of emotional intelligence is similarly impeded by concerns about the reliability and validity of its tests (Arora et al. 2010).

The changes in empathy during medical education have been the subject of cross-sectional and longitudinal studies, none of which detected an *increase* in empathy during undergraduate or residency training. However, it is uncertain whether the levels of empathy remain stable or decline during medical education. A decline in empathy paper-and-pencil test scores was found in five cross-sectional (Newton et al. 2000; DiLalla et al. 2004; Sherman and Cramer 2005; Chen et al. 2007; Thomas et al. 2007), and in four longitudinal (Hojat et al. 2004, 2009; Newton et al. 2008; Stratton et al. 2008) studies of medical students, and in all studies of residents (see Colliver et al. 2010; Neumann et al. 2011 for review). Similarly, a longitudinal study revealed that two of three dimensions of emotional intelligence and two of three dimensions of empathy were significantly lower on follow up, although the differences were generally small (Stratton et al. 2008). On the other hand, three other longitudinal studies of medical students did not find any changes in empathy scores (Zeldow and Daugherty 1987; Austin et al. 2007; Quince et al. 2011).

Empathy and emotional intelligence are believed to be important components of medical professionalism. There is evidence that medical students' empathy, as measured by paper-and-pencil test scores, is associated with academic performance and clinical competence (Hojat et al. 2002); that in general practitioners, patient-perceived empathy was associated with patients' self-assessed outcomes (Mercer et al. 2008) and with the severity and duration of common cold (Rakel et al. 2009); and that both emotional intelligence, as measured by a by paper-and-pencil instrument in doctors of 11 specialties, and nurse-rated quality of the doctor–patient relationship were associated with patients' trust (Weng et al. 2008).

Epistemological development

The term "epistemological development" refers to changes in personal beliefs about what knowledge is and how one interprets knowledge. There are several theoretical models of personal epistemology that are based on longitudinal studies of students' narrative descriptions of their experience. The more commonly used models are Perry's intellectual and ethical development scale (Perry 1968) and the Reflective Judgment Model by King and Kitchener (2004), and they describe a developmental sequence of stages, which Perry called dualism, multiplicity, relativism and commitment in relativism.

Dualism was a belief in the existence of absolute truth and of a single correct answer for every question. Thinking was in terms of right/wrong and good/bad. The transition to *multiplicity* began when students came across conflicting opinions, or teachers who answered "I don't know". At first, this was ascribed to teacher's incompetence. Later, multiplicity of opinions was viewed as legitimate in areas in which the right answer had not yet been found, and until then, multiple opinions were equally valid. Typical students' comments included "you can't judge opinions". Towards the end of multiplicity students realized that one *can* judge opinions, and that even in areas of uncertainty, a problem may have a limited number of legitimate solutions that are congruent with available data, and an unlimited number of illegitimate approaches, which are illogical and divorced from reality. This signaled their transition to *relativism*. At this stage students would say "the important things in one case do not count in another". Relativists resisted decision making. The merits of each alternative appeared so clear that choice among them became impossible. Students progressed to the final stage of *commitment in relativism* when they understood that, unless they were to remain frozen in indecision, they would have to commit themselves to a choice/decision, even if it will have to be regretted in the light of future evidence.

I found only few studies of the epistemological development of medical students, and no comparative studies of medical and other university students. A survey of medical students using a non-validated 10-item questionnaire indicated that most of them believed that value judgments were either true or false and that they were based on requirements emanating from an external value structure (Self 1983). The application of a non-validated paper and pencil measure that was derived from Perry's scheme found all medical students either in dualism or multiplicity (Simpson et al. 1986). A study that used semi-structured interviews of second year medical students concluded that they "appeared to express predominantly simplistic levels of epistemological thinking" (Knight and Mattick 2006). Finally, using a validated scale, a longitudinal study found that students' reflective ability scores decreased during the final academic year (Chalmers et al. 2011). These findings are consistent with, but do not confirm, the possibility that, similarly to their moral reasoning, medical students' epistemological development is arrested.

Tolerance/intolerance of uncertainty

The term "intolerance of uncertainty" refers to a tendency to perceive ambiguous situations as a source of threat (Budner 1962) or stress (Gerrity et al. 1992). Students' development along Perry's scheme may be seen as an increase in tolerance of uncertainty. Uncertainty was rejected at the stage of dualism; it was viewed as temporary during multiplicity; it was accepted as legitimate during relativism; and it was dealt with when students affirmed themselves in their commitments.

Studies of medical students' tolerance of uncertainty are cross-sectional (see Geller 2013 for review) and have used a variety of psychometric scales. During the 1960–1980s, the most commonly used measure was Budner's "Intolerance of Ambiguity Scale" (Budner 1962), despite its low internal reliability (alpha = 0.49) and lack of replicable factor structure (Benjamin et al. 1996). Budner's scale did not detect any differences in tolerance of uncertainty between junior and senior US medical students (Budner 1962). However, it did detect a higher tolerance of uncertainty among students who were older at entry into medical school (DeForge and Sobal 1989), and this finding was subsequently confirmed using more reliable scales (Geller et al. 1990, 1993).

These early studies (Budner 1962; DeForge and Sobal 1989; Geller et al. 1990, 1993) used scales designed to elicit responses to uncertainties in daily life (e.g., "what we are used to is always preferable to what is unfamiliar"), irrespective of the professional experience of the respondent. More recent studies (Gerrity et al. 1992; Merrill et al. 1994; Schor et al. 2000) used questions specific to the domain of medicine ("It bugs me if my attending, after carefully reviewing a patient, says 'I am not sure'"). Merrill et al. (1994) failed to detect any differences in tolerance of uncertainty between junior and senior female students; however, tolerance of uncertainty did increase during medical training in men. Using still more reliable scales, Gerrity et al. (1992) found that physicians' tolerance of uncertainty increased with years in practice, and Schor et al. (2000) confirmed that students' tolerance of uncertainty did not change during undergraduate training, with older first year medical students being more tolerant of uncertainty than younger first year students. In summary, different authors, using different scales, have failed to detect the age-expected increase in tolerance of uncertainty in medical students. I know of no comparative studies of tolerance of uncertainty among medical and other undergraduate students.

Clinical practice is wrought with uncertainty, and the ability to manage it is believed to be important for physicians and medical students. A low tolerance of uncertainty, as measured by scales of varying reliability and factor structures, has been reported to be associated with physicians' authoritarianism, dogmatism, rigidity, conformity, and ethnic prejudice (Geller et al. 1993; Furnham and Ribchester 1995); and anxiety, obsessions/compulsions, and panic sensations (Gentes and Ruscio 2011). A high tolerance of uncertainty was associated with self-reported cost-consciousness (Bovier et al. 2005), clinical performance (Anderson et al. 1995), satisfaction (Bovier and Perneger 2007), and lower burnout (Kuhn et al. 2009). Among medical students, a high tolerance of uncertainty was associated with higher patients' ratings 2 years later (Morton et al. 2000); and with a tendency to select relatively unstructured fields of medicine, e.g., psychiatry (Budner 1962; Kearl et al. 1992). A low tolerance of uncertainty has been reported to be associated with students' fears of making mistakes (Nevalainen et al. 2012); and negative attitudes toward the underserved (Dogra et al. 2007; Wayne et al. 2011).

Discussion

Four main findings emerge from this review. First, medical students are more distressed than the general population, but not more than other university students. Second, students' distress is *independently* related to endogenous factors (personality traits and life events) and to students' perceptions of their learning environment. Third, medical students' tolerance of uncertainty, moral reasoning and levels of empathy are arrested. Fourth, medical students' wellbeing is associated not only with their perceptions of the learning

environment, but also with their moral reasoning, empathy and tolerance of uncertainty; their moral reasoning is associated with tolerance of uncertainty; and all of the following: students' wellbeing, moral reasoning, empathy, and tolerance of uncertainty are related to clinical performance.

Some of these associations have been observed also in practicing physicians. Clinical performance was found to be related to moral reasoning in pediatric house officers (Sheehan et al. 1980) and orthopedic surgeons (Baldwin et al. 1996), as well as to the levels of empathy/emotional intelligence of general practitioners (Mercer et al. 2008; Rakel et al. 2009) and doctors of various medical specialties (Weng et al. 2008). A high tolerance of uncertainty has been reported to be associated with cost-consciousness (Bovier et al. 2005) and better diagnostic performance (Anderson et al. 1995) in doctors of various medical specialties. Primary-care physicians, psychiatrists, pediatricians and gynecologists have been found to be more tolerant of uncertainty than anesthetists, orthopedic surgeons, and urologists (Gerrity et al. 1992). However, pending performance of appropriate comparative studies, it is uncertain whether moral reasoning, empathy and tolerance of uncertainty are equally important for the clinical performance of physicians with various medical specialties.

Several interventions have been shown to reduce students' distress. Before–after studies (Thompson et al. 2010; Melo-Carrillo et al. 2012), non-randomized controlled studies (Holm et al. 2010) and randomized controlled trials (Jain et al. 2007; Bragard et al. 2010; Warnecke et al. 2011) have indicated that student counseling, wellness/psychoeducational programs, stress management and participant-driven discussion groups, increase wellbeing and reduce self-reported depressive symptoms, suicidal ideation and anxiety. There is also evidence that a pass/fail grading system is associated with an improved students' wellbeing relative to an assessment using a graded system (Spring et al. 2011; Reed et al. 2011). Several teaching interventions have also been claimed to promote students' empathy (Poole and Sanson-Fisher 1980; Elizur and Rosenheim 1982; Wolf et al. 1987), moral reasoning (Givner and Hynes 1983; Self et al. 1989), tolerance of uncertainty (Banning 2003), as well as understanding of medical errors (Gunderson et al. 2009) and reflectivity (Henderson and Johnson 2002). Discussions of emotional distress, medical ethics, empathy, reflectivity and tolerance of uncertainty should certainly be included in the curriculum, because they are part of students' medical literacy. However, it would appear to me that the main effort to promote medical students' development should aim at identifying a common cause for the observed arrest in moral reasoning, empathy and tolerance of uncertainty.

If college students progress in their epistemological (Perry 1968) and moral (King and Mayhew 2002) development, why can't medical students, do the same? The design of the studies of students' wellbeing, development and learning environment does not permit inferences about causality. Yet, the most obvious difference between college and medical students is the context of medical training that is characterized by a distressing, high pressure learning environment (Morton et al. 1996). It may be hypothesized that the resulting emotional distress in medical students is a major determinant of their levels of moral reasoning, empathy and tolerance of uncertainty. Distressed persons are likely to regress to the comfort provided by conformity with societal norms, by a belief in the existence of absolute truth, and by denial of uncertainty (Light 1979; Perry 1968), and this, in turn, may affect clinical performance.

However, the similarity between the emotional distress of medical and other university students suggests that its main cause is beyond the specific medical learning environment. Unlike high school and college students, medical and other university students view their training as the beginning of a life-long career. Consequently, they share the uncertainties

that have been identified by Fox (1958) in medical students, namely, concerns about personal inadequacy, about the limitations in available knowledge, and about their ability to distinguish between the first two. It may be hypothesized that these specific uncertainties, and particularly students' *concerns about personal inadequacy*, are a major cause of emotional distress.

Therefore, I believe that faculty efforts to reduce medical students' emotional distress should aim at creating a "nurturing" learning environment (Dyrbye et al. 2005), which would reduce, rather than increase, students' concerns of personal inadequacy. In addition to interventions that have been shown to improve students' wellbeing, medical faculty should aim at creating a learning environment, where students are trusted, rather than judged; supported, rather than belittled; and mainly, encouraged rather than led to doubt their adequacy for the medical profession.

This will require modifying two types behavior that characterized some of my clinical preceptors in the 1950s: first, student public humiliation ("your knowledge is so poor that it transforms bedside discussions into a waste of time") as a misguided attempt to encourage learning, and second, perpetuation of students' fears of errors ("the chief resident made a mistake for which I'd have crucified even a medical student") in an attempt to promote a strive for excellence. Hopefully, an acceptance of medical students as junior colleagues will not only improve their wellbeing; it will also promote their professional development by an acknowledgement that, although reducible, medical errors are inevitable, and that students' uncertainties are shared by their clinical preceptors.

References

Akabayashi, A., Slingsby, B. T., Kai, I., Nishimura, T., & Yamagishi, A. (2004). The development of a brief and objective method for evaluating moral sensitivity and reasoning in medical students. *BMC Medical Ethics, 5*, E1.

Aktekin, M., Karaman, T., Senol, Y. Y., Erdem, S., Erengin, H., & Akaydin, M. (2001). Anxiety, depression and stressful life events among medical students: A prospective study in Antalya, Turkey. *Medical Education, 35*, 12–17.

Alexandrino-Silva, C., Pereira, M. L., Bustamante, C., Ferraz, A. C., Baldassin, S., Andrade, A. G., et al. (2009). Suicidal ideation among students enrolled in healthcare training programs: A cross-sectional study. *Revista Brasiliera de Psiquiatria, 31*, 338–344.

Anderson, J. D., Jay, S. J., Weng, H. C., & Anderson, M. M. (1995). Studying the effect of clinical uncertainty on physicians' decision-making using ILIAD. *Medinfo, 8*(Pt 2), 869–872.

Arora, S., Ashrafian, H., Davis, R., Athanasiou, T., Darzi, A., & Sevdalis, N. (2010). Emotional intelligence in medicine: A systematic review through the context of the ACGME competencies. *Medical Education, 44*, 749–764.

Austin, E. J., Evans, P., Magnus, B., & O'Hanlon, K. (2007). A preliminary study of empathy, emotional intelligence and examination performance in MBChB students. *Medical Education, 41*, 684–689.

Baldwin, D. C., Adamson, T. E., Self, D. J., Sheehan, T. J., Oppenberg, A. A., & Baldwin, D. C. (1996). Moral reasoning and malpractice. A pilot study of orthopedic surgeons. *American Journal of Orthopedics (Belle Mead NJ), 25*, 481–484.

Baldwin, D. C., Daugherty, S. R., & Self, D. J. (1991). Changes in moral reasoning during medical school. *Academic Medicine, 66*(9 Suppl), S1–S3.

Banning, C. K. (2003). The effect of the case method on tolerance for ambiguity. *Journal of Management Education, 27*, 556–567.

Barrier, J. H., Brazeau-Lamontagne, L., Pottier, P. & Boutoille, D. (2005). Comparison of medical ethical competencies of pregradute third and sixth year students during their internal medical hospital rotations. *Revue de Medicine Interne, 26*, 128–136 (French).

Bebeau, M. J. (2002). The defining issues test and the four component model: Contributions to professional education. *Journal of Moral Education, 3*, 271–295.

Benbassat, J., & Baumal, R. (2007). Uncertainties in the selection of applicants for medical school. *Advances in Health Science Education, 12*, 509–521.

Benbassat, J., Baumal, R., Borkan, J. M., & Ber, R. (2003). Overcoming barriers to teaching the behavioral and social sciences to medical students. *Academic Medicine, 78*, 372–380.

Benjamin, A. J., Riggio, R. E., & Mayes, B. T. (1996). Reliability and factor structure of Budner's tolerance for ambiguity scale. *Journal of Social Behavior and Personality, 11*, 625–663.

Blackall, G. F., Melnick, S. A., Shoop, G. H., George, J., Lerner, S. M., Wilson, P. K., et al. (2007). Professionalism in medical education: The development and validation of a survey instrument to assess attitudes toward professionalism. *Medical Teacher, 29*, e58–e62.

Bonne, O., Segman, R., Katz, M., & Kaplan-DeNour A. (2003). Emotional distress in Israeli medical students. *Harefuah, 142*, 588–591 (Hebrew).

Bovier, P. A., Martin, D. P., & Perneger, T. V. (2005). Cost-consciousness among Swiss doctors: A cross-sectional survey. *BMC Health Services Research, 5*, 72.

Bovier, P. A., & Perneger, T. V. (2007). Stress from uncertainty from graduation to retirement—a population-based study of Swiss physicians. *Journal of General Internal Medicine, 22*, 632–638.

Bragard, I., Etienne, A. M., Merckaert, I., Libert, Y., & Razavi, D. (2010). Efficacy of a communication and stress management training on medical residents' self-efficacy, stress to communicate and burnout: A randomized controlled study. *Journal of Health Psychology, 15*, 1075–1081.

Brazeau, C. M., Schroeder, R., Rovi, S., & Boyd, L. (2010). Relationships between medical student burnout, empathy, and professionalism climate. *Academic Medicine, 85*(10 Suppl), S33–S36.

Budner, S. (1962). Intolerance of ambiguity as a personality variable. *Journal of Personality, 30*, 29–50.

Bunevicius, A., Katkute, A., & Bunevicius, R. (2008). Symptoms of anxiety and depression in medical students and in humanities students: Relationship with big-five personality dimensions and vulnerability to stress. *International Journal of Social Psychiatry, 54*, 494–501.

Chalmers, P., Dunngalvin, A., & Shorten, G. (2011). Reflective ability and moral reasoning in final year medical students: A semi-qualitative cohort study. *Medical Teacher, 33*, e281–e289.

Chaves, J. R. (2000). Assessing ethics and professionalism in dental education. *Journal of the Indiana Dental Association, 79*, 16–21.

Chen, D., Lew, R., Hershman, W., & Orlander, J. (2007). A cross-sectional measurement of medical student empathy. *Journal of General Internal Medicine, 22*, 1434–1438.

Colliver, J. A., Conlee, M. J., Verhulst, S. J., & Dorsey, J. K. (2010). Reports of the decline of empathy during medical education are greatly exaggerated: A reexamination of the research. *Academic Medicine, 85*, 588–593.

Compton, M. T., Carrera, J., & Frank, E. (2008). Stress and depressive symptoms/dysphoria among US medical students: Results from a large, nationally representative survey. *The Journal of Nervous and Mental Disease, 196*, 891–897.

Crandall, S. J., Reboussin, B. A., Michielutte, R., Anthony, J. E., & Naughton, M. J. (2007). Medical students' attitudes toward underserved patients: A longitudinal comparison of problem-based and traditional curricula. *Advances in Health Sciences Education, 12*, 71–86.

Crandall, S. J., Volk, R. J., & Loemker, V. (1993). Medical students' attitudes toward providing care for the underserved. Are we training socially responsible physicians? *Journal of the American Medical Association, 269*, 2519–2523.

Curran, T. A., Gawley, E., Casey, P., Gill, M., & Crumlish, N. (2009). Depression, suicidality and alcohol abuse among medical and business students. *Irish Medical Journal, 102*, 249–252.

DeForge, B. R., & Sobal, J. (1989). Intolerance of ambiguity in students entering medical school. *Social Science and Medicine, 28*, 869–874.

Deutsch, F., & Madle, R. A. (1975). Empathy: Historic and current conceptualizations, measurement, and a cognitive theoretical perspective. *Human Development, 18*, 267–287.

DiLalla, L. F., Hull, S. K., & Dorsey, J. K. (2004). Effect of gender, age, and relevant course work on attitudes toward empathy, patient spirituality, and physician wellness. *Teaching and Learning Medicine, 16*, 165–170.

Dogra, N., Giordano, J., & France, N. (2007). Cultural diversity teaching and issues of uncertainty: The findings of a qualitative study. *BMC Medical Education, 7*, 8.

Dyrbye, L. N., Massie, F. S., Harper, W., Power, D. V., Durning, S. J., Thomas, M. R., et al. (2010). Relationship between burnout and professional conduct and attitudes among US medical students. *Journal of the American Medical Association, 304*, 1173–1180.

Dyrbye, L. N., Thomas, M. R., Harper, W., Massie, F. S., Power, D. V., Eacker, A., et al. (2009). The learning environment and medical student burnout: A multicentre study. *Medical Education, 43*, 274–282.

Dyrbye, L. N., Thomas, M. R., Massie, F. S., Power, D. V., Eacker, A., Harper, W., et al. (2008). Burnout and suicidal ideation among U.S. medical students. *Annals of Internal Medicine, 149*, 334–341.

Dyrbye, L. N., Thomas, M. R., & Shanafelt, T. D. (2005). Medical student distress: Causes, consequences, and proposed solutions. *Mayo Clininics Proceedings, 80*(12), 1613–1622.

Eisenberg, N., & Strayer, J. (1987). Critical issues in the study of empathy. In N. Eisenberg & J. Strayer (Eds.), *Empathy and its development*. Cambridge: Cambridge University Press.

Elizur, A., & Rosenheim, E. (1982). Empathy and attitudes among medical students: The effects of group experience. *Journal of Medical Education, 57*, 675–683.

Fitz, M. M., Homan, D., Reddy, S., Griffith, C. H., Baker, E., & Simpson, K. P. (2007). The hidden curriculum: Medical students' changing opinions toward the pharmaceutical industry. *Academic Medicine, 82*(10 Suppl), S1–S3.

Fox, R. C. (1958). *Training for uncertainty. The student—physician introductory studies in the sociology of medical education*. Cambridge: Cambridge University Press.

Furnham, A., & Ribchester, T. (1995). Tolerance of ambiguity: A review of the concept, its measurement and applications. *Current psychology, 14*, 179–199.

Gallagher, C. T. (2011). Assessment of levels of moral reasoning in pharmacy students at different stages of the undergraduate curriculum. *International Journal of Pharmacy Practice, 19*, 374–380.

Geddes, E. L., Salvatori, P., & Eva, K. W. (2009). Does moral judgement improve in occupational therapy and physiotherapy students over the course of their pre-licensure training? *Learning in Health and Social Care, 8*, 92–102.

Geller, G. (2013). Tolerance for ambiguity: An ethics-based criterion for medical student selection. *Academic Medicine, 88*, 1–4.

Geller, G., Faden, R. R., & Levine, D. M. (1990). Tolerance for ambiguity among medical students: Implications for their selection, training and practice. *Social Science and Medicine, 31*, 619–624.

Geller, G., Tambor, E. S., Chase, G. A., & Holtzman, N. A. (1993). Measuring physicians' tolerance for ambiguity and its relationship to their reported practices regarding genetic testing. *Medical Care, 31*, 989–1001.

Gentes, E. L., & Ruscio, A. M. (2011). A meta-analysis of the relation of intolerance of uncertainty to symptoms of generalized anxiety disorder, major depressive disorder, and obsessive-compulsive disorder. *Clinical Psychology Revue, 31*, 923–933.

Gerrity, M. S., Earp, J. A. L., DeVellis, R. F., & Light, D. W. (1992). Uncertainty and professional work: Perception of physicians in clinical practice. *American Journal of Sociology, 97*, 1022–1051.

Givner, N., & Hynes, K. (1983). An investigation of change in medical students' medical thinking. *Medical Education, 17*, 3–7.

Glaser, K. M., Markham, F. W., Adler, H. M., McManus, P. R. & Hojat, M. (2007). Relationships between scores on the Jefferson Scale of physician empathy, patient perceptions of physician empathy, and humanistic approaches to patient care: a validity study. *Medical Science Monitor, 13*, CR291–CR294.

Glass, A. R. (2006). Unprofessional behavior among medical students. *New England Journal of Medicine, 354*, 1851–1853.

Glick, S. M. (1993). The empathetic physician: Nature and nurture. In Spiro, H., McCrea, M. G., Peschel, E., St James, D. (Eds.), *Empathy and the practice of medicine. Beyond Pills and the Scalpel*. New Haven: Yale Univ Press.

Goebert, D., Thompson, D., Takeshita, J., Beach, C., Bryson, P., Ephgrave, K., et al. (2009). Depressive symptoms in medical students and residents: A multischool study. *Academic Medicine, 84*, 236–241.

Gunderson, A. J., Smith, K. M., Mayer, D. B., McDonald, T., & Centomani, N. (2009). Teaching medical students the art of medical error full disclosure: Evaluation of a new curriculum. *Teaching and Learning Medicine, 21*, 229–232.

Hebert, P., Meslin, E. M., Dunn, E. V., Byrne, N., & Reid, S. R. (1990). Evaluating ethical sensitivity in medical students: Using vignettes as an instrument. *Journal of Medical Ethics, 16*, 141–145.

Hebert, P., Meslin, E. M., Dunn, E. V., & Hebert, P. C. (1992). Measuring the ethical sensitivity of medical students: A study at the University of Toronto. *Journal of Medical Ethics, 18*, 142–147.

Helkama, K., Uutela, A., Pohjanheimo, E., Salminen, S., Koponen, A., & Rantanen, L. (2003). Moral reasoning and values in medical school: A longitudinal study in Finland. *Scandinavian Journal of Educational Research, 47*, 399–411.

Henderson, P., & Johnson, M. H. (2002). An innovative approach to developing the reflective skills of medical students. *BMC Medical Education, 2*, 4.

Hill-Sakurai, L. E., Lee, C. A., Schickedanz, A., Maa, J., & Lai, C. J. (2008). A professional development course for the clinical clerkships: Developing a student-centered curriculum. *Journal of General Internal Medicine, 23*, 964–968.

Hojat, M., Gonnella, J. S., Mangione, S., Nasca, T. J., Veloski, J. J., Erdmann, J. B., et al. (2002). Empathy in medical students as related to academic performance, clinical competence and gender. *Medical Education, 36*, 522–527.

Hojat, M., Mangione, S., Nasca, T. J., Rattner, S., Erdmann, J. B., Gonnella, J. S., et al. (2004). An empirical study of decline in empathy in medical school. *Medical Education, 38*, 934–941.

Hojat, M., Vergare, M. J., Maxwell, K., Brainard, G., Herrine, S. K., Isenberg, G. A., et al. (2009). The devil is in the third year: A longitudinal study of erosion of empathy in medical school. *Academic Medicine, 84*, 1182–1191.

Holland, L. (2011). Do higher education computing degree courses develop the level of moral judgement required from a profession. *Journal of Information, Communication and Ethics in Society, 9*, 116–126.

Holm, M., Tyssen, R., Stordal, K. I., & Haver, B. (2010). Self-development groups reduce medical school stress: A controlled intervention study. *BMC Medical Education, 10*, 23.

Honney, K., Buszewicz, M., Coppola, W., & Griffin, M. (2010). Comparison of levels of depression in medical and non-medical students. *The Clinical Teacher, 7*, 180–184.

Hornblow, A. R., Kidson, M. A., & Jones, K. V. (1977). Measuring medical students' empathy: A validation study. *Medical Education, 11*, 7–12.

Horowitz, G. L., & Bleich, H. L. (1981). PaperChase: A computer program to search the medical literature. *New England Journal of Medicine, 305*, 924–930.

Hren, D., Marušić, M., & Marušić, A. (2011). Regression of moral reasoning during medical education: Combined design study to evaluate the effect of clinical study years. *PLoS ONE, 6*, e17406.

Husted, S. D. (1978). Assessment of moral reasoning in pediatric faculty, house officers and medical students. In *Proceedings of the 17th annual conference on research in medical education*, 17, pp. 439–441, as quoted by Bebeau 2002.

Jadad, A. R., Cook, D. J., Jones, A., Klassen, T. P., Tugwell, P., Moher, M., et al. (1998). Methodology and reports of systematic reviews and meta-analyses: A comparison of Cochrane reviews with articles published in paper-based journals. *Journal of the American Medical Association, 280*, 278–280.

Jain, S., Shapiro, S. L., Swanick, S., Roesch, S. C., Mills, P. J., Bell, I., et al. (2007). A randomized controlled trial of mindfulness meditation versus relaxation training: Effects on distress, positive states of mind, rumination, and distraction. *Annals of Behavioral Medicine, 33*, 11–21.

Jarski, R. W., Gjerde, C. L., Bratton, B. D., Brown, D. D., & Matthes, S. S. (1985). A comparison of four empathy instruments in simulated patient-medical student interactions. *Journal of Medical Education, 60*, 545–551.

Kearl, G. W., Mainous, A. G., & Harrell, P. L. (1992). Students' expected practice locations and their tolerance of ambiguity. *Academic Medicine, 67*, 413–414.

Khawaja, N. G., & Duncanson, K. (2008). Using the University Student depression inventory to investigate the effect of demographic variables on students' depression. *Australian Journal of Guidance and Counselling, 18*, 1–15.

King, P. M., & Kitchener, K. S. (2004). Reflective judgment: Theory and research on the development of epistemic assumptions through adulthood. *Educational Psychologist, 39*, 5–18.

King, P. M., & Mayhew, M. J. (2002). Moral judgement development in higher education: Insights from the defining issues test. *Journal of Moral Education, 31*, 247–270.

Kjeldstadli, K., Tyssen, R., Finset, A., Hem, E., Gude, T., Gronvold, N. T., et al. (2006). Life satisfaction and resilience in medical school—a six-year longitudinal, nationwide and comparative study. *BMC Medical Education, 6*, 48.

Knight, L. V., & Mattick, K. (2006). 'When I first came here, I thought medicine was black and white': Making sense of medical students' ways of knowing. *Social Science and Medicine, 63*, 1084–1096.

Kohlberg, L. (1984). *The psychology of moral development: The nature and validity of moral stages* (pp. 170–205). San Francisco, CA: Harper & Row.

Krichbaum, K., Rowan, M., Duckett, L., Ryden, M. B., & Savik, K. (1994). The clinical evaluation tool: A measure of the quality of clinical performance of baccalaureate nursing students. *Journal of Nursing Education, 33*, 395–404.

Kuhn, G., Goldberg, R., & Compton, S. (2009). Tolerance for uncertainty, burnout, and satisfaction with the career of emergency medicine. *Annals of Emergency Medicine, 54*, 106–113.

Levasseur, J., & Vance, D. R.(1993). Doctors, nurses and empathy. In Spiro, H., McCrea, M. G., Peschel, E., St James, D. (Eds.), *Empathy and the practice of medicine. Beyond Pills and the Scalpel*. New Haven: Yale Univ Press.

Levine, R. E., Litwins, S. D., & Frye, A. W. (2006). An evaluation of depressed mood in two classes of medical students. *Academic Psychiatry, 30*, 235–237.

Light, D. (1979). Uncertainty and control in professional training. *Journal of Health and Social Behaviour, 20*, 310–322.

Lind, G. (2000). Moral regression in medical students and their learning environment. http://www.uni-konstanz.de/ag-moral/pdf/Lind-2000_Moral_Regression_in_Medical_Students.pdf in December 2013.

Maslach, C. (2003). *Burnout: The cost of caring*. Cambridge, MA: Malor Books.

Mays, N., Pope, C., & Popay, J. (2005). Systematically reviewing qualitative and quantitative evidence to inform management and policy-making in the health field. *Journal of Health Services Research & Policy, 10*(Suppl 1), 6–20.

Melo-Carrillo, A., Van Oudenhove, L., & Lopez-Avila, A. (2012). Depressive symptoms among Mexican medical students: High prevalence and the effect of a group psychoeducation intervention. *Journal of Affective Disorders, 136*, 1098–1103.

Mercer, S. W., Neumann, M., Wirtz, M., Fitzpatrick, B., & Vojt, G. (2008). General practitioner empathy, patient enablement, and patient-reported outcomes in primary care in an area of high socio-economic deprivation in Scotland—a pilot prospective study using structural equation modeling. *Patient Education and Counseling, 73*, 240–245.

Merrill, J. M., Camacho, Z., Laux, L. F., Lorimor, R., Thornby, J. I., & Vallbona, C. (1994). Uncertainties and ambiguities: Measuring how medical students cope. *Medical Education, 28*, 316–322.

Morton, K. R., Lamberton, H. H., Testerman, J. K., Worthley, J. S., & Loo, L. K. (1996). Why does moral reasoning plateau during medical school? *Academic Medicine, 71*, 5–6.

Morton, K. R., Worthley, J. S., Nitch, S. R., Lamberton, H. H., Loo, L. K., & Testerman, J. K. (2000). Integration of cognition and emotion: A postformal operations model of physician-patient interaction. *Journal of Adult Development, 7*, 151–160.

Murphy, R. J., Gray, S. A., Sterling, G., Reeves, K., & DuCette, J. (2009). A comparative study of professional student stress. *Journal of Dental Education, 73*, 328–337.

Neumann, M., Edelhäuser, F., Tauschel, D., Fischer, M. R., Wirtz, M., Woop, C., et al. (2011). Empathy decline and its reasons: A systematic review of studies with medical students and residents. *Academic Medicine, 86*, 996–1009.

Nevalainen, M., Kuikka, L., Sjoberg, L., Eriksson, J., & Pitkala, K. (2012). Tolerance of uncertainty and fears of making mistakes among fifth-year medical students. *Family Medicine, 44*, 240–246.

Newton, B. W., Savidge, M. A., & Barber, L. (2000). Differences in medical students' empathy. *Academic Medicine, 75*, 1215.

Newton, B. W., Savidge, M. A., Barber, L., Clardy, J., Cleveland, E., & O'Sullivan, P. (2008). Is there hardening of the heart during medical school? *Academic Medicine, 83*, 244–249.

Niemi, P. M., & Vainiomaki, P. T. (2006). Medical students' distress—quality, continuity and gender differences during a six-year medical programme. *Medical Teacher, 28*, 136–141.

Paro, H. B., Morales, N. M., Silva, C. H., Rezende, C. H., Pinto, R. M., Morales, R. R., et al. (2010). Health-related quality of life of medical students. *Medical Education, 44*, 227–235.

Patenaude, J., Niyonsenga, T., & Fafard, D. (2003). Changes in students' moral development during medical school: a cohort study. *Canadian Medical Association Journal, 168*, 840–844.

Perry, W. G. (1968). *Forms of intellectual and ethical development in the college years*. New York: Holt, Reinhart and Winston.

Poole, A. D., & Sanson-Fisher, R. W. (1980). Longterm effects of empathy training on the interview skills of medical students. *Patient Counselling and Health Education, 2*, 125–127.

Quince, T. A., Parker, R. A., Wood, D. F., & Benson, J. A. (2011). Stability of empathy among undergraduate medical students: A longitudinal study at one UK medical school. *BMC Medical Education, 11*, 90.

Rakel, D. P., Hoeft, T. J., Barrett, B. P., Chewning, B. A., Craig, B. M., & Niu, M. (2009). Practitioner empathy and the duration of the common cold. *Family Medicine, 41*, 494–501.

Reed, D. A., Shanafelt, T. D., Satele, D. W., Power, D. V., Eacker, A., Harper, W., et al. (2011). Relationship of pass/fail grading and curriculum structure with well-being among preclinical medical students: A multi-institutional study. *Academic Medicine, 86*, 1367–1373.

Rennie, S. C., & Rudland, J. R. (2003). Differences in medical students' attitudes to academic misconduct and reported behaviour across the years—a questionnaire study. *Journal of Medical Ethics, 29*, 97–102.

Rest, J. (1994). Background: theory and research. In J. R. Rest (Ed.), *Moral development in the professions: Psychology and applied ethics* (pp. 1–26). Hillsdale, NJ: Lawrence Erlbaum Associates.

Samaranayake, C. B., & Fernando, A. T. (2011). Satisfaction with life and depression among medical students in Auckland, New Zealand. *New Zealand Medical Journal, 124*, 12–17.

Santen, S. A., Holt, D. B., Kemp, J. D., & Hemphill, R. R. (2010). Burnout in medical students: Examining the prevalence and associated factors. *Southern Medical Journal, 103*, 758–763.

Satterfield, J. M., & Hughes, E. (2007). Emotion skills training for medical students: A systematic review. *Medical Education, 41*, 935–941.

Schor, R., Pilpel, D., & Benbassat, J. (2000). Tolerance of uncertainty of medical students and practicing physicians. *Medical Care, 38*, 272–280.

Schwartz, P. L., & Loten, E. G. (2004). Effect of year in school on medical students' perceptions evaluated with the Cognitive Behavior Survey, Attitudes Toward Social Issues in Medicine Survey, and Learning Environment Questionnaire. *Teaching and Learning Medicine, 16*, 333–344.

Schwenk, T. L., Davis, L., & Wimsatt, L. A. (2010). Depression, stigma and suicidal ideation in medical students. *Journal of the American Medical Association, 304*, 1181–1190.

Self, D. J. (1983). A study of the foundations of ethical decision-making of physicians. *Theoretical Medicine, 4*, 57–69.

Self, D. J., & Baldwin, C. (1998). Does medical education inhibit the development of moral reasoning in medical students? A cross-sectional study. *Academic Medicine, 73*(Suppl 10), 91–93.

Self, D. J., Olivarez, M., Baldwin, D. C, Jr., & Shadduck, J. A. (1996). Clarifying the relationship of veterinary medical education and moral development. *Journal of the American Medical Association, 209*, 2002–2004.

Self, D. J., Schrader, D. E., Baldwin, C., & Wolinsky, F. D. (1993). The moral development of medical students: A pilot study of the possible influence of medical education. *Medical Education, 27*, 26–34.

Self, D. J., Wolinsky, F. D., & Baldwin, C. (1989). The effect of teaching medical ethics on medical students' moral reasoning. *Academic Medicine, 64*, 755–759.

Shanafelt, T. D., Bradley, K. A., Wipf, J. E., & Back, A. L. (2002). Burnout and self-reported patient care in an internal medicine residency program. *Annals of Internal Medicine, 136*, 358–367.

Sheehan, T.J., Husted, S.D. & Candee, D. (1981). The development of moral judgment over three years on a group of medical students. In *Presented at the annual meeting of the American Education Research Association*, as quoted by Bebeau 2002.

Sheehan, T. J., Husted, S. D., Candee, D., & Bargen, M. (1980). Moral judgement as a predictor of clinical performance. *Evaluation and the Health Professions, 3*, 292–304.

Sherman, J. J., & Cramer, B. S. (2005). Measurement of changes in empathy during dental school. *Journal of Dental Education, 69*, 338–345.

Sidana, S., Kishore, J., Ghosh, V., Gulati, D., Jiloha, R., & Anand, T. (2012). Prevalence of depression in students of a medical college in New Delhi: A cross-sectional study. *Australasian Medical Journal, 5*, 247–250.

Simpson, D. E., Dalgaard, K. A., & O'Brien, D. K. (1986). Student and faculty assumptions about the nature of uncertainty in medicine and medical education. *Journal of Family Practice, 23*, 468–472.

Smith, C. K., Peterson, D. F., Degenhardt, B. F., & Johnson, J. C. (2007). Depression, anxiety, and perceived hassles among entering medical students. *Psychology, Health & Medicine, 12*, 31–39.

Spring, L., Robillard, D., Gehlbach, L., & Simas, T. A. (2011). Impact of pass/fail grading on medical students' well-being and academic outcomes. *Medical Education, 45*, 867–877.

Stratton, T. D., Saunders, J. A., & Elam, C. L. (2008). Changes in medical students' emotional intelligence: An exploratory study. *Teaching and Learning in Medicine, 20*, 279–284.

Swick, H. M. (2000). Toward a normative definition of medical professionalism. *Academic Medicine, 75*, 612–616.

Thomas, M. R., Dyrbye, L. N., Huntington, J. L., Lawson, K. L., Novotny, P. J., Sloan, J. A., et al. (2007). How do distress and well-being relate to medical student empathy? A multicenter study. *Journal of General Internal Medicine, 22*, 177–183.

Thompson, D., Goebert, D., & Takeshita, J. (2010). A program for reducing depressive symptoms and suicidal ideation in medical students. *Academic Medicine, 85*, 1635–1639.

Vengoechea, J., Moreno, S., & Ruiz, A. (2008). Misconduct in medical students. *Developing world bioethics, 8*, 219–225.

Warnecke, E., Quinn, S., Ogden, K., Towle, N., & Nelson, M. R. (2011). A randomised controlled trial of the effects of mindfulness practice on medical student stress levels. *Medical Education, 45*, 381–388.

Wayne, S., Dellmore, D., Serna, L., Jerabek, R., Timm, C., & Kalishman, S. (2011). The association between intolerance of ambiguity and decline in medical students' attitudes toward the underserved. *Academic Medicine, 86*, 877–882.

Weng, H. C., Chen, H. C., Chen, H. J., Lu, K., Hung, S. Y. (2008). Doctors'emotional intelligence and the patient–doctor relationship. *Medical Education*, *42*, 703–711.

Wolf, F. M., Woolliscroft, J. O., Calhoun, J. G., & Boxer, G. J. (1987). A controlled experiment in teaching students to respond to patients' emotional concerns. *Journal of Medival Education, 62*, 25–34.

Woloschuk, W., Harasym, P. H., & Temple, W. (2004). Attitude change during medical school: A cohort study. *Medical Education, 38*, 522–534.

Zeldow, P. B., & Daugherty, S. R. (1987). The stability and attitudinal correlates of warmth and caring in medical students. *Medical Education, 21*, 353–357.