



# EDUCATION FOR HEALTH

## REVIEW ARTICLE

# Stress and Coping Strategies among Arab Medical Students: Towards a Research Agenda

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## ABSTRACT

**Background:** Research conducted in the past ten years in the area of stress and coping among Arab medical students has identified some important issues, but other significant aspects have not yet been explored.

**Objectives:** To provide a systematic review of studies reporting on stress, anxiety and coping among Arab medical students and to identify implications for future research.

**Methods:** PubMed was searched to identify peer-reviewed English-language studies published between January 1998 and October 2009 reporting on stress and coping among undergraduate Arab medical students. Search strategy used combinations of the terms: Arab medical student, stress, PBL, psychological distress, depression, anxiety and coping strategies. Demographic information on respondents, instruments used, prevalence data and statistically significant associations were abstracted.

**Results:** The search identified 8 articles that met the specified inclusion criteria. Within the limited range of Arab medical students studied, studies suggest these students have a high prevalence of perceived stress, depression and anxiety, with levels of perceived psychological stress as high as those reported in the international literature for medical students of other regions of the world. Limited data were available regarding coping strategies, the impact of stress on academic performance and attrition among Arab students. No data were available regarding the impact of problem-based learning on stress and coping.

**Conclusions:** The existing literature confirms that stress, depression and anxiety are common among Arab medical students, as for students elsewhere. Little is known about the contribution of different curricula approaches to perceived stress and what coping



strategies institutions and students apply to help alleviate stress. Large, prospective, multicentre, multi-method studies are needed to identify personal and curricula features that influence stress, depression, anxiety and coping strategies among Arab students.

**Keywords:** Arab, coping, stress, literature review, medical students, research

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## Introduction

The incidence of stress and stress-related illnesses such as anxiety and depression among students, trainees and qualified physicians internationally is increasingly reported in the literature<sup>1-5</sup>. Indeed, some studies indicate that medical students face unique academic challenges that render them more vulnerable to stress and anxiety than students of other disciplines<sup>6,7</sup>. These challenges of a medical education include the rigours of the educational programme and emotionally tense experiences, such as dealing with illness, disease and dying<sup>8</sup>.

Many studies underscore the role of the academic environment as a source of stress<sup>9,10</sup>; however, published studies rarely emanate from medical schools in the Arab World. Furthermore, nothing is currently known about aspects of different medical school curricula that contribute to or alleviate stress in this context, where considerable changes in medical education have taken place during the past two decades.

Some medical schools in the Middle Eastern region are following the examples of their Western counterparts and have adopted innovative methods of teaching, learning and assessment, including the introduction of problem-based learning (PBL) curricula. Some, in the Kingdom of Saudi Arabia are, for example, endeavouring to implement some form of student-centred, small group learning<sup>11</sup>. PBL emphasises active, student-centred learning, student autonomy, small group work and the development of problem-solving and interpersonal skills<sup>12-14</sup>. It is an approach to learning that is often very different for students who have experienced a more teacher-centred approach in their pre-professional education<sup>15</sup>. Hence, in addition to learning technical skills, responding to patient problems and interacting with other healthcare professionals, these students may be experiencing additional stressors adapting to new ways of teaching and learning in medicine. The stressors unique to adapting to PBL may include: moving from teacher-centred to student-centred approaches to learning with the associated effects of increased personal responsibility for learning, pressure performing in small group situations, accessing learning resources and uncertainty about content to be mastered<sup>16-18</sup>. Some authors suggest that PBL curricula should provide more social support by peers and faculty, and a less competitive and more caring environment. It has been suggested that as medical educators modify curricula the psychological impact should be monitored to prevent an unwitting increase in stress and depression<sup>15,17</sup>. These factors from transitioning to PBL may contribute to anxiety and stress among Arab medical students. They may also be accentuated by poor preparation in the English language now routinely used in their education, by insecurities about whether they are learning relevant concepts adequately, and by their prior experiences of rote learning in high schools where less autonomous learning approaches are typically applied.

The purpose of the present study was, through a systematic review of the literature from January 1998 to December 2009, to provide a synthesis of existing evidence that focused on psychological stress, anxiety, depression and coping among Arab medical students and to consider implications for future research.



## Background

The Arab world constitutes 22 countries extending over North and Central Africa and South West Asia<sup>19</sup>, encompassing a cultural-geographic region rather than a single nation. Although they share a number of key features including a shared language, Islam as the majority religion for some 90% of the population, common history and similar political systems, Arab societies are nevertheless highly diverse in terms of ethnic, socio-economic and national identities.

Pre-Flexner era medical education in the Arab world followed an apprenticeship model based on local traditions. After Flexner, colonial influences such as the French and British in North Africa and the Gulf predominated. Typically, medical education follows high school entry and a six-year programme precedes a one-year internship. According to a World Health Organization (WHO) survey, most schools list English as the language of instruction although some in Tunisia, Morocco, Algeria, Syria and Lebanon list French<sup>20</sup>. Medical education is gender segregated throughout most of the Arab world, though its inflexibility varies. For example, Saudi Arabia and the United Arab Emirates have gender-separate buildings or classrooms, labs and library facilities. In most Arab countries females constitute 40-60% of medical students. Medical education is free for most medical students although some fee-dependent private medical schools have been established in the last ten years and in some countries training positions are available for international medical students.

In terms of stress and coping generally, considerable stigma is attached to mental healthcare and help seeking for psychological problems<sup>21,22</sup>. Utilisation of mental health services is often interpreted as reflecting an inability to cope, one's own personal weakness or the socially unendorsed need to involve sources external to the family in resolving problems<sup>23</sup>. Hence, there is probably more reliance on religion and social safety-nets for mitigating the impact of stress, anxiety and depression, than in Western countries.

### Questions of the literature review

The following questions were explored through a systematic review of the literature published between January 1998 and December, 2008:

- I. What are the main stressors faced by Arab medical students and are any of these stressors associated with experiences in innovative curricula?
- II. What coping mechanisms/strategies do Arab medical students utilise to alleviate stress and what mechanisms/strategies are offered by the universities they attend?

From what is learned through the above literature review, we consider the implications for future research in Arab medical education institutions.

## Methods

### *Search strategy, justification and sources*

PubMed was searched to identify peer-reviewed, English-language studies published between January 1998 and December 2008 reporting on stress, anxiety, depression and coping strategies among medical students in Arab countries. The reviewers did not



attempt to access sources published in Arabic since their own first language is English and accuracy of translation would be limited. The 1998 to 2008 time period was chosen because both new and older medical schools in the region are known to be moving towards implementation of contemporary curricula, and some were established during this period. Search terms used combinations of the terms: Arab, medical student, trainee, stress, anxiety, depression, psychological distress, curriculum and PBL. Specifically, "Arab" cross referenced with the other terms was a requirement.

The search was conducted across a comprehensive range of sources including electronic and manual searches of the journals Academic Medicine, Medical Education, Medical Teacher, Teaching and Learning in Medicine, Advances in Health Sciences Education and the online journal of Medical Education Online. Full versions of papers were obtained. Reference lists of retrieved articles were inspected to identify other relevant sources. An updating search was conducted in October, 2009 to retrieve new research published since the start of the review and to check if any relevant sources had been missed.

### **Inclusion and Exclusion criteria**

The authors determined that for studies to be eligible for inclusion they must contain assessments of stress, anxiety, depression and/or coping of medical students and/or physician trainees in any of the 22 Arab countries. Excluded were studies assessing stress, anxiety, depression and coping of medical students and trainees solely in non-Arab countries. Reviews and duplicate publications were also excluded.

### ***Assessment of methodological quality of studies included in the review***

Higher quality ratings were made for studies with institutional review board approval and for prospective, longitudinal and multi-centred studies that correlated students' perceived stress measured on validated instruments with scores later in their medical education and training, than for non-approved, cross-sectional, single centre/case studies. Selection of subjects was considered unbiased if entire cohort(s) were included or explicit probability sampling techniques were described. Since data sets may represent a restricted range of eligible subjects and the magnitude of observed associations, response rates of 80% or above was considered good<sup>24</sup>. Studies reporting the psychometric properties of instruments utilised and reporting whether Arabic versions were applied were considered of higher quality than those not reporting these aspects in their methodology. Provision of a comprehensive approach to understanding stress, anxiety, depression and coping among participants is also important to quality. Accordingly, studies using a mixed method design, applying both quantitative and qualitative data collection techniques such as interviews and focus group meetings, were evaluated more favourably than those not doing so. Studies correlating scores on stress, anxiety and/or depression measures with type of curricula, academic performance or stage of education and training or studies with estimates from logistic regression models of effects due to any of the predictor variables were also evaluated more favourably than those merely correlating these variables with gender.

All findings of group differences reported in the Results section are statistically significant at or below the .05 level.

## **Results**

A total of only eight papers were identified that met the inclusion criteria. The initial search identified five of these and the updating search identified a further three.



**Table 1: Study authors, sample sizes, student populations, instruments used and findings of 8 studies examining Arab medical student stress**

Authors	Type of Medical School Curriculum	Study Period	Population and sample	Study Design	Instrument(s)	Findings	Recommendations
Al Bedaiwi, Driver & Ashton, 2001	Postgraduate training specialty programme under supervision of Saudi Council for Health Specialties	1998	Male and Female Postgraduate medical trainees, King Fahad National Guard Hospital, Riyadh, Saudi Arabia (n=75). All trainees participating in Saudi Council for Health Specialties 4 year training programme.	Cross sectional, self-report survey	Questionnaire based on General Health 28 (Arabic and English)	82% response. 3 designated as Trainee V completed postgrad. Programme; 20 in 1 <sup>st</sup> yr of training; 55 were 2 <sup>nd</sup> to 5 <sup>th</sup> year trainees. 76% male and married (73%). All graduates of Saudi universities. Overall 59% had minor psychiatric illnesses. Paediatrics, Surgery, Family Medicine, Obstetrics & Gynaecology, Internal medicine 47%, 50%, 52%, 60% and 93% respectively. No statistical significant differences between specialties but females significantly higher minor psychiatric morbidity (p<0.026)	Further develop postgraduate training programmes promoting stress management skills, help seeking behaviours, mentoring, collegiate problem-solving, communication and management. Conduct a national survey. Interventions to improve stress levels including stress and time-management; increasing access to medical care and physical activity facilities
Carter et al., 2003	PBL first two years of 6 year programme	2000/2001	United Arab Emirates University, Faculty of Medicine & Health Sciences, male and female medical undergraduates (n=175)	Cross-sectional, self-report survey	Questionnaire based on Cohen's Perceived Stress Scale, (English) inclusion of self-reported height, weight, diet, exercise pattern, use of alcohol and tobacco, healthcare practices.	84% response. Age range 19-27 yrs. 30% male, 70% female, 47% in basic science yrs, 36% clinical science, 17% clinical clerkship; 93% single. 65% students perceived stress levels too high. Relationship between stress scores and students' opinions regarding whether stress perceived too high or not (p<0.001). No statistically significant gender or stage of medical training differences.	
Amr et al., 2008	Not specified	2006/7	Mansoura College of Medicine, Egypt. Yrs. 1-6 male and female undergraduates (n=311)	Cross-sectional self-report survey (Arabic).	Hospital Anxiety and Depression Scale; Perceived Stress Scale; Neuroticism & extraversion subscales of Eysenck Personality Questionnaire; Self-report of sources of stress and physical well-being.	85% response. 53% male, 47% female. Mean age 20.6 yrs. 196 preclinical, 115 clinical. Overall stressors reported by 94.5% of male and female students. No gender differences in mean number of stressors, anxiety symptoms and global sickness index. However, females scored significantly higher than males on depression and neuroticism scales (p 0.04 and 0.03 respectively). Females less likely to report relationship problems with teachers and substance abuse as stressors.	Future research regarding potential links between gender and medical school outcomes such as medical practice and doctor-patient relationships.



Table 1: cont'd

Authors	Type of Medical School Curriculum	Study Period	Population and sample	Study Design	Instrument(s)	Findings	Recommendations
ElGilany, Amr & Hammad, 2008	Not clear for Saudi school but Discussion mentions traditional educational programme in Egyptian school	Oct. to Dec. 2007	Yrs. 1-6 male undergraduates, Mansoura University, Egypt (n=304) and King Faisal University College of Medicine, Al Hassa, Saudi Arabia (n=284)	Cross-sectional self-report survey (Arabic) Comparative study	Cohen's Perceived Stress Scale, Hospital Anxiety and Depression Scale, perceived sources of stress	82% response. Egyptian mean age 20.6±2.3, Saudi 21.0 ±1.9. 212 preclinical, 370 clinical. Stress, anxiety and depression frequent among medical students. No statistically significant differences between 2 groups regarding number of stressors. Egyptian students however, more likely to cite relationship, academic, environmental and financial problems (p<0.001). Anxiety and depression higher among Egyptian than Saudi students (p<0.001 and 0.002 respectively) Satisfactory family income & university graduated father independent protective factors for Saudi students.	Early detection, support services, raising awareness about stress, multi-centred studies, including institutional, socio-economic and other psychosocial variables.
Abdulghani, 2008	Not specified website indicates traditional	2006/7	Years 1-5 male undergraduate students, College of Medicine, King Saud University (n=494)	Cross-sectional self-report survey (Arabic)	Kessler 10 Psychological Distress Questionnaire, addition questions relating to academic achievement, sources of stress, medical illness in past 4 weeks and how many days students not able to work.	83% response. Mean age 21.4 ±1.9 226 pre clinical, 268 clinical. 57% stressed and 20% severely stressed. There was statistically significant relationship between year of study and stress levels (p<0.001). Stress prevalence higher among first-year students (70%) and diminishes progressively. Main sources of stress were studies followed by home environment. No coping strategies identified. Stress levels associated with physical problems (p<0.001). No association between stress and academic grades.	Preventative strategies. Wellness and mental health programmes to help students make transition between different learning environments. Students should be helped to recognise symptoms of stress.



Table 1: cont'd

Authors	Type of Medical School Curriculum	Study Period	Population and sample	Study Design	Instrument(s)	Findings	Recommendations
ElGilany, Amr, Awadalla, ElKhawaga, 2008	Introduction indicates traditional for both law and medical schools	Oct. to Dec.2007	1 <sup>st</sup> to 6 <sup>th</sup> year Medical (n=283 and 1 <sup>st</sup> to 4 <sup>th</sup> year law (n=277) undergraduates, Mansoura University, Egypt.	Cross-sectional self-report survey (Arabic)	Cohen's Perceived Stress Scale, Hospital Anxiety and Depression Scale, perceived sources of stress.	Response 78% medicine; 67% law. Law students significantly more stressed and anxious than medical students (78% vs 67% respectively) p<0.001. Law students more likely to cite personal, environmental and relationship categories as stressors. Medical students commonly cited coping with the course of study, inconsiderate and insensitive instructors (34% and 28% respectively); 63% of law students were anxious and depressed and cited time limitation for recreational activities (43%), problems with opposite gender (39%) and congested classrooms (38%).	Integration of routine clinical facilities caring for university students. Counselling and preventative mental health services. Further exploration of effects of law school stress in postgraduate years.
Ahmadi et al., 2008	Not specified in article Prospectus indicates PBL/ case-based learning	2006/7	Pre-clinical, female undergraduate students, Dubai Medical College for Girls, United Arab Emirates (UAE) (n=103)	Cross-sectional self-report survey (not specified English or Arabic)	Beck Depression Inventory	100% response. Age range 17-22yrs. 27% in the normal depression range (BDI 0-9). 45.6% in marginal range (BDI 10-19) 23.3% in moderate range (BDI 20-29) Only 3.88% found to be in the moderate to severe depression range (BDI score 30-39). The majority of participants were optimistic about the future, 74% indicated they had no self-harming thoughts.	Actions to encourage students to seek help for depression and other psychiatric problems. Provision of adequate facilities. Large-scale studies at the community level to achieve a comprehensive picture of risk and protective factors for depression in UAE.
Ahmed et al., 2009	Not specified in article. Prospectus indicates PBL/case-based learning	2008	Dubai Medical College for Girls, UAE. 165 medical students and 93 doctors from 3 government hospitals, 3 primary health-care centres and medical staff of the College.	Cross-sectional self-report survey (not specified English or Arabic)	Beck Depression Inventory and Beck Anxiety Inventory	There was moderate depression and anxiety found among medical students (29% respectively). 2 <sup>nd</sup> year students exhibited greater depression and anxiety. Significant correlation between depression and anxiety (r=0.6). Crying most common depressive symptom and "fear of worst happening" most common anxiety among medical students. For medical staff 7.8% showed depression and 2.2% anxiety. No significant differences between specialities of staff.	Attention to prevention. Early efforts to address variety of concerns including academic, interpersonal relationships and financial worries.



### *Overview of studies included in the review*

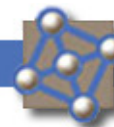
One study was published in 2001, one in 2003, five appeared in 2008 and one in 2009. Almost two-thirds of studies were from Saudi Arabia and Egypt (singularly and in collaboration), and the remaining studies were from the UAE. No source used the terms 'traditional', 'conventional' or 'problem-based/cased-based' as curriculum type descriptors.

The first study reviewed<sup>25</sup> described the prevalence of minor psychiatric morbidity among medical trainees in a Saudi Arabian teaching hospital using the General Health Questionnaire 28. Trainees were from Family Medicine (33%), Pediatrics (20%), Internal Medicine (17%), Surgery (16%) and Obstetrics and Gynaecology (13%). Fifty-nine percent of participants in this study were found to have minor psychiatric illnesses. Within specific specialities, the percentage of trainees with minor psychiatric morbidity was 47% for Pediatrics, 50% for Surgery, 52% for Family Medicine, 60% for Obstetrics and Gynaecology, and 93% for Internal Medicine. Reported minor psychiatric morbidity was statistically significantly higher among females than among males.

Of other eligible studies, one conducted in the UAE assessed medical students' overall health and lifestyle needs, including self-reported stress levels<sup>26</sup>. In addition to other health-related indicators, the investigators found a highly significant positive relationship between stress scores and students' perceptions of whether or not their stress was too high. Among other health issues, the authors expressed concern about high actual and perceived stress levels for these students when compared with US college students. Another study evaluated the prevalence of stress and depression among male medical students in a single Saudi Arabian medical school<sup>27</sup>. Fifty-seven percent of students had experienced stress and 19.6% reported perceived severe stress. A significant association between first year of study and higher stress levels was reported. Main reported sources of stress were issues with courses (60.3%) and the home environment (3.8%). This was the only study that tested whether there was an association between academic performance and stress: no such association was found.

Another study compared perceived stress among a sample of male medical students in Egypt and Saudi Arabia<sup>28</sup> attending individual, national medical schools in each country. The majority of students reported one or more stressors (95% in the Egyptian school and 92% in the Saudi school). Although there were no significant differences between the two student groups in number of perceived stressors, Egyptian students were more likely than their Saudi counterparts to mention relationship, academic and environmental problems as stressful. Among Egyptian students, the most commonly perceived stressors were congested classrooms (71%), inconsiderate and insensitive instructors (33%), fear of the future (27%), limited time for recreational activities (25%), and anxiety and depression (25%). Anxiety and depression were significantly higher among Egyptian students. Logistic regression analysis revealed that family income perceived by students to be satisfactory and a highly educated father were independent protective factors for severe stress (odds ratio 0.5 and 0.6 respectively) while anxiety and number of stressors were risk factors (odds ratio 2.3 and 1.3 respectively).

It was discovered on updating the review that two of the authors in the above study appear to have collaborated with others<sup>29</sup> to conduct another comparative study, which reported perceived stress, anxiety and depression among medical and law undergraduates at a single Egyptian university. Findings revealed that law students were more likely to cite personal, environmental and relationship issues as stressors, and they reported higher levels of anxiety than medical students. Reported predictors of stress among female law students were family incomes they felt were unsatisfactory, poorly educated parents and fathers in non-professional positions. Coping with the course of study, inconsiderate and insensitive instructors (34% respectively) and troubles with classmates (28%) were the most commonly perceived stressors among medical students.



Amr et al.<sup>30</sup> collaborated to conduct another study assessing the influence of gender on perceived sources of stress, anxiety, depression, physical symptomatology and personality in Egyptian medical students. Stressors were reported by 95% of respondents. While males and females were similar on levels of perceived stress, number of stressors, clinical anxiety, physical well-being and extraversion scale scores, females scored significantly higher than males on scales indicating depression and neuroticism.

Two further studies<sup>31,32</sup> conducted at the Dubai Medical College for Girls, the first private university in the United Arab Emirates, were identified on updating the review. The first study<sup>31</sup> assessed depression scores for medical students using the Beck Depression Inventory (BDI). Results indicated that 27% of females had BDI scores in the normal range (0-9), 46% had scores in the marginal range (10-19), 23% had scores in the moderate range (20-29) and only 4% had BDI scores in the moderate to severe range (30-39). Most (64%) of participants were optimistic about the future.

The other study<sup>32</sup> was conducted by second-year medical students at the Dubai Medical College for Girls and examined depression and anxiety in medical students and medical staff at three primary care centres and government hospitals affiliated with the school. Findings revealed that medical students reported depression and anxiety (28.6% and 28.7% respectively) while 7.8% of medical staff reported depression and 2.2% perceived themselves to be anxious. A significant correlation between depression and anxiety was also reported and second-year medical students had a higher percentage of depression and anxiety scores than students at other stages of the programme (47% and 39% respectively).

#### *Assessment of methodological quality of studies*

All articles retrieved reported cross-sectional studies intended to describe prevalence and/or associations between stress, anxiety, depression and demographic characteristics such as gender, students' year of study and setting of individual medical schools. No studies on impact of contemporary curricula on stress, anxiety and depression levels were identified. None of the studies were longitudinal and none evaluated the effects of an intervention. Only one was a comparative study of medical student stress across individual medical schools<sup>28</sup>. Collaboration between a group of Egyptian and Saudi Arabian researchers appears to have been responsible for at least two studies.

Egyptian studies gave clear descriptions of sampling techniques including sample size calculations<sup>29,30</sup>. The sample in most studies had a percentage of non-respondents but none presented a comparison of the characteristics of respondents and non-respondents. Response rates and socio-demographic characteristics of samples were reported in seven of the eight studies, and response rates in six of these were above the 80% level set by the researchers as indicative of a good response rate.

In all studies, standard instruments were used to assess health status, depression, personality, stress and anxiety. Five studies indicated that Arabic versions of instruments were administered<sup>25,27-30</sup>. These included The General Health Questionnaire 28 (GHQ28), The Hospital Anxiety and Depression Scale (HAD) the Kessler10 Psychological Distress (K10) and Cohen's Perceived Stress Scale (PSS). One study also included personality profile assessments using the Arabic version of the Eysenck Personality Questionnaire. It was not specified whether English and/or Arabic versions of the Beck Depression Inventory (BDI) and Beck Anxiety Inventory (BAI) were administered in the Dubai studies. There was a similarity in instruments utilised, analytical strategies and reporting style in the two Dubai and all of the Egyptian studies.



Data analysis included description of scores on instruments and percentages, odds ratios and 95% confidence intervals, chi square, students' test of independent samples, Pearson correlations and multivariate logistic regression.

Table 1 shows study authors, sample sizes, student populations, instruments used and findings.

## Discussion

The purpose of this study was to review the literature regarding stress, anxiety and coping strategies among Arab medical students and trainees. Medical educators internationally support the need for better understanding and institutional action regarding the causes and consequences of stress at all stages of the medical education continuum<sup>4</sup>. To the best of the authors' knowledge, this is the first attempt to critically evaluate the literature on this topic from Arab countries, to highlight its limitations and to identify important issues not yet explored.

Outcomes relating to the stipulated review questions are as follows.

### *(i) Main stressors and whether sources of stress include experiences in innovative curricula*

The existing literature identified indicates high levels of perceived psychological stress and depression among medical students in individual medical schools in Egypt, Saudi Arabia and United Arab Emirates. International studies in countries where there are similar and different systems of medical training in force have also identified high frequencies of psychological stress, burnout and psychiatric morbidity<sup>33-35</sup>. Perceived sources of medical student and trainee stress in the Arab world are multifaceted, with a mix of internal (person-related) and external (environment-related) variables which are also often identified in the international literature<sup>36-38</sup>.

No source made explicit comparisons by type of curriculum, although one speculated that higher stress levels among second-year female medical students may be due to the school's transition to an integrated system<sup>32</sup>. Although one source indicated higher stress levels among law students than medical students<sup>29</sup>, none specified whether stress among medical students is comparable, higher or lower than among other health professional students in the region. In contrast, an interesting difference in stress levels of medical and dental students was found in a US study where out of five categories (academic performance, faculty relations, patient and clinic responsibilities, personal life issues, and professional identity), medical students only demonstrated greater stress levels in professional identity<sup>39</sup>. Earlier, principle stressors among first-year medical students in a single UK school<sup>16</sup>, over three time periods, were found to be related to medical training and uncertainty about individual study behaviour in a PBL curriculum, progress, aptitude, assessment and availability of learning resources.

Medical education in the Arab World has been changing over the past two decades and some schools are implementing some form of small group, case-based or problem-based learning. Since reviewed studies do not address the impact of innovative teaching or learning and assessment strategies on perceived stress among students, no conclusions can be reached on this question. One can, however, be optimistic since most studies reviewed are of fairly recent origin and there may be more forthcoming which may take a more comprehensive and methodologically sound approach. The systematic review referred to earlier<sup>4</sup> also concluded that the current available data was insufficient to draw firm conclusions regarding the causes and consequences of significant distress among medical students.



The suggestion that the significantly higher reporting of relationship, academic and environmental stressors among Egyptian students may be explained by larger numbers of students within crammed classrooms and the lower socio-economic status<sup>28</sup> of their families relative to Saudi students, indicates that medical students from wealthier Arab countries and families may be protected from at least some academic environment and financial stressors. Studies in the UK and North America<sup>40,41</sup> examining the relationship between medical student debt, perceived financial stress and academic performance indicate that the relationships are real, complex and need to be appreciated by medical education policy makers.

The Egyptian studies found in this review identified that insensitive and inconsiderate instructors were perceived to affect stress levels among medical students. Academic staff behaviours, including verbal abuse and humiliation, have also been reported as having an effect on the mental health and stress of medical students elsewhere<sup>42,43</sup>. A number of studies<sup>44,45</sup> have also found that female students experience gender discrimination and harassment particularly during core clerkships. However, in the Arab world there is often gender segregation, and the more homogeneous nature of the student and staff populations may account for less insensitive behaviour and mistreatment of female medical students thereby potentially explaining why Egyptian and UAE females were less likely to cite relationship problems with teachers.

Dyrbye et al.<sup>4</sup> assert that the importance of comparisons is debatable “since distress among any of the groups should not be disregarded regardless of how the groups’ distress levels compare” (p. 361). We would argue, however, that lessons can be learned and useful insights gained from considering prevalence relative to both general populations in the region and between medical schools and other health professional students, particularly if rich contextual descriptions of curricula and other environmental variables are provided.

#### *(ii) Coping strategies utilised by students and offered by universities they attend*

The studies identified in this review did not aim to determine the coping strategies utilised by students or mechanisms provided by their institutions, and there were no reports of interventions targeting aspects of stress. All, however, recommended student support systems, wellness, counselling and preventive mental health services, stress management programmes and training workshops. Coping has been extensively investigated in the stress literature and several studies have explored coping within medical students<sup>46</sup>. Indeed, as a result of the findings reported in many North American medical schools, several have established policies and programmes to provide treatment services and wellness programmes addressing students’ mental health issues<sup>47</sup>. For example, a Mindfulness-based Stress Reduction course offered as a second-year elective was reported to reduce stress and enhance coping<sup>48</sup>, and following a short yoga intervention, students reported improvements in perceived stress and depressive symptoms<sup>49</sup>.

#### *(iii) Research implications*

This review has highlighted some study methodological issues and variables of significance that warrant attention in future studies. These include an emphasis on quantitative approach, a lack of comprehensive longitudinal, multicentre studies, lack of exploration of the impact of problem-based learning and other curricular and educational environmental factors on student stress. Clearly, multi-method research is needed. Qualitative studies that gather information about students’ experiences can provide deeper insights and additional direction for formulation and testing of hypotheses.



It is worth noting however that all studies identified and reviewed here mentioned limitations of the cross-sectional nature of their studies. Dyrbye et al.<sup>4,33</sup> also indicated that globally, little longitudinal data is available on mental health issues among medical students.

Most studies indicated that their institutions did not presently provide student support services and mentioned a need for interventions. Conducting interventional studies to evaluate the effects of support mechanisms and strategies that will eventually be provided by universities are needed, as is work to determine the use and the impact of effective supervision and mentoring, educational feedback and engagement in selected health promoting behaviours like exercise on perceived stress.

Furthermore, there are other stress buffers that appear not to have been explored yet. Research questions warranting attention include: Is there a relationship between perceived social support from friends and family and medical students' stress? Do Arab medical students have higher levels of healthy self-reliance in dealing with stress than students of other countries? To what extent is spirituality a positive moderator of stress among Arab medical students? Spirituality and social support factors are generally considered buffers to stress and positive influences on health and wellbeing<sup>50</sup>. In Arab culture particularly, where the Islamic religion, social structures, roles and expectations are very different from Western norms, these aspects might be important moderators of stress in medical students. Recently developed culturally sensitive instruments might be of use in pursuance of this line of enquiry<sup>51</sup>.

Finally, sources reviewed lend support to a need for more collaboration between researchers in medical schools across the region, more coherent research approaches that build on prior work and more focussed efforts to disentangle the impact of different curricula. Although a full research agenda awaits an expanding focus on stress and coping among medical students in the region, it is important to note potential confounding factors in pursuance of such research, including confidentiality and perceived barriers to help-seeking and the stigma attached to mental health, including the stress that has been noted in the international literature<sup>52,53</sup>.

We are aware of this review's limitations. These include the fact that the only information available was about stress among medical students in Egypt, Saudi Arabia and the United Arab Emirates. Therefore, generalisability of results beyond single medical centres in the Arab world is not possible. The authors also acknowledge that some published studies may have eluded our search strategy and the literature did not include findings derived from unpublished reports, Arabic language sources or internal evaluations in medical schools. Nevertheless, this review begins the process of adopting an evidence-based medical education approach to the topic of stress and coping among medical students in the changing Arab medical education environment.

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