Medical Student Distress:
Causes, Consequences, and Proposed Solutions

Liselotte N. Dyrbye, MD; Matthew R. Thomas, MD; and Tait D. Shanafelt, MD

The goal of medical education is to graduate knowledgeable, skillful, and professional physicians. The medical school curriculum has been developed to accomplish these ambitions; however, some aspects of training may have unintended negative effects on medical students' mental and emotional health that can undermine these values. Studies suggest that mental health worsens after students begin medical school and remains poor throughout training. On a personal level, this distress can contribute to substance abuse, broken relationships, suicide, and attrition from the profession. On a professional level, studies suggest that student distress contributes to cynicism and subsequently may affect students' care of patients, relationship with faculty, and ultimately the culture of the medical profession. In this article, we review the manifestations and causes of student distress, its potential adverse personal and professional consequences, and proposed institutional approaches to decrease student distress.

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Medical schools are responsible for ensuring that graduates are knowledgeable, skillful, and professional.[1,2] To achieve these goals, medical schools typically use a curriculum of didactic lectures, modeling, supervised practice, mentoring, and hands-on experience to augment individual study. Unfortunately, some aspects of the training process have unintended negative consequences on students' personal health. Studies suggest that medical students experience a high incidence of personal distress,[3-17] with potential adverse consequences on academic performance,[18-20] competency,[21] professionalism,[22-29] and health.[14,30-34] It is critical for medical educators to understand the prevalence and causes of student distress, potential adverse personal and professional consequences, and institutional factors that can positively and negatively influence student health. In this article, we summarize the manifestations, causes, and consequences of student distress; propose how medical schools can address this problem; and outline areas where additional research is needed.

METHODS

The intent of this work was to summarize the central themes of medical student distress reported in the literature and to highlight selected studies exploring the prevalence, causes, and consequences of student distress as well as strategies to reduce student distress and promote well-being. Articles were identified by searching MEDLINE and PubMed for English language articles published between 1966 and 2004 with use of the search terms *medical student* AND *depression, suicide, stress, burnout, distress, abuse, alcohol drinking, illicit drug usage, street drugs, substance-related disorders, ethics, professionalism, cynicism, cheating, debt,* or *academic performance.* Additional studies were identified from the reference lists of these articles. Articles were reviewed critically by authors and included as appropriate to provide readers an overview of the research on medical student distress to date, with specific works featured based on the validity of methods used, the novelty of the research question, and the clarity of the findings. As such, this work is intended to be a summary rather than a systematic review that gives readers an understanding of the current literature on medical student distress.

MANIFESTATIONS OF STUDENT DISTRESS

STRESS

Medical students experience substantial stress from the beginning of the training process.[3,5,35-42] Although some degree of stress is a normal part of medical training and can be a motivator for some individuals, not all students find stress constructive.[43] For many individuals, stress arouses feelings of fear, incompetence, uselessness, anger, and guilt and can be associated with both psychological[3,4,10,38,44,45] and physical morbidity.[10,46]

Students use various coping mechanisms to process stress that vary by year in training and source of stress.[47] The specific coping strategies that students use may determine the effect of stress on psychological and physical health [4,10,12,38,46,48] and may determine whether stress has a positive or negative influence.[4,12,47,49] Strategies that center on disengagement, such as problem avoidance, wishful thinking, social withdrawal, and self-criticism, have negative consequences and correlate with depression, anxiety,

and poor mental health.[4,38,45] In contrast, strategies that involve engagement, such as problem solving, positive reinterpretation, reliance on social support, and expression of emotion, enable students to respond in a manner that leads to adaptation,[4,10,38,46] which can reduce anxiety and depression and their effects on mental[38] and physical health.[46]

DEPRESSION
At the start of medical school, medical students have mental health similar to their nonmedical peers.[9,17] Given that the aims of medical training include teaching graduates how to "promote health" and prepare for a career in an intellectually stimulating and socially meaningful profession, it is tempting to speculate that medical school would be a time of personal growth and enhanced health. Unfortunately, the contrary appears to be true, with numerous studies suggesting that students' mental health worsens during medical school.[3-17]

Surveys in both the United States and abroad identify a high frequency of depression and poor mental health among medical students.[3-10] In a study from the United Kingdom, more than one third of first-year students had poor mental health when measured with the General Health Questionnaire 12, which assesses anxiety and depression.[3]

Another study from the United Kingdom of that year students found that the incidence of poor mental health on the General Health Questionnaire 12 doubled during the first year, increasing from 25% to 52%.[4] Other studies have reported similar findings[5] and suggest that this decline in students' mental health persists throughout the remainder of medical school.[6]

In a 2002 survey of first- and second-year US medical students, 24% of students were depressed according to the Beck Depression Inventory.[7] In a separate study, median Beck Depression Inventory scores increased 3-fold from the time of matriculation to the end of the second year, with 25% of students dysphoric, if not clinically depressed.[8] Two additional studies of US students confirm a peak in depression during the second year of medical school, with gradual improvement during the third and fourth year of training.[9,10]

Despite the high prevalence of mental health–related concerns and ready access to mental health services, depressed medical students are no more likely than the general population to seek treatment for depression.[7,11,50,51] Few students use mental health services,[7,51] instead relying on the support of family and friends during periods of mental illness.[51] Barriers to use of mental health services include lack of time, perception of academic jeopardy, concern regarding confidentiality, the stigma of mental illness, and ost.[7,11,51] Some of these issues appear to be even greater barriers for female and minority students.[11]

BURNOUT
Burnout is another measure of poor mental health attributed to work-related stress. This syndrome of emotional exhaustion, depersonalization, and low personal accomplishment culminates in decreased effectiveness at work and is particularly common in individuals in the helping professions (teachers, nurses, social workers, etc).[52] Several studies have reported high rates of burnout in residents[53,54] and practicing physicians,[55-57] leading to speculation that the origin of physician burnout occurs during medical school.[27,58] Despite this hypothesis, the prevalence, inciting factors, and effect of burnout among medical students have not been well studied,[6] particularly among US students.

POTENTIAL CAUSES OF STUDENT DISTRESS

ADJUSTMENT TO THE MEDICAL SCHOOL ENVIRONMENT
The sources of stress for medical students vary by year in training. The first-year medical student is faced with the challenges of being uprooted from family and friends and adapting to a demanding new learning environment. Human cadaver dissection is a well-recognized stress for many students,[3] but other sources of distress, such as a substantially increased scholastic workload[3,49] and concern for academic performance,[41] also characterize this transition. Attempting to master a large volume of information and joining a peer group of equal motivation and intelligence can be intimidating for young adults accustomed to rapid mastery of material and academic distinction. This challenge is amplified for students who struggle academically.[39] High-stakes examinations, such as the part I examination of the National Board of Medical Examiners[3,42] and tests that must be passed before academic advancement, frequently lead to performance anxiety at the end of the preclinical years.[59]

Once in the clinical years of training, students often are separated from their peer-support group and frequently rotate to new work environments at different hospitals. Each rotation requires a unique medical knowledge base and skill set, which tends to highlight students' deficiencies rather than their progress.[60] An unstructured learning environment, lack of time for recreation, concerns about financial issues, long on-duty assignments, student abuse, and exposure to human suffering can be additional sources of distress during this period.[43,49,60-63]

ETHICAL CONFLICTS
Interpersonal interactions between learners (students) and teachers (faculty, residents, and interns) can subtly but profoundly influence students.[64] The vast majority of these interactions are between students and residents and occur in an informal setting when no faculty are present.[65] This

"informal curriculum" conveys powerful messages about professional values, character, and norms. Unfortunately, depression, burnout, and stress are common among student supervisors [65,66] and can lead to modeling of cynicism and unethical behavior that contradict lessons from the formal curriculum.[65,67-70]

In 1 study of third- and fourth-year students, 98% of respondents reported observing physicians refer to patients in a derogatory fashion, and 60% reported witnessing unethical behavior toward a patient.[67] More than two thirds of students experienced guilt about their personal role in these episodes but felt forced to participate to "fit in" and receive a favorable evaluation. Others have made similar observations.[70,71] The "see one, do one, teach one" approach to learning invasive procedures, the demands to write notes about patients not personally examined, and a dehumanized approach to patients ("divide and conquer") also can present ethical challenges to students who desire to be "team players" and who are influenced strongly by supervising physicians.[65,67,69-73]

EXPOSURE TO DEATH AND HUMAN SUFFERING

Most patients receive much of their health care toward the end of life, and medical students in the clinical years are confronted frequently with issues related to death and dying for the first time.[74] Unfortunately, the medical school curriculum often focuses exclusively on disease diagnosis and treatment and pays little attention to education about end-of-life issues and palliative care.[62,74,75] In light of the frequency with which students encounter patients at the end of life and the lack of student training in this area, it is no surprise that students are fearful, anxious, and hesitant to interact with dying patients.[74] Students report feeling awkward, sad, overwhelmed, apprehensive, vulnerable, angry, and anxious in these circumstances,[62,75] which highlights the limitations of medical science and can precipitate thoughts about one's own death.[62,74,76-78]

Medical students recognize that they typically are inadequately prepared to communicate with dying patients and their families.[63,74] Although issues related to death and dying often are presented during preclinical lectures, clinical training in the skills required to care for patients at the end of life is less common.[62,63] One study reported that although 100% of third-year students had cared for a terminally ill patient, only 41% had been present while an attending physician talked with a dying patient, and only 35% had ever discussed with an attending physician how to care for terminally ill patients.[63]

STUDENT ABUSE

The perception of being taken advantage of or abused is common (50%-85%) among medical students.[61,79-81] More female than male medical students report having been victims of abuse,[80,82-84] but no variation by race has been reported in the few studies published.[82,83] Student abuse occurs most often during the clinical years,[61,85] with faculty, house staff, and nurses the most common abusers.[61,80,83-86]

Although verbal abuse is the most common problem in this category,[61,80,81,85,86] institutional abuse (unfair grades, excessive workload, unnecessary scut work),[61] assignment of inappropriate task (ie, getting food for the team),[86] physical abuse,[61,81,85,86] sexual harassment,[61,79,81,84-86] and racial discrimination[79,81,84] are also serious problems. The effect of abuse on students is serious.[80-84,87] In 1 study of more than 500 medical students, more than 40% reported that they had personally experienced abuse, with many stating that the experience was a major source of stress that affected them for a month or longer.[61]

Regardless of year in training, verbal abuse seriously affects students' confidence[82-84,87] and negatively affects the learning environment.[81-83] Studies also suggest that verbal abuse influences students' specialty choice,[82,83] adversely affects their care of patients,[83] decreases institutional loyalty,[83] and erodes mental health.[80,81,83] Anxiety, depression, hostility, low self-esteem, and use of alcohol to "escape"[80] are more common among students who perceive abuse.[80,83] Despite this profound effect, less than one third of students report abuse to faculty or medical school administrators,[79,81,82] often due to fear of reprisal or concern of potential repercussions on performance evaluations.[79,82]

PERSONAL LIFE EVENTS

Although sources of stress related to the training experience have been the focus of most research on student distress, students also experience numerous personal life stressors common to individuals their age. In a study of more than 1000 medical students, many reported experiencing the death of a family member (15%), personal illness or injury (25%), or change of health in a relative (42%) within the past year.[88] Although these life events would be expected to adversely affect students' quality of life (QOL) and professional development, their effect has not been well studied. Other personal life events, such as marriage, appear to protect against distress. In the 1995 Association of American Medical Colleges graduation questionnaire, 30% of graduating medical students were married (a lower prevalence than reported in the age-matched general population),[89] and another 14% were engaged or partnered.[90] The lower stress found among married students relative to their single counterparts[91] has been attributed to emotional support provided by the spouse.[91,92]

Although marriage is relatively common among medical students, smaller numbers of students (10%) have children by graduation,[90] and little is known about the mental

health consequences of pregnancy or childrearing during medical school. Although childbirth and childrearing typically are considered positive life events, children add a level of complexity to students' lives,[93,94] with a mental health effect that may be gender-specific.[9] In 1 study of second-year medical students, female students were more likely to be depressed if they had children, whereas no such relationship was observed among their male colleagues.[9]

EDUCATIONAL DEBT

Student debt has increased out of proportion to the escalation of tuition fees in recent years.[84] The mean educational debt for the class of 2004 was $115,218 (up 5% from the previous year).[79] Student debt among Canadian graduates also is increasing, leading some graduates to leave home to pursue more lucrative careers in the United States.[95] Although the effect of debt on medical students' mental health has not been studied directly, financial concerns are a common source of student stress[49] and appear to influence specialty choice.[96]

CONSEQUENCES OF STUDENT DISTRESS

IMPAIRED ACADEMIC PERFORMANCE

Stress and performance are related intimately. Performance measures such as grades and clinical evaluations can be sources of stress and anxiety.[39] Although these states of distress may reciprocally affect grades,[20] the degree of their influence may be subtle and depend on personality.[97-100] In 1 study, both grades in the preclinical years and clerkship examination scores could be predicted as well by psychosocial characteristics (anxiety, depression, loneliness, neuroticism, self-esteem, and stressful life events) as by Medical College Admissions Test scores.[20] Even more surprising, psychosocial characteristics were better predictors of clinical competency than the admissions test scores.[20] Specific stressors, such as interpersonal conflicts with team members, also appear to influence clerkship grades[18,19] and National Board of Medical Examiners part II examination scores.[18] Most[101-103] but not all[59] studies also suggest that anxiety correlates with poor performance, but cause vs effect is difficult to determine.[103] Although theorized to have a negative influence, the effect of depression and burnout on academic performance in medical students has not been well studied.[104]

CYNICISM

Although "an interest in helping people" is one of the most common reasons that college graduates cite for choosing a career in medicine,[105] this idealism often gives way to cynicism during medical school.[24-29] The medical school training process actually is characterized by a decline in empathy and humanitarianism[22,24]—2 traits that medical educators strive to promote. This decline in compassion, initially recognized in the 1950s,[28] begins during the preclinical years and progresses during clinical rotations.[22] Such negative attitudes may develop in response to students' environment and experiences. Although in the short term, attitudes such as cynicism may serve as a buffer against anxiety, fear of failure, and exposure to human suffering,[27,73,106] they ultimately erode professionalism. Empathy has been shown to correlate with physician competency,[21] and the erosion of this characteristic throughout the course of training is particularly concerning.[27,29,67,107-109] Cynicism and loss of compassion also appear to affect specialty choice[110-113] and can translate into an unwillingness to care for chronically ill, elderly, and terminal patients.[112,114] Increasingly, students also appear to be basing their specialty choice on lifestyle considerations rather than on humanitarian ideals,[96] reflecting both a change in priorities and the desire to limit personal distress.[113]

ACADEMIC DISHONESTY

A lack of integrity among some medical school applicants, medical students, residents, and physicians has been well described.[115-118] Nearly one quarter of students admit to cheating,[117] and more than two thirds report witnessing cheating by colleagues.[116] Students cite illness, workload, and perception of the material taught as "trivial" as reasons they cheat.[117] Dishonesty in patient care activities, such as recording tasks not performed, reporting findings elicited by others, and lying about having ordered a test, often are motivated by fear and a desire to appear knowledgeable.[117]

The perception of what defines academic integrity also differs by year in school. In 1 cross-sectional study, first-year students were more likely than more senior students to correctly identify case scenarios describing academic dishonesty as being unacceptable.[119] Students in later years of training were both less likely to consider the behaviors wrong and more likely to report that they had or would engage in the behaviors described.[119]

SUBSTANCE ABUSE

Although the overall pattern of alcohol consumption among medical students is similar to that of age-related peers,[120,121] problematic alcohol consumption is common among medical students.[14,30-34] Up to 20% of first-year medical students admit to excessive alcohol intake[14,30,32] and report anxiety, stress, examination and work pressures, and tension to be among the common reasons for alcohol consumption.[34,122,123] At one Midwest medical school, students' mean score on a validated assessment for alcohol dependence (Alcohol Use Disorders Identification Test)

doubled during the first semester (P<.001), with 20% of students scoring above the cutoff for problematic drinking.[14] Other studies suggest that alcohol use remains high throughout medical training.[14,32,34,123] In a study of graduating students from 8 US medical schools, 29% of students reported that their alcohol consumption increased during medical school, with more than 20% reporting at least 1 episode of binge drinking (5 or more drinks in 1 sitting) in the past 30 days.[33]

Illicit drug use among medical students is comparable to or less than that of age-related peers.[31,122] Despite this fact, 3% to 10% of medical students report using illicit substances.[31] In a survey of 2046 senior students at 23 medical schools, the reported incidence of marijuana (10%), cocaine (2.8%), tranquilizer (2.3%), heroin/opiate (1.1%), psychedelic (0.7%), amphetamine (0.3%), and barbiturate (0.2%) use in the last 30 days was concerning.[122] Most,[122,124] but not all,[34] studies suggest that students who report use of illicit drugs started this practice before medical school.

SUICIDE

Suicide is the third-leading cause of death among 20- to 30-year-olds in the United States.[125] The annual suicide rate for male medical students between 1974 and 1981 was comparable to similarly aged men in the general population.[126] Although the suicide rate for female students during this period equaled that of their male colleagues, it was 3 to 4 times higher than age-matched women in the general population.[126] In a follow-up study of 101 US medical schools, 15 students were reported to have committed suicide between August 1989 and May 1994.[127] All but 1 of these suicides were committed by men.[127] In this study, suicide ranked higher as a cause of death in medical students than in similarly aged Americans.[127]

Although the prevalence of suicidal ideation and planning among medical students has not been well studied,[15] an estimated 8 to 25 attempted suicides occur for each suicide death, reflecting the concern that completed suicides represent only a fraction of the extreme distress manifested by suicidal ideation, planning, and attempts among medical students.[125,128,129] The risk of student suicide appears higher in the clinical years. Among senior Norwegian medical students, 14% reported having suicidal thoughts within the past year, and 6% had planned to commit suicide during medical school. Such suicidal thoughts persist into postgraduate training[15] and practice.[130]

Depression, personal life events, and personality traits may influence the transition from suicidal ideation to planning,[131] but the factors that prompt medical students to act on their plan have not been studied. Among physicians, suicide attempts are more likely among those who are single, female, depressed, have other psychiatric illness, or struggle with drug or alcohol dependency.[128,132]

REDUCING STUDENT DISTRESS: IDEAS FOR MEDICAL SCHOOLS AND MEDICAL EDUCATORS

Understanding the causes and consequences of student distress is important (Figure 1), but medical schools need to go beyond identifying distress and strive to promote well-being for all students. Well-being is distinct from the mere absence of distress and includes achieving a high QOL in multiple domains (physical health, mental health, emotional health, spiritual health, etc).[133,134] Promoting and nuturing well-being during medical school and equipping graduates with the skills necessary to recognize personal distress, to determine when they need to seek assistance, and to develop strategies to promote their own well-being is essential to promoting professionalism and laying the foundation for resilience through the course of a career.

CREATING A NURTURING LEARNING ENVIRONMENT

The Association of American Medical Colleges urges medical schools to establish relationships between faculty members and students to promote a positive learning environment.[135] Examples and characteristics of positive faculty-student mentoring programs have been described,[136-138] with studies suggesting that these programs have a positive effect on student well-being.[139,140] Although relationships with faculty undoubtedly assist students, student-led support programs may provide an even stronger source of support and promote positive strategies for coping with stress.[141] Senior medical students may more easily relate to challenges faced by junior students, and "buddy programs" designed to promote mentorship of junior students by senior students appear to lower student stress.[142] Fostering relationships between classes and with faculty through institution-sponsored social events also can reduce stress and help prevent burnout.[16,53,143-145]

The evaluation system used to assess student performance also can have a powerful effect on the learning environment. The A-F grading scheme, used to classify performance, often creates a competitive environment that promotes anxiety and peer competition rather than collaborative learning. Researchers at the University of Michigan evaluated the effect of changing to a pass-fail grading system on student performance and satisfaction.[146] Compared with previous classes, students' performance on tests in basic science courses were unchanged, suggesting students' motivation for subject mastery was not affected by the change in the evaluation system. In contrast, students' satisfaction with the evaluation system and learning envi-
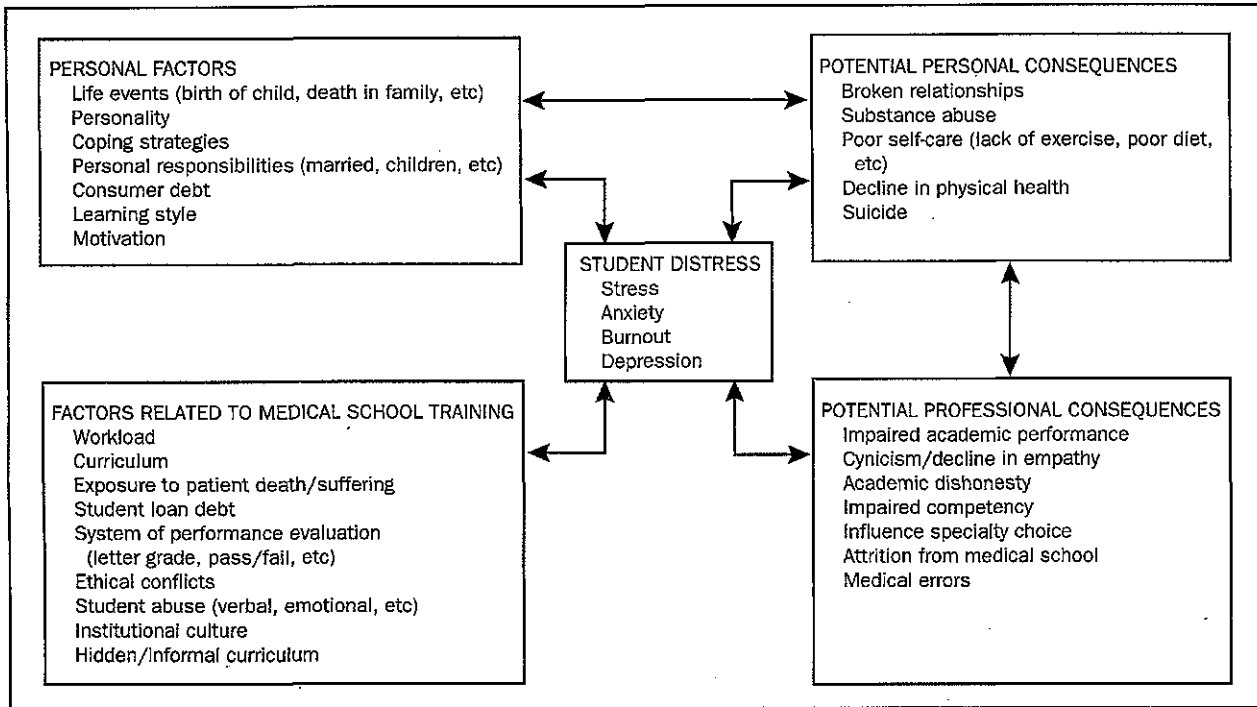
FIGURE 1. Proposed model of causes and consequences of student distress.

ronment improved with the pass-fail approach. Although some authors have reported that residency program directors prefer candidates evaluated with use of traditional grades,[147,148] others have reported that the pass-fail grading system does not influence students' likelihood of matching with a highly ranked postgraduate training program.[149]

Aligning the "informal curriculum" with the ideals of compassion and professionalism is also essential to create a positive learning environment.[71] Thus, fostering a nurturing environment for students in part may depend on promoting the well-being of residents and faculty. Unfortunately, burnout and cynicism are common among residents and practicing physicians and can adversely affect professional modeling.[52,55-57] Faculty development programs need to both address staff satisfaction and confront problematic behavior such as disrespect, hostility, and rudeness, which are often ignored.[150]

Finally, autonomy is a central component of physician job satisfaction and is likely important to students.[57,151] Allowing students to contribute to curriculum development can benefit both students and administrators and give students a sense of ownership in their educational experience. Students bring unique perspectives to curriculum committees including insight regarding redundancies in the curriculum, feedback on effective and ineffective teaching methods, and ideas about areas for new curriculum devel-

opment (alternative medicine, end-of-life care, ethics, genomics, etc). Because students rotate among various hospitals in the training system, they also can provide insight regarding variations in the care of patients, workload, culture, and teaching style among hospitals and identify the most effective experiences.[69,73]

IDENTIFYING AND ASSISTING STRUGGLING STUDENTS

Poor undergraduate scholastic performance,[38,39] poor academic performance early in medical school,[38,45] mental health problems,[38,45,46] and avoidant coping mechanisms[38,46] place students at risk of distress both during and after medical school.[38,46] Simply making students aware of their mental health "profile" does not appear to reduce distress,[14] and once struggling students are identified, they need individualized support. Deans must not only make students aware of the available resources, but also address barriers to care. Because of the stigma of mental illness, many medical students are not comfortable seeking care for mental health problems from their own institution and prefer to receive off-site care.[11,51] Creating an ombudsman program, offering career counseling, and providing students off-campus confidential resources covered by the student health insurance plan are critical. Descriptions of successful mental health programs for medical students may serve as models.[145,152-157]

TEACHING SKILLS FOR STRESS MANAGEMENT AND PROMOTING SELF-AWARENESS

Teaching students to use adaptive coping mechanisms,[48] such as acceptance, planning, positive reinterpretation, and self-distraction, can reduce psychological morbidity.[4,10,38] Stress-management programs that inform students about the effects of stress on physiological and psychological functioning and teach students how to plan, prioritize, identify sources of stress, and cope with stress[144,145,158,159] reduce tension and anxiety and simultaneously increase awareness and use of positive coping strategies.[144,158-160] Peer discussion groups can help students process conflict, nurture self-awareness, and promote empathy.[161,162] Such groups also provide opportunities for students to express, analyze, and share feelings, which decreases the likelihood of burnout.[52] Such shared reflection helps students realize that their struggles are not unique[162] and provides insight into how colleagues solve similar problems.

HELPING STUDENTS PROMOTE PERSONAL HEALTH

Encouraging students to promote personal health with regular physical activity and adequate sleep is also valuable.[16,48,163] Requiring students to establish a primary care physician at matriculation facilitates delivery of age-appropriate preventive services and establishes a care provider with whom students can discuss distress, mental health problems, and substance use. Students should also be provided appropriate time off during holidays and between rotations to allow them to decompress from the rigors of training. Explicit promotion of work-life balance, including role-modeling by medical school faculty, also may be of great benefit. Presentations by faculty regarding how they have personally handled challenges in work-life balance are an excellent way to expose students to this concept and stimulate discussion.

AREAS OF NEEDED RESEARCH

Although much is known about student distress, little is known about student well-being, how it can be fostered, and its potential to enhance learning and professional development. Validated tools are available to measure various domains of QOL and should be used for such studies.[164-171] Research is needed to identify personal and program factors that enhance students' QOL (physical health, emotional health, spiritual health, etc), assess the efficacy of support systems to assist struggling students, and develop curriculum to promote well-being. Prospective longitudinal studies exploring changes in student stress, burnout, and QOL from of the time of matriculation through the completion of residency training would be

enlightening. The influence of faculty distress and QOL on student QOL and professional development also needs to be explored.

CONCLUSIONS

Medical school is a stressful period of physician training. Many medical students experience substantial distress, which contributes to poor academic performance, academic dishonesty, cynicism, and substance abuse. Medical educators need to be aware of the manifestations, causes, and consequences of student distress, and medical schools need to develop and evaluate programs to support struggling students and promote student well-being. Additional research is needed to identify personal and program factors that promote well-being and explore its potential to enhance competency. In the long run, efforts to promote students' well-being will benefit patients, the public, and the profession, in addition to the individual.

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