Personal Life Events and Medical Student Burnout: A Multicenter Study

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Abstract

Purpose
Burnout, a marker of professional distress prevalent among residents and physicians, has been speculated to originate in medical school. Little is known about burnout in medical students. The authors sought to identify the prevalence of burnout, variation of its prevalence during medical school, and the impact of personal life events on burnout and other types of student distress.

Method
All medical students (n = 1,098) attending the three medical schools in Minnesota were surveyed in spring 2004 using validated instruments to assess burnout, quality of life, depression, and alcohol use. Students were also asked about the prevalence of positive and negative personal life events in the previous 12 months.

Results
A total of 545 medical students (response rate 50%) completed the survey. Burnout was present in 239 (45%) of medical students. While the frequency of a positive depression screen and at-risk alcohol use decreased among more senior students, the frequency of burnout increased (all $p < .03$). The number of negative personal life events in the last 12 months also correlated with the risk of burnout ($p = .0160$). Personal life events demonstrated a stronger relationship to burnout than did year in training on multivariate analysis.

Conclusions
Burnout appears common among U.S. medical students and may increase by year of schooling. Despite the notion that burnout is primarily linked to work-related stress, personal life events also demonstrated a strong relationship to professional burnout. The authors' findings suggest both personal and curricular factors are related to burnout among medical students. Efforts to decrease burnout must address both of these elements.

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Medical school curricula are designed to ensure every graduate is knowledgeable, skillful, and professional.[1] Limited evidence suggests that student distress (i.e., depression, anxiety, psychological problems, burnout) may adversely affect development of these qualities.[2–4] Psychological morbidity appears to adversely impact academic performance[2–4] and contribute to student substance abuse[5–10] and academic dishonesty.[11–14] Others have demonstrated that cynicism,[15–17] an unwillingness to care for the chronically ill,[18,19] and decreased empathy[15,17,20] parallel student distress.

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Unfortunately, while medical students matriculate with mental health profiles similar to those of their nonmedical peers,[21,22] studies document that mental health deteriorates during medical school.[6,21–32] This decline in mental health begins during the first year of training[24,25] and persists through the remainder of medical school.[26] Studies of U.S. and British medical students suggest that up to half of them have symptoms of depression[22,27–29] and poor mental health.[23–25] The majority of the articles in the literature about medical student stress and depression focus on sources of stress attributable to the training experience.[4,23,33] These studies point to academic pressure,[4] workload,[23,33] financial concerns,[33] sleep deprivation,[33] exposure to patient death and suffering,[34,35] student abuse,[8,36–39] and a "hidden curriculum" of cynicism[40–47] as sources of stress. Some researchers call for curricular changes to address these factors.[28,42,44,48–51] In addition to the rigors of training, medical students experience a number of major personal life events (illness, death of family members, marriage, birth or adoption of a child, etc.) common to individuals their age and beyond the direct control of medical educators.[52] Such personal life events are known to contribute to depression, anxiety, and substance use in the general population.[53–58]

Burnout is a measure of professional distress with three domains: *emotional exhaustion, depersonalization,* and *low sense of personal accomplishment.*[59] Emotional exhaustion is characterized by feeling emotionally depleted by one's work; depersonalization, by treating people as if they are impersonal objects; and low personal accomplishment, by feeling that one's work is inconsequential.[59] Although a number of studies have reported high rates of burnout in residents[60,61] and practicing

physicians,[62–64] we could fine no published studies about the prevalence of burnout among U.S. medical students. Some have speculated the origin of physician burnout occurs during medical school.[65,66] In contrast to the established relationship between personal life events and depression,[53–56,58] burnout is believed to be a consequence of work-related factors. Personal life events, however, may also influence burnout, although the relationship of personal life events to burnout or professional development among medical students is unknown.

With these gaps in research in mind, in 2004 we performed a multicenter survey of all medical students in the state of Minnesota to explore the frequency of burnout among U.S. medical students, identify whether it varies through the course of schooling, and explore the relationship of personal life events to professional burnout and other aspects of student distress.

Method

Participants

All 1,098 medical students in the state of Minnesota were asked to participate in this study. Participation was elective and all responses were anonymous. Medical students in Minnesota attend a private medical school (Mayo Clinic College of Medicine), a traditional public university (University of Minnesota Medical School—Minneapolis campus), or a public university with a focus in primary care (University of Minnesota Medical School—Duluth campus). The institutional review boards of the Mayo Clinic and the University of Minnesota approved this study.

Data collection

We surveyed the students electronically in April 2004. A cover letter stated that the purpose of the survey was to better understand the factors that contribute to student well-being and identify how medical schools can make changes to improve student quality of life (QOL). Participants were blinded to any specific hypothesis of the study. The questionnaire consisted of 118 questions regarding demographic information, recent personal life events, burnout, symptoms of depression, alcohol usage, and QOL. E-mail messages reminded students to complete their questionnaires.

Validated survey tools were used to identify burnout,[67–70] symptoms of depression,[71,72] at-risk alcohol use,[73,74] and mental and physical QOL.[75,76] Burnout was measured using the Maslach Burnout Inventory (MBI), a validated 22-item questionnaire considered a standard tool for measuring burnout.[67–70] The instrument has three subscales to evaluate each of the domains of burnout, characterized as emotional exhaustion, depersonalization, and low sense of personal accomplishment. According to convention, we considered a high score for medical professionals on the depersonalization or emotional exhaustion subscale an indicator of professional burnout.[67]

Other aspects of student well-being were measured to assess whether variation in burnout followed a pattern similar to variation in other measures of student distress. Symptoms of depression were identified using the two-item Primary Care Evaluation of Mental Disorders,[71] a validated screening tool that performs as well as longer instruments do.[72] At-risk alcohol use and alcohol dependence were measured using items from the Alcohol Use Disorders Identification Test.[73,74] Mental and physical QOL were measured using the Medical Outcomes Study Short Form (SF-8).[75–77] Norm-based scoring methods of responses on this instrument are used to calculate mental and physical QOL summary scores.[76] The average mental and physical QOL summary scores for the U.S. population are 50 (scale 0–100; standard deviation [SD] = 8).[76]

Items to explore the occurrence of personal life events hypothesized to have a significant effect on students' well-being and similar to individual items from longer "life events" survey tools[54,57,58,78,79] were developed for our questionnaire. These items simply asked students if they had personally experienced the following life events within the prior year: marriage, divorce, birth or adoption of a child, a major illness, a major illness of a significant other or close family member, and the death of a close family member. Consistent with the literature we considered divorce, personal illness, illness in a close family member or significant other, or death of a close family member as "negative" life events, and marriage or birth or adoption of a child as "positive" life events.[80–89] Finally, students were asked about their current level of educational debt.

Statistical analysis

The primary analysis involved descriptive summary statistics for estimating the prevalence of burnout, a positive depression screen, at-risk alcohol use, mental and physical QOL, and life events for medical students. Next, we compared the prevalence of burnout, a positive depression screen, at-risk alcohol use, and mental and physical QOL by the year in school and number of negative or positive personal life events experienced in the previous 12 months. The Cochran-Armitage trend test[90] was used for assessing trends in proportions, and simple linear regression was used for assessing trends in continuous variables. Finally, we used forward stepwise logistic regression to evaluate independent associations among age, sex, year in training, and personal life events in the previous 12 months with burnout, symptoms of depression, at-risk alcohol use, and mental and physical QOL. All analyses were done using SAS version 8.

Results

Of the 1,098 medical students in the state of Minnesota at the time of our study, correct e-mail addresses could be confirmed for 1,087 students. The survey was completed by 545 students (a response rate of 50%). Table 1 shows the demographic characteristics of responders along with the rotation type at the time of the survey for third-year and fourth-year students. Nonresponders were more likely to be men and less likely to be first-year students (both $p < .0001$). Among responders, women were more likely than men to be single (184 of 297 women [62%] were single versus 129 of 247 men [53%], $p = .007$) and less likely to have children (16 of 297 women [5.5%] had children versus 40 of 247 men [15.5%], $p < .001$).

Burnout by year in training

Two-hundred and thirty-nine students (45%) met criteria for burnout on the MBI (Table 2). Mean scores for emotional exhaustion (21.8, SD 9.99), depersonalization (6.4, SD 4.95), and personal accomplishment (36.1, SD 8.72) were all in the moderate range. One-hundred and eighty-five students (35%) had high emotional exhaustion, 137

Table 1

Demographics and Characteristics of 545 Participating Medical Students at Three Minnesota Medical Schools, 2004

Variable	Medical students, No. (%)
Gender	
Male	247 (45.4)
Female	297 (54.6)
Age	
<24	192 (35.4)
25–30	319 (58.7)
>30	32 (6)
Ethnicity	
White	460 (84.4)
Minority	84 (15.6)
State/country of primary residence	
Minnesota	334 (61.5)
United States, excluding Minnesota	178 (32.8)
Foreign	31 (5.7)
Relationship status	
Married	183 (33.6)
Nonmarried partner	44 (8.1)
Single	314 (57.6)
Divorced	4 (0.7)
Have children	56 (10.3)
Year in medical school	
First	179 (32.8)
Second	116 (21.3)
Third	83 (15.2)
Fourth	154 (28.3)
Other*	13 (2.4)
Debt	
<$49,000	246 (45.3)
$50–99,999	203 (37.4)
> $100,000	94 (17.3)
Current rotation†	
Outpatient	79 (37.4)
Inpatient	109 (51.7)
Research	23 (10.9)
No time off	248 (45.7)

* Students who took a break from medical school to pursue enrichment activities, such as research projects or graduate work.
† Asked of third- and fourth-year students only.

(26%) had high depersonalization, and 164 (31%) had a low sense of personal accomplishment. Although a consistent increase sense of personal accomplishment was observed by year in training (a desirable trait) a similar increase in depersonalization (undesirable) was also observed. The overall prevalence of burnout also increased among students in more advanced years of training (Table 3).

Other symptoms of distress by year in training

Students also had a high frequency of symptoms of depression and at-risk alcohol use (Table 2). Two-hundred and ninety-six students (56%) screened positive for symptoms of depression, and 114 (22%) had at-risk alcohol use. Students overall physical QOL according to the SF-8 was significantly higher than was that of both national samples of age-comparable individuals (53.3 versus 51.4; $p < .0001$) and the general U.S. population (53.3 versus 50; $p < .0001$), while their overall mental QOL was significantly lower than that of both national samples of age-comparable individuals (43.7 versus 47.2; $p < .0001$) and the general U.S. population (43.7 versus 50; $p < .0001$). Notably, the mean mental QOL score for students was greater than one-half standard deviation below the population norm, a difference that has been considered clinically significant.[91]

Variation in the prevalence of symptoms of depression and at-risk alcohol use was observed by year in training (Table 3). Contrary to the trend observed with burnout, symptoms of depression and at-risk alcohol use were highest in the early years of training and decreased by year in school. Differences in mean mental and physical QOL scores were also observed by year in school.

Life events within the previous 12 months

The frequencies of positive and negative personal life events in the previous 12 months are shown in Table 4. Two-hundred and one students (37%) experienced at least one major negative personal life event (divorce, major illness-personal, major illness of close family member, death of close family member) in the previous 12 months, with 160 (29.4%), 36 (6.6%), and 5 (0.9%) experiencing one, two, and three negative events, respectively. No student reported experiencing all four negative personal life events in the previous 12 months. Seventy-six students (14%) experienced at least one positive personal life event (marriage, birth/adoption of a child) in the previous 12 months, with only three (0.5%) experiencing both positive life events. Having a close family member experience a major illness ($n = 108$, 20%) was the most frequently reported life event, followed by the death of a close family member ($n = 81$, 15%). A significant number of students also reported personally experiencing a major illness ($n = 55$, 10%), while fewer reported divorce ($n = 4$, 1%). Events

Table 2

Numbers of 545 Participating Students at Three Minnesota Medical Schools Who Met Criteria for Burnout, Symptoms of Depression, and At-Risk Alcohol Use, Plus the Students' Mean Scores on a Quality-of-Life Instrument, 2004

Type of distress	Medical students, No. (%)
Burnout*	
Emotional exhaustion	
Low	200 (37.5)
Moderate	148 (27.8)
High	185 (34.7)
Depersonalization	
Low	276 (52)
Moderate	119 (22.4)
High	137 (25.8)
Personal accomplishment†	
High (>40)	224 (42)
Moderate	145 (27.2))
Low (<33)	164 (30.8)
Have burnout	239 (45)
Depression	
% Screen positive	296 (56))
Alcohol use	
At-risk alcohol use	114 (22)
Binge drinking‡	77 (14.7)
Quality of life§	Mean (SD)
Mean mental QOL score	43.7 (10.72)
Mean physical QOL score	53.3 (7.43)

* Burnout was measured using the Maslach Burnout Inventory,[67–70] whose three subscales evaluate each of the domains of burnout, characterized as emotional exhaustion, depersonalization, and low sense of personal accomplishment. A high score on either the emotional exhaustion or depersonalization subscale indicates professional burnout.
† Higher score is desirable and indicates greater sense of personal accomplishment.
‡ Binge drinking defined as more than five drinks on one occasion within the last year.
§ The mean mental QOL score for students was greater than one half standard deviation below the population norm, a difference that has been considered clinically significant.

hypothesized to have a positive affect on QOL such as marriage ($n = 52$, 9%) and having or adopting a child ($n = 27$, 5%) were also relatively common.

Variations in the frequency of these events by year in training are shown in Table 4. As expected, due to a general association with age, third-year and fourth-year students were more likely to get married or have/adopt a child in the previous 12 months. The number of students who were married increased from 42 (24%) in the first year to 76 (49%) by the fourth year ($p = .0001$), with a similar trend for the number of students with children: seven, (4%) year 1, 31 (20%) year 4; $p = .0001$. The number of students with more than $100,000 of educational debt also increased dramatically over the course of training: two, (1%) year 1, 73 (48%) year 4; $p = .0001$.

Relationship between life events and personal and professional distress

As expected, specific personal life events were associated with depression and at-risk alcohol use even after adjustment for age, sex, and year in training. Personally experiencing a major illness in the previous 12 months was strongly associated with symptoms of depression (odds ratio [OR] 2.965; $p = .003$) and inversely correlated with at-risk alcohol use (OR 0.362; $p = .0399$). Having children correlated with a dramatically lower risk of symptoms of depression (OR 0.230; $p = .005$). Although the majority of the other negative personal life events explored were associated with increased odds of symptoms of depression and at-risk alcohol use, these findings did not reach statistical significance.

Negative personal life events also demonstrated a significant relationship to professional burnout. Personally experiencing a major illness in the previous 12 months was strongly associated with burnout (OR 2.594; $p = .002$). Some other negative personal life events were also associated with increased odds of burnout; however, these findings did not reach statistical significance. Positive personal life events were not related to professional burnout.

While demographic characteristics and year in training also correlated with personal and professional distress on multivariate analysis, the magnitude of these effects was less than that of personal life events. Increased age was associated with reduced at-risk alcohol use (OR 0.701; $p = .0041$), while increased year in training was associated with a slightly higher risk of burnout (OR 1.193; $p = .0355$). Women were more likely to experience symptoms of depression (OR 1.676; $p = .0055$) but less likely to have at-risk alcohol use (OR 0.522; $p < .0041$).

We next evaluated the likelihood of burnout, depression, and at-risk alcohol use as well as mental and physical QOL scores by the number of negative and positive life events in the previous 12 months. Given the small number of students (five) who experienced three negative personal events in the previous year, students were categorized as experiencing zero, one, or two or more negative personal life events for this analysis. Similarly, as only three students were both married and had given birth to or adopted a child in the previous 12 months, students were categorized as experiencing zero or one or more positive personal life event for this analysis.

The number of negative life events experienced in the previous 12 months correlated with the prevalence of burnout ($p = .0160$) with a trend toward correlation with symptoms of depression ($p = .0864$; see Figure 1). Experiencing one or more positive life events was associated with a lower prevalence of symptoms of depression ($p = .0047$) and at-risk alcohol use ($p = .0151$), but did not relate to burnout ($p = .8556$). Mean mental

Table 3

Data from 545 Students at the Three Minnesota Medical Schools Indicating Burnout, Symptoms of Depression, and Quality of Life, by Year in School, 2004

Type of distress	First year	Second year	Third year	Fourth year	*p* value
Burnout*					
Emotional exhaustion					
Mean (SD)	21.0 (9.97)	24.7 (9.94)	21.0 (9.53)	21.7 (9.95)	.9643
No. high (%)	52 (29)	59 (51)	23 (28)	51 (33)	.9571
Depersonalization					
Mean (SD)	5.2 (4.52)	6.4 (4.72)	6.7 (4.92)	7.6 (5.38)	<.0001
No. high (%)	32 (18)	31 (27)	24 (29)	50 (33)	.0024
Personal accomplishment†					
Mean (SD)	33.6 (10.26)	36.1 (7.99)	36.3 (8.44)	38.4 (6.49)	<.0001
No. high (%)	63 (35.2)	44 (38.3)	35 (42.2)	81 (52.6)	.0012
Have burnout					
No. (%)	65 (37)	61 (53)	35 (43)	78 (51)	.0299
Depression					
No. screen positive (%)	101 (56.4)	80 (69.6)	43 (51.8)	71 (47)	.0255
Alcohol use					
No "at risk" alcohol use (%)	54 (30.86)	21 (18.42)	13 (15.85)	26 (16.99)	.0022
No (%) binge drinking	33 (18.9)	11 (9.7)	13 (15.9)	20 (13.1)	.2539
Quality of life					
Mean mental QOL SF-8 (SD)	44 (10.01)	40.2 (11.37)	41.7 (11.11)	47.1 (9.80)	<.0001
Mean physical QOL SF-8 (SD)	52.4 (7.05)	53.6 (7.81)	54.5 (7.10)	53.4 (7.69)	.0202

* Burnout was measured using the Maslach Burnout Inventory.[67–70] The instrument has 3 subscales to evaluate each of the domains of burnout, characterized as emotional exhaustion, depersonalization, and low sense of personal accomplishment. A high score on either the emotional exhaustion or depersonalization subscale indicates professional burnout.

† Higher score is desirable and indicates greater sense of personal accomplishment.

QOL ($p = .0005$) and physical QOL ($p < .001$) also decreased with increasing number of negative personal life events. While mean mental QOL improved with positive life events ($p = .0058$), no statistically significant relationship was found between mean physical QOL and experiencing positive personal life events ($p = .6176$; see Figure 2).

Discussion

Student distress has been increasingly recognized as an important factor in professional development.[4,19,22,33,92–96] Our results confirm a high prevalence of personal distress among medical students, with mental quality-of-life scores lower than national samples of age-comparable individuals and a prevalence of symptoms of depression in our survey similar to those found in other studies of medical students over the last 2 decades.[22,27–29] As reported by others,[22,25,27–29] we also found a peak in depression during the second year of medical school. When compared to the 30-day prevalence of major depression in the general population[97–99] and in individuals of comparable age,[100] the

Table 4

Life Events in the Previous 12 Months for 545 Medical Students at the Three Minnesota Medical Schools, 2004

	First year	Second year	Third year	Fourth year	All years	Trend
Life event within prior year	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	*p* value
Married	11 (6.1)	10 (8.7)	10 (12)	19 (12)	50 (9)	.0383
Divorced	0	1 (1)	1 (1)	2 (1)	4 (1)	.1623
Have or adopted a child	2 (1)	3 (3)	3 (4)	18 (28)	26 (5)	<.0001
Death of close family member	24 (13)	16 (14)	14 (17)	25 (16)	79 (15)	.3951
Personally experienced major illness	17 (9.5)	21 (18)	4 (5)	11 (7)	53 (10)	.1508
Experienced major illness of close family member	38 (21)	25 (22)	14 (17)	31 (20)	108 (20)	.6516

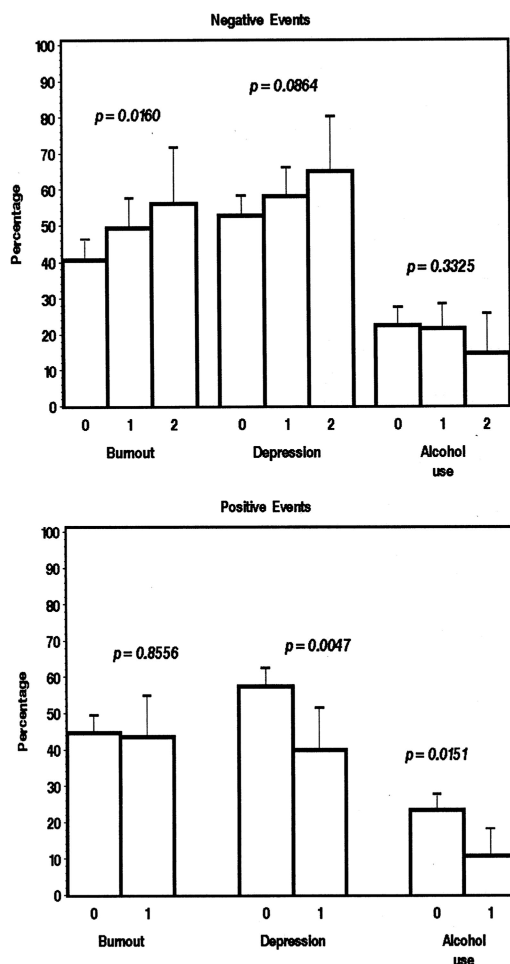

Figure 1 Relationship between personal life events and students' distress for 545 medical students at three Minnesota medical schools, 2004. Prevalence of burnout, symptoms of depression, and at-risk alcohol use by number of negative (zero, one, two or more) or positive (zero, one or more) personal life events experienced in previous 12 months. Y error bars indicate standard error. The figure shows that the number of negative life events experienced in the previous 12 months correlated with the prevalence of burnout with a trend toward correlation with symptoms of depression. In contrast, experiencing one or more positive life events was associated with a lower prevalence of symptoms of depression and at-risk alcohol use, but did not relate to burnout.

prevalence of mood disorder is strikingly higher among medical students. In contrast, the percentage of medical students who reported "binge drinking" in our sample was much lower than that for age-comparable individuals in both Minnesota ($n = 77$, 15% versus 27.8%) and the United States (24.1%).[101]

Despite a high frequency of burnout among resident physicians in the United States (range 56–76%[61,102,103]), burnout has not been well characterized in U.S. medical students. We found burnout was common ($n = 239$, 45%) in medical students from the three institutions studied, with the prevalence of burnout higher for students in more advanced years of training. The increasing prevalence of professional burnout in successive years of training occurred despite an increasing sense of personal accomplishment and was coincident with decreasing symptoms of depression and at-risk alcohol use, making burnout the most common measure of distress among fourth-year students in our series. Our finding of a lower prevalence of burnout in medical students than reported in samples of residents[102,104,105] and an increase in depersonalization and burnout as students advance through training supports the hypothesis that physician burnout has its origin in medical school.[65,66] Notably, depersonalization is the component of burnout most strongly associated with negative effects on professionalism among residents.[102] This finding suggests that efforts to address burnout must begin early in the physician training process.

In our study, positive life events were less common among students than among the general population. Fewer medical students gave birth to or adopted children in the last year than did age-comparable Minnesotans.[106] While fewer medical students were married at the time of the survey than were age-comparable Minnesotans and those of comparable age in the general U.S. population,[107] the prevalence of marriage in the last year was similar between medical students and the age-comparable general population (19, 12.3% students vs. 11.5% in the population).[108] Similarly, among the negative life events studied, fewer students were divorced in the last year than were individuals in the age-comparable general population.[108] Despite these differences relative to the general population, the frequencies of being married or having children in our sample are similar to those frequencies in other samples of U.S. medical students.[109] The population prevalence for the other life events evaluated (major personal illness, major illness in close family member, death in close family member) are not well recorded, and although the frequency of these events in our sample is comparable to these events in other samples of medical students,[52] no comparison to the general population can be made.

Personal life events are known to contribute to depression and alcohol consumption in the general population.[53–58,110] As expected, we found such a relationship between these variables among the medical students in this survey. Unlike these measures of personal distress, burnout is considered a measure of professional distress related to job-specific stressors. Most studies of physician burnout have attributed burnout to the rigors of training for and practicing medicine.[61,62,102,111–113] Despite this theory, personal life events were strongly related to the experience of professional burnout among medical students in this study. On multivariate analysis, personally experiencing a major illness was associated with a higher likelihood of burnout; also, the number of negative personal life events students experienced within the previous 12 months strongly correlated with the presence of burnout. These findings suggest that both curricular factors

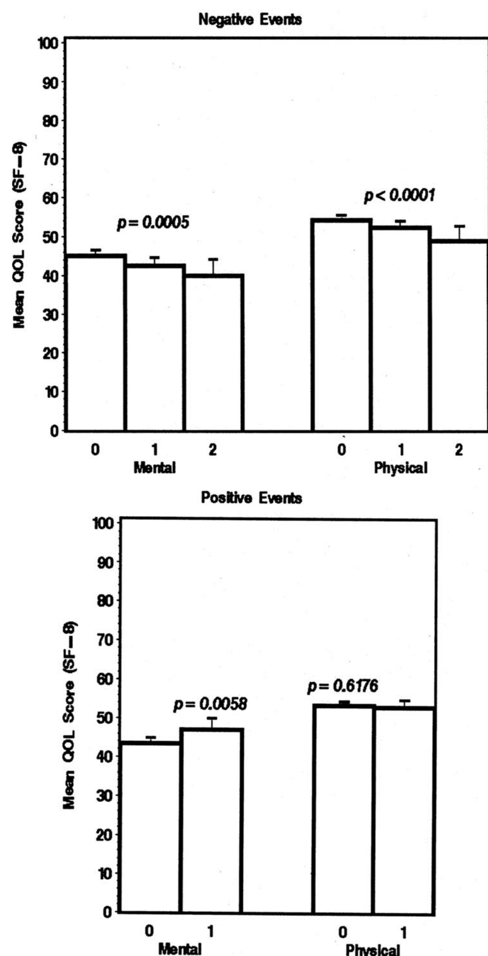

Figure 2 Relationship between personal life events and students' mental and physical quality of life for 545 medical students at three Minnesota medical schools, 2004. Mean mental and physical QOL score by number of negative (zero, one, two or more) or positive (0, 1 or more) personal life events in previous 12 months. Y error bars indicate standard error. The figure shows that mean mental QOL and physical QOL decreased with increasing number of negative personal life events and mean mental QOL improved with the experience of positive life events.

related to year in training and also personal factors are related to burnout among medical students.

How should medical schools respond?

How should medical schools respond to these findings? First, educators need to be aware of the prevalence of personal and professional distress and to the frequency of personal life events that may relate to this distress among students. Second, programs need to develop support systems to help students address these challenges, including confidential resources for treatment of depression[114–119] and substance abuse[115] as well as advocacy programs to assist students when they experience major personal or family events.[120] Third, programs need to educate students about the variety of personal and professional stressors experienced during training and inform them how to access available resources. Descriptions of such programs have been reported and may serve as models.[6,51,114,120–134] The importance of personal events identified in this study does not eliminate the effects of curricular factors known to contribute to student distress, which must also be addressed.

Finally, the experience of personal and professional stress does not end at graduation. Students must be taught the concept that physicians are themselves therapeutic instruments and as such require calibration.[51,135–137] Medical schools need to equip graduates with the skills necessary to assess personal distress, determine its effect on their care of patients, recognize when they need assistance, and develop strategies to promote their own well-being. These skills are essential to maintain perspective, professionalism, and resilience through the course of a career and should be considered an essential competence for medical school graduates. Curricula to help students develop such skills have been suggested and are a place to begin.[51,135–139]

Limits and strengths of this study

Our study is limited by several factors. First, although the response rate is typical of that found in physician surveys,[140,141] response bias remains a possibility. The influence of personal distress and burnout on response rate is unknown. Burned out students may have been more interested in the topics explored and thus more likely to complete the survey, or, alternatively, more apathetic and less likely to complete the survey. Second, although this was a multicenter study and 209 (nearly 40%) students in this study were from outside the state of Minnesota, the generalizability of these results from a single Midwestern state to other regions of the country is unknown. The prevalence of a positive depression screen and at-risk alcohol use among students in this survey are similar to other studies of medical students,[6,7,22,28,142] suggesting that the distress we observed is typical for students in the United States. Third, we assessed a limited number of personal life events; other personal life events not explored may also be important.[57,78,143] Finally, this study is limited by its cross-sectional nature and cannot determine whether the life events explored are causally related to the aspects of well-being investigated.

Our study has several important strengths. To our knowledge this is the first multicenter study of burnout in U.S. medical students and the only study to explore the impact of personal life events on burnout, depression, alcohol use, and QOL among this group. The students in our survey were from three very different medical school environments (state-sponsored traditional, state-sponsored primary care focus, private subspecialty-oriented), lending generalizability to most types of institutions in the United States. Finally, the majority of the instruments used in our survey were validated ones, allowing comparison to the general population and other samples of medical students, residents, and practicing physicians.

Goals for the future

Personal distress influences the care physicians deliver patients.[102,113,144–149] Unfortunately, burnout and depression appear to be a common problem among U.S. medical students. Both personal and professional factors appear to contribute to student burnout. Experiencing major personal life events simultaneously with the challenges of medical school may magnify both sources of stress, and medical schools have a responsibility to support students who experience such personal life events during the course of training. Additional studies are needed to identify what curricular factors contribute to student burnout so they may be addressed. Medical schools must also train young physicians to evaluate their personal health, determine its influence on their practices, and equip them with skills to promote personal well-being. Such skills should be considered essential for all medical school graduates.

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